Cost and Management Accounting

Sixth Edition

Students' Manual

Colin Drury

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Cost and Management Accounting 6e: Students Manual

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This edition published 2006 by Thomson Learning.

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Contents

Part I

Questions

An introduction to cost terms and concepts

Question SM 2.1

(i) Costs may be classified in a number of ways including classification by behaviour, by function, by expense type, by controllability and by relevance.
(ii) Management accounting should assist in EACH of the planning, control and decision making processes in an organisation.

Discuss the ways in which relationships between statements (i) and (ii) are relevant in the design of an effective management accounting system.

(15 marks)
ACCA Information for Control and Decision Making

Question SM 2.2

(a) 'Discretionary costs are troublesome because managers usually find it difficult to separate and quantify the results of their use in the business, as compared with variable and other fixed costs.'
You are required to discuss the above statement and include in your answer the meaning of discretionary costs, variable costs and fixed costs; give two illustrations of each of these three named costs.

(12 marks)

(b) A drug company has initiated a research project which is intended to develop a new product. Expenditures to date on this particular research total £500 000 but it is now estimated that a further £200 000 will need to be spent before the product can be marketed. Over the estimated life of the product the profit potential has a net present value of £350 000.
You are required to advise management whether they should continue or abandon the project. Support your conclusion with a numerate statement and state what kind of cost is the £500 000.

(5 marks)

(c) Opportunity costs and notional costs are not recognised by financial accounting systems but need to be considered in many decisions taken by management.
You are required to explain briefly the meanings of opportunity costs and notional costs; give two examples of each to illustrate the meanings you have attached to them.

(8 marks)
(Total 25 marks)
CIMA Stage 2 Cost Accounting

Question SM 2.3 Relevant costs and cost behaviour

(a) Distinguish between 'opportunity cost' and 'out of pocket cost' giving a numerical example of each using your own figures to support your answer.

(6 marks)

(b) Jason travels to work by train to his 5-days a week job. Instead of buying daily tickets he finds it cheaper to buy a quarterly season ticket which costs £188 for 13 weeks.
Debbie, an acquaintance, who also makes the same journey, suggests that they both travel in Jason's car and offers to give him £120 each quarter towards his car expenses. Except for weekend travelling and using it for local college

attendance near his home on three evenings each week to study for his CIMA Stage 2, the car remains in Jason's garage.

Jason estimates that using his car for work would involve him, each quarter, in the following expenses:

	(£)
Depreciation (proportion of annual figure)	200
Petrol and oil	128
Tyres and miscellaneous	52

You are required to state whether Jason should accept Debbie's offer and to draft a statement to show clearly the monetary effect of your conclusion.

(5 marks)

(c) A company with a financial year 1 September to 31 August prepared a sales budget which resulted in the following cost structure:

		% of sales
Direct materials		32
Direct wages		18
Production overhead:	variable	6
	fixed	24
Administrative and selling costs:	variable	3
	fixed	7
Profit		10

After ten weeks, however, it became obvious that the sales budget was too optimistic and it has now been estimated that because of a reduction in sales volume, for the full year, sales will total £2 560 000 which is only 80% of the previously budgeted figure.

You are required to present a statement for management showing the amended sales and cost structure in £s and percentages, in a marginal costing format.

(4 marks)
(Total 15 marks)
CIMA Stage 2 Cost Accounting

Accounting for direct costs

Question SM 3.1 Calculation of earnings

A company currently remunerates its factory workers on a time basis and is now considering the introduction of alternative methods of remuneration. The following information relates to two employees for one week:

	Y	Z
Hours worked	44	40
Rate of pay per hour	£3.50	£4.50
Units of output achieved	480	390

The time allowed for each unit of output is seven standard minutes. For purposes of piecework calculations each minute is valued at £0.05.

Required:

(a) Calculate the earnings of each employee where earnings are based on:
   (i) piecework rates with earnings guaranteed at 80% of pay calculated on an hourly basis; *(4 marks)*
   (ii) premium bonus scheme in which bonus (based on 75% of time saved) is added to pay calculated on an hourly basis. *(3 marks)*

(b) Describe *two* situations in which the time basis of remuneration is likely to be more appropriate than piecework schemes. *(4 marks)*

(Total 11 marks)

AAT Cost Accounting and Budgeting

Question SM 3.2 Calculation of earnings and a discussion of time-based and individual performance-based remuneration systems

(a) Describe the characteristics of factory direct and indirect labour cost and explain the treatment of factory overtime wages and holiday pay in cost accounting systems. *(9 marks)*

(b) A Ltd makes engineering components. The company has been manufacturing 6000 components per week, with six direct employees working a 40-hour week, at a basic wage of £4.00 per hour. Each worker operates independently.

A new remuneration scheme is being introduced. Each employee will receive payment on the following basis:

first 800 components per week –	16 pence per unit
next 200	17
all additional	18

There will be a guaranteed minimum wage of £140 per week. It is expected that output will increase to 6600 components per week with the new scheme.

Required:

Describe the general features of time-based and individual-performance-based remuneration systems, and outline the relative merits of each type of system. (Use the above figures to illustrate your discussion, making whatever additional assumptions that you feel are necessary.) *(16 marks)*

(Total 25 marks)

ACCA Level 1 Costing

Question SM 3.3 Calculation of labour turnover and efficiency ratio

X Ltd has an average of 42 workers employed in one of its factories in a period during which 7 workers left and were replaced.

The company pays a basic rate of £4.60 per hour to all its direct personnel. This is used as the standard rate. In addition, a factory-wide bonus scheme is in operation. A bonus of half of the efficiency ratio in excess of 100% is added as a percentage to the basic hourly rate, e.g. if the efficiency ratio is 110% then the hourly rate is £4.83 (i.e. £4.60 + (£4.60 × 5%)).

During the period 114 268 units of the company's single product were manufactured in 4900 hours. The standard hour is 22 units.

Required:

(a) Calculate the labour turnover percentage for the period. *(3 marks)*

(b) Identify the reasons for, and cost of, labour turnover, and discuss how it may be reduced *(12 marks)*

(c) Calculate the hourly wage rate paid for the period, and the total labour variance. *(10 marks)*

(Total 25 marks)

ACAA Cost and Management Accounting I

Question SM 3.4 Computation of earnings and analysis by direct and indirect categories

(a) Explain how the following cost items, relating to direct personnel, would be processed in a manufacturing business's cost accounts:

 (i) idle time; *(3 marks)*

 (ii) overtime. *(3 marks)*

(b) The following information is available regarding the labour costs in a factory department for a week:

	Direct personnel	**Indirect personnel**
Payroll hours:		
Production	432	117
Training	24	—
Idle time	32	4
Total	488	121
Rates per hour:		
Basic	£7.50	£6.00
Overtime premium	£2.50	£2.00

The following additional information is provided:

 (i) There are 12 direct personnel and 3 indirect personnel in the department.

 (ii) Group bonuses for the week, shared by all workers in the department, total £520.

 (iii) The basic wage rates apply to a normal working week of 37 hours.

 (iv) Overtime is worked in order to meet the general requirements of production.

 (v) The idle time and the time spent training during the week are regarded as normal.

 (vi) The expected number of payroll hours of direct personnel in the week (excluding time spent training), required to produce the output achieved, is 470.

Required:

 (i) Calculate the total amounts paid in the week (before share of group bonus) to direct personnel and indirect personnel respectively. *(4 marks)*

 (ii) Determine the total amounts to be charged as direct wages and indirect wages respectively. *(5 marks)*

 (iii) Complete the Wages Control Account in the company's separate cost accounting system, clearly indicating the account in which each corresponding entry would be made. *(3 marks)*

(iv) Calculate the efficiency ratio relating to the direct personnel (expressed as a percentage to one decimal place). *(2 marks)*

(Total 20 marks)

ACCA Management Information – Paper 3

Question SM 3.5
Stores pricing

On 1 January Mr G started a small business selling a special yarn. He invested his savings of £40 000 in the business and during the next six months the following transactions occurred:

Date of receipt	Yarn purchases quantity (box)	Total cost (£)	Date of despatch	Yarn sales quantity (box)	Total value (£)
13 Jan	200	7 200	10 Feb	500	25 000
8 Feb	400	15 200			
11 Mar	600	24 000	20 Apr	600	27 000
12 Apr	400	14 000			
15 June	500	14 000	25 June	400	15 200

The yarn is stored in premises Mr G has rented, and the closing stock of yarn, counted on 30 June, was 500 boxes.

Other expenses incurred, and paid in cash, during the six-month period amounted to £2300.

Required:

(a) Calculate the value of the material issues during the six-month period, and the value of the closing stock at the end of June, using the following methods of pricing:
  (i) first in, first out;
  (ii) last in, last out;
  (iii) weighted average (calculations to two decimal places only). *(10 marks)*

(b) Calculate and discuss the effect each of the three methods of material pricing will have on the reported profit of the business, and examine the performance of the business during the first six-month period. *(12 marks)*

(Total 22 marks)

ACCA Level 1 Costing

Question SM 3.6

(a) Write short notes to explain each of the following in the context of materials control:
  (i) Continuous stocktaking.
  (ii) Perpetual inventory system.
  (iii) ABC inventory analysis. *(9 marks)*

(b) State the factors that should influence the decision regarding economic order quantities of raw materials. *(7 marks)*

(c) Calculate three normal control levels, which may be used in stock control systems, from the following information for a particular raw material:

Economic order quantity, 12 000 kilos
Lead time, 10 to 14 working days
Average usage, 600 kilos per day
Minimum usage, 400 kilos per day
Maximum usage, 800 kilos per day *(9 marks)*

(Total 25 marks)

ACCA Level 1 Costing

Question SM 3.7 Economic order quantity

A large local government authority places orders for various stationery items at quarterly intervals.

In respect of an item of stock coded A32, data are:

annual usage quantity	5000 boxes
minimum order quantity	500 boxes
cost per box	£2

Usage of material is on a regular basis and on average, half of the amount purchased is held in inventory. The cost of storage is considered to be 25% of the inventory value. The average cost of placing an order is estimated at £12.50.

The chief executive of the authority has asked you to review the present situation and to consider possible ways of effecting cost savings. You are required to:

(a) tabulate the costs of storage and ordering item A32 for each level of orders from four to twelve placed per year;
(b) ascertain from the tabulation the number of orders which should be placed in a year to minimize these costs;
(c) produce a formula to calculate the order level which would minimize these costs – your answer should explain each constituent part of the formula and their relationships;
(d) give an example of the use of the formula to confirm the calculation in (b) above;
(e) calculate the percentage saving on the annual cost which could be made by using the economic order quantity system;
(f) suggest *two* other approaches which could be introduced in order to reduce the present cost of storage and ordering of stationery.

(25 marks)
CIMA Cost Accounting 2

Question SM 3.8 Calculation of optimum order size

A company is reviewing its stock policy, and has the following alternatives available for the evaluation of stock number 12 789:

(i) Purchase stock twice monthly, 100 units
(ii) Purchase monthly, 200 units
(iii) Purchase every three months, 600 units
(iv) Purchase six monthly, 1200 units
(v) Purchase annually, 2400 units.

It is ascertained that the purchase price per unit is £0.80 for deliveries up to 500 units. A 5% discount is offered by the supplier on the whole order where deliveries are 501 up to 1000, and 10% reduction on the total order for deliveries in excess of 1000.

Each purchase order incurs administration costs of £5.

Storage, interest on capital and other costs are £0.25 per unit of average stock quantity held.

You are required to advise management on the optimum order size.

(9 marks)
AAT

Cost assignment for indirect costs

Question SM 4.1 Overhead analysis, calculation of overhead rates and a product cost

Knowing that you are studying for the CIMA qualification, a friend who manages a small business has sought your advice about how to produce quotations in response to the enquiries which her business receives. Her business is sheet metal fabrication – supplying ducting for dust extraction and air conditioning installations. She believes that she has lost orders recently through the use of a job cost estimating system which was introduced, on the advice of her auditors, seven years ago. You are invited to review this system.

Upon investigation, you find that a plant-wide percentage of 125% is added to prime costs in order to arrive at a selling price. The percentage added is intended to cover all overheads for the three production departments (Departments P, Q and R), all the selling, distribution and administration costs, and the profit.

You also discover that the selling, distribution and administration costs equate to roughly 20% of total production costs, and that to achieve the desired return on capital employed, a margin of 20% of sales value is necessary.

You recommend an analysis of overhead cost items be undertaken with the objective of determining a direct labour hour rate of overhead absorption for each of the three departments work passes through. (You think about activity-based costing but feel this would be too sophisticated and difficult to introduce at the present time.)

There are 50 direct workers in the business plus 5 indirect production people.

From the books, records and some measuring, you ascertain the following information which will enable you to compile an overhead analysis spreadsheet, and to determine overhead absorption rates per direct labour hour for departmental overhead purposes:

Cost/expense	**Annual amount**	**Basis for apportionment where allocation not given**
	£	
Repairs and maintenance	62 000	Technical assessment: P £42 000, Q £10 000, R £10 000
Depreciation	40 000	Cost of plant and equipment
Consumable supplies	9 000	Direct labour hours
Wage-related costs	87 000	12.5% of direct wages costs
Indirect labour	90 000	Direct labour hours
Canteen/rest/smoke room	30 000	Number of direct workers
Business rates and insurance	26 000	Floor area

Other estimates/information

	Department P	Department Q	Department R
Estimated direct labour hours	50 000	30 000	20 000
Direct wages costs	£386 000	£210 000	£100 000
Number of direct workers	25	15	10
Floor area in square metres	5 000	4 000	1 000
Plant and equipment, at cost	£170 000	£140 000	£90 000

Required:

(a) Calculate the overhead absorption rates for each department, based on direct labour hours. *(9 marks)*

(b) Prepare a sample quotation for Job 976, utilising information given in the question, your answer to (a) above, and the following additional information:

Estimated direct material cost:	£800
Estimated direct labour hours:	30 in Department P
	10 in Department Q
	5 in Department R

(3 marks)

(c) Calculate what would have been quoted for Job 976 under the 'auditors' system' and comment on whether your friend's suspicions about lost business could be correct. *(3 marks)*

(Total 15 marks)

CIMA Stage 2 Cost Accounting

Question SM 4.2 Calculation of overhead rates and a product cost

DC Limited is an engineering company which uses job costing to attribute costs to individual products and services provided to its customers. It has commenced the preparation of its fixed production overhead cost budget for 2001 and has identified the following costs:

	(£000)
Machining	600
Assembly	250
Finishing	150
Stores	100
Maintenance	80
	1 180

The stores and maintenance departments are production service departments. An analysis of the services they provide indicates that their costs should be apportioned accordingly:

	Machining	Assembly	Finishing	Stores	Maintenance
Stores	40%	30%	20%	—	10%
Maintenance	55%	20%	20%	5%	—

The number of machine and labour hours budgeted for 2001 is:

	Machining	Assembly	Finishing
Machine hours	50 000	4 000	5 000
Labour hours	10 000	30 000	20 000

Requirements:

(a) Calculate appropriate overhead absorption rates for each production department for 2001. *(9 marks)*

(b) Prepare a quotation for job number XX34, which is to be commenced early in 2001, assuming that it has:

Direct materials	costing £2400
Direct labour	costing £1500
and requires:	

	Machine hours	Labour hours
Machining department	45	10
Assembly department	5	15
Finishing department	4	12

and that profit is 20% of selling price. *(5 marks)*

(c) Assume that in 2001 the actual fixed overhead cost of the assembly department totals £300 000 and that the actual machine hours were 4200 and actual labour hours were 30 700.

Prepare the fixed production overhead control account for the assembly department, showing clearly the causes of any over-/under-absorption. *(5 marks)*

(d) Explain how activity based costing would be used in organisations like DC Limited. *(6 marks)*

(Total marks 25)

CIMA Stage 2 Operational Cost Accounting

Question SM 4.3 Calculation of overhead absorption rates and under/over-recovery of overheads

A manufacturing company has two production cost centres (Departments A and B) and one service cost centre (Department C) in its factory.

A predetermined overhead absorption rate (to two decimal places of £) is established for each of the production cost centres on the basis of budgeted overheads and budgeted machine hours.

The overheads of each production cost centre comprise directly allocated costs and a share of the costs of the service cost centre.

Budgeted production overhead data for a period is as follows:

	Department A	Department B	Department C
Allocated costs	£217 860	£374 450	£103 970
Apportioned costs	£45 150	£58 820	(£103 970)
Machine hours	13 730	16 110	
Direct labour hours	16 360	27 390	

Actual production overhead costs and activity for the same period are:

	Department A	Department B	Department C
Allocated costs	£219 917	£387 181	£103 254
Machine hours	13 672	16 953	
Direct labour hours	16 402	27 568	

70% of the actual costs of Department C are to be apportioned to production cost centres on the basis of actual machine hours worked and the remainder on the basis of actual direct labour hours.

Required:

(a) Establish the production overhead absorption rates for the period. *(3 marks)*

(b) Determine the under- or over-absorption of production overhead for the period in each production cost centre. (Show workings clearly.) *(12 marks)*

(c) Explain when, and how, the repeated distribution method may be applied in the overhead apportionment process. *(5 marks)*

(Total 20 marks)

ACCA Management Information – Paper 3

Question SM 4.4 Analysis of under/over recovery of overheads and a discussion of blanket versus department overheads

(a) One of the factories in the XYZ Group of companies absorbs fixed production overheads into product cost using a predetermined machine hour rate.

In Year 1, machine hours budgeted were 132 500 and the absorption rate for fixed production overheads was £18.20 per machine hour. Overheads absorbed and incurred were £2 442 440 and £2 317 461 respectively.

In Year 2, machine hours were budgeted to be 5% higher than those actually worked in Year 1. Budgeted and actual fixed production overhead expenditure were £2 620 926 and £2 695 721 respectively, and actual machine hours were 139 260.

Required:
Analyse, in as much detail as possible, the under-/over-absorption of fixed production overhead occurring in Years 1 and 2, and the change in absorption rate between the two years. *(15 marks)*

(b) Contrast the use of
  (i) blanket as opposed to departmental overhead absorption rates;
  (ii) predetermined overhead absorption rates as opposed to rates calculated from actual activity and expenditure. *(10 marks)*

(Total 25 marks)

ACCA Cost and Management Accounting 1

Question SM 4.5 Calculation of fixed and variable overhead rates, normal activity level and under/over-recovery of overheads

(a) C Ltd is a manufacturing company. In one of the production departments in its main factory a machine hour rate is used for absorbing production overhead. This is established as a predetermined rate, based on normal activity. The rate that will be used for the period which is just commencing is £15.00 per machine hour. Overhead expenditure anticipated, at a range of activity levels, is as follows:

Activity level (machine hours)	**(£)**
1500	25 650
1650	26 325
2000	27 900

Required:
Calculate:
  (i) the variable overhead rate per machine hour;
  (ii) the total budgeted fixed overhead;
  (iii) the normal activity level of the department; and
  (iv) the extent of over-/under-absorption if actual machine hours are 1700 and expenditure is as budgeted. *(10 marks)*

(b) In another of its factories, C Ltd carries out jobs to customers' specifications. A particular job requires the following machine hours and direct labour hours in the two production departments:

	Machining Department	**Finishing Department**
Direct labour hours	25	28
Machine hours	46	8

Direct labour in both departments is paid at a basic rate of £4.00 per hour. 10% of the direct labour hours in the finishing department are overtime hours, paid at 125% of basic rate. Overtime premiums are charged to production overhead.

The job requires the manufacture of 189 components. Each component requires 1.1 kilos of prepared material. Loss on preparation is 10% of unprepared material, which costs £2.35 per kilo.

Overhead absorption rates are to be established from the following data:

	Machining Department	Finishing Department
Production overhead	£35 280	£12 480
Direct labour hours	3 500	7 800
Machine hours	11 200	2 100

Required:

(i) Calculate the overhead absorption rate for each department and justify the absorption method used.

(ii) Calculate the cost of the job. *(15 marks)*

(Total 25 marks)

ACCA Level 1

Question SM 4.6 Reapportionment of service department costs

A company reapportions the costs incurred by two service cost centres, materials handling and inspection, to the three production cost centres of machining, finishing and assembly.

The following are the overhead costs which have been allocated and apportioned to the five cost centres:

	(£000)
Machining	400
Finishing	200
Assembly	100
Materials handling	100
Inspection	50

Estimates of the benefits received by each cost centre are as follows:

	Machining %	Finishing %	Assembly %	Materials handling %	Inspection %
Materials handling	30	25	35	—	10
Inspection	20	30	45	5	—

You are required to:

(a) calculate the charge for overhead to *each* of the *three* production cost centres, including the amounts reapportioned from the two service centres, using:
 (i) the continuous allotment (or repeated distribution) method;
 (ii) an algebraic method; *(15 marks)*

(b) comment on whether reapportioning service cost centre costs is generally worthwhile and suggest an alternative treatment for such costs; *(4 marks)*

(c) discuss the following statement: 'Some writers advocate that an under- or over-absorption of overhead should be apportioned between the cost of goods sold in the period to which it relates and to closing stocks. However, the United Kingdom practice is to treat under- or over-absorption of overhead as a period cost.' *(6 marks)*

(Total 25 marks)

CIMA Stage 2 Cost Accounting 3

Accounting entries for a job costing system

Question SM 5.1 Integrated accounts and computation of the net profit

Set out below are incomplete cost accounts for a period for a manufacturing business:

Stores Ledger Control Account

Opening Balance	£60 140		
Cost Ledger Control A/c	£93 106		
	£153 246		£153 246

Production Wages Control Account

Cost Ledger Control A/c		Finished Goods A/c	£87 480
		Production O'hd Control A/c	

Production Overhead Control Account

Cost Ledger Control A/c	£116 202		
Prod. Wages Control A/c			

Finished Goods Control Account

Opening Balance	£147 890	Prod. Cost of Sales (variable)	
		Closing Balance	£150 187

Note

1. *Raw materials:*
   Issues of materials from stores for the period:
   Material Y: 1164 kg (issued at a periodic weighted average price, calculated to two decimal places of £). Other materials: £78 520.
   No indirect materials are held on the Stores ledger.

   Transactions for Material Y in the period:
   Opening stock: 540 kg, £7663
   Purchases: 1100 kg purchased at £14.40 per kg

2. *Payroll:*

	Direct workers	Indirect workers
Hours worked:		
Basic time	11 140	4 250
Overtime	1 075	405
Productive time – direct workers	11 664	
Basic hourly rate (£)	7.50	5.70

Overtime, which is paid at basic rate plus one third, is regularly worked to meet production targets.

3. *Production overheads:*
   The business uses a marginal costing system. 60% of production overheads are fixed costs. Variable production overhead costs are absorbed at a rate of 70% of actual direct labour.
4. *Finished goods:*
   There is no work in progress at the beginning or end of the period, and a Work in Progress Account is not kept. Direct materials issued, direct labour and production overheads absorbed are transferred to the Finished Goods Control Account.

   Required:
   (a) Complete the above four accounts for the period, by listing the missing amounts and descriptions. *(13 marks)*
   (b) Provide an analysis of the indirect labour for the period. *(3 marks)*
   (c) Calculate the contribution and the net profit for the period, based on the cost accounts prepared in (a) and using the following additional information:

Sales	£479 462
Selling and administration overheads:	
variable	£38 575
fixed	£74 360

(4 marks)
(Total 20 marks)
ACCA Management Information – Paper 3

Question SM 5.2 Integrated accounts, profits computation and reconciliation relating to absorption and marginal costing

A company manufactures two products (A and B). In the period just ended production and sales of the two products were:

	Product A (000 units)	**Product B (000 units)**
Production	41	27
Sales	38	28

The selling prices of the products were £35 and £39 per unit for A and B respectively.

Opening stocks were:

Raw materials	£72 460
Finished goods:	
Product A	£80 640 (3200 units)
Product B	£102 920 (3100 units)

Raw material purchases (on credit) during the period totalled £631 220. Raw material costs per unit are £7.20 for Product A and £11.60 for Product B.

Direct labour hours worked during the period totalled 73 400 (1 hour per unit of Product A and 1.2 hours per unit of Product B), paid at a basic rate of £8.00 per hour.

3250 overtime hours were worked by direct workers, paid at a premium of 25% over the basic rate. Overtime premiums are treated as indirect production costs. Other indirect labour costs during the period totalled £186 470 and production overhead costs (other than indirect labour) were £549 630. Production overheads are absorbed at a rate of £10.00 per direct labour hour (including £6.80 per hour for fixed production overheads). Any over-/under-absorbed balances are transferred to the Profit and Loss Account in the period in which they arise. Non-production overheads totalled £394 700 in the period.

Required:
(a) Prepare the following accounts for the period in the company's integrated accounting system:
   (i) Raw material stock control;
   (ii) Production overhead control;
   (iii) Finished goods stock control (showing the details of the valuation of closing stocks as a note). *(12 marks)*

(b) Prepare the Profit and Loss Account for the period, clearly showing sales, production cost of sales and gross profit for each product. *(4 marks)*

(c) Calculate, and explain, the difference in the net profit (loss) for the period if the marginal costing method is employed. *(4 marks)*

(Total 20 marks)

ACCA Management Information – Paper 3

Question SM 5.3 Computation of contract profit

A company has been carrying out work on a number of building contracts (including Contract ABC) over the six-month period ended 31 May 2002. The following information is available:

	All contracts (including ABC)	**Contract ABC**
Number of contracts worked on in the six months to 31.5.02	10	—
Value	£76.2 m	£6.4 m
Duration	8–22 months (average 13 months)	11 months
Contract months	53[1]	6
Direct labour costs in the period	£9.762 m	£1.017 m
Raw material costs in the period	£10.817 m	£1.456 m
Distance from base	16 kilometres (average)	23 kilometres
Value of work certified at 31.5.02	—	£5.180 m

Note:
[1]Contract months for 'All Contracts' are the sum of the number of months' work on each individual contract during the six-month period.

Contract ABC commenced on 1 September 2001. As at 30 November 2001 cumulative costs on the contract, held in work-in-progress, totalled £1.063 m (including overheads).

The company confidently predicts that further cost after 31 May 2002 to complete Contract ABC on time (including overheads) will not exceed £0.937 m. Overheads incurred over the six-month period to 31 May 2002, which are to be apportioned to individual contracts are:

	£m
Stores operations	1.56
Contract general management	1.22
Transport	1.37
General administration	4.25

The bases of apportionment are:
Stores operations
– contract value × contract months
Contract general management
– direct labour costs
Transport
– distance from base × contract months
General administration
– contract months

Required:

(a) (i) Apportion overheads to Contract ABC for the six-month period to 31 May 2002 (to the nearest £000 for each overhead item). *(6 marks)*

(ii) Determine the expected profit/loss on Contract ABC, and the amount of profit/loss on the contract that you recommend be included in the accounts of the company for the six-month period to 31 May 2002. *(7 marks)*

(b) The company is introducing a service costing system into its stores operations department.

Outline the key factors to consider when introducing the service costing system.

(7 marks)

(Total 20 marks)

ACCA Management Information – Paper 3

Question SM 5.4 Contract costing

A construction company is currently undertaking three separate contracts and information relating to these contracts for the previous year, together with other relevant data, is shown below.

	Contract MNO (000)	Contract PQR (000)	Contract STU (000)	Construction services dept overhead (000s)
Contract price	800	675	1100	
Balances brought forward at beginning of year:				
Cost of work completed	—	190	370	—
Material on site	—	—	25	—
Written-down value of plant and machinery	—	35	170	12
Wages accrued	—	2	—	—
Profit previously transferred to profit/loss a/c	—	—	15	—
Transactions during year:				
Material delivered to site	40	99	180	—
Wages paid	20	47	110	8
Payments to subcontractors	—	—	35	—
Salaries and other costs	6	20	25	21
Written down value of plant:				
issued to sites	90	15	—	—
transferred from sites	—	8	—	—
Balances carried forward at the end of year:				
Material on site	8	—	—	—
Written-down value of plant and machinery	70	—	110	5
Wages accrued	—	5	—	—
Pre-payments to subcontractors	—	—	15	—
Value of work certified at end of year	90	390	950	—
Cost of work not certified at end of year	—	—	26	—

The cost of operating the construction services department, which provides technical advice to each of the contracts, is apportioned over the contracts in proportion to wages incurred. Contract STU is scheduled for handing over to the contractee in the near future and the site engineer estimates that the extra costs required to complete the contract in addition to those tabulated above, will total £138 000. This amount includes an allowance for plant depreciation, construction services and for contingencies.

Required:

(a) Construct a cost account for each of the three contracts for the previous year and show the cost of the work completed at the year end. *(9 marks)*

(b) (i) Recommend how much profit or loss should be taken, for each contract, for the previous year. *(7 marks)*

(ii) Explain the reasons for each of your recommendations in (b) (i) above. *(6 marks)*

(Total 22 marks)

ACCA Level 1 Costing

Process costing

Question SM 6.1 Preparation of process accounts with all output fully completed

A chemical compound is made by raw material being processed through two processes. The output of Process A is passed to Process B where further material is added to the mix. The details of the process costs for the financial period number 10 were as shown below:

Process A	
Direct material	2000 kilograms at 5 per kg
Direct labour	£7200
Process plant time	140 hours at £60 per hour

Process B	
Direct material	1400 kilograms at £12 per kg
Direct labour	£4200
Process plant time	80 hours at £72.50 per hour

The departmental overhead for Period 10 was £6840 and is absorbed into the costs of each process on direct labour cost.

	Process A	**Process B**
Expected output was	80% of input	90% of input
Actual output was	1400 kg	2620 kg

Assume no finished stock at the beginning of the period and no work in progress at either the beginning or the end of the period.

Normal loss is contaminated material which is sold as scrap for £0.50 per kg from Process A and £1.825 per kg from Process B, for both of which immediate payment is received.

You are required to prepare the accounts for Period 10, for

(i) Process A,
(ii) Process B,
(iii) Normal loss/gain,
(iv) Abnormal loss/gain,
(v) Finished goods,
(vi) Profit and loss (extract).

(15 marks)
CIMA Stage 2 Cost Accounting

Question SM 6.2 Equivalent production and no losses

A firm operates a process, the details of which for the period were as follows. There was no opening work-in-progress. During the period 8250 units were received from the previous process at a value of £453 750, labour and overheads were £350 060 and material introduced was £24 750. At the end of the period the closing work-in-progress was 1600 units, which were 100% complete in respect of materials, and 60% complete in respect of labour and overheads. The balance of units were transferred to finished goods.

Requirements:

(a) Calculate the number of equivalent units produced. *(3 marks)*
(b) Calculate the cost per equivalent unit. *(2 marks)*
(c) Prepare the process account. *(7 marks)*
(d) Distinguish between joint products and by-products, and briefly explain the difference in accounting treatment between them. *(3 marks)*

(Total 15 marks)

CIMA Stage 1 Cost Accounting and Quantitative Methods

Question SM 6.3 Losses in process (weighted average)

A company manufactures a product that requires two separate processes for its completion. Output from Process 1 is immediately input to Process 2.

The following information is available for Process 2 for a period:

(i) Opening work-in-progress units:
12 000 units: 90% complete as to materials, 50% complete as to conversion costs.

(ii) Opening work-in-progress value:
Process 1 output: £13 440
Process 2 materials added: £4970
Conversion costs: £3120.

(iii) Costs incurred during the period:
Process 1 output: £107 790 (95 000 units)
Process 2 materials added: £44 000
Conversion costs: £51 480.

(iv) Closing work-in-progress units
10 000 units: 90% complete as to materials, 70% complete as to conversion costs.

(v) The product is inspected when it is complete. 200 units of finished product were rejected during the period, in line with the normal allowance. Units rejected have no disposal value.

Required:

(a) Calculate the unit cost of production for the period in Process 2 (to three decimal places of £), using the periodic weighted average method. *(7 marks)*
(b) Prepare the Process 2 Account for the period using the unit cost of production calculated in (a) above. *(5 marks)*
(c) Explain why, and how, the Process 2 Account would be different if there was no normal allowance for rejects. NB The process account should not be reworked. *(5 marks)*
(d) Explain how the process account workings, required in (a) above to calculate the unit cost, would differ if the FIFO valuation method was used instead. *(3 marks)*

(Total 20 marks)

ACCA Management Information – Paper 3

Question SM 6.4 Losses in process (weighted average)

Chemical Processors manufacture Wonderchem using two processes, mixing and distillation. The following details relate to the distillation process for a period

No opening work in progress (WIP)		
Input from mixing	36 000 kg at a cost of	£166 000
Labour for period		£43 800
Overheads for period		£29 200

Closing WIP of 8000 kg, which was 100% complete for materials and 50% complete for labour and overheads.

The normal loss in distillation is 10% of fully complete production. Actual loss in the period was 3600 kg, fully complete, which were scrapped.

Required:

(a) Calculate whether there was a normal or abnormal loss or abnormal gain for the period. *(2 marks)*

(b) Prepare the distillation process account for the period, showing clearly weights and values. *(10 marks)*
(c) Explain what changes would be required in the accounts if the scrapped production had a resale value, and give the accounting entries. *(3 marks)*

(Total 15 marks)
CIMA Stage 1 Cost Accounting

Question SM 6.5 Preparation of process accounts with output fully completed and a discussion of FIFO and average methods of WIP valuation

(a) Z Ltd manufactures metal cans for use in the food processing industry. The metal is introduced in sheet form at the start of the process. Normal wastage in the form of offcuts is 2% of input. The offcuts can be sold for £0.26 per kilo. Each metal sheet weighs 2 kilos and is expected to yield 80 cans. In addition to wastage through offcuts, 1% of cans manufactured are expected to be rejected. These rejects can also be sold at £0.26 per kilo.

Production, and costs incurred, in the month just completed, were as follows:

Production:	3 100 760 cans
Costs incurred:	
Direct materials:	39 300 metal sheets at £2.50 per sheet
Direct labour and overhead:	£33 087

There was no opening or closing work in process.

Required:
Prepare the process accounts for the can manufacturing operation for the month just completed. *(15 marks)*

(b) Another of the manufacturing operations of Z Ltd involves the continuous processing of raw materials with the result that, at the end of any period, there are partly completed units of product remaining.

Required:
With reference to the general situation outlined above
(i) explain the concept of equivalent units *(3 marks)*
(ii) describe, and contrast, the FIFO and average methods of work in process valuation. *(7 marks)*

(Total 25 marks)
ACCA Level 1 Costing

Question SM 6.6 FIFO method and losses in process

The manufacture of one of the products of A Ltd requires three separate processes. In the last of the three processes, costs, production and stock for the month just ended were:
(1) Transfers from Process 2: 180 000 units at a cost of £394 200.
(2) Process 3 costs: materials £110 520, conversion costs £76 506.
(3) Work in process at the beginning of the month: 20 000 units at a cost of £55 160 (based on FIFO pricing method). Units were 70% complete for materials, and 40% complete for conversion costs.
(4) Work in process at the end of the month: 18 000 units which were 90% complete for materials, and 70% complete for conversion costs.
(5) Product is inspected when it is complete. Normally no losses are expected but during the month 60 units were rejected and sold for £1.50 per unit.

Required:
(a) Prepare the Process 3 account for the month just ended. *(15 marks)*
(b) Explain how, and why, your calculations would be affected if the 60 units lost were treated as normal losses. *(5 marks)*
(c) Explain how your calculations would be affected by the use of weighted average pricing instead of FIFO. *(5 marks)*

(Total 25 marks)
ACCA Cost and Management Accounting 1

Question SM 6.7 FIFO method and losses in process

A company operates several production processes involving the mixing of ingredients to produce bulk animal feedstuffs. One such product is mixed in two separate process operations. The information below is of the costs incurred in, and output from, Process 2 during the period just completed.

Costs incurred:	**£**
Transfers from Process 1	187 704
Raw materials costs	47 972
Conversion costs	63 176
Opening work in process	3 009
Production:	Units
Opening work in process	1 200
(100% complete, apart from Process 2 conversion costs which were 50% complete)	
Transfers from Process 1	112 000
Completed output	105 400
Closing work in process	1 600
(100% complete, apart from Process 2 conversion costs which were 75% complete)	

Normal wastage of materials (including product transferred from Process 1), which occurs in the early stages of Process 2 (after all materials have been added), is expected to be 5% of input. Process 2 conversion costs are all apportioned to units of good output. Wastage materials have no saleable value.

Required:

(a) Prepare the Process 2 account for the period, using FIFO principles. *(15 marks)*

(b) Explain how, and why, your calculations would have been different if wastage occurred at the end of the process. *(5 marks)*

(Total 20 marks)

ACCA Cost and Management Accounting

Joint and by-product costing

Question SM 7.1 Preparation of joint product account and a decision on further processing

PQR Limited produces two joint products – P and Q – together with a by-product R, from a single main process (process 1). Product P is sold at the point of separation for £5 per kg, whereas product Q is sold for £7 per kg after further processing into product Q2. By-product R is sold without further processing for £1.75 per kg.

Process 1 is closely monitored by a team of chemists, who planned the output per 1000 kg of input materials to be as follows:

Product P	500 kg
Product Q	350 kg
Product R	100 kg
Toxic waste	50 kg

The toxic waste is disposed of at a cost of £1.50 per kg, and arises at the end of processing.

Process 2, which is used for further processing of product Q into product Q2, has the following cost structure:

Fixed costs	£6000 per week
Variable costs	£1.50 per kg processed

The following actual data relate to the first week of accounting period 10:

Process 1	
Opening work in process	Nil
Materials input 10 000 kg costing	£15 000
Direct labour	£10 000
Variable overhead	£4 000
Fixed overhead	£6 000

Outputs:

Product P	4800 kg
Product Q	3600 kg
Product R	1000 kg
Toxic waste	600 kg
Closing work in progress	nil

Process 2	
Opening work in process	nil
Input of product Q	3600 kg
Output of product Q2	3300 kg
Closing work in progress	300 kg, 50% converted

Conversion costs were incurred in accordance with the planned cost structure.

Required:
(a) Prepare the main process account for the first week of period 10 using the final sales value method to attribute pre-separation costs to joint products. *(12 marks)*
(b) Prepare the toxic waste accounts and process 2 account for the first week of period 10. *(9 marks)*
(c) Comment on the method used by PQR Limited to attribute pre-separation costs to its joint products. *(4 marks)*
(d) Advise the management of PQR Limited whether or not, on purely financial grounds, it should continue to process product Q into product Q2:
  (i) if product Q could be sold at the point of separation for £4.30 per kg; *and*
  (ii) if 60% of the weekly fixed costs of process 2 were avoided by not processing product Q further. *(5 marks)*

(Total 30 marks)
CIMA Stage 2 Operational Cost Accounting

Question SM 7.2 Flow chart and calculation of cost per unit for joint products

A distillation plant, which works continuously, processes 1000 tonnes of raw material each day. The raw material costs £4 per tonne and the plant operating costs per day are £2600. From the input of raw material the following output is produced:

	(%)
Distillate X	40
Distillate Y	30
Distillate Z	20
By-product B	10

From the initial distillation process, Distillate X passes through a heat process which costs £1500 per day and becomes product X which requires blending before sale.

Distillate Y goes through a second distillation process costing £3300 per day and produces 75% of product Y and 25% of product X1.

Distillate Z has a second distillation process costing £2400 per day and produces 60% of product Z and 40% of product X2. The three streams of products X, X1 and X2 are blended, at a cost of £1555 per day to become the saleable final product XXX.

There is no loss of material from any of the processes.

By-product B is sold for £3 per tonne and such proceeds are credited to the process from which the by-product is derived.

Joint costs are apportioned on a physical unit basis.

You are required to:
(a) draw a flow chart, flowing from left to right, to show for one day of production the flow of material and the build up of the operating costs for each product; *(18 marks)*
(b) present a statement for management showing for *each* of the products XXX, Y and Z, the output for *one* day, the total cost and the unit cost per tonne; *(5 marks)*
(c) suggest an alternative method for the treatment of the income receivable for by-product B than that followed in this question (figures are not required). *(2 marks)*

(Total 25 marks)
CIMA Stage 2 Cost Accounting

Question SM 7.3 Calculation of cost per unit and decision on further processing

A chemical company carries on production operations in two processes. Materials first pass through process I, where a compound is produced. A loss in weight takes place at the start of processing. The following data, which can be assumed to be representative, relates to the month just ended:

Quantities (kg):	
Material input	200 000
Opening work in process (half processed)	40 000
Work completed	160 000
Closing work in process (two-thirds processed)	30 000
Costs (£):	
Material input	75 000
Processing costs	96 000
Opening work in process:	
Materials	20 000
Processing costs	12 000

Any quantity of the compound can be sold for £1.60 per kg. Alternatively, it can be transferred to process II for further processing and packing to be sold as Starcomp for £2.00 per kg. Further materials are added in process II such that for every kg of compound used, 2 kg of Starcomp result.

Of the 160 000 kg per month of work completed in process I, 40 000 kg are sold as compound and 120 000 kg are passed through process II for sale as Starcomp. Process II has facilities to handle up to 160 000 kg of compound per month if required. The monthly costs incurred in process II (other than the cost of the compound) are:

	120 000 kg of compound input	**160 000 kg of compound input**
Materials (£)	120 000	160 000
Processing costs (£)	120 000	140 000

Required:

(a) Determine, using the average method, the cost per kg of compound in process I, and the value of both work completed and closing work in process for the month just ended. *(11 marks)*

(b) Demonstrate that it is worth while further processing 120 000 kg of compound. *(5 marks)*

(c) Calculate the minimum acceptable selling price per kg, if a potential buyer could be found for the additional output of Starcomp that could be produced with the remaining compound. *(6 marks)*

(Total 22 marks)

ACCA Level 1 Costing

Question SM 7.4 Profitability analysis and a decision on further processing

C Ltd operates a process which produces three joint products. In the period just ended costs of production totalled £509 640. Output from the process during the period was:

Product W	276 000 kilos
Product X	334 000 kilos
Product Y	134 000 kilos

There were no opening stocks of the three products. Products W and X are sold in this state. Product Y is subjected to further processing. Sales of Products W and X during the period were:

Product W	255 000 kilos at £0.945 per kilo
Product X	312 000 kilos at £0.890 per kilo

128 000 kilos of Product Y were further processed during the period. The balance of the period production of the three products W, X and Y remained in stock at the end of the period. The value of closing stock of individual products is calculated by apportioning costs according to weight of output.

The additional costs in the period of further processing Product Y, which is converted into Product Z, were:

Direct labour	£10 850
Production overhead	£7 070

96 000 kilos of Product Z were produced from the 128 000 kilos of Product Y. A by-product BP is also produced which can be sold for £0.12 per kilo. 8000 kilos of BP were produced and sold in the period.

Sales of Product Z during the period were 94 000 kilos, with a total revenue of £100 110. Opening stock of Product Z was 8000 kilos, valued at £8640. The FIFO method is used for pricing transfers of Product Z to cost of sales.

Selling and administration costs are charged to all main products when sold, at 10% of revenue.

Required:

(a) Prepare a profit and loss account for the period, identifying separately the profitability of each of the three main products. *(14 marks)*

(b) C Ltd has now received an offer from another company to purchase the total output of Product Y (i.e. before further processing) for £0.62 per kilo. Calculate the viability of this alternative. *(5 marks)*

(c) Discuss briefly the methods of, and rationale for, joint cost apportionment. *(6 marks)*

(Total 25 marks)

ACCA Level 1 Cost and Management Accounting 1

Income effects of alternative cost accumulation systems

Question SM 8.1 Preparation of variable and absorption costing profit statements and an explanation of the change in profits

A company sells a single product at a price of £14 per unit. Variable manufacturing costs of the product are £6.40 per unit. Fixed manufacturing overheads, which are absorbed into the cost of production at a unit rate (based on normal activity of 20 000 units per period), are £92 000 per period. Any over- or under-absorbed fixed manufacturing overhead balances are transferred to the profit and loss account at the end of each period, in order to establish the manufacturing profit.

Sales and production (in units) for two periods are as follows:

	Period 1	**Period 2**
Sales	15 000	22 000
Production	18 000	21 000

The manufacturing profit in Period 1 was reported as £35 800.

Required:

(a) Prepare a trading statement to identify the manufacturing profit for Period 2 using the existing absorption costing method. *(7 marks)*

(b) Determine the manufacturing profit that would be reported in Period 2 if marginal costing was used. *(4 marks)*

(c) Explain, with supporting calculations:

(i) the reasons for the change in manufacturing profit between Periods 1 and 2 where absorption costing is used in each period; *(5 marks)*

(ii) why the manufacturing profit in (a) and (b) differs. *(4 marks)*

(Total 20 marks)

ACCA Management Information – Paper 3

Question SM 8.2 Preparation of variable and absorption costing profit statements and CVP analysis

R Limited is considering its plans for the year ending 31 December 2001. It makes and sells a single product, which has budgeted costs and selling price as follows:

	£ per unit
Selling price	45
Direct materials	11
Direct labour	8
Production overhead:	
variable	4
fixed	3
Selling overhead:	
variable	5
fixed	2
Administration overhead:	
fixed	3

Fixed overhead costs per unit are based on a normal annual activity level of 96 000 units. These costs are expected to be incurred at a constant rate throughout the year.

Activity levels during January and February 2001 are expected to be:

	January units	February units
Sales	7000	8750
Production	8500	7750

Assume that there will be no stocks held on 1 January 2001.

Required:

(a) Prepare, in columnar format, profit statements for each of the two months of January and February 2001 using:
  (i) absorption costing;
  (ii) marginal costing. *(12 marks)*

(b) Reconcile and explain the reasons for any differences between the marginal and absorption profits for each month which you have calculated in your answer to (a) above. *(3 marks)*

(c) Based upon marginal costing, calculate:
  (i) the annual breakeven sales value; and
  (ii) the activity level, in units, which will yield an annual profit of £122 800. *(6 marks)*

(d) Explain 3 fundamental assumptions underpinning single product breakeven analysis. *(6 marks)*

(Total 27 marks)

CIMA Stage 2 – Operational Cost Accounting

Question SM 8.3 Preparation of variable and absorption costing statements as a reconciliation of the profits

The following budgeted profit statement has been prepared using absorption costing principles:

	January to June (£000)	January to June (£000)	July to December (£000)	July to December (£000)
Sales		540		360
Opening stock	100		160	
Production costs:				
Direct materials	108		36	
Direct labour	162		54	
Overhead	90		30	
	460		280	
Closing stock	160		80	
		300		200
GROSS PROFIT		240		160
Production overhead:				
(Over)/Under absorption	(12)		12	
Selling costs	50		50	
Distribution costs	45		40	
Administration costs	80		80	
		163		182
NET PROFIT/(LOSS)		77		(22)
Sales units	15 000		10 000	
Production units	18 000		6 000	

The members of the management team are concerned by the significant change in profitability between the two six-month periods. As management accountant, you have analysed the data upon which the above budget statement has been produced, with the following results:

1. The production overhead cost comprises both a fixed and a variable element, the latter appears to be dependent on the number of units produced. The fixed element of the cost is expected to be incurred at a constant rate throughout the year.
2. The selling costs are fixed.
3. The distribution cost comprises both fixed and variable elements, the latter appears to be dependent on the number of units sold. The fixed element of the cost is expected to be incurred at a constant rate throughout the year.
4. The administration costs are fixed.

Required:
(a) Present the above budgeted profit statement in marginal costing format. *(10 marks)*
(b) Reconcile EACH of the six-monthly profit/loss values reported respectively under marginal and absorption costing. *(4 marks)*
(c) Reconcile the six-monthly profit for January to June from the absorption costing statement with the six-monthly loss for July to December from the absorption costing statement. *(4 marks)*
(d) Calculate the annual number of units required to break even. *(3 marks)*
(e) Explain briefly the advantages of using marginal costing as the basis of providing managers with information for decision making. *(4 marks)*

(Total 25 marks)

CIMA Stage 2 Operational Cost Accounting

Question SM 8.4 Preparation of variable and absorption costing profit statements for FIFO and AVECO methods

The following information relates to product J, for quarter 3, which has just ended:

	Production (units)	Sales (units)	Fixed overheads (£000)	Variable costs (£000)
Budget	40 000	38 000	300	1800
Actual	46 000	42 000	318	2070

The selling price of product J was £72 per unit.

The fixed overheads were absorbed at a predetermined rate per unit.

At the beginning of quarter 3 there was an opening stock of product J of 2000 units, valued at £25 per unit variable costs and £5 per unit fixed overheads.

Required:
(a) (i) Calculate the fixed overhead absorption rate per unit for the last quarter, and present profit statements using FIFO (first in, first out) using:
(ii) absorption costing;
(iii) marginal costing; and
(iv) reconcile and explain the difference between the profits or losses. *(12 marks)*
(b) Using the same data, present similar statements to those required in part (a). Using the AVECO (average cost) method of valuation, reconcile the profit or loss figures, and comment briefly on the variations between the profits or losses in (a) and (b). *(8 marks)*

(Total 20 marks)

ACCA Paper 8 Managerial Finance

Cost–volume–profit analysis

Question SM 9.1 Break-even, contribution and profit–volume graph

(a) From the following information you are required to construct:
  (i) a break-even chart, showing the break-even point and the margin of safety;
  (ii) a chart displaying the contribution level and the profit level;
  (iii) a profit–volume chart.

Sales	6000 units at £12 per unit	= £72 000
Variable costs	6000 units at £7 per unit	= £42 000
Fixed costs		= £20 000

(9 marks)

(b) State the purposes of each of the three charts in (a) above. *(6 marks)*

(c) Outline the limitations of break-even analysis. *(5 marks)*

(d) What are the advantages of graphical presentation of financial data to executives? *(2 marks)*

(Total 22 marks)
AAT

Question SM 9.2 Profit–volume graph and changes in sales mix

A company produces and sells two products with the following costs:

	Product X	**Product Y**
Variable costs (per £ of sales)	£0.45	£0.6
Fixed costs	£1 212 000 per period	£1 212 000

Total sales revenue is currently generated by the two products in the following proportions:

Product X	70%
Product Y	30%

Required:
(a) Calculate the break-even sales revenue per period, based on the sales mix assumed above. *(6 marks)*
(b) Prepare a profit–volume chart of the above situation for sales revenue up to £4 000 000. Show on the same chart the effect of a change in the sales mix to product X 50%, product Y 50%. Clearly indicate on the chart the break-even point for each situation. *(11 marks)*
(c) Of the fixed costs £455 000 are attributable to product X. Calculate the sales revenue required on product X in order to recover the attributable fixed costs and provide a net contribution of £700 000 towards general fixed costs and profit. *(5 marks)*

(Total 22 marks)
ACCA Level 1 Costing

Question SM 9.3 Calculation of break-even points based on different sales mix assumptions and a product abandonment decision

M Ltd manufactures three products which have the following revenue and costs (£ per unit).

	Product 1	2	3
Selling price	2.92	1.35	2.83
Variable costs	1.61	0.72	0.96
Fixed costs:			
Product-specific	0.49	0.35	0.62
General	0.46	0.46	0.46

Unit fixed costs are based upon the following annual sales and production volumes (thousand units):

Product 1	2	3
98.2	42.1	111.8

Required:

(a) Calculate:

(i) the break-even point sales (to the nearest £ hundred) of M Ltd based on the current product mix; *(9 marks)*

(ii) the number of units of Product 2 (to the nearest hundred) at the break-even point determined in (i) above; *(3 marks)*

(b) Comment upon the viability of Product 2. *(8 marks)*

(Total 20 marks)

ACCA Cost and Management Accounting 1

Question SM 9.4 Calculation of break-even points and limiting factor decision-making

You are employed as an accounting technician by Smith, Williams and Jones, a small firm of accountants and registered auditors. One of your clients is Winter plc, a large department store. Judith Howarth, the purchasing director for Winter plc, has gained considerable knowledge about bedding and soft furnishings and is considering acquiring her own business.

She has recently written to you requesting a meeting to discuss the possible purchase of Brita Beds Ltd. Brita Beds has one outlet in Mytown, a small town 100 miles from where Judith works. Enclosed with her letter was Brita Beds' latest profit and loss account. This is reproduced below.

Brita Beds Ltd
Profit and loss account – year to 31 May

Sales	**(units)**	**(£)**
Model A	1 620	336 960
Model B	2 160	758 160
Model C	1 620	1 010 880
Turnover		2 106 000
Expenses	(£)	
Cost of beds	1 620 000	
Commission	210 600	
Transport	216 000	
Rates and insurance	8 450	
Light heat and power	10 000	
Assistants' salaries	40 000	
Manager's salary	40 000	2 145 050
Loss for year		39 050

Also included in the letter was the following information:

1. Brita Beds sells three types of bed, models A to C inclusive.
2. Selling prices are determined by adding 30% to the cost of beds.
3. Sales assistants receive a commission of 10% of the selling price for each bed sold.
4. The beds are delivered in consignments of 10 beds at a cost of £400 per delivery. This expense is shown as 'Transport' in the profit and loss account.
5. All other expenses are annual amounts.
6. The mix of models sold is likely to remain constant irrespective of overall sales volume.

Task 1
In preparation for your meeting with Judith Howarth, you are asked to calculate:

(a) the minimum number of beds to be sold if Brita Beds is to avoid making a loss;
(b) the minimum turnover required if Brita Beds it to avoid making a loss.

At the meeting, Judith Howarth provides you with further information:

1. The purchase price of the business is £300 000.
2. Judith has savings of £300 000 currently earning 5% interest per annum, which she can use to acquire Beta Beds.
3. Her current salary is £36 550.

To reduce costs, Judith suggests that she should take over the role of manager as the current one is about to retire. However, she does not want to take a reduction in income. Judith also tells you that she has been carrying out some market research. The results of this are as follows:

1. The number of households in Mytown is currently 44 880.
2. Brita Beds Ltd is the only outlet selling beds in Mytown.
3. According to a recent survey, 10% of households change their beds every 9 years, 60% every 10 years and 30% every 11 years.
4. The survey also suggested that there is an average of 2.1 beds per household.

Task 2
Write a letter to Judith Howarth. Your letter should:

(a) identify the profit required to compensate for the loss of salary and interest;
(b) show the number of beds to be sold to achieve that profit;
(c) calculate the likely maximum number of beds that Brita Beds would sell in a year;
(d) use your answers in (a) to (c) to justify whether or not Judith Howarth should purchase the company and become its manager;
(e) give *two* possible reasons why your estimate of the maximum annual sales volume may prove inaccurate.

On receiving your letter, Judith Howarth decides she would prefer to remain as the purchasing director for Winter plc rather than acquire Brita Beds Ltd. Shortly afterwards, you receive a telephone call from her. Judith explains that Winter plc is redeveloping its premises and that she is concerned about the appropriate sales policy for Winter's bed department while the redevelopment takes place. Although she has a statement of unit profitability, this had been prepared before the start of the redevelopment and had assumed that there would be in excess of 800 square metres of storage space available to the bed department. Storage space is critical as customers demand immediate delivery and are not prepared to wait until the new stock arrives.

The next day, Judith Howarth sends you a letter containing a copy of the original statement of profitability. This is reproduced below:

Model	**A**	**B**	**C**
Monthly demand	**35**	**45**	**20**
(beds)	**(£)**	**(£)**	**(£)**
Unit selling price	240.00	448.00	672.00
Unit cost per bed	130.00	310.00	550.00
Carriage inwards	20.00	20.00	20.00
Staff costs	21.60	40.32	60.48
Department fixed overheads	20.00	20.00	20.00
General fixed overheads	25.20	25.20	25.20
Unit profit	23.20	32.48	(3.68)
Storage required per bed (square metres)	3	4	5

In her letter she asks for your help in preparing a marketing plan which will maximize the profitability of Winter's bed department while the redevelopment takes place. To help you, she has provided you with the following additional information:

1. Currently storage space available totals 300 square metres.
2. Staff costs represent the salaries of the sales staff in the bed department. Their total cost of £3780 per month is apportioned to units on the basis of planned turnover.
3. Departmental fixed overhead of £2000 per month is directly attributable to the department and is apportioned on the number of beds planned to be sold.
4. General fixed overheads of £2520 are also apportioned on the number of beds planned to be sold. The directors of Winter plc believe this to be a fair apportionment of the store's central fixed overheads.
5. The cost of carriage inwards and the cost of beds vary directly with the number of beds purchased.

Task 3

(a) Prepare a recommended monthly sales schedule in units which will maximize the profitability of Winter plc's bed department.

(b) Calculate the profit that will be reported per month if your recommendation is implemented.

AAT Technician's Stage

Question SM 9.5 Decision-making and non-graphical CVP analysis

Fosterjohn Press Ltd is considering launching a new monthly magazine at a selling price of £1 per copy. Sales of the magazine are expected to be 500 000 copies per month, but it is possible that the actual sales could differ quite significantly from this estimate.

Two different methods of producing the magazine are being considered and neither would involve any additional capital expenditure. The estimated production costs for each of the two methods of manufacture, together with the additional marketing and distribution costs of selling the new magazine, are summarised below:

	Method A	**Method B**
Variable costs	0.55 per copy	0.50 per copy
Specific fixed costs	£80 000 per month	£120 000 per month
Semi-variable costs:		
The following estimates have been obtained:		
350 000 copies	£55 000 per month	£47 500 per month
450 000 copies	£65 000 per month	£52 500 per month
650 000 copies	£85 000 per month	£62 500 per month

It may be assumed that the fixed cost content of the semi-variable costs will remain constant throughout the range of activity shown.

The company currently sells a magazine covering related topics to those that will be included in the new publication and consequently it is anticipated that sales of this existing magazine will be adversely affected. It is estimated that for every ten copies sold of the new publication, sales of the existing magazine will be reduced by one copy.

Sales and cost data of the existing magazine are shown below:

Sales	220 000 copies per month
Selling price	0.85 per copy
Variable costs	0.35 per copy
Specific fixed costs	£80 000 per month

Required:

(a) Calculate, for each production method, the net increase in company profits which will result from the introduction of the new magazine, at each of the following levels of activity:
   500 000 copies per month
   400 000 copies per month
   600 000 copies per month *(12 marks)*

(b) Calculate, for each production method, the amount by which sales volume of the new magazine could decline from the anticipated 500 000 copies per month, before the company makes no additional profit from the introduction of the new publication. *(6 marks)*

(c) Briefly identify any conclusions which may be drawn from your calculations. *(4 marks)*

(Total 22 marks)
ACCA Foundation Costing

Question SM 9.6 Decision-making and non-graphical CVP analysis

Mr Belle has recently developed a new improved video cassette and shown below is a summary of a report by a firm of management consultants on the sales potential and production costs of the new cassette.

Sales potential: The sales volume is difficult to predict and will vary with the price, but it is reasonable to assume that at a selling price of £10 per cassette, sales would be between 7500 and 10 000 units per month. Alternatively, if the selling price was reduced to £9 per cassette, sales would be between 12 000 and 18 000 units per month.

Production costs: If production is maintained at or below 10 000 units per month, then variable manufacturing costs would be approximately £8.25 per cassette and fixed costs £12 125 per month. However, if production is planned to exceed 10 000 units per month, then variable costs would be reduced to £7.75 per cassette, but the fixed costs would increase to £16 125 per month.

Mr Belle has been charged £2000 for the report by the management consultants and, in addition, he has incurred £3000 development costs on the new cassette.

If Mr Belle decides to produce and sell the new cassette it will be necessary for him to use factory premises which he owns, but are leased to a colleague for a rental of £400 per month. Also he will resign from his current post in an electronics firm where he is earning a salary of £1000 per month.

Required:

(a) Identify in the question an example of
   (i) an opportunity cost,
   (ii) a sunk cost. *(3 marks)*

(b) Making whatever calculations you consider appropriate, analyse the report from the consultants and advise Mr Belle of the potential profitability of the alternatives shown in the report.
   Any assumptions considered necessary or matters which may require further investigation or comment should be clearly stated. *(19 marks)*

(Total 22 marks)
ACCA Level 1 Costing

Cost estimation and cost behaviour

Question SM 10.1 Linear regression analysis with price level adjustments

Savitt Ltd manufactures a variety of products at its industrial site in Ruratania. One of the products, the LT, is produced in a specially equipped factory in which no other production takes place. For technical reasons the company keeps no stocks of either LTs or the raw material used in their manufacture. The costs of producing LTs in the special factory during the past four years have been as follows:

	1998 (£)	**1999 (£)**	**2000 (£)**	**(2001) (estimated) (£)**
Raw materials	70 000	100 000	130 000	132 000
Skilled labour	40 000	71 000	96 000	115 000
Unskilled labour	132 000	173 000	235 000	230 000
Power	25 000	33 000	47 000	44 000
Factory overheads	168 000	206 000	246 000	265 000
Total production costs	£435 000	£583 000	£754 000	£786 000
Output (units)	160 000	190 000	220 000	180 000

The costs of raw materials and skilled and unskilled labour have increased steadily during the past four years at an annual compound rate of 20%, and the costs of factory overheads have increased at an annual compound rate of 15% during the same period. Power prices increased by 10% on 1 January 1999 and by 25% on the 1 January of each subsequent year. All costs except power are expected to increase by a further 20% during 2002. Power prices are due to rise by 25% on 1 January 2002.

The directors of Savitt Ltd are now formulating the company's production plan for 2002 and wish to estimate the costs of manufacturing the product LT. The finance director has expressed the view that 'the full relevant cost of producing LTs can be determined only if a fair share of general company overheads is allocated to them'. No such allocation is included in the table of costs above.

You are required to:

(a) use linear regression analysis to estimate the relationship of total production costs to volume for the products LT for 2002 (ignore general company overheads and do *not* undertake a separate regression calculation for each item of cost), *(12 marks)*

(b) discuss the advantages and limitations of linear regression analysis for the estimation of cost–volume relationships, *(8 marks)*

(c) comment on the view expressed by the finance director. *(5 marks)*

Ignore taxation.

ICAEW Elements of Financial Decisions

Question SM 10.2 Q Limited used an incremental budgeting approach to setting its budgets for the year ending 30 June 2003.

The budget for the company's power costs was determined by analysing the past relationship between costs and activity levels and then adjusting for inflation of 6%.

The relationship between monthly cost and activity levels, before adjusting for 6% inflation, was found to be:

$$y = £(14\,000 + 0.0025x^2)$$

where y = total cost; and
x = machine hours

In April 2003, the number of machine hours was 1525 and the actual cost incurred was £16 423. The total power cost variance to be reported is nearest to

A £3391 (A) B £3391 (F) C £3740 (F) D £4580 (F)

CIMA Management Accounting – Performance Management

Question SM 10.3 The overhead costs of RP Limited have been found to be accurately represented by the formula

$$y = £10\,000 + £0.25x$$

where y is the montly cost and x represents the activity level measured in machine hours.

Monthly activity levels, in machine hours, may be estimated using a combined regression analysis and time series model:

$$a = 100\,000 + 30b$$

where a represents the de-seasonalised monthly activity level and b represents the month number.

In month 240, when the seasonal index value is 108, the overhead cost (to the nearest £1000) is expected to be

A £35 000 B £37 000 C £39 000 D £41 000

(3 marks)

CIMA Management Accounting – Performance Management

Measuring relevant costs and revenues for decision-making

Question SM 11.1 Make or buy decision

The management of Springer plc is considering next year's production and purchase budgets.

One of the components produced by the company, which is incorporated into another product before being sold, has a budgeted manufacturing cost as follows:

	(£)
Direct material	14
Direct labour (4 hours at £3 per hour)	12
Variable overhead (4 hours at £2 per hour)	8
Fixed overhead (4 hours at £5 per hour)	20
Total cost	54 per unit

Trigger plc has offered to supply the above component at a guaranteed price of £50 per unit.

Required:

(a) Considering cost criteria only, advise management whether the above component should be purchased from Trigger plc. Any calculations should be shown and assumptions made, or aspects which may require further investigation should be clearly stated. *(6 marks)*

(b) Explain how your above advice would be affected by each of the two *separate* situations shown below.

(i) As a result of recent government legislation if Springer plc continues to manufacture this component the company will incur additional inspection and testing expenses of £56 000 per annum, which are not included in the above budgeted manufacturing costs. *(3 marks)*

(ii) Additional labour cannot be recruited and if the above component is not manufactured by Springer plc the direct labour released will be employed in increasing the production of an existing product which is sold for £90 and which has a budgeted manufacturing cost as follows:

	(£)
Direct material	10
Direct labour (8 hours at £3 per hour)	24
Variable overhead (8 hours at £2 per hour)	16
Fixed overhead (8 hours at £5 per hour)	40
	90 per unit

All calculations should be shown. *(4 marks)*

(c) The production director of Springer plc recently said:

> 'We must continue to manufacture the component as only one year ago we purchased some special grinding equipment to be used exclusively by this component. The equipment cost £100 000, it cannot be resold or used elsewhere and if we cease production of this component we will have to write off the written down book value which is £80 000.'

Draft a brief reply to the production director commenting on his statement.

(4 marks)
(Total 17 marks)
ACCA Level 1 Costing

Question SM 11.2 Calculation of minimum selling price

You have received a request from EXE plc to provide a quotation for the manufacture of a specialized piece of equipment. This would be a one-off order, in excess of normal budgeted production. The following cost estimate has already been prepared:

		Note	**(£)**
Direct materials:			
Steel	10 m^2 at £5.00 per sq. metre	1	50
Brass fittings		2	20
Direct labour			
Skilled	25 hours at £8.00 per hour	3	200
Semi-skilled	10 hours at £5.00 per hour	4	50
Overhead	35 hours at £10.00 per hour	5	350
Estimating time		6	100
			770
Administrative overhead at 20% of production cost		7	154
			924
Profit at 25% of total cost		8	231
Selling price			1155

Notes

1. The steel is regularly used, and has a current stock value of £5.00 per sq. metre. There are currently 100 sq. metres in stock. The steel is readily available at a price of £5.50 per sq. metre.
2. The brass fittings would have to be bought specifically for this job: a supplier has quoted the price of £20 for the fittings required.
3. The skilled labour is currently employed by your company and paid at a rate of £8.00 per hour. If this job were undertaken it would be necessary either to work 25 hours overtime which would be paid at time plus one half *or* to reduce production of another product which earns a contribution of £13.00 per hour.
4. The semi-skilled labour currently has sufficient paid idle time to be able to complete this work.
5. The overhead absorption rate includes power costs which are directly related to machine usage. If this job were undertaken, it is estimated that the machine time required would be ten hours. The machines incur power costs of £0.75 per hour. There are no other overhead costs which can be specifically identified with this job.
6. The cost of the estimating time is that attributed to the four hours taken by the engineers to analyse the drawings and determine the cost estimate given above.
7. It is company policy to add 20% on to the production cost as an allowance against administration costs associated with the jobs accepted.
8. This is the standard profit added by your company as part of its pricing policy.

Required:
(a) Prepare, on a relevant cost basis, the lowest cost estimate that could be used as the basis for a quotation. Explain briefly your reasons for using *each* of the values in your estimate. *(12 marks)*
(b) There may be a possibility of repeat orders from EXE plc which would occupy part of normal production capacity. What factors need to be considered before quoting for this order? *(7 marks)*
(c) When an organisation identifies that it has a single production resource which is in short supply, but is used by more than one product, the optimum production plan is determined by ranking the products according to their contribution per unit of the scarce resource.
Using a numerical example of your own, reconcile this approach with the opportunity cost approach used in (a) above. *(6 marks)*

(Total 25 marks)

CIMA Stage Operational Cost Accounting

Question SM 11.3 Impact of a product abandonment decision and CVP analysis

(a) Budgeted information for A Ltd for the following period, analysed by product, is shown below:

	Product I	Product II	Product III
Sales units (000s)	225	376	190
Selling price (£ per unit)	11.00	10.50	8.00
Variable costs (£ per unit)	5.80	6.00	5.20
Attributable fixed costs (£000s)	275	337	296

General fixed costs, which are apportioned to products as a percentage of sales, are budgeted at £1 668 000.

Required:
(i) Calculate the budgeted profit of A Ltd, and of each of its products. *(5 marks)*
(ii) Recalculate the budgeted profit of A Ltd on the assumption that Product III is discontinued, with no effect on sales of the other two products. State and justify other assumptions made. *(5 marks)*
(iii) Additional advertising, to that included in the budget for Product I, is being considered.
Calculate the minimum extra sales units required of Product I to cover additional advertising expenditure of £80 000. Assume that all other existing fixed costs would remain unchanged. *(3 marks)*
(iv) Calculate the increase in sales volume of Product II that is necessary in order to compensate for the effect on profit of a 10% reduction in the selling price of the product. State clearly any assumptions made. *(5 marks)*

(b) Discuss the factors which influence cost behaviour in response to changes in activity. *(7 marks)*

(Total 25 marks)

ACCA Cost and Management Accounting 1

Question SM 11.4 Price/output and key factor decisions

You work as a trainee for a small management consultancy which has been asked to advise a company, Rane Limited, which manufactures and sells a single product. Rane is currently operating at full capacity producing and selling 25 000 units of its product each year. The cost and selling price structure for this level of activity is as follows:

	At 25 000 units output	
	(£ per unit)	**(£ per unit)**
Production costs		
Direct material	14	
Direct labour	13	
Variable production overhead	4	
Fixed production overhead	8	
Total production cost		39
Selling and distribution overhead:		
Sales commission – 10% of sales value	6	
Fixed	3	
		9
Administration overhead:		
Fixed		2
Total cost		50
Mark up – 20%		10
Selling price		60

A new managing director has recently joined the company and he has engaged your organisation to advise on his company's selling price policy. The sales price of £60 has been derived as above from a cost-plus pricing policy. The price was viewed as satisfactory because the resulting demand enabled full capacity operation.

You have been asked to investigate the effect on costs and profit of an increase in the selling price. The marketing department has provided you with the following estimates of sales volumes which could be achieved at the three alternative sales prices under consideration.

Selling price per unit	£70	£80	£90
Annual sales volume (units)	20 000	16 000	11 000

You have spent some time estimating the effect that changes in output volume will have on cost behaviour patterns and you have now collected the following information.

Direct material: The loss of bulk discounts means that the direct material cost per unit will increase by 15% for all units produced in the year if activity reduces below 15 000 units per annum.

Direct labour: Savings in bonus payments will reduce labour costs by 10% for all units produced in the year if activity reduces below 20 000 units per annum.

Sales commission: This would continue to be paid at the rate of 10% of sales price.

Fixed production overhead: If annual output volume was below 20 000 units, then a machine rental cost of £10 000 per annum could be saved. This will be the only change in the total expenditure on fixed production overhead.

Fixed selling overhead: A reduction in the part-time sales force would result in a £5000 per annum saving if annual sales volume falls below 24 000 units. This will be the only change in the total expenditure on fixed selling and distribution overhead.

Variable production overhead: There would be no change in the unit cost for variable production overhead.

Administration overhead: The total expenditure on administration overhead would remain unaltered within this range of activity.

Stocks: Rane's product is highly perishable, therefore no stocks are held.

Task 1

(a) Calculate the annual profit which is earned with the current selling price of £60 per unit.

(b) Prepare a schedule to show the annual profit which would be earned with each of the three alternative selling prices.

Task 2

Prepare a brief memorandum to your boss, Chris Jones. The memorandum should cover the following points:

(a) Your recommendation as to the selling price which should be charged to maximise Rane Limited's annual profits.

(b) *Two* non-financial factors which the management of Rane Limited should consider before planning to operate below full capacity.

Another of your consultancy's clients is a manufacturing company, Shortage Limited, which is experiencing problems in obtaining supplies of a major component. The component is used in all of its four products and there is a labour dispute at the supplier's factory, which is restricting the component's availability.

Supplies will be restricted to 22 400 components for the next period and the company wishes to ensure that the best use is made of the available components. This is the only component used in the four products, and there are no alternatives and no other suppliers.

The components cost £2 each and are used in varying amounts in each of the four products.

Shortage Limited's fixed costs amount to £8000 per period. No stocks are held of finished goods or work in progress.

The following information is available concerning the products.

Maximum demand per period	**Product A 4000 units (£ per unit)**	**Product B 2500 units (£ per unit)**	**Product C 3600 units (£ per unit)**	**Product D 2750 units (£ per unit)**
Selling price	14	12	16	17
Component costs	4	2	6	8
Other variable costs	7	9	6	4

Task 3

(a) Prepare a recommended production schedule for next period which will maximise Shortage Limited's profit.

(b) Calculate the profit that will be earned in the next period if your recommended production schedule is followed.

AAT Technicians Stage

The application of linear programming to management accounting

Question SM 12.1 Optimal output and calculation of shadow prices using graphical approach

MF plc manufactures and sells two types of product to a number of customers. The company is currently preparing its budget for the year ending 31 December 2003 which it divides into 12 equal periods.

The cost and resource details for each of the company's product types are as follows:

	Product type M	Product type F
	£	£
Selling price per unit	200	210
Variable costs per unit		
Direct material P (£2.50 per litre)	20	25
Direct material Q (£4.00 per litre)	40	20
Direct labour (£7.00 per hour)	28	35
Overhead (£4.00 per hour)	16	20
Fixed production cost per unit	40	50
	Units	*Units*
Maximum sales demand in period 1	1000	3000

The fixed production cost per unit is based upon an absorption rate of £10 per direct labour hour and a total annual production activity of 180 000 direct labour hours. One-twelfth of the annual fixed production cost will be incurred in period 1.

In addition to the above costs, non-production overhead costs are expected to be £57 750 in period 1.

During period 1, the availability of material P is expected to be limited to 31 250 litres. Other materials and sufficient direct labour are expected to be available to meet demand.

It is MF plc's policy not to hold stocks of finished goods.

Required:

(a) Calculate the number of units of product types M and F that should be produced and sold in period 1 in order to maximize profit. *(4 marks)*

(b) Using your answer to (a) above, prepare a columnar budgeted profit statement for period 1 in a marginal cost format. *(4 marks)*

After presenting your statement to the budget management meeting, the production manager has advised you that in period 1 the other resources will also be limited. The maximum resources available will be:

Material P	31 250 litres
Material Q	20 000 litres
Direct labour	17 500 hours

It has been agreed that these factors should be incorporated into a revised plan and that the objective should be to make as much profit as possible from the available resources.

Required:

(c) Use graphical linear programming to determine the revised production plan for period 1. State clearly the number of units of product types M and F that are to be produced. *(10 marks)*

(d) Using your answer to part (c) above, calculate the profit that will be earned from the revised plan. *(3 marks)*

(e) Calculate and explain the meaning of the shadow price for material Q. *(5 marks)*

(f) Discuss the other factors that should be considered by MF plc in relation to the revised production plan. *(4 marks)*

(Total 30 marks)

CIMA Management Accounting – Performance Management

Question SM 12.2
Limiting factor optimum production and the use of simultaneous equations where more than one scarce factor exists

A company manufactures two products (X and Y) in one of its factories. Production capacity is limited to 85 000 machine hours per period. There is no restriction on direct labour hours.

The following information is provided concerning the two products:

	Product X	**Product Y**
Estimated demand (000 units)	315	135
Selling price (per unit)	£11.20	£15.70
Variable costs (per unit)	£6.30	£8.70
Fixed costs (per unit)	£4.00	£7.00
Machine hours (per 000 units)	160	280
Direct labour hours (per 000 units)	120	140

Fixed costs are absorbed into unit costs at a rate per machine hour based upon full capacity.

Required:

(a) Calculate the production quantities of Products X and Y which are required per period in order to maximise profit in the situation described above. *(5 marks)*

(b) Prepare a marginal costing statement in order to establish the total contribution of each product, and the net profit per period, based on selling the quantities calculated in (a) above. *(4 marks)*

(c) Calculate the production quantities of Products X and Y per period which would fully utilise both machine capacity and direct labour hours, where the available direct labour hours are restricted to 55 000 per period. (The limit of 85 000 machine hours remains.) *(5 marks)*

(Total 14 marks)

ACCA Foundation Paper 3

Activity-based costing

Question SM 13.1 Preparation of conventional costing and ABC profit statements

The following budgeted information relates to Brunti plc for the forthcoming period:

	Products		
	XYI (000)	**YZT (000)**	**ABW (000)**
Sales and production (units)	50	40	30
	(£)	(£)	(£)
Selling price (per unit)	45	95	73
Prime cost (per unit)	32	84	65
	Hours	**Hours**	**Hours**
Machine department (machine hours per unit)	2	5	4
Assembly department (direct labour hours per unit)	7	3	2

Overheads allocated and apportioned to production departments (including service cost centre costs) were to be recovered in product costs as follows:

Machine department at
£1.20 per machine hour
Assembly department at
£0.825 per direct labour hour

You ascertain that the above overheads could be re-analysed into 'cost pools' as follows:

Cost pool	**£000**	**Cost driver**	**Quantity for the period**
Machining services	357	Machine hours	420 000
Assembly services	318	Direct labour hours	530 000
Set-up costs	26	Set-ups	520
Order processing	156	Customer orders	32 000
Purchasing	84	Suppliers orders	11 200
	941		

You have also been provided with the following estimates for the period:

	Products		
	XYI	**YZT**	**ABW**
Number of set-ups	120	200	200
Customer orders	8000	8000	16 000
Suppliers' orders	3000	4000	4 200

Required:

(a) Prepare and present profit statements using:
  (i) conventional absorption costing; *(5 marks)*
  (ii) activity-based costing; *(10 marks)*

(b) Comment on why activity-based costing is considered to present a fairer valuation of the product cost per unit. *(5 marks)*

(Total 20 marks)

ACCA Paper 8 Managerial Finance

Question SM 13.2

In a marginal costing system only variable costs would be assigned to products or services, in which case management may rely on a *contribution approach to decisions*.

Required:

(a) Explain and discuss the contribution approach to decisions giving brief examples and drawing attention to any limitations. *(6 marks)*

A full absorption costing system would involve the assignment of both variable and fixed overhead costs to products. A traditional full absorption costing system typically uses a *single volume related allocation base (or cost driver)* to assign overheads to products. An activity based costing (ABC) system would use *multiple allocation bases (or cost drivers)*, taking account of *different categories of activities and related overhead costs* such as unit, batch, product sustaining and facility sustaining.

Required:

(b) Describe the likely stages involved in the design and operation of an ABC system. *(4 marks)*

(c) Explain and discuss volume related allocation bases (or cost drivers), giving an example of one within a traditional costing system. Contrast this with the multiple allocation bases (or cost drivers) of an ABC system. *(6 marks)*

(d) Briefly elaborate on the different categories of activities and related overhead costs, such as unit, batch, product sustaining and facility sustaining, which may be used in an ABC system. *(4 marks)*

(Total 20 marks)

ACCA Paper 8 Managerial Finance

Question SM 13.3 Computation of product costs for traditional and ABC systems

The following information provides details of the costs, volume and cost drivers for a particular period in respect of ABC plc, a hypothetical company:

	Product X	Product Y	Product Z	Total
1. Production and sales (units)	30 000	20 000	8 000	
2. Raw material usage (units)	5	5	11	
3. Direct material cost	£25	£20	£11	£1 238 000
4. Direct labour hours	$1\frac{1}{3}$	2	1	88 000
5. Machine hours	$1\frac{1}{3}$	1	2	76 000
6. Direct labour cost	8	£12	£6	
7. Number of production runs	3	7	20	30
8. Number of deliveries	9	3	20	32
9. Number of receipts (2 × 7)[a]	15	35	220	270
10. Number of production orders	15	10	25	50
11. Overhead costs:				
Set-up	30 000			
Machines	760 000			
Receiving	435 000			
Packing	250 000			
Engineering	373 000			
	£1 848 000			

[a] The company operates a just-in-time inventory policy, and receives each component once per production run.

In the past the company has allocated overheads to products on the basis of direct labour hours.

However, the majority of overheads are more closely related to machine hours than direct labour hours.

The company has recently redesigned its cost system by recovering overheads using two volume-related bases: machine hours and a materials handling overhead rate for recovering overheads of the receiving department. Both the current and the previous cost system reported low profit margins for product X, which is the company's highest-selling product. The management accountant has recently attended a conference on activity-based costing, and the overhead costs for the last period have been analysed by the major activities in order to compute activity-based costs.

From the above information you are required to:

(a) Compute the product costs using a traditional volume-related costing system based on the assumptions that:
   (i) all overheads are recovered on the basis of direct labour hours (i.e. the company's past product costing system);
   (ii) the overheads of the receiving department are recovered by a materials handling overhead rate and the remaining overheads are recovered using a machine hour rate (i.e. the company's current costing system).

(b) Compute product costs using an activity-based costing system.

(c) Briefly explain the differences between the product cost computations in (a) and (b).

Decision-making under conditions of risk and uncertainty

Question SM 14.1 Calculation of expected value and the presentation of a probability distribution

The Dunburgh Bus Company operated during the year ended 31 May 2000 with the following results:

(i) Average variable costs were £0.75 per bus mile.
(ii) Total fixed costs were £1 750 000.
(iii) The fare structure per journey was as follows:

Adults 0 to 3 miles	£0.20
4 to 5 miles	£0.30
over 5 miles	£0.50
Juveniles (any distance)	£0.15
Senior citizens (any distance)	£0.10

(iv) Total passenger journeys paid for were 24 000 000 which represented 60% capacity utilisation. The capacity utilised comprised 60% adult, 20% juvenile and 20% senior citizen journeys. The adult journeys were broken down into 0–3 miles: 50%, 4–5 miles: 30%, over 5 miles: 20%.
(v) Twenty routes were operated with four buses per route, each bus covering 150 miles per day for 330 days of the year. The remaining days were taken up with maintenance work on the buses.
(vi) Advertising revenue from displays inside and outside the buses totalled £250 000 for the year. This is a fixed sum from contracts which will apply to each year up to 31 May 2002.

It is anticipated that all costs will increase by 10% due to inflation during the year to 31 May 2001 and that fares will be increased by 5% during the year. Whilst the fare increase of 5% has already been agreed and cannot be altered, it is possible that inflation might differ from the 10% rate anticipated.

Required:
(a) Prepare a statement showing the calculation of the net profit or loss for the year ended 31 May 2000 *(5 marks)*
(b) Calculate the average percentage capacity utilisation at which the company will break even during the forthcoming year to 31 May 2001 if all fares are increased by 5%, cost inflation is 10% as anticipated and the passenger mix and bus operating activity are the same as for the year to 31 May 2000. *(5 marks)*
(c) Now assume that management have some doubts about the level of capacity utilisation and rate of cost inflation which will apply in the year to 31 May 2001. Other factors are as previously forecast. Revised estimates of the likely levels of capacity utilisation and inflation are as follows:

Capacity utilisation	**Probability**	**Inflation**	**Probability**
70%	0.1	8%	0.3
60%	0.5	10%	0.6
50%	0.4	12%	0.1

(Capacity utilisation rates and inflation rates are independent of each other.)

(i) Calculate the expected value of net profit or loss for the year to 31 May 2001 and show the range of profits or losses which may occur. *(9 marks)*

(ii) Draw up a table of the possible profits and losses and their probabilities as calculated in (i) for the year ended 31 May 2001 in a way which brings to the attention of management the risks and opportunities which are implied and comment briefly on the figures. *(5 marks)*

(d) Comment on factors which have not been incorporated into the model used in (c) above which may affect its usefulness to management in profit forecasting. *(6 marks)*

(Total 30 marks)

ACCA Level 2 Cost Accounting

Question SM 14.2 Pricing decision and the calculation of expected profit and margin of safety

E Ltd manufactures a hedge-trimming device which has been sold at £16 per unit for a number of years. The selling price is to be reviewed and the following information is available on costs and likely demand.

The standard variable cost of manufacture is £10 per unit and an analysis of the cost variances for the past 20 months show the following pattern which the production manager expects to continue in the future.

Adverse variances of +10% of standard variable cost occurred in ten of the months.

Nil variances occurred in six of the months.

Favourable variances of –5% of standard variable cost occurred in four of the months.

Monthly data

Fixed costs have been £4 per unit on an average sales level of 20 000 units but these costs are expected to rise in the future and the following estimates have been made for the total fixed cost:

	(£)
Optimistic estimate (Probability 0.3)	82 000
Most likely estimate (Probability 0.5)	85 000
Pessimistic estimate (Probability 0.2)	90 000

The demand estimates at the two new selling prices being considered are as follows:

If the selling price/unit is demand would be:	**£17**	**£18**
Optimistic estimate (Probability 0.2)	21 000 units	19 000 units
Most likely estimate (Probability 0.5)	19 000 units	17 500 units
Pessimistic estimate (Probability 0.3)	16 500 units	15 500 units

It can be assumed that all estimates and probabilities are independent.

You are required to

(a) advise management, based only on the information given above, whether they should alter the selling price and, if so, the price you would recommend; *(6 marks)*

(b) calculate the expected profit at the price you recommend and the resulting margin of safety, expressed as a percentage of expected sales; *(6 marks)*

(c) criticise the method of analysis you have used to deal with the probabilities given in the question; *(4 marks)*

(d) describe briefly how computer assistance might improve the analysis. *(4 marks)*

(Total 20 marks)

CIMA Stage 3 Management Accounting Techniques

Capital investment decisions

Question SM 15.1

An investment project has the following expected cash flows over its economic life of three years:

	(£)
Year 0	(142 700)
1	51 000
2	62 000
3	73 000

Required:

(i) Calculate the net present value (NPV) of the project at discount rates of 0%, 10% and 20% respectively.

(ii) Draw a graph of the project NPVs calculated in (i) and use the graph to estimate, and clearly indicate, the project internal rate of return (IRR) to the nearest integer percentage. *(8 marks)*

ACCA Foundation Stage Paper 3

Question SM 15.2 Calculation of payback, accounting rate of return and NPV

P, a multinational organization, is currently appraising a major capital investment project which will revolutionise its business. This investment involves the installation of an Intranet. *[An Intranet is a private Internet reserved for use by employees and/or customers who have been given the authority and passwords necessary to use that network. It is a private network environment built around Internet technologies and standards.]*

You have recently been appointed as the Management Accountant for this project and have been charged with the responsibility of preparing the financial evaluation of the proposed investment. You have carried out some initial investigations and find that management currently uses a target accounting rate of return of 25% and a target payback period of four years as the criteria for the acceptance or rejection of major capital investments.

You propose to use the net present value method of project appraisal and, having carried out some further investigations, you ascertain the following information for the project:

	£000
Initial outlay	2000
Cash savings:	
Years 1 to 3	400 per annum
Years 4 to 5	500 per annum
Years 6 to 8	450 per annum
Years 9 to 10	400 per annum

At the end of the project's life, no residual value is expected for the project.

The company's cost of capital is 15% per annum. All cash savings are assumed to occur at the end of each year.

Ignore taxation and inflation.

Required:
As Management Accountant for this project, you are required to:
(a) write a report to the management of P which incorporates the following:
  (i) a full analysis and evaluation of the existing methods of project appraisal and of your proposed method of project appraisal;
  (ii) a recommendation on a purely financial basis as to whether or not the project should be undertaken;
  (iii) a discussion of the difficulties associated with the net present value method when appraising this type of investment; *(15 marks)*

CIMA Management Accountant – Decision Making

Question SM 15.3 Discussion of alternative investment appraisal techniques and the calculation of payback and NPV for two mutually exclusive projects

(a) Explain why Net Present Value is considered technically superior to Payback and Accounting Rate of Return as an investment appraisal technique even though the latter are said to be easier to understand by management. Highlight the strengths of the Net Present Value method and the weaknesses of the other two methods. *(8 marks)*

(b) Your company has the option to invest in projects T and R but finance is only available to invest in one of them.
You are given the following projected data:

Project		**T** **(£)**	**R** **(£)**
Initial cost		70 000	60 000
Profits:	Year 1	15 000	20 000
	Year 2	18 000	25 000
	Year 3	20 000	(50 000)
	Year 4	32 000	10 000
	Year 5	18 000	3 000
	Year 6		2 000

You are told:
(1) All cash flows take place at the end of the year apart from the original investment in the project which takes place at the beginning of the project.
(2) Project T machinery is to be disposed of at the end of year 5 with a scrap value of £10 000.
(3) Project R machinery is to be disposed of at the end of year 3 with a nil scrap value and replaced with new project machinery that will cost £75 000.
(4) The cost of this additional machinery has been deducted in arriving at the profit projections for R for year 3. It is projected that it will last for three years and have a nil scrap value.
(5) The company's policy is to depreciate its assets on a straight line basis.
(6) The discount rate to be used by the company is 14%.

Required:
(i) If investment was to be made in project R determine whether the machinery should be replaced at the end of year 3. *(4 marks)*
(ii) Calculate for projects T and R taking into consideration your decision in (i) above:
  (a) Payback period
  (b) Net present value and advise which project should be invested in, stating your reasons. *(10 marks)*

(c) Explain what the discount rate of 14% represents and state two ways how it might have been arrived at. *(3 marks)*

(Total 25 marks)

AAT Cost Accounting and Budgeting

Question SM 15.4 Calculation of NPV incorporating taxation

Sound Equipment Ltd was formed five years ago to manufacture parts for hi-fi equipment. Most of its customers were individuals wanting to assemble their own systems. Recently, however, the company has embarked on a policy of expansion and has been approached by JBZ plc, a multinational manufacturer of consumer electronics. JBZ has offered Sound Equipment Ltd a contract to build an amplifier for its latest consumer product. If accepted, the contract will increase Sound Equipment's turnover by 20%.

JBZ's offer is a fixed price contract over three years, although it is possible for Sound Equipment to apply for subsequent contracts. The contract will involve Sound Equipment purchasing a specialist machine for £150,000. Although the machine has a 10-year life, it would be written off over the three years of the initial contract as it can only be used in the manufacture of the amplifier for JBZ.

The production director of Sound Equipment has already prepared a financial appraisal of the proposal. This is reproduced below. With a capital cost of £150,000 and total profits of £60 300, the production director has calculated the return on capital employed as 40.2%. As this is greater than Sound Equipment's cost of capital of 18%, the production director is recommending that the board accepts the contract.

	Year 1 (£)	Year 2 (£)	Year 3 (£)	Total
Turnover	180 000	180 000	180 000	540 000
Materials	60 000	60 000	60 000	180 000
Labour	40 000	40 000	40 000	120 000
Depreciation	50 000	50 000	50 000	150 000
Pre-tax profit	30 000	30 000	30 000	90 000
Corporation tax at 33%	9 900	9 900	9 900	29 700
After tax profit	20 100	20 100	20 100	60 300

You are employed as the assistant accountant to Sound Equipment Ltd and report to John Green, the financial director, who asks you to carry out a full financial appraisal of the proposed contract. He feels that the production director's presentation is inappropriate. He provides you with the following additional information:

- Sound Equipment pays corporation tax at the rate of 33%;
- the machine will qualify for a 25% writing-down allowance on the reducing balance;
- the machine will have no further use other than in manufacturing the amplifier for JBZ;
- on ending the contract with JBZ, any outstanding capital allowances can be claimed as a balancing allowance;
- the company's cost of capital is 18%;
- the cost of materials and labour is forecast to increase by 5% per annum for years 2 and 3.

John Green reminds you that Sound Equipment operates a just-in-time stock policy and that production will be delivered immediately to JBZ, who will, under the terms of the contract, immediately pay for the deliveries. He also reminds you that suppliers are paid immediately on receipt of goods and that employees are also paid immediately.

Write a report to the financial director. Your report should:

(a) use the net present value technique to identify whether or not the initial three-year contract is worthwhile;
(b) explain your approach to taxation in your appraisal;
(c) identify *one* other factor to be considered before making a final decision.

Notes:
For the purpose of this task, you may assume the following:

- the machine would be purchased at the beginning of the accounting year;
- there is a one-year delay in paying corporation tax;
- all cashflows other than the purchase of the machine occur at the end of each year;
- Sound Equipment has no other assets on which to claim capital allowances.

AAT Technicians Stage

The budgeting process

Question SM 16.1 Preparation of functional budgets

Wollongong wishes to calculate an operating budget for the forthcoming period. Information regarding products, costs and sales levels is as follows:

Product	A	B
Materials required		
X (kg)	2	3
Y (litres)	1	4
Labour hours required		
Skilled (hours)	4	2
Semi-skilled (hours)	2	5
Sales level (units)	2000	1500
Opening stocks (units)	100	200

Closing stock of materials and finished goods will be sufficient to meet 10% of demand. Opening stocks of material X was 300 kg and for material Y was 1000 litres. Material prices are £10 per kg for material X and £7 per litre for material Y. Labour costs are £12 per hour for the skilled workers and £8 per hour for the semi skilled workers.

Required:
Produce the following budgets:
(a) production (units);
(b) materials usage (kg and litres);
(c) materials purchases (kg, litres and £); and
(d) labour (hours and £). *(10 marks)*

ACCA Paper 1.2 – Financial information for Management

Question SM 16.2 Preparation of functional budgets and budgeted profit statement

A division of Bud plc is engaged in the manual assembly of finished products F1 and F2 from bought-in components. These products are sold to external customers. The budgeted sales volumes and prices for Month 9 are as follows:

Product	Units	Price
F1	34 000	£50.00
F2	58 000	£30.00

Finished goods stockholding budgeted for the end of Month 9, is 1000 units of F1 and 2000 units of F2, with no stock at the beginning of that month. The purchased components C3 and C4 are used in the finished products in the quantities shown below. The unit price is for just-in-time delivery of the components; the company holds no component stocks.

	Component	
Product	C3	C4
F1 (per unit)	8 units	4 units
F2 (per unit)	4 units	3 units
Price (each)	£1.25	£1.80

The standard direct labour times and labour rates and the budgeted monthly manufacturing overhead costs for the assembly and finishing departments for Month 9 are given below:

Product	**Assembly**	**Finishing**
F1 (per unit)	30 minutes	12 minutes
F2 (per unit)	15 minutes	10 minutes
Labour rate (per hour)	£5.00	£6.00
Manufacturing overhead cost for the month	£617 500	£204 000

Every month a predetermined direct labour hour recovery rate is computed in each department for manufacturing overhead and applied to items produced in that month.

The selling overhead of £344 000 per month is applied to products based on a predetermined percentage of the budgeted sales value in each month.

Required:

(a) Prepare summaries of the following budgets for Month 9:
  (i) component purchase and usage (units and value);
  (ii) direct labour (hours and value);
  (iii) departmental manufacturing overhead recovery rates;
  (iv) selling overhead recovery rate;
  (v) stock value at the month-end. *(8 marks)*

(b) Tabulate the standard unit cost and profit of each of F1 and F2 in Month 9. *(3 marks)*

(c) Prepare a budgeted profit and loss account for Month 9 which clearly incorporates the budget values obtained in (a) above. *(3 marks)*

(d) Explain clearly the implications of the company's treatment of manufacturing overheads, i.e. computing a monthly overhead rate, compared to a predetermined overhead rate prepared annually. *(6 marks)*

(Total 20 marks)

ACCA Paper 8 Managerial Finance

Question SM 16.3 Preparation of cash budgets

A redundant manager who received compensation of £80 000 decides to commence business on 4 January, manufacturing a product for which he knows there is a ready market. He intends to employ some of his former workers who were also made redundant but they will not all commence on 4 January. Suitable premises have been found to rent and second-hand machinery costing £60 000 has been bought out of the £80 000. This machinery has an estimated life of five years from January and no residual value.

Other data

1. Production will begin on 4 January and 25% of the following month's sales will be manufactured in January. Each month thereafter the production will consist of 75% of the current month's sales and 25% of the following month's sales.
2. Estimated sales are

	(Units)	**(£)**
January	Nil	Nil
February	3200	80 000
March	3600	90 000
April	4000	100 000
May	4000	100 000

3. Variable production cost per unit

	(£)
Direct materials	7
Direct wages	6
Variable overhead	2
	15

4. Raw material stocks costing £10 000 have been purchased (out of the manager's £80 000) to enable production to commence and it is intended to buy, each month, 50% of the materials required for the following month's production requirements. The other 50% will be purchased in the month of production. Payment will be made 30 days after purchase.
5. Direct workers have agreed to have their wages paid into bank accounts on the seventh working day of each month in respect of the previous month's earnings.
6. Variable production overhead: 60% is to be paid in the month following the month it was incurred and 40% is to be paid one month later.
7. Fixed overheads are £4000 per month. One quarter of this is paid in the month incurred, one half in the following month, and the remainder represents depreciation on the second-hand machinery.
8. Amounts receivable: a 5% cash discount is allowed for payment in the current month and 20% of each month's sales qualify for this discount. 50% of each month's sales are received in the following month, 20% in the third month and 8% in the fourth month. The balance of 2% represents anticipated bad debts.

You are required to:

(a) (i) prepare a cash budget for each of the first four months, assuming that overdraft facilities will be available; *(17 marks)*

(ii) state the amount receivable from customers in May; *(4 marks)*

(b) describe briefly the benefits to cash budgeting from the use of a particular type of software package. *(4 marks)*

(Total 25 marks)

CIMA Stage 2 Cost Accounting 2

Management control systems

Question SM 17.1 Preparation of a flexible budget performance report

The Viking Smelting Company established a division, called the reclamation division, two years ago, to extract silver from jewellers' waste materials. The waste materials are processed in a furnace, enabling silver to be recovered. The silver is then further processed into finished products by three other divisions within the company.

A performance report is prepared each month for the reclamation division which is then discussed by the management team. Sharon Houghton, the newly appointed financial controller of the reclamation division, has recently prepared her first report for the four weeks to 31 May. This is shown below:

Performance Report Reclamation Division
4 weeks to 31 May

	Actual	**Budget**	**Variance**	**Comments**
Production (tonnes)	200	250	50 (F)[a]	
	(£)	(£)	(£)	
Wages and social security costs	46 133	45 586	547 (A)	Overspend
Fuel	15 500	18 750	3 250 (F)	
Consumables	2 100	2 500	400 (F)	
Power	1 590	1 750	160 (F)	
Divisional overheads	21 000	20 000	1 000 (A)	Overspend
Plant maintenance	6 900	5 950	950 (A)	Overspend
Central services	7 300	6 850	450 (A)	Overspend
Total	100 523	101 386	863 (F)	

[a](A) = adverse, (F) = favourable

In preparing the budgeted figures, the following assumptions were made for May:

- the reclamation division was to employ four teams of six production employees;
- each employee was to work a basic 42-hour week and be paid £7.50 per hour for the four weeks of May;
- social security and other employment costs were estimated at 40% of basic wages;
- a bonus, shared amongst the production employees, was payable if production exceeded 150 tonnes. This varied depending on the output achieved;

1. if output was between 150 and 199 tonnes, the bonus was £3 per tonne produced;
2. if output was between 200 and 249 tonnes, the bonus was £8 per tonne produced;
3. if output exceeded 249 tonnes the bonus was £13 per tonne produced;

- the cost of fuel was £75 per tonne;
- consumables were £10 per tonne;
- power comprised a fixed charge of £500 per four weeks plus £5 per tonne for every tonne produced;
- overheads directly attributable to the division were £20 000;
- plant maintenance was to be apportioned to divisions on the basis of the capital values of each division;
- the cost of Viking's central services was to be shared equally by all four divisions.

You are the deputy financial controller of the reclamation division. After attending her first monthly meeting with the board of the reclamation division, Sharon Houghton arranges a meeting with you. She is concerned about a number of issues, one of them being that the current report does not clearly identify those expenses and variances which are the direct responsibility of the reclamation division.

Task 1

Sharon Houghton asks you to prepare a flexible budget report for the reclamation division for May in a form consistent with responsibility accounting.

On receiving your revised report. Sharon tells you about the other questions raised at the management meeting when the original report was presented. These are summarised below:

(i) Why are the budget figures based on two-year-old data taken from the proposal recommending the establishment of the reclamation division?
(ii) Should the budget data be based on what we were proposing to do or what we actually did do?
(iii) Is it true that the less we produce the more favourable our variances will be?
(iv) Why is there so much maintenance in a new division with modern equipment and why should we be charged with the actual costs of the maintenance department even when they overspend?
(v) Could the comments, explaining the variances, be improved?
(vi) Should all the variances be investigated?
(vii) Does showing the cost of central services on the divisional performance report help control these costs and motivate the divisional managers?

Task 2

Prepare a memo for the management of the reclamation division. Your memo should:

(a) answer their queries and justify your comments;
(b) highlight the main objective of your revised performance report developed in Task 1 and give two advantages of it over the original report

AAT Technicians Stage

Question SM 17.2 Sales forecasting removing seasonal variations, flexible budgets and budget preparation

You work as the assistant to the management accountant for Henry Limited, a medium-sized manufacturing company. One of its products, product P, has been very successful in recent years, showing a steadily increasing trend in sales volumes. Sales volumes for the four quarters of last year were as follows:

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Actual sales volume (units)	420 000	450 000	475 000	475 000

A new assistant has recently joined the marketing department and she has asked you for help in understanding the terminology which is used in preparing sales forecasts and analysing sales trends. She has said: 'My main problem is that I do not see why my boss is so enthusiastic about the growth in product P's sales volume. It looks to me as though the rate of growth is really slowing down and has actually stopped in quarter 4. I am told that I should be looking at the deseasonalised or seasonally adjusted sales data but I do not understand what is meant by this.'

You have found that product P's sales are subject to the following seasonal variations:

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Seasonal variation (units)	+25 000	+15 000	0	–40 000

Task 1

(a) Adjust for the seasonal variations to calculate deseasonalised or seasonally adjusted sales volume (i.e. the trend figures) for each quarter of last year.
(b) Assuming that the trend and seasonal variations will continue, forecast the sales volumes for each of the four quarters of next year.

Task 2

Prepare a memorandum to the marketing assistant which explains:

(a) what is meant by seasonal variations and deseasonalised or seasonally adjusted data;
(b) how they can be useful in analysing a time series and preparing forecasts.

Use the figures for product P's sales to illustrate your explanations.

Task 3

Using the additional data below, prepare a further memorandum to the marketing assistant which explains the following:

(a) why fixed budgets are useful for planning but flexible budgets may be more useful to enable management to exercise reflective control over distribution costs,
(b) *two* possible activity indicators which could be used as a basis for flexing the budget for distribution costs,
(c) how a flexible budget cost allowance is calculated and used for control purposes. Use your own examples and figures where appropriate to illustrate your explanations.

Additional data:
The marketing assistant has now approached you for more help in understanding the company's planning and control systems. She has been talking with the distribution manager, who has tried to explain how flexible budgets are used to control distribution costs within Henry Limited. She makes the following comment. 'I thought that budgets were supposed to provide a target to plan our activities and against which to monitor our costs. How can we possibly plan and control our costs if we simply change the budgets when activity levels alter?'

Product Q is another product which is manufactured and sold by Henry Limited. In the process of preparing budgetary plans for next year the following information has been made available to you.

1. Forecast sales units of product Q for the year = 18 135 units.
2. Closing stocks of finished units of product Q at the end of next year will be increased by 15% from their opening level of 1200 units.
3. All units are subject to quality control check. The budget plans are to allow for 1% of all units checked to be rejected and scrapped at the end of the process. All closing stocks will have passed this quality control check.
4. Five direct labour hours are to be worked for each unit of product Q processed, including those which are scrapped after the quality control check. Of the total hours to be paid for, 7.5% are budgeted to be idle time.
5. The standard hourly rate of pay for direct employees is £6 per hour.
6. Material M is used in the manufacture of product Q. One finished unit of Q contains 9 kg of M but there is a wastage of 10% of input of material M due to evaporation and spillage during the process.
7. By the end of next year stocks of material M are to be increased by 12% from their opening level of 8000 kg. During the year a loss of 1000 kg is expected due to deterioration of the material in store.

Task 4

Prepare the following budgets for the forthcoming year:

(a) production budget for product Q, in units;
(b) direct labour budget for product Q, in hours and in £;

(c) material usage budget for material M, in kg;
(d) material purchases budget for material M, in kg.

Task 5
The supplier of material M was warned that available supplies will be below the amount indicated in your budget for Task 4 part (d) above. Explain the implications of this shortage and suggest *four* possible actions which could be taken to overcome the problem. For each suggestion, identify any problems which may arise.

AAT Technicians Stage

Question SM 17.3 Preparation of flexible budgets

Data
Rivermede Ltd makes a single product called the Fasta. Last year, Steven Jones, the managing director of Rivermede Ltd, attended a course on budgetary control. As a result, he agreed to revise the way budgets were prepared in the company. Rather than imposing targets for managers, he encouraged participation by senior managers in the preparation of budgets.

An initial budget was prepared but Mike Fisher, the sales director, felt that the budgeted sales volume was set too high. He explained that setting too high a budgeted sales volume would mean his sales staff would be de-motivated because they would not be able to achieve that sales volume. Steven Jones agreed to use the revised sales volume suggested by Mike Fisher.

Both the initial and revised budgets are reproduced below complete with the actual results for the year ended 31 May.

Rivermede Ltd – budgeted and actual costs for the year ended 31 May

Fast production and sales (units)	**Original budget 24 000 (£)**	**Revised budget 20 000 (£)**	**Actual results 22 000 (£)**	**Variances from revised budget 2000 (£)**	**(F)**
Variable costs					
Material	216 000	180 000	206 800	26 800	(A)
Labour	288 000	240 000	255 200	15 200	(A)
Semi-variable costs					
Heat, light and power	31 000	27 000	33 400	6 400	(A)
Fixed costs					
Rent, rates and depreciation	40 000	40 000	38 000	2 000	(F)
	575 000	487 000	533 400	46 400	(A)

Assumptions in the two budgets

1. No change in input prices
2. No change in the quantity of variable inputs per Fasta

As the management accountant at Rivermede Ltd, one of your tasks is to check that invoices have been properly coded. On checking the actual invoices for heat, light and power for the year to 31 May, you find that one invoice for £7520 had been incorrectly coded. The invoice should have been coded to materials.

Task 1
(a) Using the information in the original and revised budgets, identify:
- the variable cost of material and labour per Fasta;
- the fixed and unit variable cost within heat, light and power.

(b) Prepare a flexible budget, including variances, for Rivermede Ltd after correcting for the miscoding of the invoice.

Data
On receiving your flexible budget statement, Steven Jones states that the total adverse variance is much less than the £46 400 shown in the original statement. He

also draws your attention to the actual sales volume being greater than in the revised budget. He believes these results show that a participative approach to budgeting is better for the company and wants to discuss this belief at the next board meeting. Before doing so, Steven Jones asked for your comments.

Task 2

Write a memo to Steven Jones. Your memo should:

(a) *briefly* explain why the flexible budgeting variances differ from those in the original statement given in the data to task 1;
(b) give *two* reasons why a favourable cost variance may have arisen other than through the introduction of participative budgeting;
(c) give *two* reasons why the actual sales volume compared with the revised budget's sales volume may not be a measure of improved motivation following the introduction of participative budgeting.

AAT Technicians Stage

Question SM 17.4 Demand forecasts and preparation of flexible budgets

Data

Happy Holidays Ltd sells holidays to Xanadu through newspaper advertisements. Tourist are flown each week of the holiday season to Xanadu, where they take a 10-day touring holiday. In 2000, Happy Holidays began to use the least-squares regression formula to help forecast the demand for its holidays.

You are employed by Happy Holidays as an accounting technician in the financial controller's department. A colleague of yours has recently used the least-squares regression formula on a spreadsheet to estimate the demand for holidays per year. The resulting formula was:

$$y = 640 + 40x$$

where y is the annual demand and x is the year. The data started with the number of holidays sold in 1993 and was identified in the formula as year 1. In each subsequent year the value of x increases by 1 so, for example, 1998 was year 6. To obtain the *weekly* demand the result is divided by 25, the number of weeks Happy Holidays operates in Xanadu.

Task 1

(a) Use the least-squares regression formula developed by your colleague to estimate the weekly demand for holidays in Xanadu for 2001.
(b) In preparation for a budget meeting with the financial controller, draft a *brief* note. Your note should identify *three* weaknesses of the least-squares regression formula in forecasting the weekly demand for holidays in Xanadu.

Data

The budget and actual costs for holidays to Xanadu for the 10 days ended 27 November 2000 is reproduced below.

Happy Holidays Ltd Cost Statement
10 days ended 27 November 2000

	Fixed budget (£)	Actual (£)	Variances (£)
Aircraft seats	18 000	18 600	600 A
Coach hire	5 000	4 700	300 F
Hotel rooms	14 000	14 200	200 A
Meals	4 800	4 600	200 F
Tour guide	1 800	1 700	100 F
Advertising	2 000	1 800	200 F
Total costs	45 600	45 600	0

Key: A = adverse, F = favourable

The financial controller gives you the following additional information:

Cost and volume information

- each holiday lasts 10 days;
- meals and hotel rooms are provided for each of the 10 days;
- the airline charges £450 per return flight per passenger for each holiday but the airline will only sell seats at this reduced price if Happy Holidays purchases seats in blocks of 20;
- the costs of coach hire, the tour guide and advertising are fixed costs;
- the cost of meals was budgeted at £12 per tourist per day;
- the cost of a single room was budgeted at £60 per day;
- the cost of a double room was budgeted at £70 per day;
- 38 tourists travelled on the holiday requiring 17 double rooms and 4 single rooms;

Sales information

- the price of a holiday is £250 more if using a single room.

Task 2
Write a memo to the financial controller. Your memo should:

(a) take account of the cost and volume information to prepare a revised cost statement using flexible budgeting and identifying any variances;
(b) state and justify which of the two cost statements is more useful for management control of costs;
(c) identify *three* factors to be taken into account in deciding whether or not to investigate individual variances.

AAT Technicians Stage

Standard costing and variance analysis

Question SM 18.1 Variance analysis and reconciliation of standard with actual cost

SK Limited makes and sells a single product 'Jay' for which the standard cost is as follows:

		£ per unit
Direct materials	4 kilograms at £12.00 per kg	48.00
Direct labour	5 hours at £7.00 per hour	35.00
Variable production overhead	5 hours at £2.00 per hour	10.00
Fixed production overhead	5 hours at £10.00 per hour	50.00
		143.00

The variable production overhead is deemed to vary with the hours worked.

Overhead is absorbed into production on the basis of standard hours of production and the normal volume of production for the period just ended was 20 000 units (100 000 standard hours of production).

For the period under consideration, the actual results were:

Production of 'Jay'	**18 000 units (£)**
Direct material used – 76 000 kg at a cost of	836 000
Direct labour cost incurred – for 84 000 hours worked	604 800
Variable production overhead incurred	172 000
Fixed production overhead incurred	1 030 000

You are required

(a) to calculate and show, by element of cost, the standard cost for the output for the period; *(2 marks)*

(b) to calculate and list the relevant variances in a way which reconciles the standard cost with the actual cost (*Note*: Fixed production overhead sub-variances of capacity and volume efficiency (productivity) are *not* required); *(9 marks)*

(c) to comment briefly on the usefulness to management of statements such as that given in your answer to (b) above. *(4 marks)*

(Total 15 marks)

CIMA Stage 2 Cost Accounting

Question SM 18.2 Reconciliation of budgeted and actual contribution

JK plc operates a chain of fast-food restaurants. The company uses a standard marginal costing system to monitor the costs incurred in its outlets. The standard cost of one of its most popular meals is as follows:

		£ per meal
Ingredients	(1.08 units)	1.18
Labour	(1.5 minutes)	0.15
Variable conversion costs	(1.5 minutes)	0.06
The standard selling price of this meal is		1.99

In one of its outlets, which has budgeted sales and production activity level of 50 000 such meals, the number of such meals that were produced and sold during April 2003 was 49 700. The actual cost data was as follows:

		£
Ingredients	(55 000 units)	58 450
Labour	(1 200 hours)	6 800
Variable conversion costs	(1 200 hours)	3 250
The actual revenue from the sale of the meals was		96 480

Required:

(a) Calculate
  (i) the total budgeted contribution for April 2003;
  (ii) the total actual contribution for April 2003. *(3 marks)*

(b) Present a statement that reconciles the budgeted and actual contribution for April 2003. Show all variances to the nearest £1 and in as much detail as possible. *(17 marks)*

(c) Explain why a marginal costing approach to variance analysis is more appropriate in environments such as that of JK plc, where there are a number of different items being produced and sold. *(5 marks)*

(Total 25 marks)

CIMA Management Accounting – Performance Management

Question SM 18.3 Calculation of labour variances and actual material inputs working backwards from variances

A company manufactures two components in one of its factories. Material A is one of several materials used in the manufacture of both components.

The standard direct labour hours per unit of production and budgeted production quantities for a 13-week period were:

	Standard direct labour hours	**Budgeted production quantities**
Component X	0.40 hours	36 000 units
Component Y	0.56 hours	22 000 units

The standard wage rate for all direct workers was £5.00 per hour.

Throughout the 13-week period 53 direct workers were employed, working a standard 40-hour week.

The following actual information for the 13-week period is available:

Production:
  Component X, 35 000 units
  Component Y, 25 000 units
Direct wages paid, £138 500
Material A purchases, 47 000 kilos costing £85 110
Material A price variance, £430 F
Material A usage (component X), 33 426 kilos
Material A usage variance (component X), £320.32 A

Required:

(a) Calculate the direct labour variances for the period; *(5 marks)*

(b) Calculate the standard purchase price for material A for the period and the standard usage of material A per unit of production of component X. *(8 marks)*

(c) Describe the steps, and information, required to establish the material purchase quantity budget for material A for a period. *(7 marks)*

(Total 20 marks)

ACCA Cost and Management Accounting 1

Question SM 18.4 Comparison of absorption and marginal costing variances

You have been provided with the following data for S plc for September:

Accounting method: Variances:	Absorption (£)	Marginal (£)
Selling price	1900 (A)	1900 (A)
Sales volume	4500 (A)	7500 (A)
Fixed overhead expenditure	2500 (F)	2500 (F)
Fixed overhead volume	1800 (A)	n/a

During September production and sales volumes were as follows:

	Sales	Production
Budget	10 000	10 000
Actual	9 500	9 700

Required:

(a) Calculate:
 (i) the standard contribution per unit;
 (ii) the standard profit per unit;
 (iii) the actual fixed overhead cost total. *(9 marks)*

(b) Using the information presented above, explain why different variances are calculated depending upon the choice of marginal or absorption costing. *(8 marks)*

(c) Explain the meaning of the fixed overhead volume variance and its usefulness to management. *(5 marks)*

(d) Fixed overhead absorption rates are often calculated using a single measure of activity. It is suggested that fixed overhead costs should be attributed to cost units using multiple measures of activity (activity-based costing).
 Explain 'activity-based costing' and how it may provide useful information to managers.
 (Your answer should refer to both the setting of cost driver rates and subsequent overhead cost control.) *(8 marks)*

(Total 30 marks)

CIMA Operational Cost Accounting Stage 2

Question SM 18.5 Calculation of labour, material and overhead variances plus appropriate accounting entries

JC Limited produces and sells one product only, Product J, the standard cost for which is as follows for one unit.

	(£)
Direct material X – 10 kilograms at £20	200
Direct material Y – 5 litres at £6	30
Direct wages – 5 hours at £6	30
Fixed production overhead	50
Total standard cost	310
Standard gross profit	90
Standard selling price	400

The fixed production overhead is based on an expected annual output of 10 800 units produced at an even flow throughout the year; assume each calendar month is equal. Fixed production overhead is absorbed on direct labour hours.

During April, the first month of the financial year, the following were the actual results for an actual production of 800 units.

		(£)
Sales on credit:		320 000
800 units at £400		
Direct materials:		
X 7800 kilogrammes	159 900	
Y 4300 litres	23 650	
Direct wages: 4200 hours	24 150	
Fixed production overhead	47 000	
		254 700
Gross profit		65 300

The material price variance is extracted at the time of receipt and the raw materials stores control is maintained at standard prices. The purchases, bought on credit, during the month of April were:

X 9000 kilograms at £20.50 per kg from K Limited
Y 5000 litres at £5.50 per litre from C plc.

Assume no opening stocks.

Wages owing for March brought forward were £6000.

Wages paid during April (net) £20 150.

Deductions from wages owing to the Inland Revenue for PAYE and NI were £5000 and the wages accrued for April were £5000.

The fixed production overhead of £47 000 was made up of expense creditors of £33 000, none of which was paid in April, and depreciation of £14 000.

The company operates an integrated accounting system.

You are required to

(a) (i) calculate price and usage variances for each material,
(ii) calculate labour rate and efficiency variances,
(iii) calculate fixed production overhead expenditure, efficiency and volume variances; *(9 marks)*

(b) show all the accounting entries in T accounts for the month of April – the work-in-progress account should be maintained at standard cost and each balance on the separate variance accounts is to be transferred to a Profit and Loss Account which you are also required to show; *(18 marks)*

(c) explain the reason for the difference between the actual gross profit given in the question and the profit shown in your profit and loss account. *(3 marks)*

(Total 30 marks)

CIMA Stage 2 Cost Accounting

Part II

Solutions

An introduction to cost terms and concepts

Solutions to Chapter 2 questions

Solution SM 2.1

In Chapters 1 and 2 it was pointed out that a management accounting system should generate information to meet the following requirements:

1. to allocate costs between cost of goods sold and inventories for internal and external profit measurement and inventory valuation;
2. to provide relevant information to help managers to make better decisions;
3. to provide information for planning, control and performance measurement.

The question relates to how costs can be classified for meeting the planning, control and decision-making requirements.

Planning relates to the annual budgeting and long-term processes described in Chapter 15. Within these processes costs can be classified by:

- *Behaviour* – By classifying costs into fixed, variable, semi-fixed and semi-variable categories the outcomes from different activity levels can be examined.
- *Function* – Functions are the different responsibility centres within the organisation. The budget is built up by the functional levels so that everyone in the organisation has a clear understanding of the role that their responsibility centre has in achieving the annual budget.
- *Expense type* – Classifying by expense types provides useful information on the nature, content and trend of different expense categories that is useful for planning how much should be authorised on spending within the different categories.
- *Controllability* – Classifying expenses by responsibility centres determines the individuals who are accountable for achieving the budget and who should thus be involved in setting the budget for the specific responsibility centres.

The management function of control consists of the measurement, reporting and the subsequent correction of performance in an attempt to ensure that a firm's objectives and plans are achieved. Within the control process costs can be classified by:

- *Behaviour* – Costs must be classified by behaviour for comparing actual and budgeted performance using flexible budgets. You should refer to Chapter 16 for a description of flexible budgeting.
- *Function* – For control, cost and revenues should be traced to the heads of the responsibility centres who are responsible for incurring them. For a description of this process you should refer to 'Responsibility accounting' in Chapter 2.
- *Expense type* – This will ensure that like items are compared with one another when budget and actual performance are compared and trends in revenues and different expense categories are monitored.
- *Controllability* – Costs and revenues must be assigned to the responsibility heads who are made accountable for them so that effective control can be exercised.
- *Relevance* – Attention should only be focused on those expense categories where there are significant deviations from the budget. Insignificant deviations are not relevant for cost control. See 'Management by exception' in Chapter 1 for a more detailed explanation of this point.

Decision-making involves choosing between alternative courses of actions. The following classifications are important for decision-making:

- *By behaviour* – Classification of costs by fixed, variable, semi-fixed and semi-variable is necessary for predicting future costs for alternative courses of action. In particular, classification is necessary for cost–volume–profit analysis and identifying break-even levels. You should refer to Chapter 8 for a more detailed discussion of these topics.
- *By expense type* – This is necessary to identify how different cost categories will change as a result of pursuing alternative courses of action.
- *By relevance* – For decision-making it is necessary to distinguish between relevant and irrelevant costs and revenues for alternative courses of action. For a more detailed explanation you should refer to 'Relevant and Irrelevant Costs and Revenues' in Chapter 2.

It is apparent from the above discussion that costs should be classified in different ways for different purposes. This is explained in more detail in the section entitled 'Maintaining a cost database' in Chapter 2.

Solution SM 2.2

(a) A large proportion of non-manufacturing costs are of a discretionary nature. In respect of such costs, management has some significant range of discretion as to the amount it will budget for the particular activity in question. Examples of discretionary costs (sometimes called *managed* or *programmed costs*) include advertising, research and development, and training costs. There is no optimum relationship between inputs (as measured by the costs) and outputs (as measured by revenues or some other objective function) for these costs. Furthermore, they are not predetermined by some previous commitment. In effect, management can determine what quantity of service it wishes to purchase. For example, it can choose to spend small or large amounts on research and development or advertising. The great difficulty in controlling such costs is that there is no established method for determining the appropriate amount to be spent in particular periods.

For a description of fixed and variable costs see Chapter 2. Examples of fixed costs include depreciation of the factory building, supervisors' salaries and leasing charges. Examples of variable costs include direct materials, power and sales commissions.

(b) The £500 000 is a sunk cost and cannot be avoided. It is therefore not a relevant cost for decision-making purposes. The project should be continued because the incremented/relevant benefits exceed the incremental/relevant costs:

	(£000)
Incremental benefits	350
Incremental costs	200
Net incremental benefit	150

(c) An opportunity cost is a cost that measures the opportunity lost or sacrificed when the choice of one course of action requires that an alternative course of action be given up. The following are examples of opportunity costs:

(i) If scarce resources such as machine hours are required for a special contract then the opportunity cost represents the lost profit that would have been earned from the alternative use of the machine hours.

(ii) If an employee is paid £5 per hour and is charged out at £11 per hour for committed work then, if that employee is redirected to other work, the lost contribution of £6 per hour represents the opportunity cost of the employee's time.

The CIMA terminology defines a notional cost as: 'A hypothetical cost taken into account in a particular situation to represent a benefit enjoyed by an entity in respect of which no actual cost is incurred.' The following are examples of notional costs:

(i) interest on capital to represent the notional cost of using an asset rather than investing the capital elsewhere;
(ii) including rent as a cost for premises owned by the company so as to represent the lost rent income resulting from using the premises for business purposes.

Solution SM 2.3

(a) See Chapter 2 for a description of opportunity costs. Out of pocket cost can be viewed as being equivalent to incremental or relevant costs as described in Chapter 2.

(b) Depreciation is not a relevant cost since it will be the same for both alternatives. It is assumed that tyres and miscellaneous represent the additional costs incurred in travelling to work. The relevant costs are:

Using the car to travel to work:

	(£)
Petrol	128
Tyres and miscellaneous	52
	180
Contribution from passenger	120
Relevant cost	60

Using the train:

Relevant cost	£188

(c)

	(£000)	(£000)	(%)
Sales		2560.0	100
Direct materials	819.2		32
Direct wages	460.8		18
Variable production overhead	153.6		6
Variable administration/selling	76.8		3
Total variable cost		1510.4	59
Contribution		1049.6	41
Fixed production overhead[a]	768		30
Fixed administration/selling[b]	224		8.75
		992	
Profit		57.6	2.25

Notes
[a] 100/80 × £2 560 000 × 0.24
[b] 100/80 × £2 560 000 × 0.07

Accounting for direct costs

Solutions to Chapter 3 questions

Solution SM 3.1

(a)

		Y		Z	
(i)		£		£	
	Time-based earnings	154	(44 × £3.50)	180	(40 × £4.50)
	Guaranteed minimum (80%)	123.20		144	
	Piecework earnings	168	(480 × £0.35)	136.50	(390 ×£0.35)
	Earnings	£168		£144	
(ii)	Time taken	44 hrs		40 hrs	
	Time allowed	56 hrs	(480 × 7/60)	45.5 hrs	(390 ×7/60)
	Time saved	12 hrs		5.5 hrs	
	Bonus hours (75% of time saved)	9 hrs		4.125 hrs	
	Hours paid	53 hrs		44.125 hrs	
	Earnings	£185.50		£198.56	

(b) Time rate bases are preferable when:
  (i) quality is more important than quantity;
  (ii) employees have little control over their output.

Solution SM 3.2

(a) For the answer to this question you should refer to the sections on categories of manufacturing cost in Chapter 2 and accounting treatment of various labour cost items in Chapter 3.

(b) *Current system:*

Total weekly wages	£960 (6 × £160)
Weekly wage per employee	£160 (£960/6 employees)
Average output per employee	1000 units (6000 units/6)
Labour cost per unit of output	16p (£960/6000 units)
New system:	
Average output per employee	1000 units (6600 units/6)
Weekly wage per employee	£180 (800 × 16p) + (200 × 17p) + (100 × 18p)
Total weekly wages	£1080 (£180 × 6)
Labour cost per unit of output	16.36p (£1080/6600 units)

Note that the above calculations are based on the assumption that each individual produces the average output of 1,100 units per week. If this is not the case then total wages will differ slightly from the above figure.

With time-based remuneration systems, workers are paid for the number of hours attended at the basic wage rate. An additional premium over the base rate is paid for overtime. The merits of time-based systems are that they are simple to administer and easy to understand. The weekly wage is known in advance and does not fluctuate with changes in output. Time rate systems have a number of disadvantages. In particular, there is no motivation to increase output, and this can result in a greater need for supervision. Time-based systems are most appropriate where the quality of the output is particularly important or where the workers have little influence over the volume of production.

With individual performance-based remuneration systems, wages paid are related to output. The merits of performance-based systems are that effort and efficiency are rewarded, and this generally results in higher wages, improved morale and the ability to attract efficient workers. In the above illustration, on average, each employee's wage increases by £20 per week (a 12.5% increase). The employer gains from increased production, higher sales revenue and a decrease in unit fixed costs. Labour cost per unit has increased in the above illustration, but it is likely that this will be compensated for by a lower fixed overhead cost per unit and additional sales revenue.

Individual performance-based remuneration systems suffer from the following disadvantages:

(i) Some workers may suffer a decline in wages. For example, a worker who produces 900 units per week would receive a weekly wage of £145 (800 × 16p plus 100 × 17p), a decline of £15 per week.
(ii) Performance-based systems are more complex and expensive to administer, and can result in complex negotiations and frequent disputes.
(iii) Quality of output might suffer.

Solution SM 3.3

(a) Labour turnover percentage

$$\frac{\text{Number of employees leaving during the period (7)}}{\text{Average total number of employees for the period (42)}} \times 100$$

= 16.7%

(b) Possible reasons for the labour turnover include:
(i) Promotion either within or outside the firm.
(ii) Personal circumstances such as moving from the area, retirement, pregnancy.
(iii) Dissatisfaction with pay or working conditions.

The costs of labour turnover include leaving, recruitment and training costs. Leaving costs include the costs associated with completing the appropriate documentation and lost production if the employees cannot be immediately replaced. Recruitment costs result from the advertising, selection and engagement of new staff. Training costs include costs associated with lost production when training is being given, defective work and low productivity during the training period.

Labour turnover and associated costs can be reduced by ensuring that;
(i) pay and working conditions are satisfactory and comparable with alternative employers;
(ii) adequate training is provided;
(iii) an appropriate career structure exists.

(c) The time allowed for 114 268 units is 5194 hours (114 268/22)

Efficiency ratio	= Time allowed (standard hours)/actual hours
	= 5194 hours/4900 hours
	= 106%

Therefore the labour rate is £4.738 per hour (£4.60 × 103/100)

Standard cost	= £23 892	(5194 hours at £4.60)
Actual cost	= £23 216	(4900 hours at £4.738)
Variance	= £676	Favourable

Solution SM 3.4

(a) The accounting treatment of idle time and overtime are explained in the sections titled 'Labour cost accounting' and 'Accounting treatment of various labour cost items' in Chapter 3.

(b) (i) Wages paid (before share of group bonus):

	Direct personnel	**Indirect personnel**
Total hours	488	121
Normal hours	444 (12 × 37)	111 (3 × 37)
Overtime hours	44 (488 – 444)	10 (121 – 111)
Basic wages	£3 660 (488 × £7.50)	£726 (121 × £6)
Overtime premium	£110 (44 × £2.50)	£20 (20 × £2)
Total wages	£3 770	£746

(ii) Analysis of wages:

	Direct cost	**Indirect cost**
	£	**£**
Direc workers:		
Basic wages	3240 (432 × £7.50)	420 (56 × £7.50)
Overtime premium		110
Indirect workers		746
Group bonus		520
	3240	1796

(iii)

Wages control account

Cost ledger control account	5036	Work in progress account	3240
		Production overhead account	1796
	5036		5036

(iv)

$$\text{Efficiency ratio} = \frac{\text{Expected hours for actual output}}{\text{Actual hours}} =$$

$$\frac{470}{(432 + 32)} \times 100 = 101.3\%$$

Solution SM 3.5

(a) (i) FIFO: 2100 boxes were purchased and 1500 boxes were issued to production, leaving a balance of 600 boxes. Actual closing stock is 500 boxes, resulting in a stock loss of 100 boxes. The closing stock will be valued at the latest purchase price: £28 per unit (£14 000/500).
Closing stock valuation = £14 000 (500 × £28)
Cost of sales (including stock loss) =
£60 400 (Total purchase cost (74 400) – (14 000)

(ii) LIFO:

Date	Issue	Cost (£)
10/2	400 units	15 200
	100 units at £7200/200	3 600
		18 800
20/4	400 units	14 000
	200 units at £24 000/600	8 000
		22 000
25/6	400 units at £14 000/500	11 200
30/6	100 units (stock loss) at £14 000/500	2 800
	Total cost of issues	54 800

Closing stock = Purchase cost (£74 000)
– Issue cost (£54 800)
= £19 600

Note

(1) If the question does not require you to prepare a stores ledger account, you are recommended for the FIFO method to follow the approach shown in this answer. First calculate the closing stock in units. With the FIFO method the closing stock will be valued at the latest purchase prices. You can calculate the cost of sales as follows:

Cost of sales = Opening stock + Purchases
– Closing stock

(iii)

Weighted average method

Receipts			Issues			Closing balance		
Date	**Quantity (boxes)**	**Total cost (£)**	**Date**	**Quantity (boxes)**	**Total cost (£)**	**Quantity (boxes)**	**Cost (£)**	**Weighted average issue price (£)**
13/1	200	7 200				200	7 200	36.00
8/2	400	15 200				600	22 400	37.33
			10/2	500 at £37.33	18 665	100	3 735	37.33
11/3	600	24 000				700	27 735	39.62
12/4	400	14 000				1 100	41 735	37.94
			20/4	600 at £37.94	22.764	500	18 971	37.94
15/6	500	14 000				1 000	32 971	32.97
			25/6	400 at £32.97	13 188	600	19 783	32.97
			30/6	100 at £32.97	3 297	500	16 486	32.97
					57 914			

(b) Profit calculations

	FIFO (£)	LIFO (£)	Weighted average (£)
Sales	67 200	67 200	67 200
Cost of sales and stock loss	(60 400)	(54 800)	(57 914)
Other expenses	(2 300)	(2 300)	(2 300)
Profit	4 500	10 100	6 986

The purchase cost per box is £36 (Jan.), £38 (Feb.), £40 (March), £35 (April) and £28 (June).

The use of FIFO results in the lowest profit because prices are falling and the higher earlier prices are charged to production, whereas with LIFO the later and lower prices are charged to production. The use of the weighted average method results in a profit calculation between these two extremes. There are two items of concern regarding the performance of the business:

(i) There was a large purchase at the highest purchase price in March. This purchase could have been delayed until April so as to take advantage of the lower price.

(ii) The stock loss has cost over £3000. This should be investigated. A materials control procedure should be implemented.

Solution SM 3.6

(a) (i) Continuous stocktaking refers to a situation where a sample of store items are counted regularly on, say, a daily basis. Sufficient items should be checked each day so that during a year all items are checked at least once. The alternative system of stocktaking is a complete physical stockcount where all the stock items are counted at one point in time. Continuous stocktaking is preferable because production is not disrupted and any discrepancies and losses are relevant earlier.

(ii) A perpetual inventory system is a stock recording system whereby the balance is shown for a stock item after each receipt or issue. In a non-computerised system the records are maintained on bin cards or stores ledger cards. A separate record is maintained for each item of materials in stores. Therefore the stock balance for each stores item is available at any point in time.

(iii) For an explanation of ABC inventory analysis see the section on control of stocks through classification in Chapter 3.

(b) For the answer to this question you should refer to Chapter 3 (sections on relevant costs for quantitative models under conditions of certainty and determining the economic order quantity).

(c) Normal control levels are the re-order level, minimum level and maximum level explained in the 'Key Examination Points' section.

Reorder level = Maximum usage
× Maximum lead time
= 800 kg × 14 days
= 11 200 kg

Minimum level = Re-order level
– Average usage in average lead time
= 11 200 kg – (600 kg × 12 days)
= 4000 kg

Maximum level = Re-order level + EOQ
– Minimum usage in minimum lead time
= 11 200 kg + 12 000 kg
– (400 kg × 10 days)
= 19 200 kg

Solution SM 3.7

(a) *Item A32: storage and ordering cost schedule*

No of orders per year	4	5	6	7	8	9	10	11	12
Order size (boxes)	1250	1000	833	714	625	556	500	455	417
Average stock (boxes)	625	500	417	357	313	278	250	228	208
	(£)	(£)	(£)	(£)	(£)	(£)	(£)	(£)	(£)
Storage costs (average stock × 25% of £2)	312.5	250.0	208.5	178.5	156.5	139.0	125.0	114.0	104.0
Ordering costs (£12.5 per order)	50.0	62.5	75.0	87.5	100.0	112.5	125.0	137.5	150.0
Total cost	£362.5	£312.5	£283.5	£266.,0	£256.5	£251.5	£250.0	£251.5	£254.0

(b) The number of orders which should be placed in a year to minimize costs is 10.

(c)
$$\text{EOQ} = \sqrt{\left(\frac{2DO}{H}\right)}$$

where D = total demand for period, O = ordering cost per order, H = holding cost per unit.

(d)
$$\text{EOQ} = \sqrt{\left(\frac{2 \times 5000 \times 12.5}{0.5}\right)}$$
$$= 500 \text{ units}$$

(e) The maximum saving that could be made if the authority process four orders per year would be:
$$\frac{£362.50 - £250}{£362.50} = 31\%$$

(f) (i) Reducing the number of stock items by eliminating slow moving and obsolete stocks.
(ii) Standardization of stock items thus reducing the total number of items in stock.

Solution SM 3.8

The purchase cost is not constant per unit. It is therefore not possible to use the EOQ formula. Instead the following schedule of costs should be prepared:

Evaluation of optimum order size

Size of order	**No. of orders**	**Annual purchase cost (WI) (£)**	**Storage cost (£)**	**Admin. cost (£)**	**Total cost (£)**
2400	1	1728 (£0.72)	300	5	2033
1200	2	1728 (£0.72)	150	10	1888
600	4	1824 (£0.76)	75	20	1919
200	12	1920 (£0.80)	25	60	2005
100	24	1920 (£0.80)	12.50	120	2052.50

It is recommended that two orders be placed per year for 1200 units.

		(£)
Calculation of cost 2(1200 × £0.80 – 10%)	=	£1728
Add: Storage, average quantity held 600 × £0.25	=	150
Add two orders placed per annum × £5	=	10
		£1888

Workings (W1) Annual demand of 2400 units × unit purchase cost

Cost assignment for indirect costs

Solutions to Chapter 4 questions

Solution SM 4.1

(a) Calculation of department overhead rates

	Department P (£)	Department Q (£)	Department R (£)
Repairs and maintenance	42 000	10 000	10 000
Depreciation	17 000[a]	14 000	9 000
Consumable supplies	4 500[b]	2 700	1 800
Wage related costs	48 250	26 250	12 500
Indirect labour	45 000	27 000	18 000
Canteen/rest/smoke room	15 000[c]	9 000	6 000
Business rates and insurance	13 000[d]	10 400	2 600
	184 750	99 350	55 900
Direct labour hours	50 000	30 000	20 000
Overhead absorption rate	£3.70	£3.31	£3.00

Notes:
The calculations for Department P are:
[a]Depreciation = £170 000/£400 000 × £40 000.
[b]Consumable supplies = 50 000/100 000 × £9000.
[c]Canteen = 25/50 × £30 000.
[d]Business rates insurance = 5000/10 000 × £26 000.

(b) Job 976: Sample quotation

		(£)	(£)
Direct materials			800.00
Direct labour	P (30 × £7.72[a])	231.60	
	Q (10 × £7.00[b])	70.00	
	R (5 × £5.00[c])	25.00	326.60
Overhead absorbed	P (30 × £3.70)	111.00	
	Q (10 × £3.31)	33.10	
	R (5 × £3.00)	15.00	159.10
Production cost			1285.70
Selling, distribution and administration costs (20% × £1285.70)			257.14
Total cost			1542.84
Profit margin (20% of selling price)			385.71
Selling price (£1542.84 × 100/800)			1928.55

Notes:
[a]£386 000/50 000.
[b]£210 000/30 000.
[c]£100 000/20 000.

(c)

	(£)
Direct materials	800.00
Direct labour	326.60
Prime cost	1126.60
Overhead applied (125%)	1408.25
Total cost	2534.85

The auditor's system results in a higher cost for this quotation. However, other jobs will be overcosted with the previous system. The auditor's system will result in the reporting of more accurate job costs with some job costs being higher, and others being lower, than the present system. For a more detailed answer see the section on plant-wide (blanket) overhead rates in Chapter 4.

Solution SM 4.2

(a)

Calculation of overhead absorption rates

	Machining (£000)	Assembly (£000)	Finishing (£000)	Stores (£000)	Maintenance (£000)
Allocated costs	600.00	250.00	150.00	100.00	80.00
Stores apportionment	40.00 (40%)	30.00 (30%)	20.00 (20%)	(100.00)	10.00 (10%)
Maintenance apportionment	49.50 (55%)	18.00 (20%)	18.00 (20%)	4.50 (5%)	(90.00)
Stores apportionment[a]	2.00 (4/9)	1.50 (3/9)	1.00 (2/9)	(4.50)	
Total	691.50	299.50	189.00	—	—
Machine hours	50 000				
Labour hours		30 000	20 000		
Overhead absorption rates[b]	13.83	9.98	9.45		

Notes

[a] Costs have become too small at this stage to justify apportioning 10% of the costs to the maintenance department. Therefore stores costs are apportioned in the ratio 40: 30: 20.

[b] Machine hours are the predominant activity in the machine department whereas labour hours are the predominant activity in the assembly and finishing departments. Therefore machine hours are used as the allocation base in the machining department and direct labour hours are used for the assembly and finishing departments.

(b)

Quotation for Job XX 34

	(£)	(£)
Direct material		2400.00
Direct labour		1500.00
Overhead cost:		
Machining (45 machine hours at £13.83)	622.35	
Assembly (15 labour hours at £9.98)	149.70	
Finishing (12 labour hours at £9.45	113.40	885.45
Total cost		4785.45
Selling price (Profit margin = 20% of selling price ∴ selling price = £4785.45/0.8)		5981.81

(c) *Overhead control account*

	(£)		(£)
Overhead incurred	300 000	WIP control (30 700 hrs at £9.98)	306 386
Balance – over-recovery transferred to costing profit and loss account	6 386		
	306 386		306 386

(d) For the answer to this question see 'An illustration of the two-stage process for an ABC system' in Chapter 4. In particular, the answer should stress that cost centres will consist of activity cost centres rather than departmental centres. Separate cost driver rates would also be established for the service departments and the costs would be allocated to cost objects via cost driver rates rather than being reallocated to production departments and assigned within the production department rates. The answer should also stress that instead of using just two volume-based cost drivers (e.g. direct labour and machine hours) a variety of cost drivers would be used, including non-volume-based drivers such as number of set-ups and number of material issues. The answer could also stress that within the machining department a separate set-up activity centre might be established with costs being assigned using the number of set-ups as the cost driver. The current system includes the set-up costs within the machine hour overhead rate.

Solution SM 4.3

(a)

	Department A	**Department B**
Allocated costs	£217 860	£374 450
Apportioned costs	45 150	58 820
Total departmental overheads	263 010	433 270
Overhead absorption rate	£19.16 (£263 010/13 730)	£26.89 (£433 270/16 110)

(b)

	Department A (£)	**Department B** (£)	**Department C** (£)
Allocated costs	219 917	387 181	103 254
Apportionment of 70% of Department C costs [a]	32 267	40 011	(72 278)
Apportionment of 30% of Department C costs [b]	11 555	19 421	(30 976)
Total departmental overheads	263 739	446 613	
Overheads charged to production	261 956 [c]	455 866 [d]	
Under/(over-recovery)	1 783	(9 253)	

Notes

[a] Allocated on the basis of actual machine hours

[b] Allocated on the basis of actual direct labour hours

[c] £19.16 × 13 672 actual machine hours

[d] £26.89 × 16 953 actual direct labour hours

(c) See Appendix 4.1 (Chapter 4) for the answer to this question.

Solution SM 4.4

(a) *Year 1*

(1)	Budgeted machine hours	132 500
(2)	Budgeted fixed overheads	£2 411 500 (132 500 × £18.20)
(3)	Actual machine hours	134 200 (£2 442 440/£18.20)
(4)	Fixed overheads absorbed	£2 442 440
(5)	Actual fixed overheads incurred	£2 317 461
	Over-absorption of fixed overheads	£124 979 (5 − 4)

The section on 'Under- and over-recovery of fixed overheads' in Chapter 4 indicates that an under- or over-recovery will arise whenever actual activity or expenditure differs from budgeted activity or expenditure. Actual activity was 1700 hours in excess of budget and this will result in an over-recovery of fixed overheads of £30 940. Actual overheads incurred were £94 039 (£2 317 461 – £2 411 500) less than budget and this is the second factor explaining the over-absorption of fixed overheads.

Summary	**(£)**
Over-recovery due to actual expenditure being less than budgeted expenditure	94 039
Over-recovery due to actual activity exceeding budgeted activity	30 940
Total over-recovery of overhead for year 1	124 979

Year 2

(1)	Budgeted machine hours (134 200 × 1.05)	140 910
(2)	Budgeted fixed overheads	£2 620 926
(3)	Fixed overhead rate (£2 620 926/140 900 hours)	£18.60
(4)	Actual fixed overheads incurred	£2 695 721
(5)	Fixed overheads absorbed (139 260 × £18.60)	£2 590 236
(6)	Under-recovery of overhead for year 2 (4 – 5)	£105 485

Analysis of under-recovery of overhead	**(£)**
Under-recovery due to actual activity being less than budgeted activity (139 260 – 140 910) × £18.60	30 690
Under-recovery due to actual expenditure being greater than budgeted expenditure (£2 695 721 − £2 620 926	74 795
Total under-recovery for the year	105 485

Change in the overhead rate

Change in the rate (£18.60 – £18.20)/£18.20	=	+ 2.198%
This can be analysed as follows:		
Increase in budgeted expenditure (£2 620 926 – £2 411 500)/£2 411 500	=	+ 8.684%
Increase in budgeted activity (140 910 hours – 132 500 hrs)/132 500	=	+ 6.347%

The increase of 2.198% in the absorption rate is due to an expenditure increase of 8.684% in budgeted expenditure partly offset by an increase in budgeted activity of 6.347% over the 2 years.

Proof

(1.08684/1.06347) – 1 = 0.02198 (2.198%)

(b) See 'Plant-wide (blanket) overhead rates' and 'Budgeted overhead rates' in Chapter 4 for the answers to these questions.

Solution SM 4.5

(a) (i) and (ii) An activity increase of 150 hours (1650 – 1500) results in an increase in total overheads of £675. It is assumed that the increase in total overheads is due entirely to the increase in variable overheads arising from an increase in activity. Therefore the variable overhead rate is £4.50 (£675/150 hours) per machine hour. The cost structure is as follows:

1. Activity level (hours)	1 500	1 650	2 000
2. Variable overheads at £4.50 per hour	£6 750	£7 425	£9 000
3. Total overheads	£25 650	£26 325	£27 900
4. Fixed overheads (3 – 2)	£18 900	£18 900	£18 900

(iii) The fixed overhead rate is £10.50 (£15 − £4.50 variable rate)

normal activity = fixed overheads (£18 900)/fixed overhead rate (£10.50)
= 1800 machine hours

(iv) Under-absorption = 100 machine hours (1800 – 1700) at £10.50 = £1050

(b) (i) A machine hour rate is recommended for the machine department because most of the overheads (e.g. depreciation and maintenance) are likely to be related to machine hours. For non-machine labour-intensive departments, such as the finishing department, overheads are likely to be related to direct labour hours rather than machine hours. Overheads are therefore charged to jobs performed in the finishing department using the direct labour hour method of recovery.

Calculation of overhead rates

	Machining department	**Finishing department**
Production overhead	£35 280	£12 480
Machine hours	11 200	
Direct labour hours		7800
Machine hour overhead rate	£3.15	
Direct labour hour overhead rate		£1.60

(ii)

	Machining department (£)	**Finishing department (£)**
Direct materials		
(189 × 1.1 × £2.35/0.9)	542.85	—
Direct labour[a]		
25 hours × £4	100.00	
28 hours × £4		112.00
Production overhead		
46 machine hours at £3.15	144.90	
28 direct labour hours at £1.60		44.80
	787.75	156.80

Total cost of job = £944.55 (£787.75 + £156.80)

Note

[a]Overtime premiums are charged to overheads, and are therefore not included in the above job cost.

Solution SM 4.6

(a) (i)

	Machining (£)	Finishing (£)	Assembly (£)	Materials handling (£)	Inspection (£)
Initial cost	400 000	200 000	100 000	100 000	50 000
Reapportion:					
Materials handling	30 000	25 000	35 000	(100 000)	10 000
	430 000	225 000	135 000	—	60 000
Inspection	12 000 (20%)	18 000 (30%)	27 000 (45%)	3 000 (5%)	(60 000)
	442 000	243 000	162 000	3 000	—
Materials handling	900 (30%)	750 (25%)	1 050 (45%)	(3 000)	300 (10%)
	442 900	243 750	163 050	—	300
Inspection	60 (20%)	90 (30%)	135 (45%)	15 (5%)	(300)
	442 960	243 840	163 185	(15)	
	5	4	6		
	442 965	243 844	163 191		

(ii) Let

$$x = \text{material handling}$$
$$y = \text{inspection}$$
$$x = 100\,000 + 0.05y$$
$$y = 50\,000 + 0.1x$$

Rearranging the above equations:

$$x - 0.05y = 100\,000 \quad (1)$$
$$-0.1x + y = 50\,000 \quad (2)$$

Multiply equation (1) by 1 and equation (2) by 10:

$$x - 0.05y = 100\,000$$
$$-x + 10y = 500\,000$$

Adding the above equations:

$$9.95y = 600\,000$$
$$y = 60\,301$$

Substituting for y in equation (1):

$$x - 0.05 \times 60\,301 = 100\,000$$
$$x = 103\,015$$

Apportioning the values of x and y to the production departments in the agreed percentages:

		Machining (£)	Finishing (£)	Assembly (£)
Initial cost		400 000	200 000	100 000
(x) Materials handling	(0.3)	30 905 (0.25)	25 754 (0.35)	36 055
(y) Inspection	(0.2)	12 060 (0.3)	18 090 (0.45)	27 136
		442 965	243 844	163 191

(b) Reapportioning production service department costs is necessary to compute product costs for stock valuation purposes in order to meet the financial accounting requirements. However, it is questionable whether arbitrary apportionments of fixed overhead costs provides useful information for decision-making. Such apportionments are made to meet stock valuation requirements, and they are inappropriate for decision-making, cost control and performance reporting.

An alternative treatment would be to adopt a variable costing system and treat fixed overheads as period costs. This would eliminate the need to reapportion service department fixed costs. A more recent suggestion is to trace support/service department costs to products using an activity-based costing system (ABCS). For a description of ABCS you should refer to Chapter 13.

(c) For the answer to this question see 'Under- and over-recovery of overheads'.

Accounting entries for a job costing system

Solutions to Chapter 5 questions

Solution SM 5.1

(a)

Stores ledger control account

	(£)		(£)
Opening Balance	60 140	Finished Goods Control A/c (1)	95 200
Cost Ledger Control A/c	93 106	Closing Balance	58 046
	153 246		153 246

Production wages control account

	(£)		(£)
Cost Ledger Control A/c (2)	121 603	Finished Goods Control A/c	87 480
		Production Overhead Control A/c (2) (indirect wages)	34 123
	121 603		121 603

Production overhead control account

	(£)		(£)
Cost Ledger Control A/c	116 202	Finished Goods Control A/c (3)	61 236
Production Wages Control A/c (2)	34 123	Profit and Loss A/c – Fixed Overhead (3)	90 195
Profit and Loss A/c – over absorbed variable production overhead (3)	1 106		
	151 431		151 431

Finished goods control account

	(£)		(£)
Opening Balance	147 890	Variable Production Cost of Sales A/c (balance)	241 619
Stores Ledger Control A/c	95 200	Closing Balance	150 187
Production Wages Control A/c	87 480		
Production Overhead Control A/c	61 236		
	391 806		391 806

Workings

(1)

	(Kg)	(£)
Opening stock	540	7 663
Purchases	1 100	15 840
	1 640	23 503

Issue price £23 503/1 640 = £14.33 per kg

Cost of material issues: Material Y = £14.33 × 1 164kg	= £16 680
Other materials	= £78 520
	£95 200

(2) *Analysis of wages*

	Direct labour (£)	Indirect labour (£)
Direct workers productive time (11 664 × £7.50)	87 480	
Direct workers unproductive time at £7.50 (12 215 hours – 11 664)		4 132.50
Overtime premium (1 075 hours × £2.50)		2 687.50
Indirect workers basic time (4 655 hours × £5.70)		26 533.50
Indirect workers overtime premium (405 hours × £1.90)		769.50
	87 480	34 123.00

Total wages for the period £121 603 (£87 480 + £34 123)

(3) *Analysis of overheads*

Production overheads = £150 325 (£116 202 + £34 123)
Fixed overheads = 90 195 (60% × £150 325)
Variable overheads = 60 130 (40% × £150 325)
Variable overheads absorbed = 61 236 (70% of the direct labour cost of £87 480)
Over-absorbed overheads = 1 106 (£61 236 – £60 130)

Note that with a marginal costing system fixed overheads are charged directly to the profit and loss account and not included in the product costs. Therefore they are not included in the finished stocks.

(b) See working (2) in part (a) for the answer to this question.

(c)

	(£)	(£)
Sales		479 462
Less: Variable production cost of sales	241 619	
Variable selling and administration overheads	38 575	
Over-absorbed variable production overheads	(1 106)	279 088
Contribution		200 374
Less: Fixed production overheads	90 195	
Fixed selling and administration overheads	74 360	164 655
Net profit		35 819

Solution SM 5.2

(a)

Raw material stock control account

	(£)		(£)
Opening balance	72 460	Finished goods (1)	608 400
Creditors	631 220	Closing balance	95 280
	703 680		703 680

Production overhead control account

	(£)		(£)
Bank/Creditors	549 630	Finished goods (3)	734 000
Wages (2)	192 970	P & L – under absorption (3)	8 600
	742 600		742 600

Finished goods stock control account

	(£)		(£)
Opening balance	183 560	Production cost of sales (6)	1 887 200
Raw materials	608 400	Closing balance	225 960
Wages (5)	587 200		
Production overhead	734 000		
	2 113 160		2 113 160

Workings

(1) Raw materials issues:
Product A: 41 000 units at £7.20 per unit = £295 200
Product B: 27 000 units at £11.60 per unit = £313 200
£608 400

(2) Indirect labour charged to production overhead:
3 250 overtime premium hours at £2 per hour = £6 500 + £186 470 = £192 970

(3) Production overhead absorbed charged to finished goods:
Product A: 41 000 × 1 hour × £10 = £410 000
Product B: 27 000 × 1.2 hours × £10 = £324 000
£734 000

Production overhead under-absorbed = £549 630 + £192 970 – £734 000 = £8 600

(4) Direct labour charge to finished goods stock:
Product A: 41 000 × 1 hour × £8 = £328 000
Product B: 27 000 × 1.2 hours × £8 = £259 200
£587 200

(5) Production cost of sales:
Cost of product A = £7.20 materials + £8 direct labour + £10 overhead = £25.20
Cost of product B = £11.60 materials + £9.60 direct labour (1.2 hours × £8) + £12 overhead (1.2 hours × £10) = £33.20
Cost of sales: Product A = 38 000 units × £25.20 per unit = £957 600
Product B = 28 000 units × £33.20 per unit = £929 600
£1 887 200

(6) Valuation of closing stocks of finished goods:

Product A: 6200 units at £25.20	=	£156 240
Product B: 2100 units at £33.20	=	£69 720
		£225 960

The above figure can also be derived from the balance of the account.

(b)

	Product A (£000)	Product B (£000)	Total (£000)
Sales	1330	1092	2422
Production cost of sales	(957.6)	(929.6)	(1887.2)
Gross profit (before adjustment)	372.4	162.4	534.8
Under absorbed production overheads			(8.6)
Gross profit (after adjustment)			526.2
Non-production overheads			(394.7)
Net profit			131.5

(c) With a marginal costing system fixed production overheads are charged directly against profits whereas with an absorption costing system they are included in the product costs and therefore included in the stock valuations. This means that with absorption costing cost of sales and profits will be affected by the changes in stocks. An increase in stocks will result in some of the fixed overheads incurred during the period being deferred to future periods whereas with a decrease in stocks the opposite situation will apply. Thus, absorption costing profits will be higher than marginal costing profits when stocks increase and lower when stocks decrease. For a more detailed explanation of the difference in profits you should refer to 'Variable costing and absorption costing: a comparison of their impact on profit' in Chapter 8.

In this question there is a stock increase of 3000 units for product A resulting in absorption costing profits exceeding marginal costing profits by £20 400 (3000 units at £6.80 per unit fixed overhead). Conversely, for product B there is a 1000 units stock reduction resulting in marginal costing profits exceeding the absorption costing profits by £8160 (1000 units at £8.16 per unit fixed overhead). The overall impact is that absorption costing profits exceed marginal costing profits by £12 240.

Solution SM 5.3

(a) (i) The overheads apportioned to Contract ABC are as follows:

Stores operations = £1.56 million × (£6.4 million × 6 months)/(76.2 million × 53 months) = £148 000

Contract general management = £1.22 million × (£1.017 million/9.762 million) = £127 000

Transport = £1.37 million × (23km × 6 months)/(16km × 53 months) = £223 000

General administration = £4.25 million × (6 months/53 months) = £481 000

Total overheads apportioned to Contract ABC = £979 000

(ii)

	(£ million)	(£ million)
Costs to 1.12.01		1.063
Additional costs from 1.12.01 to 31.5.02:		
Raw materials	1.456	
Direct labour	1.017	
Overheads	0.979	3.452
Costs to date		4.515
Costs to complete		0.937
Total costs		5.452
Contract value		6.400
Estimated contract profit		0.948

Amount of profit taken to be included in the profit statement for the period:

[Value of work certified (£5.18 million)/Contract value (£6.4 million)] × £0.948 million = £0.767 million

Note that with some questions on contract costing the profit to date is computed by deducting the cost of work certified from the value of work certified. However, the cost of work not yet certified or the cost of work certified is not given in the question so it is not possible to adopt this approach.

(b) Service costing represents a costing system where the cost objects are the cost of services rather than the cost of products. It is applied in the service sector but can be applied in other sectors where the objective is to calculate the cost of the service departments. The key factors to consider are as follows:

- determining which services are to be costed within the stores department (e.g. materials receiving, materials handling, etc.);
- establishing whether total costs or unit costs should be calculated. In the latter situation the output should be measurable to calculate the cost per unit of output;
- establishing how costs should be classified in determining the total costs of services (e.g. determining the different categories of direct and indirect costs to be reported);
- deciding the key financial and non-financial performance measures to be reported.

Solution SM 5.4

(a) *Contract accounts (for the previous year)*

	MNO (£000)	PQR (£000)	STU (£000)		MNO (£000)	PQR (£000)	STU (£000)
Materials on site b/fwd			25	Wages accrued b/fwd		2	
Plant on site b/fwd		35	170	Plant control a/c		8	
Materials control a/c	40	99	180	Materials on site c/fwd	8		
Wages control a/c	20	47	110	Plant on site c/fwd	70		110
Subcontractors a/c			35	Prepayment c/fwd			15
Salaries	6	20	25	Cost of work not certified c/fwd			26
Plant control a/c	90	15		Cost of work certified (balance)[c]	82	221	416
Wages accrued c/fwd		5					
Apportionment of construction services[a]	4	10	22				
	160	231	567		160	231	567
Cost of work certified b/fwd	82	221	416	Attributable sales revenue	82	200	530
Profit taken this period[b]			114	Loss taken[b]		21	
	82	221	530		82	221	530
Cost of work not certified b/fwd			26	Wages accrued b/fwd		5	
Materials on site b/fwd	8						
Plant on site b/fwd	70		110				
Prepayment b/fwd			15				

Notes

[a]Costs incurred by construction services department:

	(£000)
Plant depreciation (12 – 5)	7
Salaries	21
Wages paid	8
	36

Wages incurred by each department are:

	(£000)
MNO	20
PQR	50 (47 + 5 − 2)
STU	110
	180

The costs apportioned to each contract are:

	(£000)
MNO	4 $\left(\frac{[20]}{180} \times £36\right)$
PQR	10 $\left(\frac{[50]}{180} \times £36\right)$
STU	22 $\left(\frac{110}{180} \times £36\right)$
	36

[b]See (b) (i) for calculation.

[c]Profit taken plus cost of sales for the current period or cost of sales less loss to date.

(b) (i) *Contract MNO*: Nil.

Contract PQR:

	(£)
Cost of contract to date (see part (a))	411 000
Value of work certified	390 000
Recommended loss to be written off	21 000

Contract STU:

	(£)
Cost of work certified	786 000
Cost of work not yet certified	26 000
Estimated costs to complete	138 000
Estimated cost of contract	950 000
Contract price	1 100 000
Anticipated profit	150 000

The profit taken to date is calculated using the following formula:

$$\frac{\text{cash received to date (£950 000)}}{\text{contract price (£1 100 000)}} \times \text{estimated profit from the contract (£150 000)}$$

= £129 545 (say £129 000)

The profit taken for the current period is £114 000, consisting of the profit to date of £129 000 less the profit previously transferred to the profit and loss account of £15 000.

(ii) *Contract MNO*: This contract is at a very early stage, and it is unlikely that the outcome can be reasonably foreseen. It is therefore prudent not to anticipate any profit at this stage.

Contract PQR: This contract has incurred a loss, and, applying the prudence concept, this loss should be written off as soon as it is incurred.

Contract STU: Applying the prudence concept, a proportion of the profit

$$\frac{\text{cash received to date}}{\text{contract price}}$$

is recognized in this period. The proportion of profit that is recognized is arbitrary and very much a matter of opinion. Alternative apportionments applying the concept of prudence could have been applied.

Process costing

Solutions to Chapter 6 questions

Solution SM 6.1

(a) (i)

Process A account

	(kg)	(£)		(kg)	(£)	(£)
Direct material	2000	10 000	Normal loss	400	0.50	200
Direct labour		7 200	Process B	1400	18.575	26 005
Process costs		8 400	Abnormal loss	200	18.575	3 715
Overhead		4 320				
	2000	29 920		2000		29 920

Unit cost = (£29 920 − £200)/1600 = £18.575

(ii)

Process B account

	(kg)	(£)		(kg)	(£)	(£)
Process A	1400	26 005	Finished goods	2620	21.75	56 989
Direct material	1400	16 800	Normal loss	280	1.825	511
Direct labour		4 200	(10% × 2800)			
Overhead		2 520				
Process costs		5 800				
		55 325				
Abnormal gain	100	2 175				
	2900	57 000		2900		57 500

Unit cost = (£55 325 − £511)/(2800 − 280) = £21.75

(iii)

Normal loss/gain account

	(kg)	(£)		(kg)	(£)
Process A	400	200	Bank (A)	400	200
Process B	280	511	Abnormal gain (B)	100	182.5
			Bank (B)	180	328.5
	680	711		680	711

(iv)

Abnormal loss/gain

	(£)		(£)
Process A	3715	Process B	2175
Normal loss/gain (B)	182.5	Bank	100
		Profit and Loss	1622.5
	3897.5		3897.5

(v)

Finished goods

	(£)		(£)
Process B	56 989		

(vi)

Profit and loss account (extract)

	(£)		(£)
Abnormal loss/gain	1622.5		

Solution SM 6.2

(a) Units completed = 8250 − Closing WIP (1600) = 6650

Calculation of number of equivalent units produced

	Completed units	Closing WIP	Total equivalent units
Previous process	6650	1600	8250
Materials	6650	1600	8250
Labour and overhead	6650	960 (60%)	7610

(b)

	(£)	Total equivalent units	Cost per unit (£)
Previous process cost	453 750	8250	55
Materials	24 750	8250	3
Labour and overheads	350 060	7610	46
			104

(c) *Process account*

	Units	(£)		Units	(£)
Input from previous process	8250	453 750	Finished goods[a]	6650	691 600
Materials		24 750	Closing WIP[b]	1600	136 960
Labour and overheads		350 060			
	8250	828 560		8250	828 560

Note

[a] Cost of completed production = 6650 units × £104 = £691 600

[b]

			(£)
Closing WIP:	Previous process cost (1600 × £55)	=	88 000
	Materials (1600 × £3)	=	4 800
	Labour and overhead (960 × £46)	=	44 160
			136 960

(d) See the introduction to Chapter 7 and 'Accounting for by-products' in Chapter 7 for the answer to this question.

Solution SM 6.3

(a)

	Units
Input:	
Opening WIP	12 000
Transferred from process 1	95 000
	107 000
Output:	
Closing WIP	10 000
Normal loss	200
Completed units (balance)	96 800
	107 000

Statement of completed production and calculation of cost per unit (Process 2)

	Opening WIP (£)	Current cost (£)	Total cost (£)	Completed units	Closing WIP	Total equiv. units	Cost per unit (£)	WIP (£)
Previous process cost	13 440	107 790	121 230	96 800	10 000	106 800	1.135	11 350
Materials added	4 970	44 000	48 970	96 800	9 000	105 800	0.463	4 167
Conversion costs	3 120	51 480	54 600	96 800	7 000	103 800	0.526	3 682
	21 530	203 270	224 800				2.124	19 199
				Completed units (96 800 × £2.124)				205 601
								224 800

Note that the above answer is based on the short-cut approach described in Appendix 6.1.

(b)

Process 2 Account

	Units	(£)		Units	(£)
Opening WIP	12 000	21 530	Finished goods	96 800	205 601
Transferred from process 1	95 000	107 790	Normal loss	200	—
Materials		44 000	Closing WIP	10 000	19 199
Conversion cost		51 480			
	107 000	224 800		107 000	224 800

(c) If losses are not expected to occur the loss would be abnormal. Because abnormal losses are not an inherent part of the production process and arise from inefficiencies they are not included in the process costs. Instead, they are charged with their full share of production costs and removed (credited) from the process account and reported separately as an abnormal loss. The abnormal loss is treated as a period cost and written off in the profit and loss account.

(d) Workings would be different because FIFO assumes that the opening WIP is the first group of units to be completed during the current period. The opening WIP is charged separately to completed production, and the cost per unit is based only on current period costs and production for the current period. This requires that opening WIP equivalent units are deducted from completed units to derive current period equivalent units. The cost per unit is derived from dividing current period costs by current period total equivalent units.

Solution SM 6.4

(a) Fully complete production = Input (36 000) − Closing WIP (8000)
= 28 000 kg
Normal loss = 2 800 (10% × 28 000 kg)
Abnormal loss = 800 (Actual loss (3600) − 2800)
Good output = 24 400 (28 000 − 3600)

(b)

		Completed units (£)	Normal loss	Abnormal loss	Closing WIP	Total equiv. units	Cost per unit (£)
Previous process cost	166 000	24 400	2800	800	8000	36 000	4.61111
Conversion cost	73 000	24 400	2800	800	4000	32 000	2.28125
	239 000						6.89236

		(£)	(£)
Completed units (24 400 × £6.89236)		168 174	
Add normal loss (2800 × £6.89236)		19 298	
			187 472
Abnormal loss (800 × £6.89236)			5 514
WIP: Previous process cost	(8000 × £4.61111)	36 889	
Conversion cost	(4000 × £2.28125)	9 125	46 014
			239 000

The above computations assume that losses are detected at the end of the process when the units are fully complete. Therefore none of the normal loss is allocated to partly completed units (WIP). There is an argument for allocating the normal loss between completed units and the abnormal loss (see the section on equivalent units and abnormal losses in the appendix to Chapter 6) but it is unlikely to make a significant difference to the answer. Also examination questions are unlikely to require such sophisticated answers.

An alternative approach is to adopt the short-cut method described in Chapter 6. This method allocates the normal loss between completed units, WIP and the abnormal loss. Because the units actually lost are fully complete it is likely that losses are detected on completion. Therefore the short-cut method is not theoretically correct. Nevertheless the computations suggest that it was the examiner's intention that the question should be answered using the short-cut method. The revised answer is as follows:

	(£)	Completed units	Abnormal loss	WIP	Total equiv. units	Cost per unit (£)	WIP (£)
Previous process cost	166 000	24 400	800	8000	33 200	5.00	40 000
Conversion cost	73 000	24 400	800	4000	29 200	2.50	10 000
	239 000					7.50	50 000

Completed units (24 400 × £7.50)	183 000
Abnormal loss (800 × £7.50)	6 000
	239 000

Distillation process account

	(kg)	(£)		(kg)	(£)
Input from mixing	36 000	166 000	Finished goods	24 400	183 000
Labour		43 800	Abnormal loss	800	6 000
Overheads		29 200	Normal loss	2 800	—
			Closing WIP	8 000	50 000
	36 000	239 000		36 000	239 000

(c) If the scrapped production had a resale value the resale value would be credited to the process account (thus reducing the cost of the process account). The accounting entries would be as follows:

Dr Cash
Cr Process Account (with sales value of normal loss)
Cr Abnormal Loss Account (with sales value of abnormal loss)

Solution SM 6.5

(a)

Expected output from an input of 39 300 sheets:	3 144 000 cans	(39 300 × 80)
Less 1% rejects	31 440 cans	
Expected output after rejects	3 112 560 cans	

The normal loss arising from the rejects (31 440 cans) is sold at £0.26 per kg. It is therefore necessary to express the rejects in terms of kilos of metal. Each sheet weighs 2 kilos but wastage in the form of offcuts is 2% of input. Therefore the total weight of 80 cans is 1.96 kg (0.98 × 2 kg) and the weight of each can is 0.0245 kilos (1.96 kg/80 cans). The weight of the normal loss arising from the rejects is 770.28 kg (31 440 × 0.0245 kg). The normal loss resulting from the offcuts is 1572 kg (39 300 × 2 kg × 0.02). Hence the total weight of the normal loss is 2342.28 kilos (1572 kg + 770.28 kg), with an expected sales value of £609 (2342.28 kg × £0.26).

Process account

	(£)		(£)
Direct materials (39 300 × £2.50)	98 250	Finished goods (3 100 760 cans × £0.042[a])	130 232
		Normal loss	609
Direct labour and overheads	33 087	Abnormal loss (11 800 kg[b] at £0.042[a])	496
	131 337		131 337

Abnormal loss account

	(£)		(£)
Process account	496	Sale proceeds[c]	75
		Profit and loss account	421
	496		496

Notes

[a]Cost per unit = $\dfrac{\text{£98 250} + \text{£33 087} - \text{£609}}{\text{expected output (3 112 560 cans)}}$ = £0.042 per can

[b]Expected output (3 112 560) − actual output (3 100 760 cans) = 11 800 cans

[c]Abnormal loss = 11 800 cans (3 112 560 − 3 100 760)

This will yield 289.1 kilos (11 800 × 0.0245 kilos) of metal with a sales value of £75 (289.1 × £0.26).

(b) (i) See 'Opening and closing work in progress' in Chapter 6 for the answer to this question.

(ii) See 'Weighted average method' and 'First in, first out method' in Chapter 6 for the answer to this question.

Solution SM 6.6

(a)

Production statement

Input:	Units
Opening WIP	20 000
Transfer from previous process	180 000
	200 000

Output:	
Closing WIP	18 000
Abnormal loss	60
Completed units (balance)	181 940
	200 000

Statement of equivalent production and calculation of cost of completed production and WIP

	Current costs (£)	Completed units less opening WIP equivalent units	Abnormal loss	Closing WIP equivalent units	Current total equivalent units	Cost per unit (£)
Previous process cost	394 200	161 940	60	18 000	180 000	2.19
Materials	110 520	167 940	60	16 200	184 200	0.60
Conversion cost	76 506	173 940	60	12 600	186 600	0.41
	581 226					3.20

	(£)	(£)
Cost of completed production:		
Opening WIP (given)	55 160	
Previous process cost (161 940 × £2.19)	354 649	
Materials (167 940 × £0.60)	100 764	
Conversion costs (173 940 × £0.41)	71 315	581 888
Cost of closing WIP:		
Previous process cost (18 000 × £2.19)	39 420	
Materials (16 200 × £0.60)	9 720	
Conversion costs (12 600 × £0.41)	5 166	54 306
Value of abnormal loss (60 × £3.20)		192
		636 386

Process 3 account

	(£)		(£)
Opening WIP	55 160	Transfer to finished goods stock	581 888
Transfer from process 2	394 200	Abnormal loss	192
Materials	110 520	Closing WIP	54 306
Conversion costs	76 506		
	636 386		636 386

(b) Normal losses are unavoidable losses that are expected to occur under efficient operating conditions. They are an expected production cost and should be absorbed by the completed production whereas abnormal losses are not included in the process costs but are removed from the appropriate process account and reported separately as an abnormal loss. See 'Losses in process and partially completed units' in the appendix to Chapter 6 for a more detailed explanation of the treatment of normal losses.

(c) If the weighted average method is used, both the units and value of WIP are merged with current period costs and production to calculate the average cost per unit. The weighted average cost per unit is then applied to all completed units, any abnormal losses and closing WIP equivalent units. In contrast, with the FIFO method the opening WIP is assumed to be the first group of units completed during the current period. The opening WIP is charged separately to completed production, and the cost per unit is based only on current costs and production for the period. The closing WIP is assumed to come from the new units that have been started during the period.

Solution SM 6.7

(a) It is assumed that the normal loss occurs at the start of the process and should be allocated to completed production and closing WIP. It is also assumed that process 2 conversion costs are not incurred when losses occur. Therefore losses should not be allocated to conversion costs.

Statement of input and output (units)

	Input		Output
Opening WIP	1 200	Completed output	105 400
Transferred from Process 1	112 000	WIP	1 600
		Normal loss (5% × 112 000)	5 600
		Abnormal loss (balance)	600
	113 200		113 200

Since the loss occurs at the start of the process it should be allocated over all units that have reached this point. Thus the normal loss should be allocated to all units of output. This can be achieved by adopting the short-cut method described in Chapter 6 whereby the normal loss is not included in the unit cost statement.

Calculation of cost per unit and cost of completed production (FIFO method)

	Current costs (£)	Completed units less opening WIP equiv. units	Abnormal loss	Closing WIP equiv. units	Current total equiv. units	Cost per unit (£)
Previous process cost	187 704					
Materials	47 972					
	235 676	104 200(105 400 − 1200)	600	1600	106 400	2.215
Conversion costs	63 176	104 800(105 400 − 600)	—	1200	106 000	0.596
	298 852					2.811

	(£)	(£)
Cost of completed production:		
Opening WIP (given)	3 009	
Previous process cost and materials (104 200 × £2.215)	230 803	
Conversion cost (104 800 × £0.596)	62 461	296 273
Abnormal Loss (600 × £2.215)		1 329
Closing WIP:		
Previous process cost and materials (1600 × £2.215)	3 544	
Conversion costs (1200 × £0.596)	715	4 259
		301 861

Process 2 account

	(£)		(£)
Opening WIP	3 009	Transfer to finished goods	296 273
Transfers from Process 1	187 704	Abnormal loss	1 329
Raw materials	47 972	Closing WIP	4 259
Conversion costs	63 176		
	301 861		301 861

(b) If the loss occurs at the end of the process then the normal loss should only be charged to those units that have reached the end of the process. In other words, the cost of normal losses should not be allocated to closing WIP. To meet this requirement a separate column for normal losses is incorporated into the unit cost statement and the normal loss equivalent units are included in the calculation of total equivalent units. The cost of the normal loss should be calculated and added to the cost of completed production. For an illustration of the approach see 'Losses in process and partially completed units' in the appendix to Chapter 6.

Joint and by-product costing

Solutions to Chapter 7 questions

Solution SM 7.1

(a) Normal loss (toxic waste) = 50 kg per 1000 kg of input (i.e. 5%)
Actual input = 10 000 kg
Abnormal loss = Actual toxic waste (600) less normal loss (500) = 100 kg

By-product R net revenues of £1750 are credited to the joint (main) process account and normal and abnormal losses are valued at the average cost per unit of output:

$$\frac{\text{Net cost of production (£35 750} - \text{£1750)}}{\text{Expected output of the joint products (8500 kg)}} = \text{£4}$$

The cost of the output of the joint products is £33 600 (8400 kg × £4) and this is to be allocated to the individual products on the basis of final sales value (i.e. 4800 kg × £5 = £24 000 for P and 3600 kg × £7 = £25 200 for Q):
P = £24 000/£49 200 × £33 600 = £16 390
Q = £25 200/£49 200 × £33 600 = £17 210

The main process account is as follows:

Main process account

	(kg)	(£)		(kg)	(£)
Materials	10 000	15 000	P Finished goods	4 800	16 390
Direct labour	—	10 000	Q Process 2	3 600	17 210
Variable overhead	—	4 000	By-product R	1 000	1 750
Fixed overhead	—	6 000	Normal toxic waste	500	—
Toxic waste disposal a/c	—	750	Abnormal toxic waste	100	400
	10 000	35 750		10 000	35 750

(b) *Toxic waste disposal (Creditors' account)*

	(£)		(£)
Bank	900	Main process account	750
		Abnormal toxic waste	150
	900		900

Abnormal toxic waste account

Main process account	400	Profit and Loss Account	550
Toxic waste disposal account (100 × £1.50)	150		
	550		550

Process 2 account

	kg	(£)		kg	(£)
Main process Q	3600	17 210	Finished goods Q[b]	3 300	26 465
Fixed cost		6 000	Closing work-in-progress[b]	300	1 920
Variable cost		5 175[a]			
	3600	28 385		3600	28 385

Notes
[a] 3300 + (50% × 300) × £1.50 = £5175
[b]

	(£)	Completed units	WIP equiv. units	Total equiv. units	Cost per unit
Previous process cost	17 210	3300	300	3600	£4.78
Conversion cost	11 175	3300	150	3450	£3.24
					£8.02

	(£)
Completed units (3 300 units × £8.02)	26 465
WIP (300 × £4.78) + (150 × £3.24)	1 920
	28 385

(c) See the section on methods of apportioning joint costs to joint products in Chapter 6 for the answer to this question.

(d)

	(£)
Incremental sales revenue per kg from further processing (£7 − £4.30)	2.70
Incremental (variable) cost per kg of further processing	1.50
Incremental contribution per kg from further processing	1.20

	(£)
At an output of 3600 kg the incremental contribution is	4320
Avoidable fixed costs	3600
Net benefit	720

$$\text{Break-even point} = \frac{\text{Avoidable fixed costs (£3600)}}{\text{Incremental unit contribution (£1.20)}} = 3000 \text{ kg}$$

Further processing should be undertaken if output is expected to exceed 3000 kg per week.

Solution SM 7.2

(a) See Figure 7.2

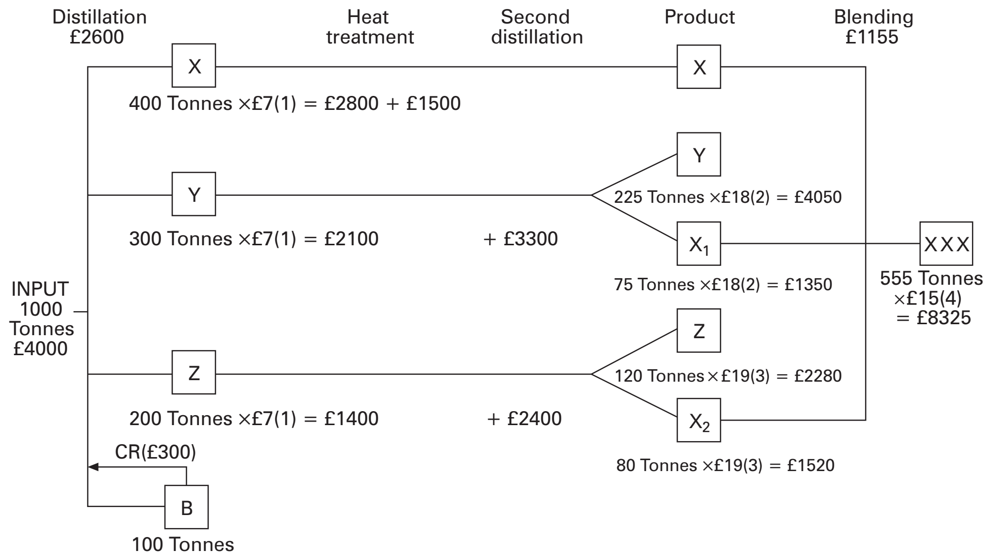

Figure 7.2

Workings

(*W1*)	(4000 + 2600 − 300)/900 = £7
(*W2*)	(2100 + 3300)/300 = £18
(*W3*)	(1400 + 2400)/200 = £19
(*W4*)	(2800 + 1500 + 1155 + 1350 + 1520)/555 = £15

(b)

Product	Output (tonnes)	Total cost (£)	Cost per tonne (£)
XXX	555	8325	15
Y	225	4050	18
Z	120	2280	19

(c) An alternative treatment is to credit the income direct to the profit and loss account rather than crediting the proceeds to the process from which the by-product was derived.

Solution SM 7.3

(a) You can see from the question that the input is 240 000 kg and the output is 190 000 kg. It is assumed that the difference of 50 000 kg is a normal loss in output which occurs at the start of processing. Therefore the loss should be charged to the completed production and WIP. By making no entry for normal losses in the cost per unit calculation the normal loss is automatically apportioned between completed units and WIP.

	Opening WIP (£)	Current cost (£)	Total cost (£)	Completed units	Closing WIP	Total equivalent units	Cost per unit (£)	WIP value (£)
Materials	20 000	75 000	95 000	160 000	30 000	190 000	0.50	15 000
Processing costs	12 000	96 000	108 000	160 000	20 000	180 000	0.60	12 000
			203 000				1.10	27 000
			Completed units (160 000 units × £1.10)					176 000
								203 000

(b) This question requires a comparison of incremental revenues and incremental costs. Note that the costs of process 1 are irrelevant to the decision since they will remain the same whichever of the two alternatives are selected. You should also note that further processing 120 000 kg of the compound results in 240 000 kg of Starcomp.

	(£)	(£)
Incremental sales revenue:		
Starcomp (120 000 × 2 kg × £2)	480 000	
Compound (120 000 × £1.60)	192 000	288 000
Incremental costs:		
Materials	120 000	
Processing costs	120 000	240 000
Incremental profits		48 000

It is therefore worthwhile further processing the compound.

(c) The sales revenue should cover the additional costs of further processing the 40 000 kg compound and the lost sales revenue from the 40 000 kg compound if it is sold without further processing.

Additional processing costs:

	(£)
Materials (£160 000 − £120 000)	40 000
Processing costs (£140 000 − £120 000)	20 000
Lost compound sales revenue (40 000 × £1.60)	64 000
	124 000

$$\text{Minimum selling price per kg of Starcomp} = \frac{£124\,000}{40\,000\text{ kg} \times 2}$$

$$= £1.55$$

Solution SM 7.4

(a) *Profit and loss account*

	W (£)	X (£)	Z (£)	Total (£)
Opening stock	—	—	8 640	8 640
Production cost	189 060	228 790	108 750	526 600
Less closing stock	(14 385)	(15 070)	(15 010)	(44 465)
Cost of sales	174 675	213 720	102 380	490 775
Selling and administration costs	24 098	27 768	10 011	61 877
Total costs	198 773	241 488	112 391	552 652
Sales	240 975	277 680	100 110	618 765
Profit/(loss)	42 202	36 192	(12 281)	66 113

Workings

Joint process cost per kilo of output = £0.685 per kg (£509 640/744 000 kg)

Production cost for products W, X and Y:

Product W (276 000 kg × £0.685) = £189 060
X (334 000 kg × £0.685) = £228 790
Y (134 000 kg × £0.685) = £91 790

Closing stocks for products W and X:

Product W (21 000 kg × £0.685) = £14 385
X (22 000 kg × £0.685) = £15 070

Cost per kilo of product Z:

		(£)
Product Y (128 000 kg × £0.685)	=	87 680
Further processing costs		17 920
Less by-product sales (8000 × £0.12)	=	(960)
		104 640
Cost per kilo (£104 640/96 000 kg)		£1.09

Closing stock of product Z (10 000 kg × £1.09)	=	£10 900
Add closing stock of input Y (6000 × £0.685)	=	£4 110
Closing stock relating to product Z		£15 010

Production cost relating to final product Z:

		(£)
Product Y (134 000 kg × £0.685)	=	91 790
Further processing costs		17 920
Less by-product costs		(960)
		108 750

(b) The joint costs are common and unavoidable to both alternatives, and are therefore not relevant for the decision under consideration. Further processing from an input of 128 000 kg of Y has resulted in an output of 96 000 kg of Z. Thus it requires 1.33 kg of Y to produce 1 kg of Z (128/96).

	(£)	
Revenue per kilo for product Z	1.065	(£100 110/94 000 kg)
Sale proceeds at split-off point (1.33 × £0.62)	0.823	
Incremental revenue per kg from further processing	0.242	
Incremental costs of further processing	0.177	[(£17 920 − £960)/96 000]
Incremental profit from further processing	0.065	

It is assumed that selling and administration costs are fixed and will be unaffected by which alternative is selected. The company should therefore process Y further into product Z and not accept the offer from the other company to purchase the entire output of product Y.

(c) See 'Methods of allocating joint costs to joint products' in Chapter 7 for the answer to this question.

Income effects of alternative cost accumulation systems

Solutions to Chapter 8 questions

Solution SM 8.1

(a) Manufacturing cost per unit of output = variable cost (£6.40) + fixed cost (£92 000/20 000 = £4.60) = £11

Absorption costing profit statement

	(£000)
Sales (22 000 units at £14 per unit)	308.0
Manufacturing cost of sales (22 000 units × £11)	242.0
Manufacturing profit before adjustment	66.0
Overhead over-absorbed [a]	4.6
Manufacturing profit	70.6

Note

[a] The normal activity that was used to establish the fixed overhead absorption rate was 20 000 units but actual production in period 2 was 21 000 units. Therefore a period cost adjustment is required because there is an over-absorption of fixed overheads of £4 600 [(22 000 units – 21 000 units) × £4.60].

(b)

	(£000)
Sales	308.0
Variable cost of sales (22 000 units × £6.40)	140.8
Contribution to fixed costs	167.2
Less fixed overheads	92.0
Profit	75.2

(c) (i) Compared with period 1 profits are £34 800 higher in period 2 (£70 600 – £35 800). The reasons for the change are as follows:

	(£000)
Additional sales (7000 units at a profit of £3 per unit)	21 000
Difference in fixed overhead absorption (3000 units extra production at £4.60 per unit) [a]	13 800
Additional profit	34 800

Note

[a] Because fixed overheads are absorbed on the basis of normal activity (20 000 units) there would have been an under-recovery of £9200 (2000 units × £4.60) in period 1 when production was 18 000 units. In period 2 production exceeds normal activity by 1000 units resulting in an over-recovery of £4600. The difference between the under- and over-recovery of £13 800 (£9200 + £4600) represents a period cost adjustment that is reflected in an increase in profits of £13 800. In other words, the under-recovery of £9200 was not required in period 2 and in addition there was an over-recovery of £4600.

(c) (ii) Additional profits reported by the marginal costing system are £4600 (£75 200 – £70 600). Because sales exceed production by 1000 units in period 2 there is a stock reduction of 1000 units. With an absorption costing system the stock reduction will result in a release of £4600 (1000 units at £4.60) fixed overheads as an expense during the current period. With a marginal costing system changes in stock levels do not have an impact on the fixed overhead that is treated as an expense for the period. Thus, absorption costing profits will be £4600 lower than marginal costing profits.

Solution SM 8.2

(a)

January	(£)	Marginal costing (£)	(£)	Absorption costing (£)
Sales revenue (7000 units)		315 000		315 000
Less: Cost of sales (7000 units)				
Direct materials	77 000		77 000	
Direct labour	56 000		56 000	
Variable production overhead	28 000		28 000	
Variable selling overhead	35 000	196 000		
Fixed overhead (7000 × £3)			21 000	182 000
Contribution		119 000		
Gross profit				133 000
Over-absorption of fixed production overhead (1)				1 500
				134 500
Fixed production costs (2)	24 000			
Fixed selling costs (2)	16 000		16 000	
Variable selling costs			35 000	
Fixed admin costs (2)	24 000	64 000	24 000	75 000
Net profit		55 000		59 500

February	(£)	Marginal costing (£)	(£)	Absorption costing (£)
Sales revenue (8750 units)		393 750		393 750
Less: Cost of sales (8750 units)				
Direct materials	96 250		96 250	
Direct labour	70 000		70 000	
Variable production overhead	35 000		35 000	
Variable selling overhead	43 750	245 000		
Fixed overhead (8750 × £3)			26 250	227 500
Contribution		148 750		
Gross profit				166 250
Under-absorption of fixed production overhead				750
				165 500
Fixed production costs (2)	24 000			
Fixed selling costs (2)	16 000		16 000	
Variable selling costs			43 750	
Fixed admin costs (2)	24 000	64 000	24 000	83 750
Net profit		84 750		81 750

Workings:

(1) Fixed production overhead has been unitized on the basis of a normal monthly activity of 8000 units (96 000 units per annum). Therefore monthly production fixed overhead incurred is £24 000 (8000 × £3). In January actual production exceeds normal activity by 500 units so there is an over-absorption of £1500 resulting in a period cost adjustment that has a positive impact on profits. In February production is 250 units below normal activity giving an under-absorption of production overheads of £750.

(2) With marginal costing fixed production overheads are treated as period costs and not assigned to products. Therefore the charge for fixed production overheads is £24 000 per month (see note 1). Both marginal and absorption costing systems treat non-manufacturing overheads as period costs. All of the non-manufacturing overheads have been unitized using a monthly activity level of 8000 units. Therefore the non-manufacturing fixed overheads incurred are as follows:
Selling = £16 000 (8000 × £2)
Administration = £24 000 (8000 × £3)

(b) In January additional profits of £4500 are reported by the absorption costing system. Because production exceeds sales by 1500 units in January there is a stock increase of 1500 units. With an absorption costing system the stock increase will result in £4500 (1500 units × £3) being incorporated in closing stocks and deferred as an expense to future periods. With a marginal costing system changes in stock levels do not have an impact on the fixed overhead that is treated as an expense for the period. Thus, absorption costing profits will be £4500 higher than marginal costing profits. In February sales exceed production by 1000 units resulting in a stock reduction of 1000 units. With an absorption costing system the stock reduction will result in a release of £3000 (1000 units at £3) fixed overheads as an expense during the current period. Thus, absorption costing profits are £3000 lower than marginal costing profits.

(c) (i) Contribution per unit = Selling price (£45) – unit variable cost (£28) = £17
Break-even point (units) = Annual fixed costs (£64 000)/unit contribution (£17) = 3765 units
Break-even point (£ sales) = 3765 units × £45 selling price = £169 424
The above calculations are on a monthly basis. The sales value of the annual break-even point is £2 033 100 (£169 425 × 12).

(ii) Required contribution for an annual profit of £122 800
= Fixed costs (£64 000 × 12) + £122 800
= £899 800

Required activity level = $\dfrac{\text{Required contribution (£899 800)}}{\text{Unit contribution (£17)}}$
= 52 400 units

(d) See 'Cost–volume–profit analysis assumptions' in Chapter 9 for the answer to this question.

Solution SM 8.3

(a) *Preliminary calculations*

	January–June (£)	July–December (£)
Production overheads	90 000	30 000
(Over)/under-absorbed	(12 000)	12 000
	78 000	42 000

Change in overheads £36 000
Change in production volume (units) 12 000

Production variable overhead rate per unit		£3	
Fixed production overheads (£78 000 – (18 000 × £3))		£24 000	
Distribution costs	£45 000		£40 000
Decrease in costs		£5 000	
Decrease in sales volume (units)		5 000	
Distribution cost per unit sold		£1	
Fixed distribution cost (£45 000 – (15 000 × £1))		£30 000	

Unit costs are as follows:

	(£)	**(£)**
Selling price		36
Direct materials	6	
Direct labour	9	
Variable production overhead	3	
Variable distribution cost	1	19
Contribution		17

Note that the unit direct costs are derived by dividing the total cost by units produced

Marginal costing profit statement

	January–June		**July–December**	
	(£000)	**(£000)**	**(£000)**	**(£000)**
Sales		540		360
Variable costs at £19 per unit sold		285		190
Contribution		255		170
Fixed costs:				
Production overhead	24		24	
Selling costs	50		50	
Distribution cost	30		30	
Administration	80	184	80	184
Profit		71		(14)

(b) Marginal costing stock valuation per unit = £18 per unit production variable cost
Absorption costing stock valuation per unit = £20 per unit total production cost

	January–June (£000)	**July–December (£000)**
Absorption costing profit	77	(22)
Fixed overheads in stock increase of 3000 units	6	
Fixed overheads in stock decrease of 4000 units		(8)
Marginal costing profit	71	14

(c) Absorption gross profit per unit sold = Annual gross profit (£400 000)/Annual production (15 000 units)
= £16

	(£000)
Profit from January–June	77
Reduction in sales volume (5000 × £16)	(80)
Difference in overhead recovery (£12 000 over-recovery and £12 000 under-recovery)	(24)
Reduction in distribution cost	5
	(22)

(d) Fixed cost £184 000 × 2 = £368 000
Contribution per unit £17
Break-even point 21 647 units (Fixed costs/contribution per unit)

(e) See 'Some arguments in support of variable costing' in Chapter 8 for the answer to this question.

Solution SM 8.4

(a) $$\text{Fixed overhead rate per unit} = \frac{\text{Budgeted fixed overheads (£300 000)}}{\text{Budgeted production (40 000 units)}} = £7.50$$

Absorption Costing (FIFO) Profit Statement:

		(£000)
Sales (42 000 × £72)		3024
Less cost of sales:		
Opening stock (2000 × £30)	60	
Add production (46 000 × £52.50[a])	2415	
	2475	
Less closing stock (6000 × £52.50)	315	2160
		864
Add over-absorption of overheads[b]		27
Profit		891

Notes:
[a] Variable cost per unit = £2070/46 000 = £45
Total cost per unit = £45 + £7.50 Fixed overhead = £52.50
[b] Overhead absorbed (46 000 × £7.50) = £345 000
Actual overhead incurred = £318 000
Over-recovery £27 000

Marginal Costing (FIFO) Profit Statement:

	(£000)	(£000)
Sales		3024
Less cost of sales:		
Opening stock (2000 × £25)	50	
Add production (46 000 × £45)	2070	
	2120	
Less closing stock (6000 × £45)	270	1850
Contribution		1174
Less fixed overheads incurred		318
Profit		856

Reconciliation:
Absorption profit exceeds marginal costing profit by £35 000 (£891 000 − £856 000). The difference is due to the fixed overheads carried forward in the stock valuations:

	(£)
Fixed overheads in closing stocks (6000 × £7.50)	45 000
Less fixed overheads in opening stocks (2000 × £5)	10 000
Fixed overheads included in stock movement	35 000

Absorption costing gives a higher profit because more of the fixed overheads are carried forward into the next accounting period than were brought forward from the last accounting period.

(b) *Absorption Costing (AVECO) Profit Statement:*

	(£000)	(£000)
Sales		3024
Opening stock plus production		
(48 000 × £51.56[a])	2475	
Less closing stock (6000 × £51.56)	309	2166
		858
Add over-absorption of overheads		27
Profit		885

Marginal Costing (AVECO) Profit Statement:

	(£000)	(£000)
Sales		3024
Less cost of sales		
Opening stock plus production		
(48 000 × £44.17[b])	2120	
Less closing stock (6000 × £44.17)	265	1855
Contribution		1169
Less fixed overheads		318
Profit		851

Notes

[a] With the AVECO method the opening stock is merged with the production of the current period to ascertain the average unit cost:
Opening stock (2000 × £30) + Production cost (£2 415 000) = £2 475 000
Average cost per unit = £2 475 000/48 000 units

[b] Average cost = (Production cost (£2 070 000) + Opening stock (50 000))/48 000 units.

Reconciliation:

	(£000)
Difference in profits (£885 − £851)	34
Fixed overheads in closing stocks (309 − 265)	44
Less fixed overheads in opening stock (2000 × £5)	10
Fixed overheads included in stock movement	34

The variations in profits between (a) and (b) are £6000 for absorption costing and £5000 for marginal costing. With the FIFO method all of the lower cost brought forward from the previous period is charged as an expense against the current period. The closing stock is derived only from current period costs. With the AVECO method the opening stock is merged with the units produced in the current period and is thus allocated between cost of sales and closing stocks. Therefore some of the lower cost brought forward from the previous period is incorporated in the closing stock at the end of the period.

Cost–volume–profit analysis

Solutions to Chapter 9 questions

Solution SM 9.1

(a) See Figure 9.1 (below).
(b) See Chapter 9 for the answer to this question.
(c) The major limitations are:
  (i) Costs and revenue may only be linear within a certain output range.
  (ii) In practice, it is difficult to separate fixed and variable costs, and the calculations will represent an approximation.
  (iii) It is assumed that profits are calculated on a variable costing basis.
  (iv) Analysis assumes a single product is sold or a constant sales mix is maintained.
(d) The advantages are:
  (i) The information can be absorbed at a glance without the need for detailed figures.
  (ii) Essential features are emphasised.
  (iii) The graphical presentation can be easily understood by non-accountants.

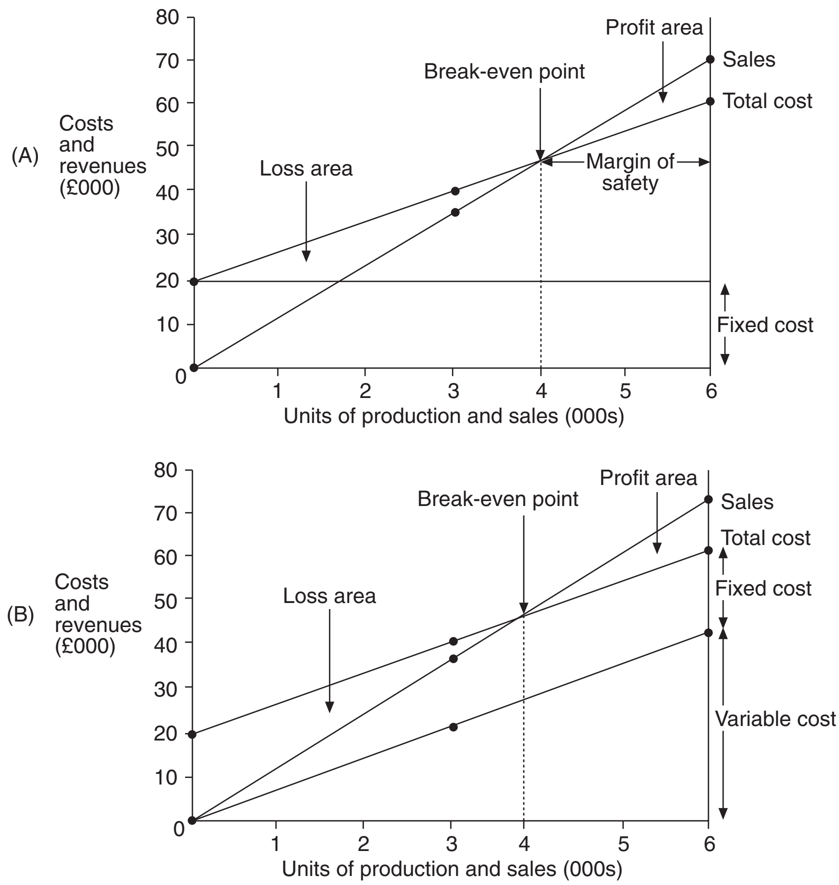

Figure 9.1 *(A) Break-even chart. (B) Contribution graph*

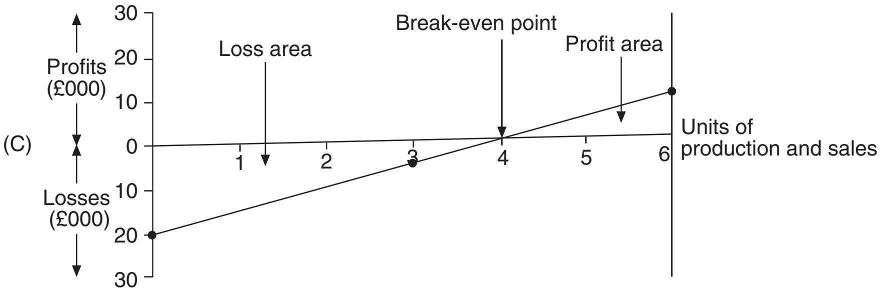

Figure 9.1 *(C) Profit–volume graph*

Solution SM 9.2

(a) Break-even point $= \dfrac{\text{fixed costs (£1 212 000)}}{\text{average contribution per £ of sales (£0.505)}} = £2\ 400\ 000$

Average contribution per £ of sales = [0.7 × (£1 − £0.45)] + [0.3 × (£1 − £0.6)]

(b) The graph (Figure 9.2) is based on the following calculations:

Zero activity: loss = £1 212 000 (fixed costs)
£4 m existing sales: (£4m × £0.505) − £1 212 000 = £808 000 profit
£4 m revised sales: (£4m × £0.475) − £1 212 000 = £688 000 profit
Existing break-even point: £2 400 000
Revised break-even point: £2 551 579 (£1 212 000/£0.475)
Revised contribution per £ of sales: (0.5 × £0.55) + (0.5 × £0.40) = £0.475

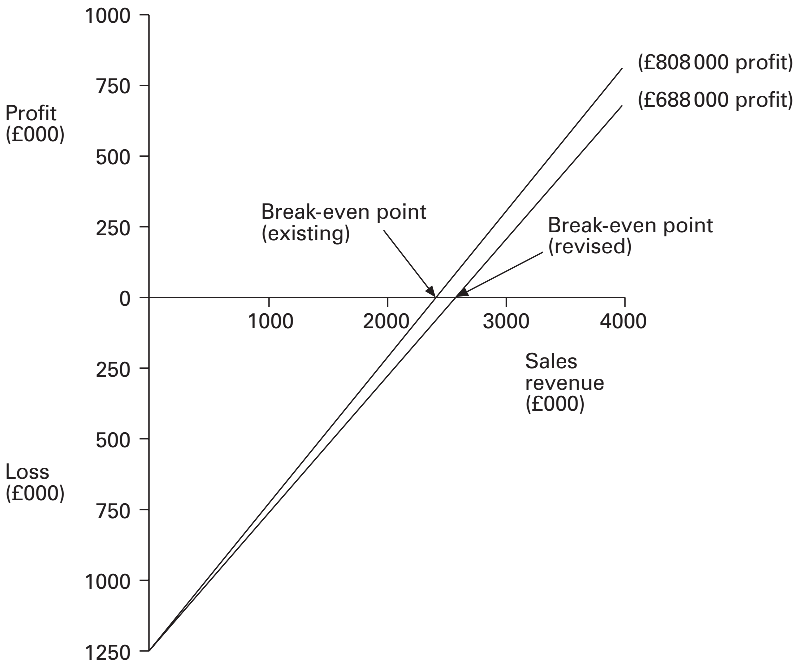

Figure 9.2 *Profit–volume chart*

Solution SM 9.3

(a) (i)

Products	1	2	3	Total
1. Unit contribution	£1.31	£0.63	£1.87	
2. Specific fixed costs per unit	£0.49	£0.35	£0.62	
3. General fixed costs per unit	£0.46	£0.46	£0.46	
4. Sales volume (000s units)	98.2	42.1	111.8	252.1
5. Total contribution (1 × 4)	£128.642	£26.523	£209.066	£364.231
6. Total specific fixed costs (2 × 4)	£48.118	£14.735	£69.316	£132.169
7. Total general fixed costs (3 × 4)	£45.172	£19.366	£51.428	£115.966
8. Unit selling price	£2.92	£1.35	£2.83	
9. Total sales revenue (8 × 4)	£286.744	£56.835	£316.394	£659.973

Average contribution per unit = Total contribution (£364.231)/sales volume (252.1)
= £1.4448

Average selling price per unit = Total sales revenue (£659.973)/sales volume (252.1)
= £2.6179

$$\text{Break-even point (units)} = \frac{\text{Total fixed costs}}{\text{Average contribution per unit}}$$

= (£132.169 + £115.966)/£1.4448
= 171.743 units

Break-even point (sales value) = 171.743 units × average selling price (£2.6179)
= £449.606

Alternatively, the break-even point (sales value) can be calculated using the following formula:

$$\text{Break-even point} = \frac{\text{Fixed costs (£132.169 + £115.966)}}{\text{Total contribution (£364.231)}} \times \text{Total sales (£659.973)}$$

= £449.606

It is assumed that the question requires the calculation of the break-even point to cover both general and specific fixed costs. An alternative answer would have been to present details of the break-even point to cover only specific fixed costs.

(ii) The planned sales mix for Product 2 that was used to calculate the break-even point in (i) is 42.1/252.1. Therefore the number of units of Product 2 at the break-even point is:

42.1/252.1 × 171 743 units = 28 681

(b) At the forecast sales volume the profit/contributions are as follows:

	(£000s)
Contributions to all fixed costs	26.523
Less specific fixed costs	14.735
Contribution to general fixed costs	11.788
Less share of general fixed costs	19.366
Net loss	7.578

Product 2 provides a contribution of £11 788 towards general fixed costs and, unless savings in general fixed costs in excess of £11 788 can be made if Product 2 is abandoned, it is still viable to produce Product 2. If the company ceases production of Product 2 it will lose a contribution of £11 788 and total profits will decline by £11 788. The company should investigate whether a greater contribution than £11 788 can be generated from the resources. If this is not possible the company should continue production of Product 2.

Solution SM 9.4

Task 1	(£)	(£)
Sales		2 106 000
Less variable cost of sales:		
Cost of beds	1 620 000	
Commission	210 600	
Transport	216 000	2 046 600
Contribution		59 400

Average contribution per bed sold = £59 400/5400 = £11
Fixed costs (£8450 + £10 000 + £40 000 + £40 000) = £98 450

$$\text{Break-even point (units)} = \frac{\text{Fixed costs (£98 450)}}{\text{Contribution per unit (£11)}} = 8950 \text{ beds}$$

Average selling price per unit (£2 106 000/5400 beds) = £390
Break-even point (sales revenue) = 8950 beds at £390 = £3 490 500

Task 2
The letter should include the items listed in (a) to (e) below:

(a) Required contribution:

	(£)
Salary	36 550
Interest lost	15 000
Fixed costs shown in Task 1	98 450
	150 000
Less manager's salary saved	40 000
Total contribution	110 000

The minimum profit required to compensate for loss of salary and interest is £11 550 (£110 000 − £98 450 fixed costs).

(b) Required volume = Required contribution (£110 000)/Contribution per unit (£11) = 10 000 beds

(c) Average life of a bed = (9 years × 0.10) + (10 years × 0.60) + (11 years × 0.3) = 10.2 years

Total bed population = 44 880 households × 2.1 beds per market = 94 248

$$\text{Estimated annual demand} = \frac{\text{94 248 beds}}{\text{Average replacement period (10.2 years)}}$$
$$= 9\,240 \text{ beds}$$

(d) The proposal will not achieve the desired profit. Estimated annual sales are 9240 beds but 10 000 beds must be sold to achieve the desired profit. The shortfall of 760 beds will result in profit being £8360 (760 × £11) less than the desired profit.

(e) The estimate of maximum annual sales volume may prove to be inaccurate because of the following reasons:
   (i) The population of Mytown may differ from the sample population. For example the population of Mytown might contain a greater proportion of elderly people or younger people with families. Either of these situations may result in the buying habits of the population of Mytown being different from the sample proportion.
   (ii) The data is historic and does not take into account future changes such as an increase in wealth of the population, change in composition or a change in buying habits arising from different types of beds being marketed.

Task 3
This question requires a knowledge of the material covered in Chapter 11. Therefore you should delay attempting this question until you have understood the content of Chapter 11.

	A (£)	**B** (£)	**C** (£)	**Total**
Selling price	240	448	672	
Unit purchase cost	130	310	550	
Carriage inwards	20	20	20	
Contribution	90	118	102	
Square metres per bed	3	4	5	
Contribution per square metre	£30	£29.50	£20.40	
Ranking	1	2	3	
Maximum demand	35	45	20	
Storage required (square metres)	105	180	100	385

Monthly sales schedule and statement of profitability:

	(£)	(£)
Contribution from sales of A (35 × £90)		3150
Contribution from sales of B (45 × £118)		5310
Contribution from sales of C (3[a] × £102)		306
		8766
Less specific avoidable fixed costs:		
Staff costs	3780	
Departmental fixed overheads	2000	5780
Contribution to general fixed overheads		2986
Less general fixed overheads		2520
Departmental profit		466

Note
[a] The balance of storage space available for Model C is 300 square metres less the amount allocated to A and B (285 metres) = 15 metres. This will result in the sales of 3 beds (15 metres/5 metres per bed).

Solution SM 9.5

(a) *Analysis of semi-variable costs*[a]

Method A: variable element $= \dfrac{\text{increase in costs}}{\text{increase in activity}} = \dfrac{£10\ 000}{100\ 000 \text{ copies}}$

$= £0.10$ per copy

fixed element = total semi-variable cost (£55 000) − variable cost (£35 000) at an activity level of 350 000 copies

Therefore fixed element = £20 000

Method B: variable element $= \dfrac{\text{increase in costs}}{\text{increase in activity}} = \dfrac{£5000}{100\,000 \text{ copies}}$

$= £0.05$ per copy

fixed element = total semi-variable cost (£47 500) − variable costs (£17 500) at an activity level of 350 000 copies

Therefore fixed element = £30 000

Note

[a]The analysis is based on a comparison of total costs and activity levels at 350 000 and 450 000 copies per year.

Contribution per copy of new magazine

	Method A (£)	**Method B (£)**
Selling price	1.00	1.00
Variable cost (given)	(0.55)	(0.50)
Variable element of semi-variable cost	(0.10)	(0.05)
Lost contribution from existing magazine	(0.05)	(0.05)
Contribution	0.30	0.40

Calculation of net increase in company profits

	Method A			**Method B**		
Copies sold	500 000	400 000	600 000	500 000	400 000	600 000
Contribution per copy	£0.30	£0.30	£0.30	£0.40	£0.40	£0.40
Total contribution	£150 000	£120 000	£180 000	£200 000	£160 000	£240 000
Fixed costs[a]	£100 000	£100 000	£100 000	£150 000	£150 000	£150 000
Net increase in profit	£50 000	£20 000	£80 000	£50 000	£10 000	£90 000

Note

[a]Method A = specific fixed costs (£80 000) + semi-variable element (£20 000)
= £100 000

Method B = specific fixed costs (£120 000) + semi-variable element (£30 000)
= £150 000

(b) $$\text{Break-even point} = \frac{\text{fixed costs}}{\text{contribution per unit}}$$

Method A = £100 000/0.30 = 333 333 copies
Method B = £150 000/0.40 = 375 000 copies

The margin of safety is the difference between the anticipated sales and the break-even point sales:

Method A = 500 000 − 333 333 = 166 667 copies
Method B = 500 000 − 375 000 = 125 000 copies

(c) Method B has a higher break-even point and a higher contribution per copy sold. This implies that profits from Method B are more vulnerable to a decline in sales volume. However, higher profits are obtained with Method B when sales are high (see 600 000 copies in (B)).

The break-even point from the sale of the existing magazine is 160 000 copies (£80 000/£0.50) and the current level of monthly sales is 220 000 copies. Therefore sales can drop by 60 000 copies before break-even point is reached. For every 10 copies sold of the new publication, sales of the existing publication will be reduced by one copy. Consequently, if more than 600 000 copies of the new publication are sold, the existing magazine will make a loss. If sales of the new magazine are expected to consistently exceed 600 000 copies then the viability of the existing magazine must be questioned.

Solution SM 9.6

(a) (i) The opportunity costs of producing cassettes are the salary forgone of £1000 per month and the rental forgone of £400 per month.
(ii) The consultant's fees and development costs represent sunk costs.

(b) The following information can be obtained from the report.

	£10 selling price	£9 selling price
Sales quantity	7500–10 000 units	12 000–18 000 units
Fixed costs[a]	£13 525	£17 525
Profit at maximum sales[b]	£3 975	£4 975
Profit/(loss) at minimum sales[c]	(£400)	(£2 525)
Break-even point[d]	7 729 units	14 020 units
Margin of safety:		
Below maximum	2 271 units	3 980 units
Above minimum	229 units	2 020 units

Notes

[a] Fixed production cost + £1400 opportunity cost
[b] (10 000 units × £1.75 contribution) − £13 525 fixed costs = £3975 profit
(18 000 units × £1.25 contribution) − £17 525 fixed costs = £4975 profit
[c] (7 500 units × £1.75 contribution) − £13 525 fixed costs = £400 loss
(12 000 units × £1.25 contribution) − £17 525 fixed costs = £2525 loss
[d] Fixed costs/contribution per unit

Conclusions

(i) The £10 selling price is less risky than the £9 selling price. With the £10 selling price, the maximum loss is lower and the break-even point is only 3% above minimum sales (compared with 17% for a £9 selling price).
(ii) The £9 selling price will yield the higher profits if maximum sales quantity is achieved.
(iii) In order to earn £3975 profits at a £9 selling price, we must sell 17 200 units (required contribution of 17 525 fixed costs plus £3975 divided by a contribution per unit of £1.25).

Additional information required

(i) Details of capital employed for each selling price.
(ii) Details of additional finance required to finance the working capital and the relevant interest cost so as to determine the cost of financing the working capital.
(iii) Estimated probability of units sold at different selling prices.
(iv) How long will the project remain viable?
(v) Details of range of possible costs. Are the cost figures given in the question certain?

Cost estimation and cost behaviour

Solutions to Chapter 10 questions

Solution SM 10.1

(a) The first stage is to convert all costs to a 2002 basis. The calculations are as follows:

	1998 (£000)	**1999 (£000)**	**2000 (£000)**	**2001 (£000)**
Raw materials				
Skilled labour	$242(1.2)^4$	$344(1.2)^3$	$461(1.2)^2$	$477(1.2)$
Unskilled labour				
Factory overheads	$168(1.15)^3(1.2)$	$206(1.15)^2(1.2)$	$246(1.15)(1.2)$	$265(1.2)$
Power	$25(1.1)(1.25)^3$	$33(1.25)^3$	$47(1.25)^2$	$44(1.25)$
Raw materials				
Skilled labour	500.94	595.12	663.84	572.4
Unskilled labour				
Factory overheads	306.432	326.304	339.48	318
Power	53.625	64.35	73.32	55
Total (2002 prices)	861 000	986 000	1 077 000	945 000
Output (units)	160 000	190 000	220 000	180 000

The equation $Y = a + bx$ is calculated from the above schedule of total production costs (2002 prices) and output. The calculations are as follows:

Output in units (000) x	Total cost (£000) y	x^2	xy
160	861	25 600	137 760
190	986	36 100	187 340
220	1077	48 400	236 940
180	945	32 400	170 100
$\Sigma x = 750$	$\Sigma y = 3869$	$\Sigma x^2 = 142\,500$	$\Sigma xy = 732\,140$

We now solve the following simultaneous equations:

$$\Sigma y = Na + b\Sigma x$$
$$\Sigma xy = \Sigma xa + b\Sigma x^2$$

Therefore

$$3869 = 4a + 750b \qquad (1)$$
$$732\,140 = 750a + 142\,500b \qquad (2)$$

Multiply equation (1) by 190 (142 500/750) and equation (2) by 1. Then equation (1) becomes

$$735\,110 = 760a + 142\,500b \qquad (3)$$

Subtract equation (2) from equation (3):

$$\begin{aligned} 2970 &= 10a \\ a &= 297 \end{aligned}$$

Substitute for a in equation (1):

$$\begin{aligned} 3869 &= 4 \times 297 + 750b \\ 2681 &= 750b \\ b &= 3.57 \end{aligned}$$

The relationship between total production costs and volume for 2002 is:

$$y = £297\,000 + 3.57x$$

where y = total production costs (at 2002 price) and x = output level.

(b) See Chapter 10 for the answer to this question.

(c) General company overheads will still continue whether or not product LT is produced. Therefore the output of LT will not affect general production overheads. Consequently, the regression equation should not be calculated from cost data that includes general company overheads. General company overheads will not increase with increments in output of product LT. Hence short-term decisions and cost control should focus on those costs that are relevant to production of LTs. Common and unavoidable general fixed costs are not relevant to the production of LT, and should not be included in the regression equation.

Solution SM 10.2

Total cost for 1525 machine hours = £14 000 + 0.0025(1525^2) = £19 814
Inflation adjusted figure = £19 814 × 1.06 = £21 003
Variance = £4580F (£21 003 – £16 423)
Answer = D

Solution SM 10.3

Machine hours = [100 000 + (30 × 240)] × 1.08 = 115 776
Overhead cost = Overhead cost = £10 000 + (0.25 × 115 776) = £38 944
Answer = C

Measuring relevant costs and revenues for decision-making

Solutions to Chapter 11 questions

Solution SM 11.1

(a)

	(£)
Purchase price of component from supplier	50
Additional cost of manufacturing (variable cost only)	34
Saving if component manufactured	16

The component should be manufactured provided the following assumptions are correct:

(i) Direct labour represents the *additional* labour cost of producing the component.

(ii) The company will not incur any additional fixed overheads if the component is manufactured.

(iii) There are no scarce resources. Therefore the manufacture of the component will not restrict the production of other more profitable products.

(b) (i) Additional fixed costs of £56 000 will be incurred, but there will be a saving in purchasing costs of £16 per unit produced. The break-even point is 3500 units (fixed costs of £56 000/£16 per unit saving). If the quantity of components manufactured per year is less than 3500 units then it will be cheaper to purchase from the outside supplier.

(ii) The contribution per unit sold from the existing product is £40 and each unit produced uses 8 scarce labour hours. The contribution per labour hour is £5. Therefore if the component is manufactured, 4 scarce labour hours will be used, resulting in a lost contribution of £20. Hence the relevant cost of manufacturing the components is £54, consisting of £34 incremental cost plus a lost contribution of £20. The component should be purchased from the supplier.

(c) The book value of the equipment is a sunk cost and is not relevant to the decision whether the company should purchase or continue to manufacture the components. If we cease production now, the written-down value will be written off in a lump sum, whereas if we continue production, the written-down value will be written off over a period of years. Future cash outflows on the equipment will not be affected by the decision to purchase or continue to manufacture the components. For an illustration of the irrelevance of the written down value of assets for decision-making purposes see 'Replacement of equipment' in Chapter 11.

Solution SM 11.2

(a) *Calculation of minimum selling price:*

	(£)
Direct materials: Steel[a]	55.00
Brass Fittings[b]	20.00
Direct Labour: Skilled[c]	300.00
Semi-skilled[d]	—
Overhead[e]	7.50
Estimating time[f]	—
Administration[g]	—
Relevant cost of the order	382.50

Notes:

[a] Using the materials for the order will result in them having to be replaced. Therefore future cash outflows will increase by £55.

[b] Future cash outflows of £20 will be incurred.

[c] The required labour hours can be obtained by reducing production of another product involving a lost contribution before deducting the labour cost of £21 (£13 + £8) per hour (note that the labour cost will be incurred for all alternatives and therefore is not an incremental cash flow). Alternatively, the company can pay additional wages involving overtime of £300 (25 hours × £12). Therefore the latter course of action is the most economical and the incremental cash flows from undertaking the order will be £300.

[d] No incremental cost is involved since the alternative is paid idle time.

[e] The only incremental cost is power consisting of 10 hours at £0.75 per hour.

[f] Estimating time is a sunk cost.

[g] Administration does not involve any incremental cash flows.

(b) Factors to be considered include:
  (i) time period for repeat orders, the number of repeat orders and the likely demand;
  (ii) the cash flows generated from the alternative use of the capacity;
  (iii) competition to obtain future orders from Exe plc;
  (iv) estimated price quotations from competitors.

(c) *Limiting factor presentation:*

	Product X	Product Y
Product contribution	£10	£20
Kg of material used per product	1	4
Contribution per kg	£10	£5

Thus scarce materials should be allocated to Product X since it yields a contribution of £5 per kg in excess of the contribution derived from Product Y.

Opportunity cost approach:

	Product X		Product Y	
Product contribution at acquisition cost	£10		£20	
Lost contribution from alternative use:				
1 kg allocated to Y at £5 per kg	(£5)			
4 kg allocated to X at £10 per kg			£40	
Cash flow impact per product	+£5		–£20	
Cash flow impact per kg	+£5	(£5/1 kg)	–£5	(£20/4 kg)

The above analysis shows that X yields a contribution of £5 per kg when taking alternative uses of the materials into consideration. Producing Product Y results in the contribution being reduced by £5 per kg taking into account the alternative use of the materials. This is consistent with the limiting factor approach which indicates that the company is £5 per kg better off using the materials for X or £5 per kg worse off from using the materials for Y.

Solution SM 11.3

(a) (i)

	Product I (£000)	Product II (£000)	Product III (£000)	Total (£000)
Sales	2475	3948	1520	7943
Contribution	1170	1692	532	3394
Attributable fixed costs	(275)	(337)	(296)	(908)
General fixed costs[a]	(520)	(829)	(319)	(1668)
	(795)	(1166)	(615)	(2576)
Profit	375	526	(83)	818
	= £1.6/unit	= £1.40/unit	= (£0.04/unit)	

Note

[a]General fixed costs are allocated to products at 21% of total sales revenue (£1668/£7943)

(ii) If Product III is discontinued it is assumed that variable costs and attributable (i.e. specific) fixed costs are avoidable. It is assumed that general fixed costs are common and unavoidable to all products and will remain unchanged if Product III is discontinued. However, it is possible that some general fixed costs may be avoidable in the longer term. The revised profits if Product III is discontinued will be:

	(£000s)
Contribution of Products I and II (£1170 + £1692)	2862
Attributable fixed costs (£275 + £337)	(612)
General fixed costs	(1668)
Profit	582

Profits will decline by £236 000 (£818 − £582) if Product III is discontinued because A Ltd will no longer obtain a contribution of £236 000 (£532 − £296) towards general fixed costs.

(iii) Extra sales of 15 385 units (£80 000 additional fixed costs/£5.20 unit contribution) will be required to cover the additional advertising expenditure. It is assumed that existing fixed costs will remain unchanged.

(iv) The revised unit contribution will be £3.45 (£9.45 − £6).

$$\text{Required sales} = \frac{\text{£1 692 000 (existing total contribution)}}{\text{£3.45 revised unit contribution}}$$

= 490 435 units (an increase of 30.4% over the budgeted sales of 376 000 units)

(b) The following factors will influence cost behaviour in response to changes in activity:

(i) The magnitude of the change in activity (more costs are likely to be affected when there is a large change in activity).

(ii) Type of expense (some expenses are directly variable with volume such as direct materials, whereas others are fixed or semi-fixed).

(iii) Management policy (some expenses are varied at the discretion of management, e.g. advertising).

(iv) The time period (in the long term, all costs can be changed in response to changes in activity whereas in the short term, some costs, e.g. salaries of supervisors, will remain unchanged).

Solution SM 11.4

Task 1

(a) and (b)

Selling price	£60	£70	£80	£90	
Sales volume (units)	25 000	20 000	16 000	11 000	
	(£ per unit)	(£ per unit)	(£ per unit)	(£ per unit)	
Direct material	14.00	14.00	14.00	16.10	(£14 × 115/100)
Direct labour	13.00	13.00	11.70 (90%)	11.70	
Variable production overhead	4.00	4.00	4.00	4.00	
Sales commission (10% of selling price)	6.00	7.00	8.00	9.00	
Total variable cost per unit	37.00	38.00	37.70	40.80	
Contribution per unit	23.00	32.00	42.30	49.20	
	£000	£000	£000	£000	
Total contribution	575	640	676.8	541.2	
Fixed costs:					
production overhead (25 000 × £8)	200	200	190	190	
selling and distribution (25 000 × £3)	75	70	70	70	
administration (25 000 × £2)	50	50	50	50	
Total fixed costs	325	320	310	310	
Total annual profit	250	320	366.8	231.2	

Task 2

(a) A selling price of £80 maximises company profits at £366 800 per annum.

(b) Factors to be considered include:

(i) The effect on morale arising from a large reduction in direct labour and the resulting redundancies.

(ii) If competitors do not increase their prices customers may migrate to competitors in the long term and long-term annual profits may be considerably less than the profits predicted in the above schedule. The migration of customers may also enable competitors to reap the benefits of economies of scale thus resulting in their having lower unit costs than Rane Ltd.

Task 3

(a) The products should first be ranked according to their contribution per component used.

	Product A **£ per unit**	**Product B** **£ per unit**	**Product C** **£ per unit**	**Product D** **£ per unit**
Selling price	14	12	16	17
Variable costs	11	11	12	12
Contribution	3	1	4	5
Number of components used per unit	2 (£4/£2)	1 (£2/£2)	3 (£6/£2)	4 (£8/£2)
Contribution per component	£1.50	£1.00	£1.33	£1.25
Ranking	1	4	2	3

The scarce components should be allocated as follows:

Product	**Units**	**Components used**	**Balance unused**
A	4000	8 000	14 400
C	3600	10 800	3 600
D	900	3 600	—
		22 400	

(b) Profit to be earned next period:

	Product	Units	Contribution per unit (£)	Total (£)
	A	4000	3	12 000
	C	3600	4	14 400
	D	900		4 500
Total contribution				30 900
Fixed costs				8 000
Profit				22 900

The application of linear programming to management accounting

Solutions to Chapter 12 questions

Solution SM 12.1

(a)

	M	F
Contribution per unit	£96	£110
Litres of material P required	8	10
Contribution per litre of material P	£12	£11
Ranking	1	2
Production/sales (units)	1000	2325[a]

Note

[a] 31 250 litres of P less (1000 × 8) for M = 23 250 litres for F giving a total production of 2325 units (23 250 litres/10)

(b)

	M (£000)	F (£000)	Total (£000)
Sales	200	488.250	688.250
Variable costs:			
Material P	20	58.125	78.125
Material Q	40	46.500	86.500
Direct labour	28	81.375	109.375
Overhead	16	46.500	62.500
	104	232.500	336.500
Contribution	96	255.750	351.750
Fixed costs (£150 000 + £57 750)			207.750
Profit			144.000

(c) Maximise Z = 96M + 110F (product contributions) subject to:

8M + 10F ≤ 31 250 (material P constraint)
10M + 5F ≤ 20 000 (material Q constraint)
4M + 5F ≤ 17 500 (direct labour constraint)
M ≤ 1 000 (maximum demand for M)
F ≤ 3 000 (maximum demand for F)

The above constraints are plotted on the graph shown in Figure 12.1 (below) as follows:

Material P; Line from M = 3906.25, F = 0 to F = 3125, M = 0
Material Q; Line from M = 2000, F = 0 to F = 4000, M = 0
Direct labour; Line from M = 4375, F = 0 to F = 3500, M = 0
Sales demand of M; Line from M = 1000
Sales demand of F; Line from F = 3000

The optimal solution occurs where the lines in Figure 12.1 intersect for material P and Q constraints. The point can be determined from the graph or mathematically as follows:

8M + 10F = 31 250 (material P constraint)
10M + 5F = 20 000 (material Q constraint)

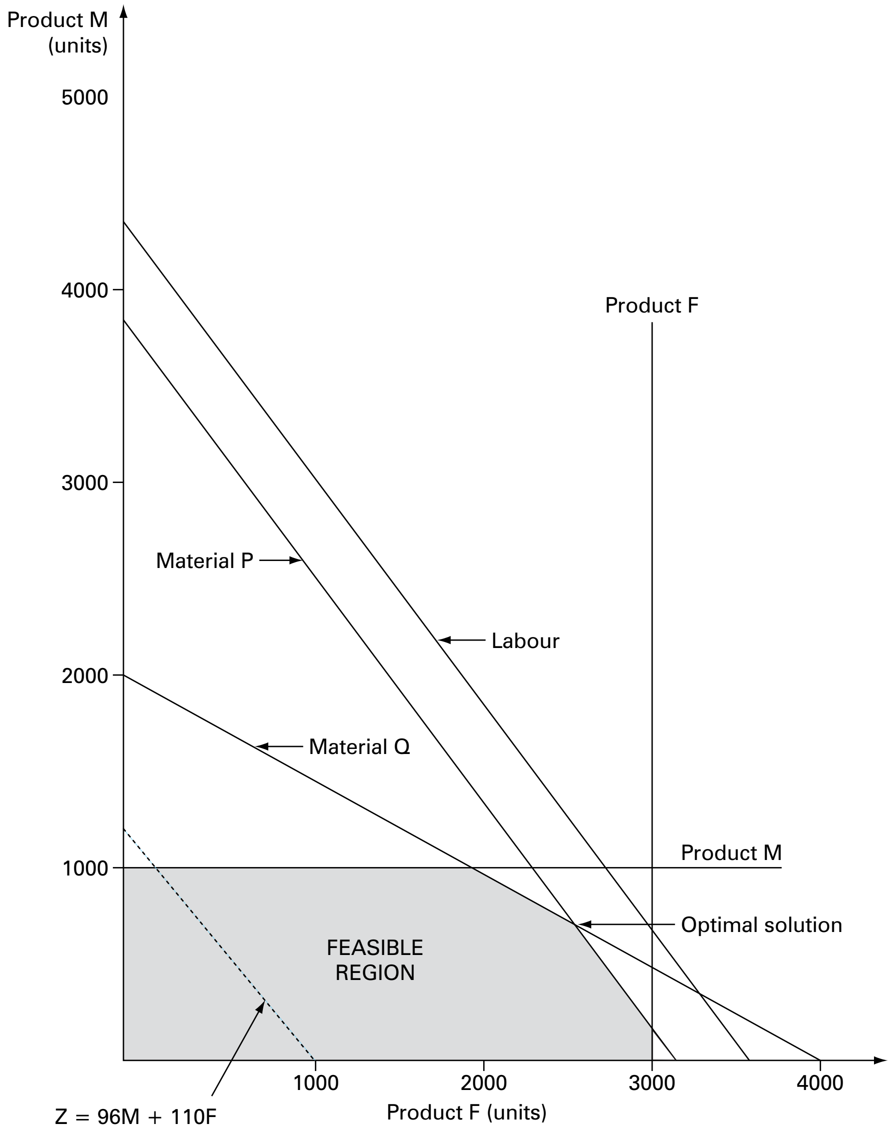

Figure 12.1

multiplying the first equation by 1 and the second equation by 2:

8M + 10F = 31 250
20M + 10F = 40 000
subtracting –12M = – 8750
M = 729.166

Substituting for M in the first equation:

8(729.166) + 10F = 31 250
F = 2541.667

(d)

		(£)
Contribution:	(729 units of M at £96)	69 984
	(2542 units of F at £110)	279 620
		349 604
Less fixed costs		207 750
Profit		141 854

Moving from the solution in (c) where the lines intersect as a result of obtaining an additional litre of material Q gives the following revised equations:

$8M + 10F = 31\,250$ (material P constraint)

$10M + 5F = 20\,001$ (material Q constraint)

The values of M and F when the above equations are solved are 729.333 and 2541.533. Therefore, M is increased by 0.167 units and F is reduced by 0.134 units giving an additional total contribution of £1.292 [0.167 × £96) – (0.134 × £110)] per additional litre of Q. Therefore the shadow price of Q is £1.292 per litre.

(e) See Chapter 12 for an explanation of shadow prices.

(f) Other factors to be taken into account include the impact of failing to meet the demand for product M, the need to examine methods of removing the constraints by sourcing different markets for the materials and the possibility of subcontracting to meet the unfulfilled demand.

Solution SM 12.2

(a)

	Product X	Product Y	Total
(1) Estimated demand (000 units)	315	135	
(2) Machine hours required (per 000 units)	160	280	
(3) Machine hours required to meet demand (1 × 2)	50 400	37 800	88 200

The machine hours required to meet demand are in excess of the machine hours that are available. Therefore machine hours are the limiting factor and the company should allocate capacity according to contribution per machine hour.

	Product X (£)	Product Y (£)
Selling price	11.20	15.70
Variable cost	6.30	8.70
Contribution	4.90	7.00
Machine hours required per unit[a]	0.16	0.28
Contribution per machine hour	£30.625	£25

Note

[a] Product X = 160/1000   Product Y = 280/1000

The company should concentrate on maximizing output of Product X. Meeting the maximum demand of Product X will require 50 400 machine hours and this will leave 34 600 hours (85 000 hrs – 50 400 hrs) to be allocated to Product Y. Therefore 123 571 units (34 600 hrs/0.28 hrs) of Y and 315 000 units of X should be produced.

(b)

	Product X (£)	Product Y (£)	Total (£)
Contribution per unit	4.90	7.00	
Sales volume	315 000	123.571	
Contribution (£000s)	1543.5	864.997	2 408.497
Less fixed costs[a]			2 124.997
Profit			283.500

Note

[a] Fixed costs: Product X = 315 000 units × £4 per unit = £1 260 000

Product Y = 123 571 units × £7 per unit = £864 997

2 124 997

(c) There are now two limiting factors and linear programming techniques must be used.

Let X = Number of units of X produced (in 000s of units)
Y = Number of units of Y produced (in 000s of units)

$160X + 280Y = 85\,000$ Machine hours (1)
$120X + 140Y = 55\,000$ Labour hours (2)

Multiply equation (2) by 2 and equation (1) by 1

$160X + 280Y = 85\,000$ (1)
$240X + 280Y = 110\,000$ (2)

Subtract equation (2) from equation (1)

$$-80X = -25\,000$$
$$X = 312.5 \text{ (i.e. 312 500 units)}$$

Substitute for X in equation (1)

$$\begin{aligned} 160\,(312.5) + 280Y &= 85\,000 \\ 50\,000 + 280Y &= 85\,000 \\ 280Y &= 35\,000 \\ Y &= 125 \text{ (i.e. 125 000)} \end{aligned}$$

Therefore the optimal output to fully utilise both labour and machine capacity is 312 500 units of Product X and 125 000 units of Product Y.

Activity-based-costing

Solutions to Chapter 13 questions

Solution SM 13.1

(a) (i) *Conventional Absorption Costing Profit Statement:*

		XYI	YZT	ABW
(1)	Sales volume (000 units)	50	40	30
		£	£	£
(2)	Selling price per unit	45	95	73
(3)	Prime cost per unit	32	84	65
(4)	Contribution per unit	13	11	8
(5)	Total contribution in £000s (1 × 4)	650	440	240
(6)	Machine department overheads[a]	120	240	144
(7)	Assembly department overheads[b]	288.75	99	49.5
	Profit (£000s)	241.25	101	46.5

Total profit = £388 750

Notes:
[a] XYI = 50 000 × 2 hrs × £1.20, YZT = 40 000 × 5 hrs × £1.20
[b] XYI = 50 000 × 7 hrs × £0.825, YZT = 40 000 × 3 hrs × £0.825

(ii) *Cost pools:*

	Machining services	Assembly services	Set-ups	Order processing	Purchasing
£000	357	318	26	156	84
Cost drivers	420 000 machine hours	530 000 direct labour hours	520 set-ups	32 000 customer orders	11 200 suppliers' orders
Cost driver rates	£0.85 per machine hour	£0.60 direct labour hour	£50 per set-up	£4.875 per customer order	£7.50 per suppliers' order

ABC Profit Statement:

	XYI (£000)	YZT (£000)	ABW (£000)
Total contribution	650	440	240
Less overheads:			
Machine department at £0.85 per hour	85	170	102
Assembly at £0.60 per hour	210	72	36
Set-up costs at £50 per set-up	6	10	10
Order processing at £4.875 per order	39	39	78
Purchasing at £7.50 per order	22.5	30	31.5
Profit (Loss)	287.5	119	(17.5)

Total profit = £389 000

(b) See the sections on 'Comparison of traditional and ABC costing systems' and 'Volume-based and non-volume-based cost drivers' in Chapter 13 for the answer to this question.

Solution SM 13.2

(a) For short-term decision-making, contribution to fixed costs is often advocated. Contribution is defined as sales less variable costs. It therefore attempts to include only those costs and revenues that will change as a result of a decision. Fixed costs are assumed to be unavoidable and remain unchanged and irrelevant for decision-making. Ignoring fixed costs can only be justified in certain circumstances. For example, the contribution approach can be applied to one-time only special orders where the company has a temporary excess supply of spare capacity. In this situation a short-term approach can be adopted by focusing only on the sales revenues and variable costs. The contribution approach is also advocated for pricing off-peak business and ranking products where limiting factors apply (see 'Product-mix decisions when capacity constraints apply' in Chapter 9). In the latter situation a company may be faced with short-term capacity constraint and profit is maximized by ranking products by their contributions per limiting factor.

The contribution approach can only be applied when decisions have no long-term implications. However, most decisions do have long-term implications and in these circumstances fixed costs cannot be ignored. With the contribution approach there is a danger that only those direct costs that are uniquely attributable to individual products will be regarded as relevant for decision-making. Those fixed costs relating to the joint resources that fluctuate according to the demand for them will also be relevant for decision-making. An ideal answer should emphasise, why in the longer-term, fixed costs are likely to change and be relevant for decision-making. For a more detailed discussion of this issue you should refer to 'The need for a cost accumulation system in generating relevant cost information for decision-making' in Chapter 13. Points 1 (many indirect costs are relevant for decision-making) and 3 (product decisions are not independent) are of particular importance.

(b) See section 'Designing ABC systems' in Chapter 13 for the answer to this question.

(c) See sections on 'A comparison of traditional and ABC systems' and 'Volume-based and non-volume-based cost drivers' in Chapter 13 for the answer to this question.

(d) See 'Activity hierarchies' in Chapter 13 for the answer to this question.

Solution SM 13.3

(a) (i) Direct labour overhead rate

$$= \frac{\text{total overheads (£1 848 000)}}{\text{total direct labour hours (88 000)}}$$

$$= \text{£21 per direct labour hour}$$

Product costs

Product	**X (£)**	**Y (£)**	**Z (£)**
Direct labour	8	12	6
Direct materials	25	20	11
Overhead[a]	28	42	21
Total cost	61	74	38

Note

[a]X = 1⅓ hours × £21
Y = 2 hours × £21
Z = 1 hour × £21

(ii) Materials handling
Overhead rate

$$= \frac{\text{receiving department overheads (£435 000)}}{\text{direct material cost (£1 238 000)}} \times 100$$

$$= 35.14\% \text{ of direct material cost}$$

Machine hour overhead rate

$$= \frac{\text{other overheads (£1 413 000)}}{\text{76 000 machine hours}}$$

$$= \text{£18.59 per machine hour}$$

Product costs

Product	**X** (£)	**Y** (£)	**Z** (£)
Direct labour	8.00	12.00	6.00
Direct materials	25.00	20.00	11.00
Materials handling overhead	8.78 (£25 × 35.14%)	7.03 (£20 × 35.14%)	3.87 (£11 × 35.14%)
Other overheads[a] (machine hour basis)	24.79	18.59	37.18
Total cost	66.57	57.62	58.05

Note
[a]X = $1\frac{1}{3}$ × £18.59
Y = 1 × £18.59
Z = 2 × £18.59

(b) The cost per transaction or activity for each of the cost centres is as follows:

Set-up cost
Cost per set up

$$= \frac{\text{setup cost (£30 000)}}{\text{number of production runs (30)}} = \text{£1000}$$

Receiving
Cost per receiving order

$$= \frac{\text{receiving cost (£435 000)}}{\text{number of orders (270)}} = \text{£1611}$$

Packing
Cost per packing order

$$= \frac{\text{packing cost (£250 000)}}{\text{number of orders (32)}} = \text{£7812}$$

Engineering
Cost per production order

$$= \frac{\text{engineering cost (£373 000)}}{\text{number of production orders (50)}} = \text{£7460}$$

The total set-up cost for the period was £30 000 and the cost per transaction or activity for the period is £1000 per set-up. Product X required three production runs, and thus £3000 of the set-up cost is traced to the production of product X for the period. Thus the cost per set-up per unit produced for product X is £0.10 (£3000/30 000 units).

Similarly, product Z required 20 set-ups, and so £20 000 is traced to product Z. Hence the cost per set-up for product Z is £2.50 (£20 000/8000 units).

The share of a support department's cost that is traced to each unit of output for each product is therefore calculated as follows:

$$\text{cost per transaction} \times \frac{\text{number of transactions per product}}{\text{number of units produced}}$$

The unit standard costs for products X, Y and Z using an activity-based costing system are

	X	Y	Z
Direct labour	£8.00	£12.00	£6.00
Direct materials	25.00	20.00	11.00
Machine overhead[a]	13.33	10.00	20.00
Set-up costs	0.10	0.35	2.50
Receiving[b]	0.81	2.82	44.30
Packing[c]	2.34	1.17	19.53
Engineering[d]	3.73	3.73	23.31
Total manufacturing cost	53.31	50.07	126.64

Notes

[a]Machine hours × machine overhead rate (£760 000/ 76 000 hrs)

[b]X = (£1611 × 15)/30 000
Y = (£1611× 35)/20 000
Z = (£1611 × 220)/8000

[c]X = (£7812 × 9)/30 000
Y = (£7812 × 3)/20 000
Z = (£7812 × 20)/8000

[d]X = (£7460 × 15)/30 000
Y = (£7460 × 10)/20 000
Z = (£7460 × 25)/8000

(c) The traditional product costing system assumes that products consume resources in relation to volume measures such as direct labour, direct materials or machine hours. The activity-based system recognises that some overheads are unrelated to production volume, and uses cost drivers that are independent of production volume. For example, the activity-based system assigns the following percentage of costs to product Z, the low volume product:

Set-up-related costs 66.67% (20 out of 30 set-ups)
Delivery-related costs 62.5% (20 out of 32 deliveries)
Receiving costs 81.5% (220 out of 270 receiving orders)
Engineering-related costs 50% (25 out of 50 production orders)

In contrast, the current costing system assigns the cost of the above activities according to production volume, measured in machine hours. The total machine hours are

Product X 40 000 (30 000 × 1⅓)
Product Y 20 000 (20 000 × 1)
Product Z 16 000 (8 000 × 2)
76 000

Therefore 21% (16 000/76 000) of the non-volume-related costs are assigned to product Z if machine hours are used as the allocation base. Hence the traditional system undercosts the low-volume product, and, on applying the above approach, it can be shown that the high-volume product (product X) is overcosted. For example, 53% of the costs (40 000/76 000) are traced to product X with the current system, whereas the activity-based system assigns a much lower proportion of non-volume-related costs to this product.

Decision-making under conditions of risk and uncertainty

Solutions to Chapter 14 questions

Solution SM 14.1

(a) *Profit and Loss Statement for Period Ending 31 May 2000*

	(£)
Revenue (14 400 000 journeys):	
0–3 miles (7 200 000 × £0.20)	1 440 000
4–5 miles (4 320 000 × £0.30)	1 296 000
Over 5 miles (2 880 000 × £0.50)	1 440 000
Juvenile fares (4 800 000 × £0.15)	720 000
Senior citizen fares (4 800 000 × £0.10)	480 000
	5 376 000
Advertising revenue	250 000
	5 626 000
Less: Variable costs (20 routes × 4 buses × 150 miles × 330 days × £0.75)	(2 970 000)
Fixed costs	(1 750 000)
Net profit	906 000

(b) Assuming the same passenger mix as 2000 the weighted average fare per passenger for year ending 31 May 2001 is (£5 376 000 × 1.05)/24 000 000 = £0.2352.
The break-even point is where:
Total revenue from fares + Advertising revenue = Total cost
Let x = number of passenger journeys
Break-even point: $0.2352x$ + £250 000 = (2 970 000 + £1 750 000) 1.1
$0.2352x$ = £4 942 000
x = 21 011 905
Maximum capacity utilisation = 40 000 000 passenger journeys (24 000 000/0.6)
Break-even capacity utilisation = 21 011 905/40 000 000 = 52.5%

(c) (i)

Expected value and probability estimates for 2001

Capacity Utilisation %	(Probability)	Revenue Fares (£000)	Adverts (£000)	Inflation (%)	(Probability)	Costs (£000)	Combined probability	Net profit (£000)	Expected value (£000)
70	0.1	6585.6[a]	250	8	0.3	5097.6[b]	0.03	1738.0	52.14
		6585.6	250	10	0.6	5192.0[b]	0.06	1643.6	98.62
		6585.6	250	12	0.1	5286.4[b]	0.01	1549.2	15.49
60	0.5	5644.8[a]	250	8	0.3	5097.6	0.15	797.2	119.58
		5644.8	250	10	0.6	5192.0	0.30	702.8	210.84
		5644.8	250	12	0.1	5286.4	0.05	608.4	30.42
50	0.4	4704.0[a]	250	8	0.3	5097.6	0.12	−143.6	−17.23
		4704.0	250	10	0.6	5192.0	0.24	−238.0	−57.12
		4704.0	250	12	0.1	5286.4	0.04	−332.4	−13.30
							1.00		439.44

Notes

[a]Fare revenues at 60% capacity for 2000 were £5 376 000. Assuming 5% inflation fare revenues for 2001 at 60% capacity will be £5 644 800 (£5 376 000 × 1.05). At 70% and 50% capacity utilization fare revenues will be as follows:

70% = 70/60 × £5 644 800 = £6 585 600
50% = 50/60 × £5 644 800 = £4 704 000

[b]Variable costs vary with bus miles which are assumed to remain unchanged. Predicted costs at the different inflation levels are as follows:

8% = (£2 970 000 + £1 750 000)1.08 = £5 097 600
10% = (£2 970 000 + £1 750 000)1.10 = £5 192 000
12% = (£2 970 000 + £1 750 000)1.12 = £5 286 400

(c) (ii) The answer to this question requires the preparation of a cumulative probability distribution that measures the cumulative probability of profits/(losses) being greater than specified levels.

Cumulative probability distribution

Losses greater than £300 000	= 0.04 probability
Probability of a loss occurring	= 0.40
Profits greater than £600 000	= 0.60
Profits greater than £700 000	= 0.55
Profits greater than £800 000	= 0.10
Profits greater than £1 500 000	= 0.10

(d) The following factors have not been incorporated into the analysis:
   (i) Change in the passenger mix.
   (ii) Changes in the number of routes and the number of days operation per year.
   (iii) Changes in fare structure such as off-peak travel or further concessions for juveniles and senior citizens.
   (iv) Changes in cost levels due to factors other than inflation (e.g. more efficient operating methods).

Solution SM 14.2

(a) For each selling price there are three possible outcomes for sales demand, unit variable cost and fixed costs. Consequently, there are 27 possible outcomes. In order to present probability distributions for the two possible selling prices, it would be necessary to compute profits for 54 outcomes. Clearly, there would be insufficient time to perform these calculations within the examination time that can be allocated to this question. It is therefore assumed that the examiner requires the calculations to be based on an expected value approach.
   The expected value calculations are as follows:

(i) *Variable cost*

		(£)
(£10 + 10%) × 10/20	=	5.50
£10 × 6/20	=	3.00
(£10 − 5%) × 4/20	=	1.90
		10.40

(ii) *Fixed costs*

		(£)
£82 000 × 0.3	=	24 600
£85 000 × 0.5	=	42 500
£90 000 × 0.2	=	18 000
		85 100

(iii) *£17 selling price*

	(units)
21 000 units × 0.2 =	4 200
19 000 units × 0.5 =	9 500
16 500 units × 0.3 =	4 950
	18 650

(iv) *£18 selling price*

	(units)
19 000 units × 0.2 =	3 800
17 500 units × 0.5 =	8 750
15 500 units × 0.3 =	4 650
	17 200

Expected contribution

£17 selling price = (£17 − £10.40) × 18 650 = £123 090
£18 selling price = (£18 − £10.40) × 17 200 = £130 720

The existing selling price is £16, and if demand continues at 20 000 units per annum then the total contribution will be £112 000 [(£16 − £10.40) × 20 000 units].

Using the expected value approach, a selling price of £18 is recommended.

(b) Expected profit = £130 720 − £85 100 fixed costs = £45 620
Break-even point = fixed costs (£85 100)/contribution per unit (£7.60)
= 11 197 units
Margin of safety = expected demand (17 200 units) − 11 197 units = 6003 units
% margin of safety = 6003/17 200 = 34.9% of sales
Note that the most pessimistic estimate is above the break-even point.

(c) An expected value approach has been used. The answer should draw attention to the limitations of basing the decision solely on expected values. In particular, it should be stressed that risk is ignored and the range of possible outcomes is not considered. The decision ought to be based on a comparison of the probability distributions for the proposed selling prices. For a more detailed answer see 'Probability distributions and expected value' and 'Measuring the amount of uncertainty' in Chapter 14.

(d) Computer assistance would enable a more complex analysis to be undertaken. In particular, different scenarios could be considered, based on different combinations of assumptions regarding variable cost, fixed cost, selling prices and demand. Using computers would also enable the Monte Carlo simulation to be used for more complex decisions.

Capital investment decisions

Solutions to Chapter 15 questions

Solution SM 15.1

(i) Net present values:

Year	0% NPV (£)	10% Discount Factor	10% NPV (£)	20% Discount Factor	20% NPV (£)
0	(142 700)	1 000	(142 700)	1.000	(142 700)
1	51 000	0.909	46 359	0.833	42 483
2	62 000	0.826	51 212	0.694	43 028
3	73 000	0.751	54 823	0.579	42 267
NPV	43 300		9 694		(14 922)

(ii) ***Project NPV profile***

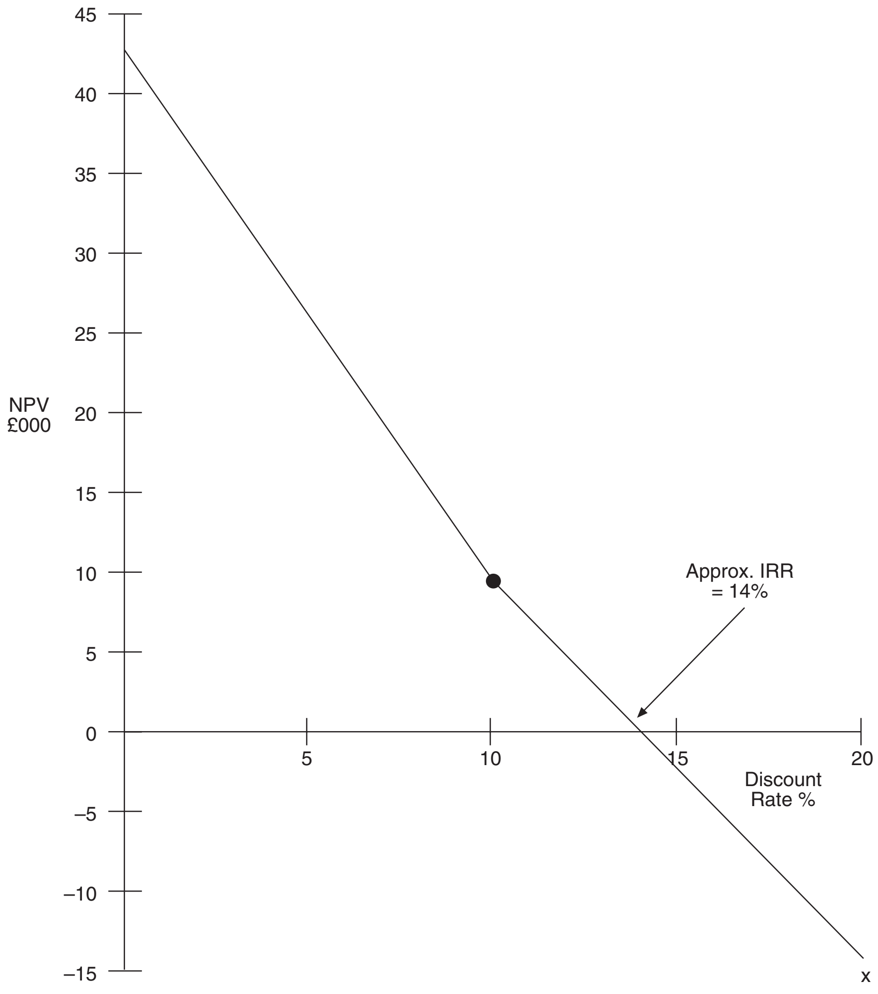

Figure 15.1

Solution SM 15.2

(a) The answer should include the following points:

1. Computations of the payback period and accounting rate of return (see below for the calculations), a description of the methods and their benefits and limitations (see text for a discussion of the payback and accounting rate of return methods).
2. A computation of the net present value (see below) and an explanation as to why this method is preferred to the other methods (see text for an explanation).
3. A recommendation that since the project has a positive net present value it should be accepted.
4. A discussion of the difficulties associated with NPV. These include the greater potential for a lack of understanding by non-accountants, difficulties in estimating cash flows over the whole life of the asset and the difficulty in deriving the discount rate.

Computation of the payback period

The cumulative cash flows for years 4 and 5 are £1 700 000 and £2 200 000. Therefore, the payback period occurs between years 4 and 5. Assuming that cash flows accrue evenly throughout the year, a cash flow of £300 000 is required in year 5 to reach the payback period. This represents 7 months (£300 000/£500 000 × 12 months). Therefore, the payback period is 4 years and 7 months. This is above the target payback period of 4 years, so the project would be rejected using this method.

Computation of accounting rate of return

Total cash flows = (£400 × 3) + (£500 × 2) + (£450 × 3) + (£400 × 2)	= £4 350 000
Less depreciation/initial outlay	= £2 000 000
Total profits over the period	= £2 350 000
Average annual profit	= £235 000
Average investment (Initial cost/2)	= £1 000 000
Accounting rate of return	= 23.5%

This is below the target return so the project would be rejected.

Computation of NPV

Year	Cash flows (£000s)	Discount factor (15%)[a]	Present value (£000s)
1 – 3	400	2.283	913.20
4 – 5	500	1.069	534.50
6 – 8	450	1.135	510.75
9 – 10	400	0.531	212.40
			2170.85
Less initial outlay			2000.00
NPV			170.85

Note

[a] The discount factors are derived by summing the factors for years 1–3, 4–5, 6–8 and 9–10 in the discount tables.

The project has a positive NPV and should be accepted.

Solution SM 15.3

(a) The answer should stress that NPV is considered superior to the payback method and the accounting rate of return because it takes account of the time value of money. For a description of the time value of money you should refer to 'Compounding and discounting' and 'The concept of net present value' in Chapter 15. The answer should also draw attention to the limitations of the payback method and accounting rate of return described in Chapter 15.

(b) (i) To compute the NPV it is necessary to convert the profits into cash flows by adding back depreciation of £25 000 per annum in respect of the asset purchased at the end of year 3 for £75 000. The NPV calculation is as follows:

Year	**Cash flow (£)**	**Discount factor**	**NPV**
3	(75 000)	0.675	(50 625)
4	35 000	0.592	20 720
5	28 000	0.519	14 532
6	27 000	0.465	12 555
			(2 818)

(ii) The cash flows are based on the assumption that the reinvestment in R is not made at the end of year 3.

Year	**Discount factor**	**Project T cash flows[a] (£)**	**Project T NPV (£)**	**Project R cash flows (£)**	**Project R NPV (£)**
1	0.877	27 000	23 679	40 000 (3)[c]	35 080
2	0.769	30 000	23 070	45 000	34 605
3	0.675	32 000	21 600	45 000 (4)[d]	30 375
4	0.592	44 000	26 048		
5	0.519	40 000[b]	20 760		
			115 157		100 060
Investment outlay			70 000		60 000
NPV			45 157		40 060

Payback: T = 2 years + (£70 000 − £57 000)/£32 000 = 2.41 years
R = 1 year + (£60 000 − £40 000)/45 000 = 1.44 years

The decision should be to invest in Project T because it has the higher NPV.

Notes
[a] Yearly profits plus (£70 000 − £10 000)/5 years depreciation.
[b] £18 000 profits + £12 000 depreciation + £10 000 sale proceeds.
[c] Profits plus £60 000/3 years depreciation.
[d] £75 000 investment outlay − £50 000 = Annual profit (£25 000). Cash flow = £25 000 profit + £20 000 depreciation.

(c) For an explanation of the meaning of the term 'discount rate' see 'The opportunity cost of an investment' in Chapter 15. The discount rate can be derived from observations of the returns shareholders require in financial markets. Where a project is to be financed fully by borrowing, the cost of borrowing could be used as a basis for determining the discount rate.

Solution SM 15.4

The report should include the information contained in items (a) to (c) below:

(a) Depreciation is not a cash flow. The operating net cash inflows (before tax) therefore consist of sales less materials and labour costs. The NPV calculation is as follows:

Year	**0**	**1**	**2**	**3**	**4**
	(£)	**(£)**	**(£)**	**(£)**	**(£)**
Net cash inflows before tax		80 000	75 000	69 750	
Tax[a]			(14 025)	(15 469)	4 826
Investment outlay	(150 000)				
Net cash flow	(150 000)	80 000	60 975	54 281	4 826
Discount factor (18%)	1.000	0.847	0.718	0.609	0.516
Present value	(150 000)	67 760	43 780	33 057	2 490

NPV = –£2 913

Note

[a]The tax computation is as follows:

Year	**1**	**2**	**3**
	(£)	**(£)**	**(£)**
Net cash inflows before tax	80 000	75 000	69 750
Writing down allowances	37 500	28 125	84 375
Taxable profit	42 500	46 875	(14 625)
Tax at 33%	14 025	15 469	(4 826)
Writing down allowances:			
Opening WDV	150 000	112 500	84 375
Writing down allowances (25%)	37 500	28 125	
Closing WDV	112 500	84 375	Nil
Balancing allowance			84 375

(b) Because corporation taxes are payable on taxable profits and not accounting profits depreciation has been replaced by the Inland Revenue's allowable depreciation (known as written-down allowances). The net cost of the asset is £150 000 and written-down allowances received amounted to £65 625 (£37 500 + £28 125). Therefore a balancing allowance is available at the end of the asset's life of £84 375 (£150 000) – £65 625). The Inland Revenue allows the net cost of the asset to be claimed over its life with a balancing adjustment in the final year. Because taxation is normally payable nine months after the company's accounting year end the taxation cash flows are shown to be delayed by one year. This is a simplification of the actual situation but is normally sufficiently accurate for appraising investments.

(c) Other factors to be considered include:
   (i) The probability of obtaining a subsequent contract. There would be no need to purchase a further machine and the project would therefore yield a positive NPV.
   (ii) The negative NPV is very small and if the company has other profitable activities it may be worthwhile accepting in order to have the chance of obtaining a second contract and establishing long-term relationships with a large multinational customer.
   (iii) Capacity that is available. If other profitable opportunities have to be foregone to undertake the contract because of shortage of capacity then the opportunity cost should be included in the financial analysis.

The budgeting process

Solutions to Chapter 16 questions

Solution SM 16.1

(a) Production budget

Product	A	B
Sales	2000	1500
Opening stock	(100)	(200)
Closing stock		
(10% × sales level)	200	150
	2100	1450

(b) Materials usage budget

Material type	X Kg	Y Litres
Usage		
(2100 × 2) + (1450 × 3)	8550	
(2100 × 1) + (1450 × 4)		7900

(c) Materials purchases budget

Usage	8550	7900
Opening stock	(300)	(1000)
Closing stock[a]	850	800
	9100	7700
	× £10	× £7
	£91 000	£53 900

(d) Labour budget

	Skilled hours	Semi-skilled hours
(2100 × 4) + (1450 × 2)	11 300	
(2100 × 2) + (1450 × 5)		11 450
	× £12	× £8
	£135 600	£91 600

Note

[a]Material Closing Stock

Material X (2000 × 2 + 1500 × 3) × 10% = 850

Material Y (2000 × 1 + 1500 × 4) × 10% = 850

Solution SM 16.2

(a) *Workings*

Budgeted sales (units and value)

Product	Units	Price	Value (£)
F1	34 000	£50.00	1 700 000
F2	58 000	£30.00	1 740 000
			3 440 000

Budgeted production (units)

Product	Sales	Stock increase	Production
F1	34 000	1000	35 000
F2	58 000	2000	60 000

(i) Component purchase and usage budget (units and value)

Product	Component C3	Component C4	Total
F1	280 000u	140 000u	
F2	240 000u	180 000u	
	520 000u	320 000u	
Value	£650 000	£576 000	£1 226 000

(ii) Direct labour budget (hours and value)

Product	Assembly	Finishing	Total
F1	17 500 hours	7000 hours	
F2	15 000 hours	10 000 hours	
	32 500	17 000	
Value	£162 500	£102 000	£264 500

(iii) Departmental manufacturing overhead recovery rates

	Assembly	Finishing
Total overhead cost per month	£617 500	£204 000
Total direct labour hours	32 500	17 000
Overhead rate (per direct labour hour)	£19.00	£12.00

(iv) Selling overhead recovery rate

Total overhead cost per month	£344 000
Total sales value (Month 9)	£3 440 000
Selling overhead rate	10%

(v) Closing stock budget

Product	Units	Cost[a] £	Value £
F1	1000	32.80	32 800
F2	2000	19.40	38 800
			71 600

Note

[a]See part (b) for the calculation of the cost per unit

(b) Standard unit costs for month 9

			Product		
			F1		**F2**
			£/unit		**£/unit**
Material	C3	8 × £1.25	10.00	4 × £1.25	5.00
	C4	4 × £1.80	7.20	3 × £1.80	5.40
Labour	Assembly	30/60 × £5	2.50	15/60 × £5	1.25
	Finishing	12/60 × £6	1.20	10/60 × £6	1.00
M'fg. overhead	Assembly	30/60 × £19	9.50	15/60 × £19	4.75
	Finishing	12/60 × £12	2.40	10/60 × £12	2.00
Manufacturing cost			32.80		19.40
Selling overhead (10% of selling price)			5.00		3.00
Total cost			37.80		22.40
Selling price			50.00		30.00
Profit			12.20		7.60

(c) Budgeted profit and loss account for month 9

	(£)
Components	1 226 000
Direct labour	264 500
Manufacturing overhead	821 500
Subtotal	2 312 000
Less closing stock	71 600
Cost of sales	2 240 400
Selling overhead	344 000
Total cost	2 584 400
Sales	3 440 000
Net profit	855 600

(d) The company currently uses an absorption costing system but computes predetermined overhead rates on a monthly basis. It is preferable to calculate a predetermined overhead rate at annual intervals. This is because a large amount of overheads are likely to be fixed in the short-term whereas activity will fluctuate from month to month, giving large fluctuations in overhead rates if monthly rates are used. An average, annualised rate based on the relationship of total annual overhead to total annual activity is more representative of typical relationships between total costs and volume/activity than a monthly rate. For a more detailed discussion of these issues you should refer to 'Budgeted overhead rates' in Chapter 4.

Solution SM 16.3

(a) (i) *Cash budget*

	January (£)	**February (£)**	**March (£)**	**April (£)**
Balance b/d	10 000	9 000	3 890	9 090
Sales (*W1*)	—	15 200	57 100	80 000
	10 000	24 200	60 990	89 090
Purchases (*W3*)	—	11 550	24 500	26 950
Wages (*W4*)	—	4 800	19 800	22 200
Variable overhead (*W5*)	—	960	4 600	7 080
Fixed overhead (*W6*)	1 000	3 000	3 000	3 000
	1 000	20 310	51 900	59 230
Balance c/d	9 000	3 890	9 090	29 860

Workings
(*W1*) Sales

	Amount	20%	Discount 5%	Net	50%	20%	8%	Total cash receipts
January	—	—	—	—	—	—	—	
February	80 000	16 000	800	15 200				15 200
March	90 000	18 000	900	17 100	40 000			57 100
April	100 000	20 000	1000	19 000	45 000	16 000		80 000
May	100 000	20 000	1000	19 000	50 000	18 000	6400	93 400

(*W2*) Production:

					Total
January	800				800
February	2400	900			3300
March		2700	1000		3700
April			3000	1000	4000
May				3000	
	3200	3600	4000	4000	

(*W3*) Purchases at £7 per unit:

	Production	Current month	Following month	Total	Value (£)
January	February (3300)		1650	1650	11 550
February	March (3700)	1650	1850	3500	24 500
March	April (4000)	1850	2000	3850	26 950

(*W4*) Direct wages:

February payment	800 × £6 =	£4 800
March payment	3300 × £6 =	£19 800
April payment	3700 × £6 =	£22 200

(*W5*) Variable overhead at £2 per unit:

Production	February (£)	March (£)	April (£)	May (£)
January (£1600)	960	640		
February (£6600)		3960	2640	
March (£7400)			4440	2960
	960	4600	7080	2960

(*W6*) Fixed overhead:

	January (£)	February (£)	March (£)	April (£)
January	1000	2000		
February		1000	2000	
March			1000	2000
April				1000
	1000	3000	3000	3000

(ii) It is assumed that the question relates to the amount received from customers in May and not the amount due. The answer is £93 400 (see *W1*).

(b) A software package would eliminate the tedious arithmetical calculations that are necessary to produce cash budgets. Furthermore, it would enable alternative scenarios to be considered, such as what the outcome would be if any of the parameters were changed.

Management control systems

Solutions to Chapter 17 questions

Solution SM 17.1

Task 1

Reclamation Division Performance Report – 4 weeks to 31 May:

Original budget 250 tonnes
Actual output 200 tonnes

	Budget based on 200 tonnes	Actual	Variance	Comments
Controllable expenses:				
Wages and social security costs[a]	43 936	46 133	2197A	
Fuel[b]	15 000	15 500	500A	
Consumables[c]	2 000	2 100	100A	
Power[d]	1 500	1 590	90A	
Directly attributable overheads[e]	20 000	21 000	1000A	
	82 436	86 323	3887A	
Non-controllable expenses:				
Plant maintenance[e]	5 950	6 900	950A	
Central services[e]	6 850	7 300	450A	
	12 800	14 200	1400A	
Total	95 236	100 523	5287A	

Notes

[a] 6 employees × 4 teams × 42 hours per week × £7.50 per hour × 4 weeks = £30 240.
[b] 200 tonnes × £75
[c] 200 tonnes × £10
[d] £500 + (£5 × 200) = £1500
[e] It is assumed that directly attributable expenses, plant maintenance and central services are non-variable expenses.

Task 2

(a) (i) Past knowledge can provide useful information on future outcomes but ideally budgets ought to be based on the most up-to-date information. Budgeting should be related to the current environment and the use of past information that is two years old can only be justified where the operating conditions and environment are expected to remain unchanged.

(ii) For motivation and planning purposes budgets should represent targets based on what we are proposing to do. For control purposes budgets should be flexed based on what was actually done so that actual costs for actual output can be compared with budgeted costs for the actual output. This ensures that valid comparisons will be made.

(iii) For variable expenses the original budget should be reduced in proportion to reduced output in order to reflect cost behaviour. Fixed costs are not adjusted since they are unaffected in the short term by output changes. Flexible budgeting ensures that like is being compared with like so that reduced output does not increase the probability that favourable cost variances will be reported. However, if less was produced because of actual sales being less than budget this will result in an adverse sales variance and possibly an adverse profit variance.

(iv) Plant maintenance costs are apportioned on the basis of capital values and therefore newer equipment (with higher written-down values) will be charged with a higher maintenance cost. Such an approach does not provide a meaningful estimate of maintenance resources consumed by departments since older equipment is likely to be more expensive to maintain. The method of recharging should be reviewed and ideally based on estimated usage according to maintenance records. The charging of the overspending by the maintenance department to user departments is questionable since this masks inefficiencies. Ideally, maintenance department costs should be recharged based on actual usage at budgeted cost and the maintenance department made accountable for the adverse spending (price) variance.

(v) The comments do not explain the causes of the variances and are presented in a negative tone. No comments are made, nor is any praise given, for the favourable variances.

(vi) Not all variances should be investigated. The decision to investigate should depend on both their absolute and relative size and the likely benefits arising from an investigation.

(vii) Central service costs are not controllable by divisional managers. However, even though the divisional manager cannot control these costs there is an argument for including them as non-controllable costs in the performance report. The justification for this is that divisional managers are made aware of central service costs and may put pressure on central service staff to control such costs more effectively. It should be made clear to divisional managers that they are not accountable for any non-controllable expenses that are included in their performance reports.

Solution SM 17.2

Task 1

(a)

	Quarter 1 units	Quarter 2 units	Quarter 3 units	Quarter 4 units
Actual sales volume	420 000	450 000	475 000	475 000
Seasonal variation	+25 000	+15 000	—	240 000
Deseasonalised sales volumes	395 000	435 000	475 000	515 000

(b) The trend is for sales volume to increase by 40 000 units each quarter:

Forecast for next year	Quarter 1 units	Quarter 2 units	Quarter 3 units	Quarter 4 units
Trend projection	555 000	595 000	635 000	675 000
Seasonal variation	+25 000	+15 000	—	−40 000
Forecast sales volumes	580 000	610 000	635 000	635 000

Task 2

(a) Seasonal variations represent consistent patterns in sales volume that occur throughout each year. For example, the seasonal variation of +25 000 for Quarter 1 indicates that sales volume in the first quarter tends to be 25 000 units higher than the underlying trend in sales. In contrast, the seasonal variation of −40 000 in Quarter 4 indicates that sales in this quarter tend to be 40 000 units lower than the underlying trend in sales.

To derive the deseasonalised data the seasonal variations must be removed so that a trend can be observed. The above figures indicate an increase of 40 000 units per quarter. This trend is concealed when the actual data is observed because of the distorting effects of seasonal variations. Observations of the actual data suggests that the rate of increase in sales is declining.

(b) Provided that the observed trend in deseasonalised data continues the deseasonalised data can be used to project the trend in future sales. The trend values are adjusted by seasonal variations in each quarter to predict actual sales.

Task 3

(a) A fixed budget is a budget for the planned level of activity and budgeted costs are not adjusted to the actual level of activity. A fixed budget is used at the planning stage because an activity level has to be initially determined so that all department activities can be coordinated to meet the planned level of activity. However, it is most unlikely that actual activity will be the same as the planned level of activity. For example, if the actual level of activity is greater than budgeted level of activity then those costs that vary with the level of activity will be greater than the budgeted costs purely because of changes in activity. It is clearly inappropriate for variable costs to compare actual costs at one level of activity with budgeted costs at another level of activity. The original fixed budget must be adjusted to reflect the budgeted expenditure at the actual level of activity. This procedure is called flexible budgeting. The resulting comparison of actual costs with a flexible budget is more meaningful for cost control because the effect of the change in the activity level has been eliminated.

(b) Possible activity indicators include number of deliveries made, miles travelled and journeys made.

(c) See 'Flexible budgets' in Chapter 17 for the answer to this question.

Task 4

(a) Production budget for product Q

	(units)
Forecast sales for year	18 135
Increase in stock (15% × 1200)	180
Finished units required	18 315
Quality control loss (1/99)	185
Total units input to production	18 500

(b) Direct labour budget for product Q

	(hours)
Active labour hours required (18 500 × 5)	92 500
Idle time allowance (7.5/92.5)	7 500
Total hours to be paid for	100 000
Standard hourly rate	£6
Budgeted labour cost	£600 000

(c) Material usage budget for material M

	(kg)
Material required for processing	
18 500 units (× 9 kg)	166 500
Wastage (10/90)	18 500
Material usage for year	185 000

(d) Material purchases budget for material M

	(kg)
Material required for production input	185 000
Increase in material stocks (12%)	960
Expected loss in stores	1 000
Material purchases required	186 960

Task 5
The implications of the shortage is that the budget plans cannot be achieved and the availability of material is the limiting factor. If the limiting factor cannot be removed the materials purchase budget should be the first budget to be prepared and all the other budgets coordinated to ensure the most efficient usage of materials. The following four possible actions could be taken to overcome the problem:

(i) Seek alternative supplies for material M. Possible problems include the reliability and quality of materials delivered by new suppliers. New suppliers should be carefully vetted prior to entering into any contracts or making company plans dependent on deliveries from new suppliers.
(ii) Reduce the budgeted sales of product Q. This will lead to loss in profits and the possible permanent loss of customers to competitors if the competitors are able to meet customer demand.
(iii) Reduce the stock levels for product Q and material M. The danger with this course of action is that stocks may not be available when required which could lead to disruptions in production and lost sales.
(iv) Reduce the wastage of material M and the defective output of product Q. This course of action will cause problems if quality standards are reduced resulting in inferior quality output. This could have a harmful effect on future sales. Problems will not be caused if quality standards are maintained and improved working practices result in a reduction of waste and defective output.

Solution SM 17.3

Task 1 (a)

Calculation of unit variable costs

	Original budget	**Revised budget**	**Difference**	**Variable unit cost**[a]
Units	24 000	20 000	4 000	
Variable costs				
Material	216 000	180 000	£36 000	£9
Labour	288 000	240 000	£48 000	£12
Semi-variable costs				
Heat, light and power	31 000	27 000	£4 000	£1
Analysis of heat, light and power				
Variable cost	£24 000	£20 000		
Total cost	£31 000	£27 000		
Fixed cost	£7 000	£7 000		

Note
[a]Unit variable cost = change in total cost/change in volume

Task 1 (b)

Rivermede Ltd – flexible budget statement for the year ended 31 May

	Revised budget	**Actual results**		**Variance**
Production and sales (units)	22 000	22 000		
Variable costs	**(£)**	**(£)**		**(£)**
Material 22 000 × £9	198 000	214 320	(£206 800 + £7520)	6320 (A)
Labour 22 000 × £12	264 000	255 200		8800 (F)
Semi-variable cost				
Heat, light and power				
(22 000 × £1) + £7000	29 000	25 880	(£33 400 − £7520)	3120 (F)
Fixed costs				
Rent, rates and depreciation	40 000	38 000		2000 (F)
	531 000	533 400		2400 (A)

Task 2 (a)
The original statement compares the actual cost of producing 22 000 units with a budget for 20 000 units. This is not comparing like with like. The flexible budget shows what budgeted costs would have been for the actual production level of 22 000 units. Because actual production was greater than budgeted production of 20 000 units variable costs are likely to be higher and this comparison will result in an adverse effect on variable cost variances. The fact that overall variances are smaller when comparisons are made with the flexible budget is due to flexing the budget and not to participative budgeting.

Task 2 (b)
The report should indicate that favourable variances may have arisen for the following reasons:

(i) Controllable factors due to the more efficient usage of direct labour and heating, light and power.
(ii) Budget participation may have resulted in the creation of slack through an overstatement of budgeted costs.
(iii) Uncontrollable factors such as a reduction in the prices charged to Rivermede for rent and rates.

Task 2 (c)
The report should include the following items:

(i) The increased sales may have been due to a general increase in demand rather than the effort of the salesforce.
(ii) The original budget of 24 000 units may have been over-estimated or the revised budget of 20 000 units may have been understated due to the sales director creating slack by deliberately understating demand.

Solution SM 17.4

Task 1 (a)
For 2001 x takes on a value of 9.
Therefore annual demand (y) = 640 + (40 × 9) = 1000
weekly demand = 1 000/25 = 40 holidays

Task 1 (b)
Weaknesses of the least squares regression formula include:

(i) The formula assumes a linear relationship based on time but demand for holidays may not be a linear function of time.
(ii) Seasonal variations are ignored. Demand may vary throughout the holiday season with some holiday weeks being more popular than others.
(iii) It ignores changes in holidaymakers' tastes such as a change in demand from short haul to long haul or 10-day holidays to short-break holidays.
(iv) Cyclical fluctuations are ignored. Demand for holidays is likely to vary depending on the state of the economy, such as boom or recession.

Linear regression is covered in Chapter 10.

Task 2 (a)

Revised cost statement 10 days ended 27 November

Flexed budget	*Note*	**Budget (£)**	**Actual (£)**	**Variance (£)**
Aircraft seats	1	18 000	18 600	600 A
Coach hire		5 000	4 700	300 F
Hotel rooms	2	14 300	14 200	100 F
Meals	3	4 560	4 600	40 A
Tour guide		1 800	1 700	100 F
Advertising		2 000	1 800	200 F
		45 660	45 600	60 F

Notes

1. £450 × 40 because purchases are in blocks of 20 seats
2. £70 × 10 days × 34 tourists × 0.5 £11 900

£70 × 10 days × 34 tourists × 0.5	£11 900
£60 × 10 days × 4 tourists	£2 400
	£14 300

3. £12 × 10 days × 38 tourists

Task 2 (b)

The original budget is a fixed budget based on the anticipated demand when the budget was set. If actual demand is different from anticipated demand a fixed budget is inappropriate for control purposes because it does not ensure that like is compared with like. The revised flexible budget shows what costs should have been for the volume of passengers taken on the holiday. This ensures that a more meaningful comparison of budget and actual costs is made.

Task 2 (c)

The following factors should be considered:

(i) the absolute amount of the variance;
(ii) the relative amount of the variance expressed as a percentage of budgeted costs;
(iii) the trend in variances by examining the cumulative variances for the period;
(iv) whether or not the variance is controllable;
(v) the cost and benefits from investigating the variance.

Standard costing and variance analysis

Solutions to Chapter 18 questions

Solution SM 18.1

(a) *Standard cost of output produced (18 000 units)*

	(£)
Direct materials	864 000
Direct labour	630 000
Variable production overhead	180 000
Fixed production overhead	900 000
	2 574 000

(b)

	Standard cost of output (£)	Variances (£)	Actual cost (£)
Direct materials	864 000		
Price variance[a]		76 000 (F)	
Usage variance[b]		48 000 (A)	
Actual cost			836 000
Direct labour	630 000		
Rate variance[c]		16 800 (A)	
Efficiency variance[d]		42 000 (F)	
Actual cost			604 800
Variable production overhead	180 000		
Expenditure variance[e]		4 000 (A)	
Efficiency variance[f]		12 000 (F)	
Actual cost			172 000
Fixed production overhead	900 000		
Expenditure variance[g]		30 000 (A)	
Volume variance[h]		100 000 (A)	
Actual cost			1 030 000
	2 574 000	68 800 (A)	2 642 800

Notes

[a] (Standard price − Actual price) × Actual quantity
(£12 − £836 000/76 000) × 76 000 = £76 000 (F)

[b] (Standard quantity − Actual quantity) × Standard price
(18 000 × 4 kg = 72 000 − 76 000) × £12 = £48 000 (A)

[c] (Standard rate − Actual rate) × Actual hours
(£7 − £604 800/84 000) × 84 000 = £16 800 (A)

[d] (Standard hours − Actual hours) × Standard rate
(18 000 × 5 hrs = 90 000 − 84 000) × £7 = £42 000 (F)

[e] (Actual hours × Standard rate) − Actual cost
(84 000 × £2 = £168 000 − £172 000 = £4000 (A)

[f] (Standard hours − Actual hours) × Standard rate
(18 000 × 5 hrs = 90 000 − 84 000) × £2 = £12 000 (F)

[g] Budgeted fixed overheads − Actual fixed overheads
(20 000 × £50 = £1 000 000 − £1 030 000) = £30 000 (A)
[h] (Actual output − Budgeted output) × Standard rate
(18 000 − 20 000) × £50 = £100 000 (A)

(c) The statement in (b) can be used to provide a detailed explanation as to why actual cost exceeded standard cost by £68 800 for the output achieved. The statement provides attention-directing information by highlighting those areas that require further investigation. Thus management can concentrate their scarce time on focusing on those areas that are not proceeding according to plan. By investigating variances, management can pinpoint inefficiencies and take steps to avoid them re-occurring. Alternatively, the investigation may indicate that the current standards are inappropriate and need changing to take account of the changed circumstances. This may result in an alteration in the plans or more up-to-date information for decision-making.

Solution SM 18.2

(a) Budgeted contribution = Standard unit contribution (£1.99 – £1.39 = £0.60) × 50 000 = £30 000
Actual contribution = £96 480 – (£58 450 + £6800 + £3250) = £27 980

(b) Sales margin price = (Actual price – Standard price) × Actual sales volume
= Actual sales (£96 480) – Actual sales volume (49 700) × Standard price (£1.99)
= £2423A (note that the same answer would be obtained using contribution margins in the above formula)

Sales margin volume = (Actual volume – Budgeted volume) × Standard unit contribution
= (49 700 – 50 000) × £0.60 = £180A

Ingredients price = (SP – AP)AQ = (AQ × SP) – (AQ × AP)
= (55 000 × £1.18/1.08 = £60 093) – £58 450 = £1643F

Ingredients usage = (SQ – AQ)SP = (49 700 × 1.08 = 53 676 – 55 000) £1.18/1.08 = £1447A

Wage rate = (SP – AP)AH = (AH × SP) – (AH × AP)
= (1200 × £6[a] = £7200) – £6800 = £400F

Labour efficiency = (SH – AH)SP = (49 700 × 1.5 minutes = 1242.5 hours –1200hours) × £6 = £255F

Variable conversion price = (SP – AP)AH = (AH × SP) – (AH × AP)
= (1200 × £2.40[b] = £2880 – £3250 = £370A

Variable conversion efficiency = (SH – AH)SP = (49 700 × 1.5 minutes = 1242.5 hours –1200 hours) × £2.40 = £102F

Notes

[a] Actual price paid for labour = £0.15/1.5 minutes = £0.10 per minute = £6 per hour

[b] Actual variable overhead price = £0.06/1.5 minutes = £0.04 per minute = £2.40 per hour

Reconciliation statement

	(£)	
Budgeted contribution	30 000	
Sales volume contribution variance	180	(A)
Standard contribution on actual sales	29 820	
Sales price variance	2423	(A)
	27 397	

		A	F		
Cost variances					
Ingredients:	Price		1643		
	Usage	1447			
Labour	Rate		400		
	Efficiency		255		
Conversion cost	Expenditure	370			
	Efficiency		102		
Total		1817	2400	583	(F)
Actual contribution				27 980	

(c) The answer should point out that in any environment fixed overhead volume variances are not particularly helpful for cost control (see 'Volume variance' in Chapter 18 for an explanation of this point). Therefore, a marginal costing variance analysis approach is preferable for most types of environment.

Solution SM 18.3

(a) Wage rate variance = $(SP - AP)AH = (SP \times AH) - (AP \times AH)$
= (£5 × 53 workers × 13 weeks × 40 hrs) − £138 500
= £700A

Labour efficiency = $(SH - AH)SP$

SH (Standard hours) = (35 000 × 0.4 hrs) + (25 000 × 0.56 hrs)
= 28 000

AH (Actual hours) = 53 workers × 13 weeks × 40 hrs = 27 560

Variance = (28 000 − 27 560) × £5 = £2200A

(b) Material price variance = $(SP - AP)AQ$
= $(AQ \times SP) - (AQ \times AP)$

£430F (given) = 47 000 SP − £85 110

$$\text{SP (Standard price)} = \frac{£430 + 85\,110}{47\,000}$$

= £1.82

Material usage variance = $(SQ - AQ)SP$
= $(SQ \times SP) - (AQ \times SP)$

£320.32A (given) = £1.82 SQ − (33 426 × £1.82)

− £320.32A = £1.82 SQ − £60 835.32

£1.82 SQ = £60 515

SQ = £60 515/£1.82 = 33 250

Note that SQ = Actual production (35 000 units) × Standard usage

Therefore 35 000 × Standard usage = 33 250

Standard usage = 33 250/35 000
= 0.95 kg per unit of component X

(c) For the answer to this question you should refer to the detailed illustration of the budget process shown in Chapter 16. In particular, the answer should indicate that if sales are the limiting factor the production budget should be linked to the sales budget. Once the production budget has been established for the two components, the production quantity of each component multiplied by the standard usage of material A per unit of component output determines the required quantity of material to meet the production requirements. The budgeted purchase quantity of material A consists of the quantity to meet the production usage requirements plus or minus an adjustment to take account of any planned change in the level of raw material stock.

Solution SM 18.4

(a) (i) *Sales margin volume variance (Marginal costing):*
(Actual volume − Budgeted volume) × Standard contribution margin per unit
(9500 − 10 000) × Standard margin (SM) = £7500A
500 SM = 7500
Standard margin = £15

(ii) *Sales margin volume variance (Absorption costing):*
(Actual volume − Budgeted volume) × Standard profit margin per unit
(9500 − 10 000) × Standard margin (SM) = £4500A
500 SM = £4500
Standard profit margin per unit = £9

(iii) *Fixed overhead volume variance:*
(Actual production − Budgeted production) × Standard rate
(9700 − 10 000) × Standard rate = £1800A
Standard fixed overhead rate per unit = £6

Budgeted fixed overheads = 10 000 units × £6	= £60 000
Fixed overhead expenditure variance	= £2500F
Actual fixed overheads (£60 000 − £2500)	= £57 500

(b) Absorption costing unitises fixed overheads and treats them as product costs whereas marginal costing does not charge fixed overheads to products. Instead, the total amount of fixed overheads is charged as an expense (period cost) for the period. A fixed overhead volume variance only occurs with an absorption costing system. Because marginal costing does not unitise fixed costs product margins are expressed as contribution margins whereas absorption costing expresses margins as profit margins. For a more detailed answer you should refer to the section on standard absorption costing in Chapter 18.

(c) See the section on volume variance in Chapter 18 for the answer to this question.

(d) See an illustration of ABC and traditional product costing systems in Chapter 13 and the section on activity-based cost management in Chapter 17 for the answer to this question.

Solution SM 18.5

(a) *Variance analysis*

Material price = (standard price − actual price) × actual purchases
X = (£20 − £20.50) × 9000
= £4500A
Y = (£6 − £5.50) × 5000
= £2500F

Material usage = (standard usage − actual usage) × standard price
X = (800 × 10 kg − 7800 kg) × £20
= £4000F
Y = (800 × 5 litres − 4300 litres) × £6
= £1800A

Wage rate = [standard rate (£6) − actual rate (£24 150/4200)] × actual hours (4200)
= £1050F

Labour efficiency = [standard hours (800 × 5 hrs) − actual hours (4200)] × standard rate (£6)
= £1200A

Fixed overhead expenditure = budgeted cost (10 800/12 × £50) − actual cost (£47 000)
= £2000A

Volume efficiency = [standard hours (800 × 5 hrs) − actual hours (4200)] × (£50/5 hours)
= £2000A

Volume capacity[a] = [actual hours (4200) − budgeted hours[b] (4500)] × FOAR (£50/5 hours)
= £3000A

Notes

[a] Note that the CIMA Terminology (at the time of setting the examination) described the volume variance as being equivalent to the volume capacity variance.

[b] Budgeted hours = monthly budgeted output (10 800/12) × 5 hrs

(b)

Stores control

	(£)		(£)
K Ltd: X (AQ × SP)	180 000	WIP: (SQ × SP)	160 000
C Ltd: Y (AQ × SP)	30 000	WIP: (SQ × SP)	24 000
Material usage variance (X)	4 000	Material usage variance (Y)	1 800
		Balance	28 200
	£214 000		£214 000

Wages control account

	(£)		(£)
Cash	20 150	Wages owing b/fwd	6 000
PAYE and NI	5 000	Labour efficiency	1 200
Accrued wages	5 000	WIP (SQ × SP)	24 000
Wage rate variance	1 050		
	£31 200		£31 200

WIP control account

	(£)		(£)
Stores control: X	160 000	Finished goods control a/c	248 000
Y	24 000		
Wages control	24 000		
Fixed overhead	40 000		
	£248 000		£248 000

Fixed overhead control

	(£)		(£)
Expense creditors	33 000	WIP (SQ × SP)	40 000
Depreciation provision	14 000	Expenditure variance	2 000
		Efficiency variance	2 000
		Capacity variance	3 000
	£47 000		£47 000

Finished goods control

	(£)		(£)
WIP control	£248 000	Cost of sales	£248 000

Cost of sales

	(£)		(£)
Finished goods control	£248 000	Profit and loss (P/L)	£248 000

Material price variance

	(£)		(£)
K Ltd: X	4500	C Ltd: Y	2500
		P/L	2000
	£4500		£4500

Material usage variance

	(£)		(£)
Stores control: Y	1800	Stores control: X	4000
P/L	2200		
	£4000		£4000

Labour rate variance

	(£)		(£)
P/L	£1050	Wages control	£1050

Labour efficiency variance

	(£)		(£)
Wages control	1200	P/L	1200

Fixed overhead expenditure variance

	(£)		(£)
Overhead control	2000	P/L	2000

Fixed overhead efficiency variance

	(£)		(£)
Overhead control	2000	P/L	2000

Fixed overhead capacity variance

	(£)		(£)
Overhead control	£3000	P/L	£3000

Sales

	(£)		(£)
P/L	320 000	Debtors	320 000

K Limited

			(£)
		Stores control	180 000
		Price variance account	4 500

C plc

	(£)		(£)
Price variance account	2500	Stores control	30 000

Expense creditors

			(£)
		Fixed overhead control	33 000

Provision for depreciation

			(£)
		Fixed overhead control	14 000

Profit and loss account

	(£)	(£)	(£)
Sales			320 000
Cost of sales			248 000
			72 000
Variances	(F)	(A)	
Material price	—	2 000	
usage	2200	—	
Labour rate	1050	—	
efficiency	—	1 200	
Overhead expenditure	—	2 000	
efficiency	—	2 000	
volume	—	3 000	
	3250	10 200	6 950
Gross profit			65 050

(c) The difference of £250 in the accounts is due to the fact that the material price variance has been calculated on purchases (instead of usage) and written off as a period cost. In the question the raw material stocks are recorded at actual cost, and therefore the £250 is included in the stock valuation and will be recorded as an expense next period.