This is the mark schemes and teacher guidance for the *PUMA* Key Stage 3 Autumn and Spring tests: UPDATED Sept 2017

This free teacher guidance provides what you need to administer and mark the Autumn and Spring tests. It contains the:

- curriculum maps of content covered in the tests
- mark schemes and marking guidance for the tests
- facility values for test questions, and
- raw score to standardised score conversion tables.

More extensive teacher guidance will be provided in the full *PUMA* Stage 3 Manual, which will be published in Spring 2018, together with the *PUMA* tests for Summer. The *PUMA* Stage 3 Manual will also include the following information, to assist you when using *PUMA* across the whole key stage:

- strand level performance information
- age-standardised scores, mathematics ages and Hodder Scale scores for predicting progress
- further information about interpreting and analysing results
- technical information about the standardisation
- answers and mark schemes for the *PUMA* Summer tests.

In Spring 2017 the mark sheets and question level analysis for the Spring tests will be available as part of the online analysis and reports service.

To order your *PUMA* Key Stage 3 Summer test papers and manual visit www.risingstars-uk.com/pumaks3

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Progress in Understanding Mathematics Assessment

STAGE 3
Years 7–9
Autumn and Spring tests:
Test guidance and mark schemes

RS ASSESSMENT
FROM HODDER EDUCATION

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Contents

1 Introduction

Progress in Understanding Mathematics Assessment (*PUMA*) provides a standardised assessment of a pupil's mathematics attainment and a profile of mathematics skills which helps you identify those pupils who may need further teaching and practice, as well as enabling you to celebrate success. *PUMA* is designed for whole-class use, with pupils of all abilities.

Written to the National Curriculum 2014, *PUMA* is designed to be used towards the end of each term in each school year of Key Stages 1, 2 and 3 in order to measure and monitor pupils' progress and to provide reliable predictive and diagnostic information. Separate tests are available for each of the autumn, spring and summer terms in Years 1 to 9.

The tests are simple and quick to administer, and straightforward to mark.

In Key Stage 3, each test is designed to take 60 minutes and is divided into two sections:

- Section A: non-calculator – 30 minutes
- Section B: calculator – 30 minutes

The tests provide thorough coverage of the National Curriculum 2014 Programme of Study. Curriculum maps, breaking down the National Curriculum into new content for each year and term, are available in this guidance, starting on page 5. The tests assess a range of content for mathematics as specified in the Key Stage 3 Programme of Study. The Autumn tests also assess key underpinning content from the previous year, if any. Spring and Summer tests include content from the previous term, and Year 9 includes aspects of Foundation GCSEs.

All the schools taking part in the initial trialling and standardisation followed these curriculum maps, to ensure that the pupils were fully prepared for the tests. This ensured that the standardisation was based on pupils who had followed the relevant curriculum and that the outcomes were valid.

Why use *PUMA*?

Using *PUMA* provides many benefits. First, *PUMA* gives valuable **summative information**, for example:

- *PUMA* uniquely provides three carefully designed tests for each year. This enables you to follow the progress of your pupils from term to term, as well as from year to year throughout Key Stages 1, 2 and 3.
- Scores have been calibrated onto the Hodder Scale to allow you to see small increments of progress from term to term and to compare progress against national norms. The Hodder Scale was developed to provide a decimal scale that has proved to be an extremely useful measure to monitor and predict small increments of progress from term to term. The Hodder Scale is now an independent progress measure.

- *PUMA* test scores help you to set appropriate and meaningful targets for your pupils and to monitor pupils' progress.
- *PUMA* tests can provide you with an external reference for end of terms and end of years, so that you may report your value added term by term, as well as monitoring to ensure pupils are on target.

PUMA also has a **diagnostic capability** and, therefore, allows you to investigate strengths and weaknesses of your pupils' mathematics skills. To enable you to use the information gained in this formative way, total scores on the tests can be broken down into distinct aspects of mathematics, giving a useful **profile** which reflects the strands of the National Curriculum 2014.

The strands used in *PUMA* Stage 3 are:

- number
- algebra (Years 8 and 9)
- ratio, proportion and rates of change
- geometry and measures
- probability (Years 8 and 9)
- statistics.

PUMA systematically assesses pupils' mathematics skills and knowledge. The balance of the questions assessing these strands remains fairly constant as the tests become more demanding, helping you to pinpoint where pupils may be under-performing or making excellent progress.

PUMA 7 Autumn

Strand	Substrand	Content
NUMBER (N)	N1 The number system	● Consolidate their numerical and mathematical capability from Key Stage 2. ● Understand and use place value for decimals, measures and integers of any size. ● Order decimals. ● Use the symbols =, ≠, <, >, ≤ and ≥. ● Use standard units of length, including with decimal quantities. ● Use the concepts and vocabulary of factors (or divisors). ● Extend their understanding of the number system and place value to include decimals.
	N2 Calculation	● Use the four operations applied to integers. ● Use square numbers and recognise them as a power of 2.
	N3 Fractions, decimals and percentages	● Use the number line as a model for ordering of the real numbers.
ALGEBRA (A)	A1 Methods	
	A2 Graphs	
	A3 Sequences	
RATIO, PROPORTION AND RATES OF CHANGE (R)	R1 Ratio	● Change freely between related standard units (e.g. time, length and mass).
	R2 Proportion	
	R3 Rates of change	
GEOMETRY AND MEASURES (G)	G1 Measurement	● Calculate and solve problems involving perimeters of 2-D (rectilinear) shapes.
	G2 Shape	● Use language and properties precisely to analyse 2-D and 3-D shapes.
	G3 Transformations	● Identify line symmetry in 2-D shapes.
PROBABILITY (P)		
STATISTICS (S)		● Construct and interpret tables, charts and diagrams including pictograms for categorical data.

Strand	Substrand	Content
NUMBER (N)	N1 The number system	● Order positive and negative integers and fractions. ● Use standard units of mass including with decimal quantities. ● Round numbers and measures to an appropriate degree of accuracy (e.g. to a number of decimal places). ● Use the concepts and vocabulary of multiples.
	N2 Calculation	● Use the four operations, including formal written methods, applied to integers – both positive and negative (addition and subtraction only for negative integers).
	N3 Fractions, decimals and percentages	
ALGEBRA (A)	A1 Methods	
	A2 Graphs	
	A3 Sequences	
RATIO, PROPORTION AND RATES OF CHANGE (R)	R1 Ratio	● Express one quantity as a fraction of another, where the fraction is less than 1.
	R2 Proportion	
	R3 Rates of change	
GEOMETRY AND MEASURES (G)	G1 Measurement	● Draw and measure line segments and angles in geometric figures.
	G2 Shape	● Apply the properties of angles at a point, angles at a point on a straight line and vertically opposite angles. ● Begin to reason deductively in geometry.
	G3 Transformations	● Identify properties, and describe the results, of translations applied to given figures (no vectors).
PROBABILITY (P)		
STATISTICS (S)		● Construct and interpret bar charts for categorical data.

Strand	Substrand	Content
NUMBER (N)	N1 The number system	● Use the concepts and vocabulary of common factors and common multiples.
	N2 Calculation	● Use the four operations applied to integers (including formal written methods), both positive and negative.
	N3 Fractions, decimals and percentages	● Define a percentage as 'a number of parts per hundred'. ● Interpret percentages and percentage changes as fractions or decimals. ● Interpret fractions as operators.
ALGEBRA (A)	A1 Methods	● Substitute numerical values into formulae and expressions, including scientific formulae.
	A2 Graphs	
	A3 Sequences	
RATIO, PROPORTION AND RATES OF CHANGE (R)	R1 Ratio	● Express one quantity as a fraction of another, where the fraction is less than 1.
	R2 Proportion	
	R3 Rates of change	
GEOMETRY AND MEASURES (G)	G1 Measurement	
	G2 Shape	● Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons and other polygons that are reflectively and rotationally symmetric.
	G3 Transformations	
PROBABILITY (P)		● Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0–1 probability scale.
STATISTICS (S)		● Describe, interpret and compare observed distributions of a single variable through appropriate measures of central tendency (mean, mode, median) and spread (range).

Strand	Substrand	Content
NUMBER (N)	N1 The number system	● Use standard units of time, money and other measures, including with decimal quantities.
	N2 Calculation	● Understand and use priority of operations including brackets and powers. ● Recognise powers of 2, 3, 4 and 5.
	N3 Fractions, decimals and percentages	● Interpret percentages as operators.
ALGEBRA (A)	A1 Methods	● Use and interpret algebraic notation, including: ○ ab in place of $a \times b$ ○ $3y$ in place of $y + y + y$ and $3 \times y$ ○ brackets. ● Simplify and manipulate algebraic expressions to maintain equivalence by: ○ collecting like terms ○ multiplying a single term over a bracket. ● Understand and use standard mathematical formulae. ● Use algebraic methods to solve linear equations in one variable.
	A2 Graphs	● Find approximate solutions to contextual problems from given graphs of a variety of functions.
	A3 Sequences	
RATIO, PROPORTION AND RATES OF CHANGE (R)	R1 Ratio	● Use ratio notation, including reduction to simplest form. ● Divide a given quantity into two parts in a given part:part or part:whole ratio. ● Express the division of a quantity into two parts as a ratio.
	R2 Proportion	
	R3 Rates of change	
GEOMETRY AND MEASURES (G)	G1 Measurement	
	G2 Shape	● Derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons.
	G3 Transformations	
PROBABILITY (P)		
STATISTICS (S)		

Strand	Substrand	Content
NUMBER (N)	N1 The number system	● Use approximation through rounding to estimate answers.
	N2 Calculation	
	N3 Fractions, decimals and percentages	● Solve problems involving percentage change, including simple interest in financial mathematics.
ALGEBRA (A)	A1 Methods	● Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement). ● Rearrange formulae to change the subject. ● Simplify and manipulate algebraic expressions to maintain equivalence by taking out common factors.
	A2 Graphs	● Recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane.
	A3 Sequences	
RATIO, PROPORTION AND RATES OF CHANGE (R)	R1 Ratio	
	R2 Proportion	
	R3 Rates of change	● Use compound measures such as unit pricing to solve problems.
GEOMETRY AND MEASURES (G)	G1 Measurement	● Calculate and solve problems involving perimeters of 2-D shapes (including circles) and areas of circles.
	G2 Shape	
	G3 Transformations	
PROBABILITY (P)		
STATISTICS (S)		● Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs.

Strand	Substrand	Content
NUMBER (N)	N1 The number system	● Use the concepts and vocabulary of highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation property.
	N2 Calculation	● Use integer powers and associated real roots (square, cube and higher).
	N3 Fractions, decimals and percentages	
ALGEBRA (A)	A1 Methods	
	A2 Graphs	● Calculate and interpret gradients and intercepts of graphs of linear equations numerically, graphically and algebraically.
	A3 Sequences	● Recognise geometric sequences and appreciate other sequences that arise.
RATIO, PROPORTION AND RATES OF CHANGE (R)	R1 Ratio	
	R2 Proportion	
	R3 Rates of change	
GEOMETRY AND MEASURES (G)	G1 Measurement	
	G2 Shape	● Understand and use the relationship between parallel lines and alternate and corresponding angles.
	G3 Transformations	
PROBABILITY (P)		
STATISTICS (S)		

2 Administering the *PUMA* tests

When to test

The *PUMA* tests should ideally be used just before the end of term, as they have been designed to assess the National Curriculum objectives presented in the *PUMA* curriculum map for that term.

Since the standardisation tests were given in late November, March/April and late June, similar timings will produce the most dependable data; but, if the subject content has been taught, the timing is not critical.

Group size

You can administer the tests to whole classes or large groups if you feel comfortable doing so.

Timing

A maximum time of **60 minutes** for the tests is advised, with approximately 30 minutes for Section A and 30 minutes for Section B.

Preparation

Each pupil will need the appropriate test booklet plus a pen, a pencil, an eraser, a ruler and paper for additional rough working. Additional sheets are available on demand. For Section A, no calculators should be used. For Section B, calculators may be used.

Before the test, explain the following key points to pupils.

- Pupils should attempt all the questions.
- Pupils should write their answers clearly. If they change their mind, they should cross out or rub out the wrong answer and write in the new answer.
- If pupils find a question hard, they should have a go and then move on to the next one: they should not spend too long on questions they cannot answer.
- If pupils have problems, they should ask for help by raising their hand.

Administering the test

Give each pupil a test booklet. Ask them to write their names, gender, date of birth and the date of the test on the front cover.

If any pupils are uncertain about what they have to do, you may give some additional explanation to help them understand the requirements of the test, but **do not** help with the mathematical content of the question.

If the results are to be reliable, it is important that the pupils work alone, without copying from each other or discussing their answers. Remind pupils of this if necessary.

3 Answers and mark schemes

Once the pupils have completed the test, their answers may be marked using the answers and mark schemes found in this guidance.

Marking the answers

- Mark boxes in the right-hand margins of each test booklet indicate where a mark can be gained.
- Some questions have more than one part, or attract more than one mark, so you should follow the mark scheme carefully, using your professional judgement if necessary.
- Any clear indication of the answer is acceptable irrespective of what was asked for, e.g. a tick or a circle. If more answers than required have been circled or ticked, the mark should not be awarded except if it is clearly indicated that an incorrect response was initially made and then corrected.
- For scores to be valid, you should **not** award half marks.

Finding the total raw score

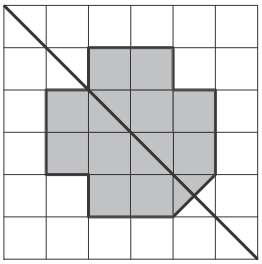
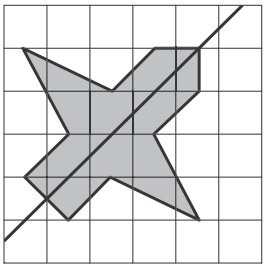
To help with marking and collating the data, page totals may be recorded at the bottom right corner of each page of the test booklet. Simply add up the ticks on a page and write the page total in each box. You can then sum the page scores to find the pupil's total raw score.

Profiling performance by strand

The code letters shown above each mark box may be used to profile the pupil's performance by strand. Total the number of correct answers the pupil has obtained in each coded strand (i.e. N, A, R, G, P, S) and make a note of these strand scores in the boxes on the front cover of the test booklet.

Answers and mark scheme: *Year 7 Autumn*

Section A – Calculators may NOT be used			
Qn	**Answer and marking guidance**	**Curriculum reference**	**Facility %**
1	Award **one mark** for: (12 681 734)	N, N1 The number system	78
2	Award **one mark** for: 0.005 km 5010 mm 505 cm 5.1 m 6 m	N, N1 The number system	23
3	(a) Award **one mark** for: 15 × 5 (<) 600 ÷ 5 (b) Award **one mark** for: 1175 ☑ 1150 ☑ (c) Award **one mark** for: 600 ÷ 50 ≠ 6 × 5 ☑	N, N1 The number system N, N2 Calculation	76 40 39
4	Award **one mark** for: 14	N, N1 The number system; N, N2 Calculation	57
5	Award **one mark** for: (416.39)	N, N1 The number system	45
6	(a) Award **one mark** for: (1) (b) Award **one mark** for: 121	N, N2 Calculation	57 71
7	(a) Award **one mark** for: 5600 (m) (b) Award **one mark** for: 8.5 (m) (c) Award **one mark** for: 47 (mm)	R, R1 Ratio	54 62 50
8	(a) Award **one mark** for: (10.1) (b) Award **one mark** for: (0.266)	N, N1 The number system	85 90
9	Award **one mark** for: 16.44 ☑	N, N1 The number system	83
10	Award **one mark** for: $\frac{5}{1000}$ ☑	N, N1 The number system	61
11	(a) Award **one mark** for: (Always true) (b) Award **one mark** for: (Sometimes true)	G, G2 Shape	65 39
12	(a) Award **one mark** for: 158 (b) Award **one mark** for: 43	S	68 43
13	Award **one mark** for: 62 (cm)	G, G1 Measurement	40

Qn	Answer and marking guidance	Curriculum reference	Facility %
14	Award **one mark** for: $85.27 > 3.435$ ☑ $67.99 \leq 69.77$ ☑	N, N1 The number system	50
15	Award **one mark** for an explanation that shows that 7475 + 325 will give the answer.	N, N2 Calculation	44
16	(a) Award **one mark** for: 72 (cm) (b) Award **one mark** for: 54 (cm)	G, G1 Measurement	21 16
17	Award **one mark** for: (20) (15)	N, N1 The number system	21
18	Award **one mark** for: 0.75 km **or** 750 m Must show units to get the mark.	N, N1 The number system	50
19	Award **one mark** for: 60	N, N1 The number system	42
20	(a) Award **one mark** for: (20) (b) Award **one mark** for: (8)	S	83 38
	Section B – Calculators MAY be used		
21	(a) Award **one mark** for: 6 ☑ (b) Award **one mark** for: $\left(\frac{9}{1000}\right)$	N, N1 The number system	71 57
22	Award **one mark** for: 9 ☑	G, G2 Shape	49
23	(a) Award **one mark** for:  Accept slight inaccuracies as long as the intention is clear. (b) Award **one mark** for:  Accept slight inaccuracies as long as the intention is clear.	G, G3 Transformations	77 84

Qn	Answer and marking guidance	Curriculum reference	Facility %
24	Award **one mark** for: 5.294 ☑	N, N3 Fractions, decimals and percentages	69
25	Award **one mark** for: (235 cm) Accept 235 cm written in box.	N, N1 The number system	36
26	(a) Award **one mark** for: 7.817 (b) Award **one mark** for: 7.832	N, N3 Fractions, decimals and percentages	58 70
27	Award **one mark** for: (23)	S	80
28	Award **one mark** for: (2) (4) (8)	N, N1 The number system	53
29	(a) Award **one mark** for: **400 mm** | **600 mm** | **800 mm** 1 | 3 | 1 or **400 mm** | **600 mm** | **800 mm** 2 | 1 | 2 (b) Award **one mark** for: 3.2 (m)	R, R1 Ratio	27 28
30	Award **one mark** for: 14.27 ☑	N, N1 The number system	43
31	Award **one mark** for: 2 ☑	N, N2 Calculation	66
32	Award **one mark** for: $\frac{3}{5}$ Do not accept $\frac{6}{10}$	N, N3 Fractions, decimals and percentages	33
33	Award **one mark** for: 36.5 (cm)	G, G1 Measurement	34
34	(a) Award **one mark** for: 3 752 000 (b) Award **one mark** for: 3 800 000 (c) Award **one mark** for: 3 752 400	N, N1 The number system	60 49 63
35	Award **one mark** for: 14.75	N, N1 The number system	49
36	(a) Award **one mark** for: (99) (b) Award **one mark** for: (00)	N, N2 Calculation	77 47
37	(a) Award **one mark** for any even square number. (b) Award **one mark** for an explanation that shows: • not all multiples of 3 are multiples of 9 • a counter-example, e.g. 6 is a multiple of 3, but 9 is not a factor of 6	N, N1 The number system	30 42
38	Award **one mark** for: 3.6 km = 3600 m ☑	R, R1 Ratio	60

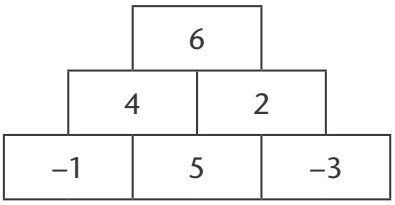
Qn	Answer and marking guidance	Curriculum reference	Facility %
39	Award **one mark** for: 25.6	G, G1 Measurement	46
40	(a) Award **one mark** for: 25	S	60
	(b) Award **one mark** for: You cannot tell ☑		67
	(c) Award **one mark** for: Statement 1: (true) Statement 2: (possibly true) Statement 3: (not true)		22

Answers and mark scheme: *Year 7 Spring*

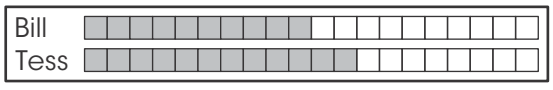
Section A – Calculators may NOT be used			
Qn	**Answer and marking guidance**	**Curriculum reference**	**Facility %**
1	Award **one mark** for: (660)	N, N1 The number system	80
2	(a) Award **one mark** for: 2.274 2.348 2.384 2.494 2.616 Allow one transcription error if the other four numbers are correct.	N, N3 Fractions, decimals and percentages	90
	(b) Award **one mark** for: 2.274	N, N2 Calculation	73
	(c) Award **one mark** for: 2.384 + 2.616 Numbers can be given in either order.		56
3	(a) Award **one mark** for: (4)	G, G3 Transformations	82
	(b) Award **one mark** for: 1		72
4	(a) Award **one mark** for: 45°, +/– 2°	G, G1 Measurement	76
	(b) Award **one mark** for: 155°, +/– 2°		44
5	(a) Award **one mark** for: 0.005 km ☑	N, N1 The number system	45
	(b) Award **one mark** for: 0.7 m → 7 mm 0.7 cm → 70 m 0.07 km → 7 cm 0.07 m → 70 cm		47
6	(a) Award **one mark** for: 70 490 Accept any number in place of 0	N, N1 The number system	48
	(b) Award **one mark** for: (68 307)		84
7	(a) Award **one mark** for: 205	N, N2 Calculation	39
	(b) Award **one mark** for: 9520		46
8	(a) Award **one mark** for: 7.8 (kg)	N, N1 The number system	57
	(b) Award **one mark** for: (50)		49
9	(a) Award **one mark** for: (2)	G, G2 Shape	48
	(b) Award **one mark** for: length = 3 cm; width = 2 cm Accept length and width reversed.		67

Qn	Answer and marking guidance	Curriculum reference	Facility %
10	Award **one mark** for: (60°)	G, G2 Shape	63
11	(a) Award **one mark** for: (30) (b) Award **one mark** for: 45 (minutes) (c) Award **one mark** for: 115 (minutes)	S	83 73 41
12	Award **one mark** for: $\frac{1}{2}$ $\frac{7}{12}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{5}{6}$ Also accept equivalent fractions, e.g.: $\frac{6}{12}$ $\frac{7}{12}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{10}{12}$	N, N1 The number system	42
13	(a) Award **one mark** for: 7 (b) Award **one mark** for: $\frac{5}{8} = \frac{15}{24}$ $\frac{13}{24} < \frac{14}{24} < \frac{15}{24}$ or a written explanation that shows using correct equivalent fractions, e.g. twenty-fourths.	N, N1 The number system	41 32
14	(a) Award **one mark** for: 25 (cm) (b) Award **one mark** for: 37.5 (cm)	G, G1 Measurement	29 32
15	(a) Award **one mark** for: 122 (°) (b) Award **one mark** for: 147 (°)	G, G2 Shape	47 53
16	Award **one mark** for: $\frac{7}{10} \times 10 = 7$ ☑ $700 \div 1000 = \frac{7}{10}$ ☑	N, N2 Calculation	58
	Section B – Calculators MAY be used		
17	(a) Award **one mark** for: 169 (b) Award **one mark** for: 4 25 36	N, N2 Calculation	61 44
18	(a) Award **one mark** for: $\frac{5}{12}$ (b) Award **one mark** for an explanation that shows: 24 – (10 + 6) = 8 There are 8 plain doughnuts $\frac{3}{8}$ of 24 = 9 8 ≠ 9 so $\frac{3}{8}$ of the doughnuts cannot be plain because $\frac{3}{8}$ of 24 is 9 (c) Award **one mark** for: $\frac{2}{5}$ Accept $\frac{8}{20}$ or $\frac{4}{10}$	R, R1 Ratio	61 26 20

Qn	Answer and marking guidance	Curriculum reference	Facility %
19	(a) Award **one mark** for: (371)	N, N1 The number system	73
	(b) Award **one mark** for: 840 000 = 84 × 10 000 84 = 7 × 12 so 84 = 7 × 12 × 10 000 or 840 000 ÷ 7 = 120 000	N, N2 Calculation	65
20	(a) Award **one mark** for: 8.5 or $8\frac{1}{2}$ (cm)	G, G1 Measurement	66
	(b) Award **one mark** for: 6.5 or $6\frac{1}{2}$ (cm)		73
21	(a) Award **one mark** for: 52 (°)	G, G2 Shape	67
	(b) Award **one mark** for: 106 (°)		52
22	Award **one mark** for: –12 –8 –1 3 5	N, N1 The number system	91
23	Award **one mark** for: to the nearest ten thousand ☑ to the nearest thousand ☑	N, N1 The number system	20
24	(a) Award **one mark** for: 18 (36) 54 (60) (72)	N, N1 The number system	72
	(b) Award **one mark** for: (3) 8 (9) (18) 24		58
25	Award **one mark** for: (9.65 m)	G, G1 Measurement	67
26	(a) Award **one mark** for: 26	S	50
	(b) Award **one mark** for: $\left(\frac{7}{18}\right)$	R, R1 Ratio	83
27	(a) Award **one mark** for: Square A to square B → 3 squares right and 4 squares down Square A to square C → 3 squares right and 1 square down Square A to square E → 1 square right and 2 squares down Square C to square E → 2 squares right and 2 squares down	G, G3 Transformations	58
	(b) Award **one mark** for: (C)		76
28	(a) Award **one mark** for: 432	N, N2 Calculation	80
	(b) Award **one mark** for: 1 box of 15 cans and 5 packs of 4 cans of cola ☑		59

Qn	Answer and marking guidance	Curriculum reference	Facility %
29	(a) Award **one mark** for: (848) (920) (b) Award **one mark** for an explanation that shows the numbers in the sequence are all multiples of 8 And 87 740 cannot be divided by 8 87 740 ÷ 8 = 10 967.5	N, N1 The number system	52 46
30	(a) Award **one mark** for: (65.7°C) (b) Award **one mark** for a correct possible answer, e.g.  Negative numbers must be in the left and right boxes and will always have a difference of 2, check number in centre box.	N, N2 Calculation	55 27
31	Award **one mark** for: ≠ ≠ = All three answers correct for the award of the mark.	N, N1 The number system	63
32	(a) Award **one mark** for: 6.255 (km) (b) Award **one mark** for: 0.25 (kg) (c) Award **one mark** for: 11 775 (g)	N, N2 Calculation	38 62 38

Answers and mark scheme: *Year 8 Autumn*

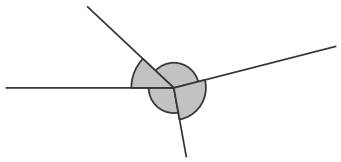
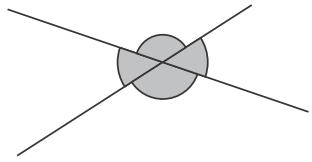
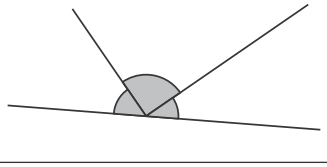
Section A – Calculators may NOT be used			
Qn	**Answer and marking guidance**	**Curriculum reference**	**Facility %**
1	(a) Award **one mark** for clear indication of Shape A only.	G, G2 Shape	85
	(b) Award **one mark** for: 24 cm Do not accept 24	G, G1 Measurement	44
	(c) Award **one mark** for: (AE)	G, G3 Transformations	82
2	(a) Award **one mark** for: 3 and 6	N, N1 The number system	66
	(b) Award **one mark** for: 15 and 30		70
3	(a) Award **one mark** for: Double the number then subtract 2 ☑ Subtract 1 then double the number ☑	A, A3 Sequences	36
	(b) Award **one mark** for: –160 1.25		44
4	(a) Award **one mark** for two fifths (numbers or words). Do not accept $\frac{6}{15}$ or other non-specified equivalents.	R, R1 Ratio	44
	(b) Award **one mark** for: (25)	N, N3 Fractions, decimals and percentages	76
	(c) Award **one mark** for selection of the second diagram only. 		57
5	(a) Award **one mark** for: 30	A, A1 Methods	69
	(b) Award **one mark** for: Force = 20 Distance = 4 ☑		75
	(c) Award **one mark** for: (100 ÷ 25)		64
6	(a) Award **one mark** for: 16 **and** Pershore	N, N2 Calculation	54
	(b) Award **one mark** for: Katesbridge **and** 6 or Edinburgh **and** 4		47
	(c) Award **one mark** for: –9	S	55
7	(a) Award **one mark** for: $\frac{4}{5}$	R, R1 Ratio	72
	(b) Award **one mark** for: 0.8 or 0.80	N, N3 Fractions, decimals and percentages	76
	(c) Award **one mark** for: 18		65

<table>
<tr><th>Qn</th><th>Answer and marking guidance</th><th>Curriculum reference</th><th>Facility %</th></tr>
<tr><td>8</td><td>(a) Award one mark for:
Angle PSR = Angle RQP ☑
PS is equal in length to QR ☑
(b) Award one mark for: 8.5
(c) Award one mark for: (157°)</td><td>G, G2 Shape

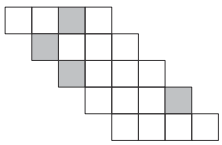
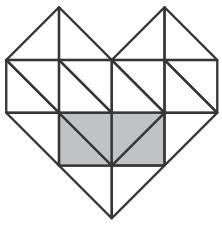
G, G1 Measurement
G, G2 Shape</td><td>50

41
72</td></tr>
<tr><td>9</td><td>(a) Award one mark for:
<table><tr><th>Percentage of earnings</th></tr><tr><td>20</td></tr><tr><td>10</td></tr><tr><td>2</td></tr><tr><td>16</td></tr><tr><td>8</td></tr></table>(b) Award one mark for: 28</td><td>N, N3 Fractions, decimals and percentages

N, N2 Calculation</td><td>41

21</td></tr>
<tr><td>10</td><td>(a) Award one mark for: 3
(b) Award one mark for:
Maya did not do enough rolls to decide whether the dice is fair or not. ☑</td><td>P</td><td>40
39</td></tr>
<tr><td>11</td><td>(a) Award one mark for: 63, 69
(b) Award one mark for: 60, 67
(c) Award one mark for: 71, 80, 89</td><td>A, A3 Sequences</td><td>89
89
37</td></tr>
<tr><td>12</td><td>Award one mark for the fact column completely correct.
<table><tr><th>Diagram</th><th>Fact</th></tr><tr><td>  </td><td>D</td></tr><tr><td>  </td><td>A</td></tr><tr><td>  </td><td>B</td></tr></table>Ignore additional text, provided it is not contradictory.</td><td>G, G2 Shape</td><td>45</td></tr>
</table>

Section B – Calculators MAY be used

Qn	Answer and marking guidance	Curriculum reference	Facility %
13	Award **one mark** for: 41.35	A, A1 Methods	79
14	(a) Award **one mark** for: 138 ÷ 23 then × 7 ☑ 7 × 138 then ÷ 23 ☑	N, N3 Fractions, decimals and percentages	20
	(b) Award **one mark** for: 215		72
	(c) Award **one mark** for: $\frac{1}{8}$ or one eighth Do not accept equivalents.	R, R1 Ratio	52
15	(a) Award **one mark** for:  ☑  ☑	N, N3 Fractions, decimals and percentages	12
	(b) Award **one mark** for exactly 42 small triangles shaded, i.e. 6 not shaded.		44
16	(a) Award **one mark** for: 10.20 or £10.20 Do not accept 10.2, £10.2, 1020 or 1020 pence.	R, R2 Proportion	81
	(b) Award **one** mark for the table completed correctly: **Number of downloads** | 1 | 100 | **2158** **Total payment** | **4 pence** | 400 pence | £86.32 Accept 4p, £0.04 Do not accept 4 or £4, or 21.58		19
17	(a) Award **one mark** for: 21	S	52
	(b) Award **one mark** for: 24		53
	(c) Award **one mark** for the table correctly completed: **Measure** | **Goes up** | **Stays the same** | **Goes down** Median | | ✓ | Mean | ✓ | | Mode | | ✓ | Range | | ✓ |		29

<table>
<tr><th>Qn</th><th>Answer and marking guidance</th><th>Curriculum reference</th><th>Facility %</th></tr>
<tr><td>18</td><td>Award one mark for correctly matching A with S, B with R, and D with T.
<table><tr><td>Statement</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr><tr><td>Arrow</td><td>S</td><td>R</td><td>Q</td><td>T</td><td>P</td></tr></table>Award one mark for correctly matching C with Q and E with P.</td><td>P</td><td>47

49</td></tr>
<tr><td>19</td><td>(a) Award one mark for: 4
(b) Award one mark for: (2)</td><td>A, A3 Sequences</td><td>70
31</td></tr>
<tr><td>20</td><td>(a) Award one mark for clear indication of 7 and 210 only.
(b) Award one mark for:
card A = 14, 56, 70 or 98
and card B = 84
No additional incorrect values for A or B.
Ignore any values written elsewhere on the Venn diagram.
(c) Award one mark for:
Common multiples ☑</td><td>N, N1 The number system</td><td>17
39

65</td></tr>
<tr><td>21</td><td>Award one mark for each value correctly entered:
<table><tr><th>Centigrade</th><th>Fahrenheit</th></tr><tr><td>100</td><td>237.6</td></tr><tr><td>28</td><td>108</td></tr></table></td><td>A, A1 Methods</td><td>
56
55</td></tr>
<tr><td>22</td><td>(a) Award one mark for correctly completing the table:
<table><tr><th>Data</th><th>Mean</th><th>Range</th></tr><tr><td>3, 5, 7, 9, 11</td><td>7</td><td>8</td></tr></table>(b) Award one mark for five suitable values (totalling 50, range of 8):
<table><tr><th>Data</th><th>Mean</th><th>Range</th></tr><tr><td>e.g. 6, 8, 10, 12, 14</td><td>10</td><td>8</td></tr></table>Allow the use of the same value several times, e.g. 6, 10, 10, 10, 14
(c) Award one mark for six suitable values (totalling 60, range of 8):
<table><tr><th>Data</th><th>Mean</th><th>Range</th></tr><tr><td>e.g. 6, 8, 10, 10, 12, 14</td><td>10</td><td>8</td></tr></table>Allow the use of the same value several times, e.g. 6, 10, 10, 10, 10, 14</td><td>S</td><td>48

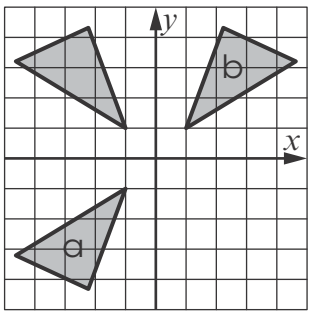
21

14</td></tr>
</table>

<table>
<tr><th>Qn</th><th>Answer and marking guidance</th><th>Curriculum reference</th><th>Facility %</th></tr>
<tr><td>23</td><td>(a) Award one mark for the table correctly completed:
<table><tr><th>Statement</th><th>True</th><th>Not enough evidence</th><th>Not true</th></tr><tr><td>More than half send and receive emails in every age range</td><td>✓</td><td></td><td></td></tr><tr><td>The greatest gap in response rate between under 25s and 75 and over is for social media</td><td></td><td></td><td>✓</td></tr><tr><td>75 and over only use Internet phone calls to keep in touch with their children</td><td></td><td>✓</td><td></td></tr></table>(b) Award one mark for the table correctly completed:
<table><tr><th>Statement</th><th>True</th><th>Not enough evidence</th><th>Not true</th></tr><tr><td>Both males and females send emails every day</td><td></td><td>✓</td><td></td></tr><tr><td>One quarter of males use the Internet every week to make phone/video calls</td><td></td><td></td><td>✓</td></tr><tr><td>The percentage that chose TV or video is about the same for males and for females</td><td>✓</td><td></td><td></td></tr></table></td><td>S</td><td>16

15</td></tr>
<tr><td>24</td><td>(a) Award one mark for: odd, square (either way round)
(b) Award one mark for: factor
(c) Award one mark for: even, odd / prime / square</td><td>N, N2 Calculation

N, N1 The number system</td><td>53

61
40</td></tr>
<tr><td>25</td><td>(a) Award one mark for the triangle correctly drawn and labelled a, as shown.
(b) Award one mark for the triangle correctly drawn and labelled b, as shown.
 
</td><td>G, G3 Transformations</td><td>29

41</td></tr>
</table>

Answers and mark scheme: *Year 8 Spring*

Section A – Calculators may NOT be used			
Qn	**Answer and marking guidance**	**Curriculum reference**	**Facility %**
1	Award **one mark** for: (5)	G, G3 Transformations	75
2	(a) Award **one mark** for: b and $3b$ and $8b$ in any order.	A, A1 Methods	36
	(b) Award **one mark** for the boxes correctly completed: $\mathbf{6}\boldsymbol{ab} + \mathbf{2}\boldsymbol{ab} = 8ab$ $\mathbf{13}\boldsymbol{a} - \mathbf{5}\boldsymbol{a} = 8a$		24
	(c) Award **one mark** for the boxes correctly completed: $8(a + b) = \mathbf{8}\boldsymbol{a} + \mathbf{8}\boldsymbol{b}$ $2a(3b - 7a) = \mathbf{6}\boldsymbol{ab} - \mathbf{14}\boldsymbol{a}^{\mathbf{2}}$		23
3	(a) Award **one mark** for brackets placed correctly: 9 + (6 ÷ 3) = 11	A, A1 Methods	87
	(b) Award **one mark** for brackets placed correctly: (2 + 7) × (7 – 2) = 45		28
	(c) Award **one mark** for brackets placed correctly: 12 × (7 – 2) = (5 + 1) × 10 Accept additional brackets that are correct.		30
4	(a) Award **one mark** for both **B** and **G**, in this order.	P	40
	(b) Award **one mark** for both **A** and **D**, in this order.		68
5	(a) Award **one mark** for both correct: 1 : 3 5 : 2	R, R1 Ratio	49
	(b) Award **one mark** for 1 : 3, in this order.		62
6	(a) Award **one mark** for: Isosceles ☑	G, G2 Shape	79
	(b) Award **one mark** for: (70°)		81

Qn	Answer and marking guidance	Curriculum reference	Facility %
7	(a) Award **one mark** for completing all three of the values in £. (b) Award **one mark** for completing all three of the percentages. 	N, N1 The number system N, N3 Fractions, decimals and percentages	56 49
8	(a) Award **one mark** for: $x = 50$ (b) Award **one mark** for: $x = 3$ (c) Award **one mark** for: $x = 4.5$ Accept $\frac{9}{2}$ or $4\frac{1}{2}$	A, A1 Methods	60 71 41
9	(a) Award **one mark** for: (700p) Accept £7.00 as an answer if no option is circled. (b) Award **one mark** for the first two correctly indicated: Which provider is **cheaper** for **20** minutes? Devized ☑ Which provider is **more expensive** for **4** minutes? Devized ☑ Award **one mark** for the last two correctly indicated: Which provider is **cheaper** for **10** minutes? Eyephones ☑ Which provider is **more expensive** for **50** minutes? Eyephones ☑	A, A1 Methods A, A2 Graphs	54 67 58

<table>
<tr><th>Qn</th><th>Answer and marking guidance</th><th>Curriculum reference</th><th>Facility %</th></tr>
<tr><td>10</td><td>(a) Award one mark for: 2 : 1

(b) Award one mark for third option clearly indicated only:

Kim £100
Terry £50</td><td>R, R1 Ratio</td><td>31

76</td></tr>
<tr><td>11</td><td>(a) Award one mark for correctly completing column 3. NB: In the cost column, the 5 and 40 may be in either order.

<table>
<tr><th>Item</th><th>Mass</th><th>Cabin or hold?</th><th>Cost (£)</th></tr>
<tr><td>Suitcase</td><td>22.3 kg</td><td>Hold</td><td>5</td></tr>
<tr><td>Bag</td><td>4200 g</td><td>Cabin</td><td>0</td></tr>
<tr><td>Rucksack</td><td>8700 g</td><td>Hold</td><td>40</td></tr>
<tr><td colspan="4">Total mass of luggage in hold: 31 (kg)</td></tr>
<tr><td colspan="2">Number of kg over 23</td><td>8</td><td>(£)32</td></tr>
<tr><td colspan="2"></td><td>Total cost</td><td>(£)77</td></tr>
</table>

(b) Award one mark for the cost of extra mass in the hold (£)32 or if they have correctly followed through their choice of cabin or hold.

(c) Award one mark for the total cost (£)77 or if they have correctly followed through their cost of extra mass plus (£)45</td><td>S</td><td>35

15

11</td></tr>
<tr><td>12</td><td>(a) Award one mark for: $p + 2t + 3p$

Accept $4p + 2t$

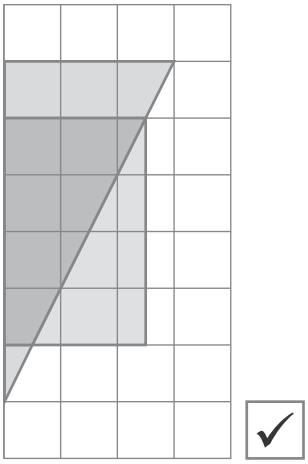
(b) Award one mark for $p + 2t + 3p$ and $3t + p$ in either order.</td><td>A, A1 Methods</td><td>56

50</td></tr>
<tr><td>13</td><td>Award one mark for 16 correctly placed.

Award one mark for 61 correctly placed.
<table>
<tr><th></th><th>Even number</th><th>Odd number</th></tr>
<tr><td>Prime number</td><td></td><td>61</td></tr>
<tr><td>Square number</td><td>16</td><td></td></tr>
<tr><td>Not a prime number AND not a square number</td><td></td><td></td></tr>
</table></td><td>N, N2 Calculation</td><td>64

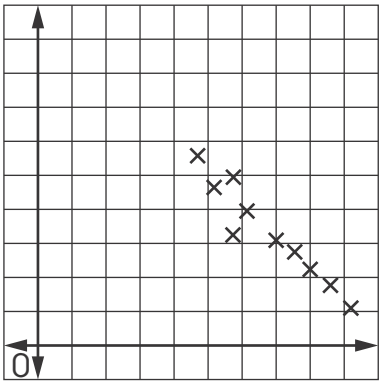
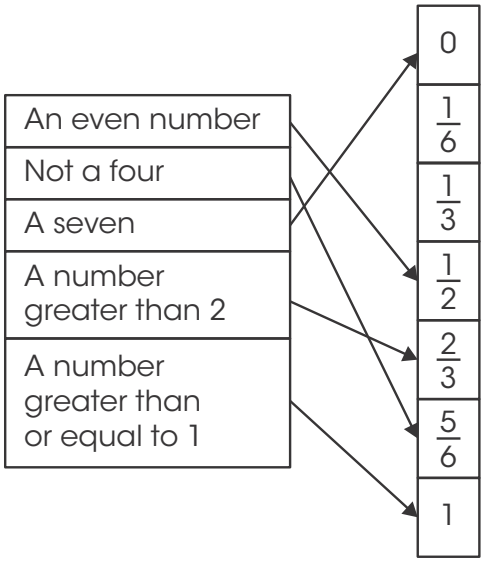
56</td></tr>
</table>

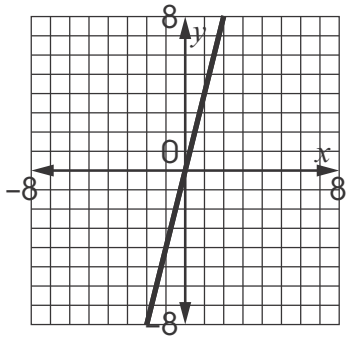
Section B – Calculators MAY be used

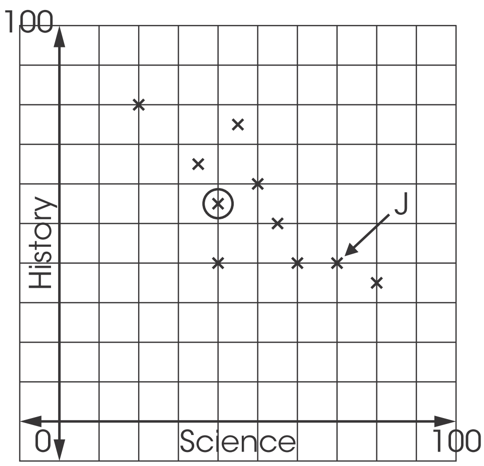
Qn	Answer and marking guidance	Curriculum reference	Facility %
14	(a) Award **one mark** for: **Millilitres** | **Litres** **5000** | 5 35 | **0.035** (b) Award **one mark** for: **Centimetres** | **Metres** **260** | 2.6 430 | **4.30** Accept 4.3	N, N1 The number system	31 71
15	(a) Award **one mark** for: $7 \times t$ (b) Award **one mark** for: $6 \times 2p + 6 \times 3q$ (c) Award **one mark** for: $7k - g + 5gk$ Accept equivalents, i.e. the terms (+) $7k$, – g, (+) $5gk$ in any order, written as a single expression, no additional terms.	A, A1 Methods	79 54 32
16	(a) Award **one mark** for: parallelogram (b) Award **one mark** for: kite (c) Award **one mark** for: 	G, G3 Transformations	40 40 51
17	(a) Award **one mark** for: 40 (%) (b) Award **one mark** for: 69.12 (c) Award **one mark** for clear indication of 72.6 g only.	N, N3 Fractions, decimals and percentages	83 56 52
18	Award **one mark** for: 4.8 km	A, A1 Methods	62

<table>
<tr><th>Qn</th><th>Answer and marking guidance</th><th>Curriculum reference</th><th>Facility %</th></tr>
<tr><td>19</td><td>(a) Award one mark for 2 : 3, in this order.
(b) Award one mark for: 15
(c) Award one mark for: 160
<table><tr><td>White counters</td><td>8</td><td>160</td></tr><tr><td>Black counters</td><td>12</td><td>240</td></tr><tr><td>Total counters</td><td>20</td><td>400</td></tr></table></td><td>R, R1 Ratio</td><td>48
13
45</td></tr>
<tr><td>20</td><td>(a) Award one mark for: (42)
(b) Award one mark for: (125)
(c) Award one mark for: 4</td><td>N, N1 The number system
N, N2 Calculation</td><td>71
59
53</td></tr>
<tr><td>21</td><td>(a) Award one mark for: add 12 or +12
(b) Award one mark for: 132
Allow answers in the range 130 to 135</td><td>A, A3 Sequences
A, A2 Graphs</td><td>39
42</td></tr>
<tr><td>22</td><td>(a) Award one mark for: 720 (°)
(b) Award one mark for: 540 (°)</td><td>G, G2 Shape</td><td>28
17</td></tr>
<tr><td>23</td><td>(a) Award one mark for: 1 4 10
(b) Award one mark for: 0 3 3 10
(c) Award one mark for: 5 5 5 6 or 4 5 5 5</td><td>N, N1 The number system</td><td>30
33
30</td></tr>
<tr><td>24</td><td>(a) Award one mark for: 1 : 2
(b) (i) Award one mark for: 180 (degrees)
(ii) Award one mark for: 48 (°)</td><td>R, R1 Ratio
G, G2 Shape</td><td>40
80
18</td></tr>
<tr><td>25</td><td>(a) Award one mark for: 3 (cm)
(b) Award one mark for: 11.5 (cm)</td><td>A, A1 Methods</td><td>51
48</td></tr>
</table>

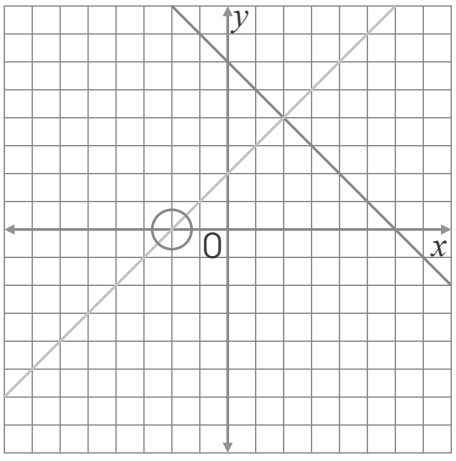
Section A – Calculators may NOT be used			
Qn	**Answer and marking guidance**	**Curriculum reference**	**Facility %**
1	Award **one mark** for: (81) (225)	N, N2 Calculation	61
2	Award **one mark** for: $10\frac{1}{2}$ Accept $\frac{21}{2}$ Accept 10.5 as the simplest form could also mean decimal point.	N, N2 Calculation	19
3	Award **one mark** for: (84)	N, N3 Fractions, decimals and percentages	81
4	Award **one mark** for: $\frac{3}{8}$	N, N3 Fractions, decimals and percentages	27
5	Award **one mark** for: £112 or £112.00	N, N3 Fractions, decimals and percentages	66
6	Award **one mark** for: (Decrease by 75%)	N, N3 Fractions, decimals and percentages	28
7	Award **one mark** for: (£408)	N, N3 Fractions, decimals and percentages	68
8	Award **one mark** for: (–6)	A, A1 Methods	47
9	Award **one mark** for both: (Metres per second) (Kilometres per hour)	R, R3 Rates of change	88
10	Award **one mark** for: (6000 m^2)	N, N1 The number system	43
11	Award **one mark** for: (£700)	N, N3 Fractions, decimals and percentages	29
12	Award **one mark** for: ($\frac{2y}{3x^2}$)	A, A1 Methods	36
13	(a) Award **one mark** for: 120 000 Accept 120000 or 120,000 (b) Award **one mark** for: ($T = \frac{Q}{mc} + t$)	A, A1 Methods	53 42

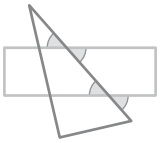
Qn	Answer and marking guidance	Curriculum reference	Facility %
14	(a) Award **one mark** for: $4\frac{5}{12}$ Allow $\frac{53}{12}$. Do not accept a decimal unless it is clearly exact and recurring 4.4166..... (b) Award **one mark** for: 4	N, N2 Calculation N, N1 The number system	21 52
15	(a) Award **one mark** for: 108 (cm^2) (b) Award **one mark** for: 100 (cm) (c) Award **one mark** for: $L = 5r$	G, G1 Measurement A, A1 Methods	28 25 44
16	Award **one mark** for: 2 hours 42 minutes	R, R3 Rates of change	55
17	Award **one mark** for: 15% or $\frac{3}{20}$ Accept an equivalent fraction or decimal.	P	67
18	Award **one mark** for:  	S	70
19	(a) Award **one mark** for: 80 (cm) (b) Award **one mark** for: 256 (cm^2)	G, G1 Measurement	35 19
20	 Award **one mark** for **4** correct (including the one that has been done for them). Award **two marks** for **5** correct (including the one that has been done for them).	P	60 38

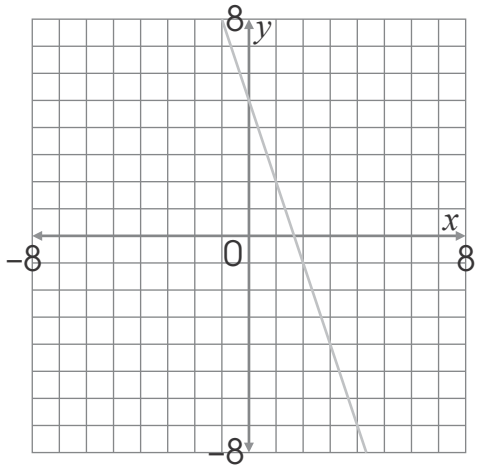
Qn	Answer and marking guidance	Curriculum reference	Facility %
21	Award **one mark** for: (16) (144)	N, N2 Calculation	79
22	Award **one mark** for: (171)	N, N3 Fractions, decimals and percentages	75
23	Award **one mark** for: (7)	A, A1 Methods	62
24	Award **one mark** for: ($x = y$)	A, A1 Methods	34
	Section B – Calculators MAY be used		
25	(a) Award **one mark** for: (£50) (b) Award **one mark** for: (£) 41.75	N, N1 The number system N, N2 Calculation	53 87
26	Award **one mark** for: (£) 54 Accept 54.00 but not 54.0 Accept £279, which is the new total that includes £54 interest.	N, N3 Fractions, decimals and percentages	34
27	(a) Award **one mark** for: (£) 52.80 Do not accept 52.8 (b) Award **one mark** for: (6)	R, R3 Rates of change	52 79
28	(a) Award **one mark** for: $7x + 8y + 19$ Accept equivalents with exactly three terms. (b) Award **one mark** for: $2xy^2(y + 2x)$ Accept equivalents, e.g. $2xy^2(2x + y)$, but only if fully factorised. (c) Award **one mark** for: ($3(x + 6)$)	A, A1 Methods	47 16 59
29	(a) Award **one mark** for: 9 (square units) (b) Award **one mark** for: $y = 2x - 6$ Accept equivalents, such as $y = 2(x - 3)$ or $x = \frac{y}{2} + 3$ or $2x - y - 6 = 0$	G, G1 Measurement A, A2 Graphs	61 15
30	(a) Award **one mark** for:  Allow for a straight line segment through (–1, –3) and (1, 5). Allow slight variation, especially if points on line clearly marked. (b) Award **one mark** for: 45 (c) Award **one mark** for: (5)	A, A2 Graphs A, A1 Methods	28 60 45

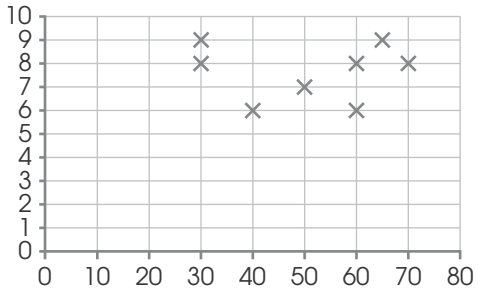
Qn	Answer and marking guidance	Curriculum reference	Facility %
31	Award **one mark** for an explanation that the sum of the probabilities of the two possible outcomes cannot exceed 1 Accept equivalents, e.g. $\frac{3}{5} + \frac{1}{2}$ is $\frac{11}{10}$, so not possible or Gavin is wrong because they are more than 1	P	46
32	(a) Award **one mark** for: 12 (b) Award **one mark** for: 40.7 (m^2) Since the mark is for finding the area of a circle, be lenient with number of decimal places. So, accept 41, 40.71, 40.72 but NOT 40 (c) Award **one mark** for: 4 : 1 only Do not accept 1 : 4	G, G1 Measurement R, R3 Rates of change	24 46 13
33	(a) Award **one mark** for correct scores: History 40, Science 70 Allow error of +/–2 (b) Award **one mark** for correct point plotted (circled point below). Allow error of +/–2 Accept marks other than a cross.  (c) Award **one mark** for: No **and** an attempt at a valid explanation. Preferably: High scores in history seem to have low scores in science. Accept: The line of best fit goes down **or** There is a negative correlation.	S	73 72 40

Qn	Answer and marking guidance	Curriculum reference	Facility %
34	(a) Award **one mark** for: 50.3 (m^2) Do not accept any other answer or an answer to two decimal places. (b) Award **one mark** for: 3 : 5 Accept 6 : 10	G, G1 Measurement	10 5
35	(a) Award **one mark** for: (2.5, 0) (b) Award **one mark** for: No **and** a valid explanation, e.g. when x is 3, y is 1; $2 \times 3 - 5 = 1$, this is not 4; etc. Do not accept vague reasons, such as it does not fit; (3, 4) cannot work; etc.	A, A2 Graphs	26 19
36	(a) Award **one mark** for: 16 (b) Award **one mark** for: 16.6 If zero marks gained, award **one mark** for both 15.9°C **and** 16.64°C.	S N, N3 Fractions, decimals and percentages	58 30
37	Award **one mark** for: (£) 343 Do not accept £342.99	N, N3 Fractions, decimals and percentages	45
38	Award **one mark** for: (£) 783.75	N, N3 Fractions, decimals and percentages	20
39	Award **one mark** for: $\frac{4b}{3a^2}$	A, A1 Methods	39
40	Award **one mark** for: $\frac{1}{5}$	P	64

Section A – Calculators may NOT be used			
Qn	**Answer and marking guidance**	**Curriculum reference**	**Facility %**
1	Award **one mark** for: (14)	N, N1 The number system	71
2	Award **one mark** for: (2^4) and (4^2)	N, N2 Calculation	28
3	Award **one mark** for: 483	N, N2 Calculation	63
4	Award **one mark** for: ($2^3 \times 3 \times 5 \times 11$)	N, N1 The number system	52
5	Award **one mark** for: ($\sqrt{100}$) ($\sqrt[3]{1000}$)	N, N2 Calculation	41
6	Award **one mark** for: (£)1620 or (£)1620.00	N, N2 Calculation	30
7	Award **one mark** for: 9 and 243	N, N1 The number system	66
8	Award **one mark** for: (750 ml)	R, R1 Ratio	56
9	Award **one mark** for: (50)	N, N1 The number system	45
10	(a) Award **one mark** for: $y = 9 - x$ or $y = -x + 9$	A, A1 Methods	32
	(b) Award **one mark** for: $y = 15x^2$		29
11	(a) Award **one mark** for: 0 3 8 15 24	A, A3 Sequences	56
	(b) Award **one mark** for: $4n + 1$		43
	(c) Award **one mark** for: (9)		34
12	(a) Award **one mark** for:  	A, A2 Graphs	24
	(b) Award **one mark** for: $x = 2$ $y = 4$		34
	(c) Award **one mark** for indication that the lines have the same gradient (–1) OR they are parallel OR both. Accept correct lines drawn on graph plus brief words of explanation, such as the graph shows they do not meet.		33

Qn	Answer and marking guidance	Curriculum reference	Facility %
13	Award **one mark** for: 	G, G2 Shape	14
14	Award **one mark** for: 100 (km per hour)	N, N2 Calculation	29
15	Award **one mark** for: $a = 48°$ Award **one mark** for: $b = 67°$	G, G2 Shape	79 74
16	(a) Award **one mark** for: 26 cm Units required. (b) Award **one mark** for: 32 cm^2 Units required. Allow **one mark** for both numbers correct but without units.	G, G1 Measurement	54 31
17	(a) Award **one mark** for: $\frac{1}{10}$ Accept 0.1 or 10% (b) Award **one mark** for 'no' or 'probably no' and a valid explanation, e.g. the three are not equally likely.	P	88 40
18	Award **one mark** for both: There is a positive correlation between price and time. ☑ Higher priced candles will tend to last longer. ☑	S	81
19	Award **one mark** for: (40)	N, N1 The number system	73
20	Award **one mark** for: 729	N, N2 Calculation	56
21	Award **one mark** for: $(3^3 \times 7^2)$	N, N1 The number system	38
22	Award **one mark** for: 15 and 405	N, N1 The number system	47
	Section B – Calculators MAY be used		
23	(a) Award **one mark** for: $(3^3 \times 5^2 \times 7)$ (b) Award **one mark** for: (3)	N, N2 Calculation	73 36
24	Award **one mark** for: 7.37 (cm)	N, N2 Calculation	22
25	Award **one mark** for: 1.94	N, N2 Calculation	36
26	Award **one mark** for: (£)6.93	N, N2 Calculation	16
27	Award **one mark** for: (14%)	N, N2 Calculation	68

Qn	Answer and marking guidance	Curriculum reference	Facility %
28	(a) Award **one mark** for:  Allow for a straight line segment through and beyond (0, 5) and (2, –1). Allow slight variation, especially if two correct points on the line are clearly marked.	A, A2 Graphs	29
	(b) Award **one mark** for: –3		25
	(c) Award **one mark** for: $x = \frac{5}{3}$		15
29	(a) Award **one mark** for: 2.3(p)	N, N2 Calculation	28
	(b) Award **one mark** for: (£)4.50		50
	(c) Award **one mark** for statement that Fixit is cheaper per bolt, giving the cost for one bolt (2.325p compared with 2.25p), or for the same number of bolts, such as 40 (93p and 90p).		39
30	(a) Award **one mark** for: $2 \times 8 + 2 \times 12$	G, G1 Measurement	67
	(b) Award **one mark** for: 49.1 (cm) Be lenient with the number of decimal places. So allow 49.13 and 49.14 but NOT just 49		14
	(c) Award **one mark** for: 45.7 (cm^2) Be lenient with the number of decimal places. So allow 45.72 and 45.73		26

Qn	Answer and marking guidance	Curriculum reference	Facility %
31	(a) Award **one mark** for 6 or more of the 8 points correct.  (b) Award **one mark** for: little or no correlation ☑ (c) Award **one mark** for: 50.625 or $50\frac{3}{8}$ Allow 50.6 or 51 with correct method. (d) Award **one mark** for: mean ☑	S	92 50 49 38
32	(a) Award **one mark** for: $\frac{2}{5}$ (b) Award **one mark** for: $\frac{8}{15}$ (c) Award **one mark** for $\frac{17}{20}$ and 0.85	P	67 67 43
33	(a) Award **one mark** for: $y = 2x$ or equivalent (b) Award **one mark** for: $y = 2x - 6$ or equivalent	A, A2 Graphs	36 16
34	Award **one mark** for: 8.44	N, N2 Calculation	42
35	(a) Award **one mark** for: $y = 3x + 9$ or equivalent right-hand side (b) Award **one mark** for: $y = \frac{25x^3}{2}$ or equivalent right-hand side	A, A1 Methods	30 26
36	(a) Award **one mark** for: 19.4 cm Units required. (b) Award **one mark** for: 18 cm^2 Units required. Allow **one mark** for both numbers correct but without units.	G, G1 Measurement	46 26
37	Award **one mark** for: (£)2472 or (£)2472.00	N, N2 Calculation	39

PUMA 7 Autumn: Standardised scores

Raw score	Standardised score
0	<70
1	70
2	71
3	72
4	73
5	74
6	75
7	76
8	77
9	79
10	80
11	81
12	82
13	83
14	84
15	85
16	87
17	88
18	89
19	90
20	91
21	92
22	93
23	95
24	96
25	97
26	98
27	99
28	100
29	101
30	102
31	104
32	105
33	106
34	107
35	108
36	109
37	110
38	112

Raw score	Standardised score
39	113
40	114
41	115
42	116
43	117
44	118
45	120
46	121
47	122
48	123
49	124
50	125
51	126
52	127
53	129
54	130
55	>130
56	
57	
58	
59	
60	

PUMA 7 Spring: Standardised scores

Raw score	Standardised score
0	<70
1	
2	
3	
4	70
5	71
6	72
7	73
8	75
9	76
10	77
11	78
12	79
13	80
14	81
15	83
16	84
17	85
18	86
19	87
20	88
21	90
22	91
23	92
24	93
25	94
26	95
27	96
28	98
29	99
30	100
31	101
32	102
33	103
34	104
35	106
36	107
37	108
38	109
39	110
40	111
41	112
42	114
43	115
44	116

Raw score	Standardised score
45	117
46	118
47	119
48	121
49	122
50	123
51	124
52	125
53	126
54	127
55	129
56	130
57	>130
58	
59	
60	

PUMA 8 Autumn: Standardised scores

Raw score	Standardised score
0	71
1	72
2	74
3	75
4	76
5	77
6	78
7	79
8	81
9	82
10	83
11	84
12	85
13	86
14	88
15	89
16	90
17	91
18	92
19	94
20	95
21	96
22	97
23	98
24	99
25	101
26	102
27	103
28	104
29	105
30	106
31	108
32	109
33	110
34	111
35	112
36	114
37	115
38	116
39	117
40	118
41	119
42	121
43	122
44	123

Raw score	Standardised score
45	124
46	125
47	126
48	128
49	129
50	130
51	>130
52	
53	
54	
55	
56	
57	
58	
59	
60	

PUMA 8 Spring: Standardised scores

Raw score	Standardised score
0	71
1	72
2	74
3	75
4	76
5	77
6	78
7	79
8	81
9	82
10	83
11	84
12	85
13	86
14	88
15	89
16	90
17	91
18	92
19	93
20	95
21	96
22	97
23	98
24	99
25	100
26	102
27	103
28	104
29	105
30	106
31	107
32	109
33	110
34	111
35	112
36	113
37	114
38	116
39	117
40	118
41	119
42	120
43	121
44	123

Raw score	Standardised score
45	124
46	125
47	126
48	127
49	128
50	130
51	>130
52	
53	
54	
55	
56	
57	
58	
59	
60	

PUMA 9 Autumn:
Standardised scores

Raw score	Standardised score
0	74
1	76
2	77
3	78
4	79
5	81
6	82
7	83
8	84
9	86
10	87
11	88
12	89
13	90
14	92
15	93
16	94
17	95
18	97
19	98
20	99
21	100
22	102
23	103
24	104
25	105
26	107
27	108
28	109
29	110
30	111
31	113
32	114
33	115
34	116
35	118
36	119
37	120
38	121
39	123
40	124
41	125
42	126
43	127
44	129

Raw score	Standardised score
45	130
46	>130
47	
48	
49	
50	
51	
52	
53	
54	
55	
56	
57	
58	
59	
60	

PUMA 9 Spring: Standardised scores

Raw score	Standardised score
0	75
1	76
2	78
3	79
4	80
5	81
6	83
7	84
8	85
9	86
10	88
11	89
12	90
13	91
14	93
15	94
16	95
17	96
18	98
19	99
20	100
21	101
22	103
23	104
24	105
25	107
26	108
27	109
28	110
29	112
30	113
31	114
32	115
33	117
34	118
35	119
36	120
37	122
38	123
39	124
40	125
41	127
42	128
43	129
44	130

Raw score	Standardised score
45	>130
46	
47	
48	
49	
50	
51	
52	
53	
54	
55	
56	
57	
58	
59	
60	