SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2016 SESSION

SUBJECT: Mathematics	**PAPER:** I – Section A (Non-Calculator Section)
DATE: 3rd September 2016	**TIME:** 20 minutes

ATTEMPT ALL QUESTIONS.

Write your answers in the space available on the examination paper.
The use of calculators and protractors is NOT allowed.
It is not necessary to show your working.
This paper carries a total of 20 marks.

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)

1 Write the number 460 099 to the nearest hundred.

Ans _____

2 Underline the largest of these numbers.

9.99×10^{-6}, 1×10^{3}, 5.5×10^{2}, 1.1×10^{-99}
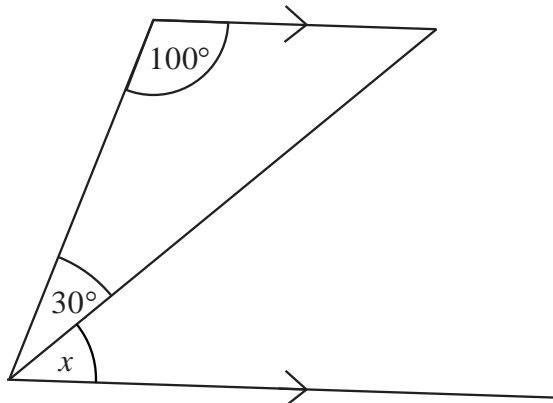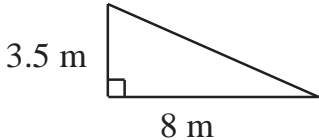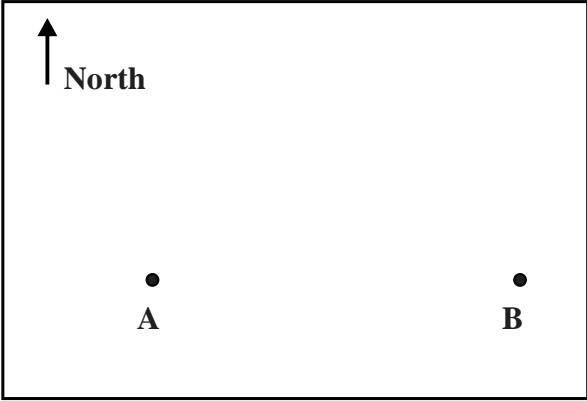
3

Diagram not drawn to scale

Work out the size of the angle marked *x*.

Ans _____

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)
4 Fill in the blank to complete the statement below. 1530 thousand = _____ million	
5 Water is flowing into a tank at the rate of 300 ml/minute. How much water, in litres, flows into the tank in 1 hour? Ans _____	
6 A rabbit runs at a speed of 24 kilometres an hour. How far does it run in 45 minutes? **Ans** _____	
7 There are 12 male members and 8 female members in a youth club. The youth leader is giving each of these members a book costing €7.50. How much does she spend? **Ans** _____	
8 Stefan is cutting out shapes. Each shape takes him ½ minute to cut out. How many shapes can he cut out in 30 minutes? **Ans** _____	
9 Find the value of $(25 \times 35) + (25 \times 65)$. **Ans** _____	
10 How many cubic centimetres are there in 34.75 litres? **Ans** _____	

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)
11 Work out an approximate value for the following expression giving your answer to one significant figure. $$(9.98)^3 - 2 \times 299$$ **Ans** _____	
12 Find the value of *x* which satifies this equation: $$\frac{x}{5} - 3 = 98$$ **Ans** _____	
13 Work out the area of this triangle. Give the appropriate units in your answer. 3.5 m 8 m **Ans** _____	
14 A robot turns 15° clockwise at the press of a button. How many times should the button be pressed for the robot to make a complete turn? **Ans** _____	
15 Write four numbers whose median is 56. **Ans** _____ _____ _____ _____	

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)
16 During a sale, a shop offers a discount of 15% of the marked prices. How much money is saved on a camera with a marked price of €250? **Ans** _____	
17 The diagram shows the position of two places A and B on a map. ↑ **North** ● ● **A** **B** Estimate the **bearing** of B from A. **Ans** _____	
18 The volume of a cube is 216 000 cm^3. What is the length of its sides? **Ans** _____	
19 Maria needs to get an average of 65 marks or more on two tests. On her first test, Maria got 83. What is the least mark she needs to get on the second test? **Ans** _____	
20 What is the total weight in kilograms of 30 bags of rice each weighing 250g? **Ans** _____	

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2016 SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	I – Section B (Calculator Section)
DATE:	3rd September 2016
TIME:	1hr and 45 minutes

ANSWER ALL QUESTIONS

Write your answers in the space available on the examination paper.

Show clearly all the necessary steps, explanations and construction lines in your working.

Unless otherwise stated, diagrams are drawn to scale.

The use of non-programmable electronic calculators with statistical functions and mathematical instruments is allowed.

Candidates are allowed to use transparencies for drawing transformations.

This paper carries a total of 80 marks.

For Office Use Only												
Sec A	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**

1 **(i)** By rounding to the nearest whole number estimate the value of

$$\frac{\sqrt{6.13^2 + 27.81}}{8.23 - 3.65}$$

3 marks

(ii) Use your calculator to work out the value of $\frac{\sqrt{6.13^2 + 27.81}}{8.23 - 3.65}$ correct to three decimal places.

2 marks

(iii) Work out the difference between the values obtained in the previous two parts of this question.

1 mark

2 24 students were given an English test.
Their teacher marked the test and showed the results in this table.

(i) What is the range of the marks?

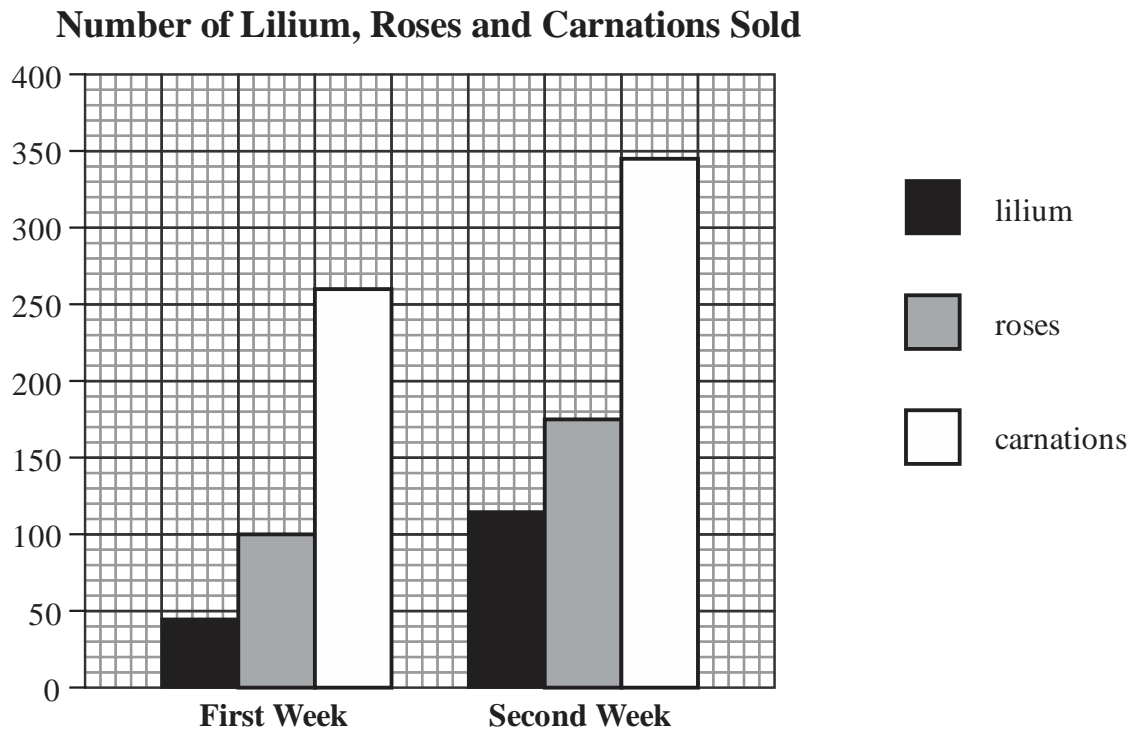| Mark	Frequency
4	2
5	3
6	8
7	6
8	4
9	1

1 mark

(ii) What is the mode of the marks?

1 mark

(iii) Work out the mean mark

3 marks

3 A florist keeps a record of the number of lilium, roses and carnations sold during two weeks. This bar chart shows how many of these three flowers were sold during each week.

Number of Lilium, Roses and Carnations Sold

(i) Use the Bar Chart to complete the table below.

	Number of Flowers Sold		
	Lilium	Roses	Carnations
First Week		100	
Second Week			

3 marks

(ii) Lilium flowers were sold at €1.50 each, roses at 95c each and carnations at 40c each. What was the income from sales for the two weeks?
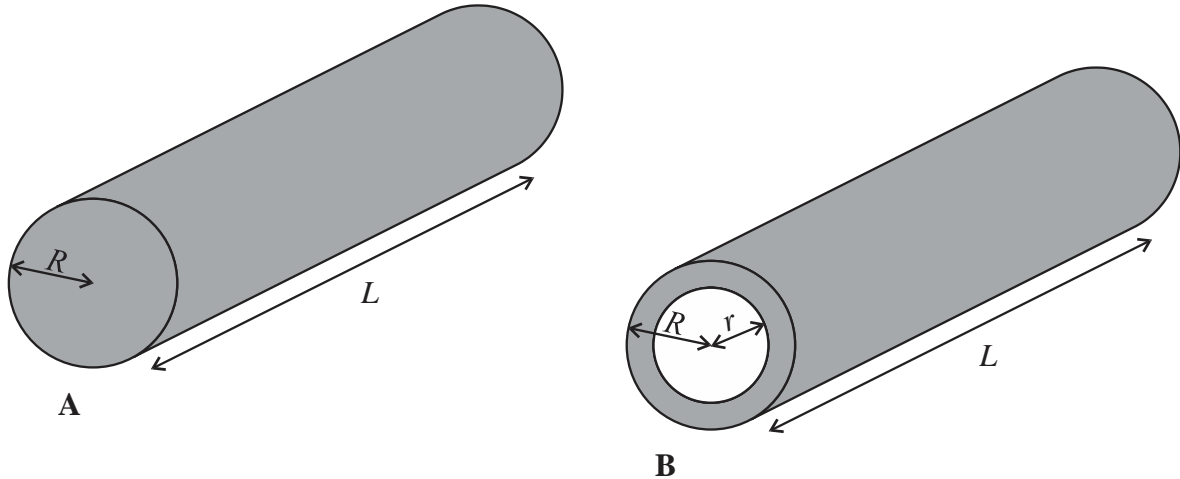
4 marks

4   In this question, use ruler and compasses only for your constructions.

   (i)   Construct a triangle ABC with AC = 10 cm and BC = 8 cm. The line AB has already
   been drawn for you.

A   B
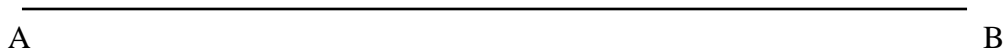
                                                                                      3 marks

   (ii)   Construct the perpendicular bisector of AB and the bisector of angle CAB.
   Name the point where these two lines meet as O.   **4 marks**

   (iii)   Draw a circle centre O and radius OC.   **1 mark**

   (iv)   The circle meets the line AB at points P and Q. Show these points on your diagram and
   measure the distance PQ.

                                                                                      1 mark

5   In this question A and B are metal cylinders as shown in the figure.
        A is a solid metal cylinder of radius R and length L.
        B is a hollow cylinder of length L with outer radius R and inner radius r.

A

B

(i)   Give an expression for the volume of metal in Cylinder A in terms of R and L.

1 mark

(ii) Give an expression for the volume of metal in the hollow Cylinder B in terms of r, R and L.

2 marks

The hollow cylinder B has inner radius of 4.7 cm, outer radius of 5 cm and length of 30 cm.

**(iii)** Find the volume of metal in this cylinder.

3 marks

(iv) This hollow cylinder is made of a metal which weighs 7.6 grams for each cubic centimetre of metal. Find the weight in kilograms of this hollow cylinder.

3 marks

6 In the diagram below, AD is parallel to BC, the base of triangle ABC.
BA is produced to E. The value of ∠BAC is taken to be y degrees.
AD bisects ∠CAE so that ∠CAD = ∠DAE = x degrees.

(i) Show that triangle ABC is an isosceles triangle.
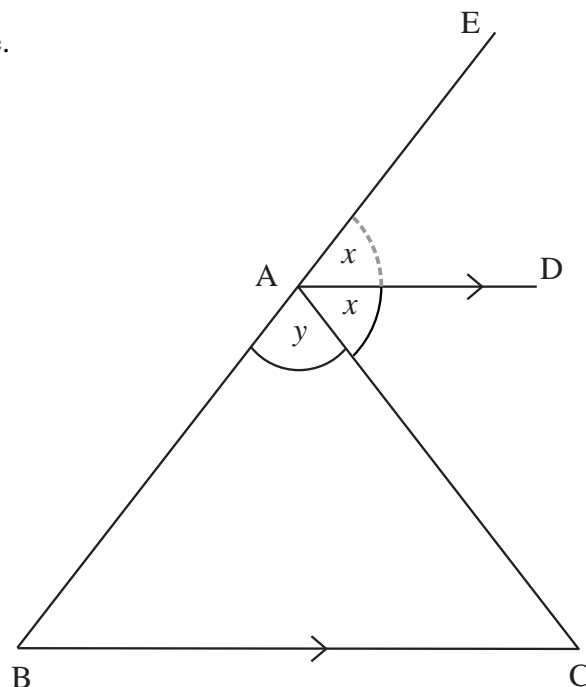
3 marks

(ii) **(a)** Write an equation that must be satisfied by x and y.

1 mark

(b) What value will x take if $y = 84°$?

1 mark

(c) Suggest another pair of values that x and y may take in the diagram above.

1 mark

7 A wall is to be decorated with a strip of tiles at each end. The diagram shows the design.
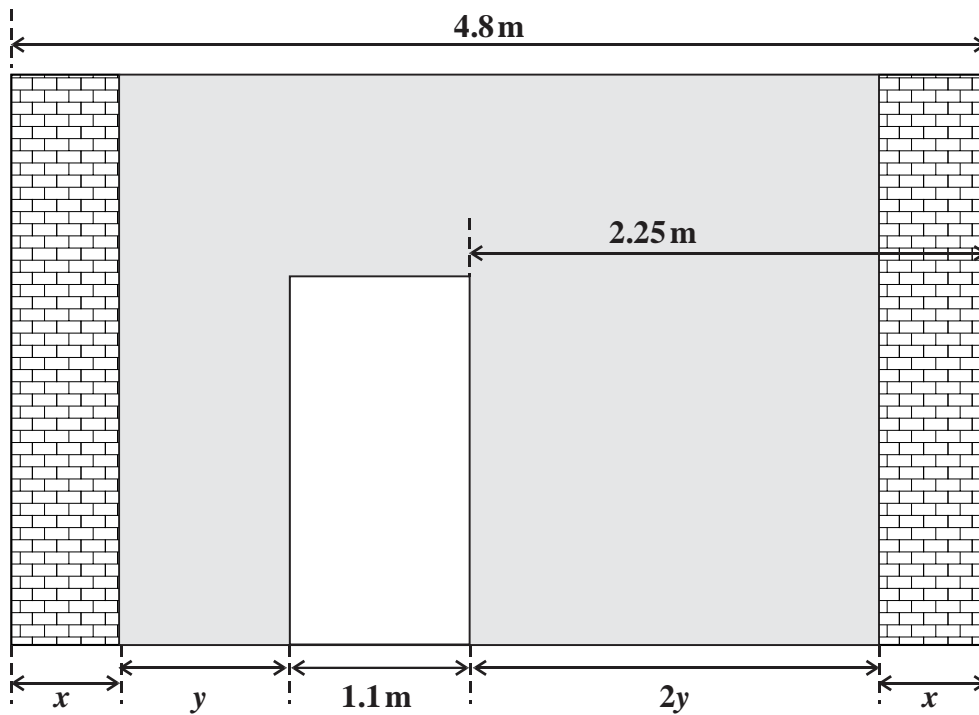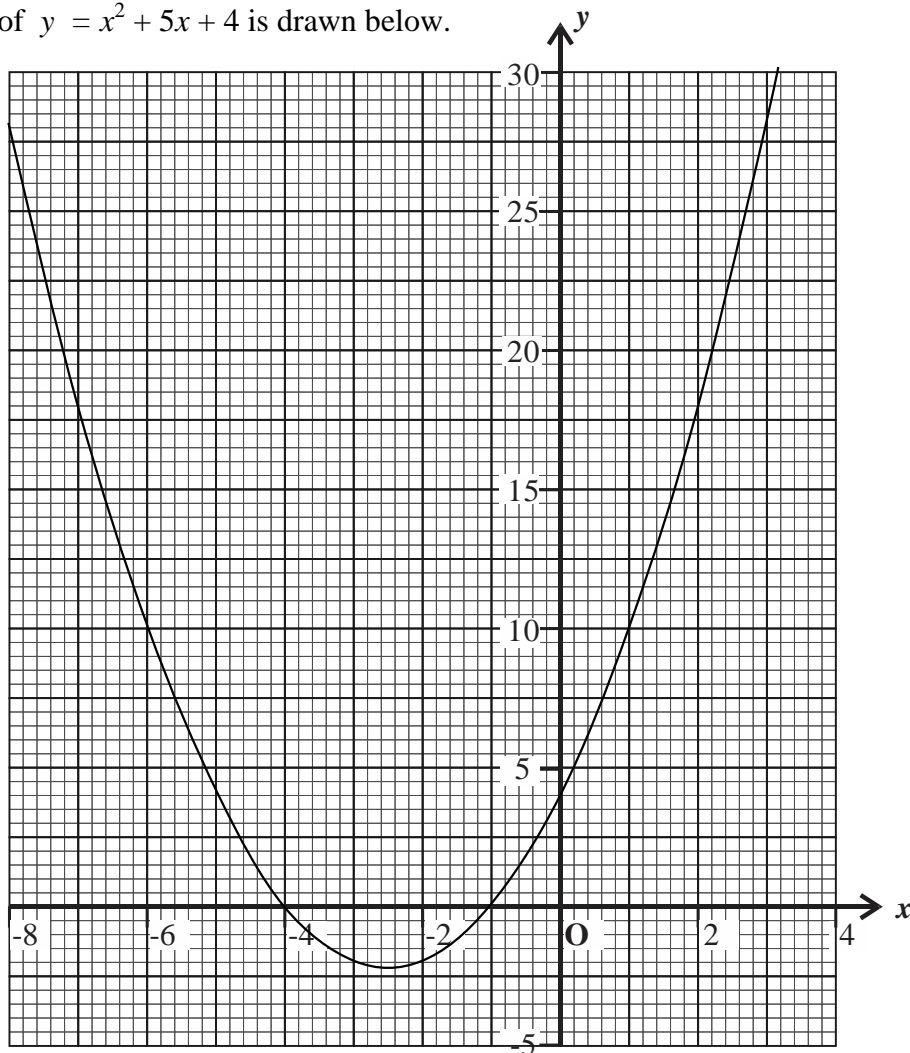

4.8 m

2.25 m

x y 1.1 m $2y$ x

Diagram not drawn to scale

Use the dimensions in the diagram to work out the values of x and y. Give your answers in centimetres.

6 marks

8   The graph of $y = x^2 + 5x + 4$ is drawn below.

(i)   Use the graph to find the value of x when $x^2 + 5x + 4$ takes the least value.

1 mark

(ii)   Use the graph to find the values of x when $x^2 + 5x + 4 = 10$.
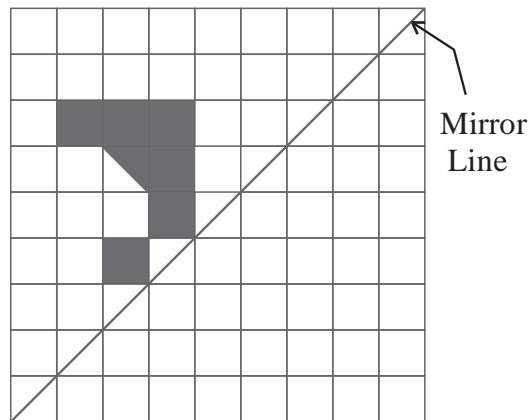
2 marks

(iii)   On the graph provided, draw a line with gradient 1 and passing through the point $(-5 , 0)$.

3 marks

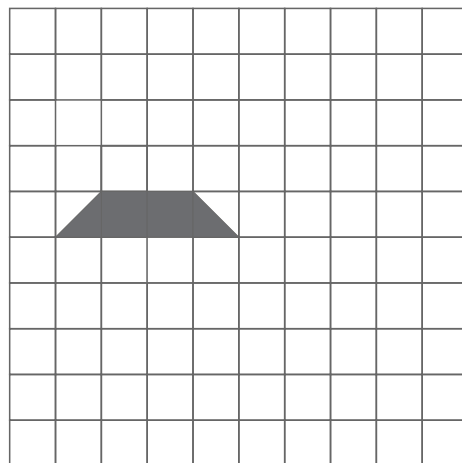(iv)   Determine the equation of the line described in part **(iii)** above.

2 marks

9 **(i)** Reflect the grey shape in the mirror line.

Mirror
Line

2 marks

(ii) Shade in some more squares and half squares so that the finished shaded shape has rotational symmetry of order 2.

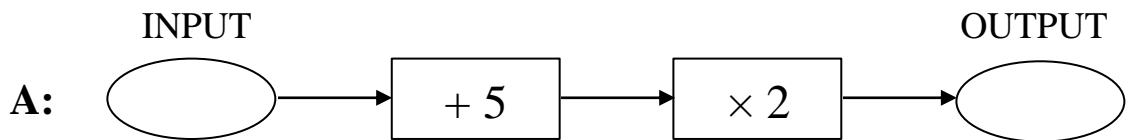**2 marks**

10 **(i)** Expand and simplify:

(a) $(x + 1) + (x - 1)$

(b) $5(x - 2) + (x - 8)$

(c) $5(2x + 3) - (x + 7)$

5 marks

(ii) Here is Number Machine **A**.

INPUT   OUTPUT

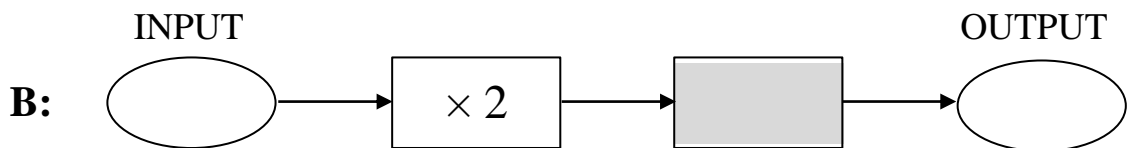**A:**   ( )   → $+5$ → $\times 2$ →   ( )

(a) Use Number Machine **A** to find the OUTPUT when the INPUT is 3.

1 mark

(b) Use Number Machine **A** to find the OUTPUT when the INPUT is x.

1 mark

(c) Number Machine **B** below has the same overall effect as the Number Machine **A**. Fill in the grey box below to complete Number Machine **B**.

INPUT   OUTPUT

B: ( )   → $\times 2$ →   [grey box]   →   ( )

3 marks

11 The diagram shows a **regular** pentagon ABCDE.
A circle centre O passes through all the vertices
of the pentagon.

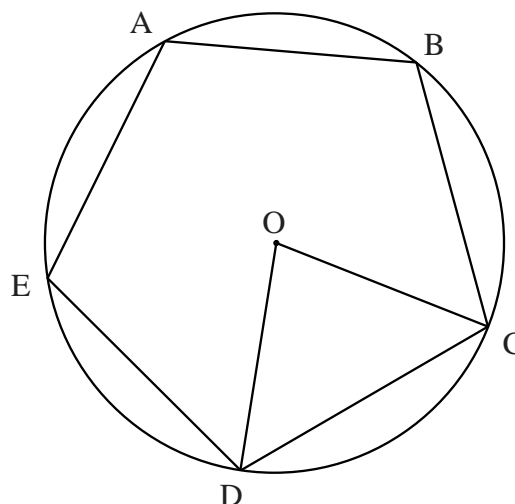**(i)** Work out the size of ∠ABC.

Diagram not drawn to scale

3 marks

(ii) Why is triangle OCD isosceles?

1 mark

(iii) Explain why OD bisects ∠EDC.

2 marks

(iv) If the radius of the circle OC is 10 m long, work out the length of a side of the pentagon.

4 marks

Page 12 of 12

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SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2016 SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	IIB
DATE:	3rd September 2016
TIME:	4:00 p.m. to 6:05 p.m.

ANSWER ALL QUESTIONS

Write your answers in the space available on the examination paper.

Show clearly all the necessary steps, explanations and construction lines in your working.

Unless otherwise stated, diagrams are drawn to scale.

The use of non-programmable electronic calculators with statistical functions and mathematical instruments is allowed.

Candidates are allowed to use transparencies for drawing transformations.

This paper carries a total of 100 marks.

For Office Use Only										
Question No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Mark										

Question No	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
Mark									

	Total Mark	

1 Complete the following statements:

(i) 700 millilitres is the same as _____ litres.

(ii) The time interval of 2½ hours is the same as _____ minutes.

(iii) The weight of 3440 grams correct to the nearest kilogram is written as _____ kg.

(iv) When expressed as a fraction in its simplest form, 0.8 is written as _____ .

(v) When written in standard form 0.0053 is written as _____ .

(vi) An example of a fraction bigger than a third and smaller than a half is _____ .

(vii) The prime number between 20 and 27 is _____ .

7 marks

2 The table below shows the temperature on five successive days taken at noon at a particular place in Vienna.

	Temperature
Monday	−3°C
Tuesday	−5°C
Wednesday	−4°C
Thursday	−7°C
Friday	−8°C

(i) On which day was the least temperature recorded?

1 mark

(ii) On which day was the highest temperature recorded?

1 mark

(iii) What is the mean temperature over the five days?

2 marks

3 In a game, players roll two dice together; one black and one white.
They obtain the **total score** by adding the numbers shown
on the two dice.

(i) Complete the possibility space for the **total score**.

		Score on White Dice					
	+	**1**	**2**	**3**	**4**	**5**	**6**
Score on Black Dice	**1**	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5				
	4	5	6				
	5	6	7				
	6	7	8				

2 marks

(ii) Which total score is most likely?

1 mark

(iii) Which two total scores are less likely than any other score?

2 marks

(iv) Work out the probability of obtaining a total score of 8.

2 marks

4 William would like to buy 26 pens of a particular make from a shop.
The pens can be bought individually at €2.50 each pen.
They can also be bought in packs of 6 for €13.50 per pack.
What is the smallest amount that William will pay to get 26 pens from this shop?

4 marks

5 Solve the equations below:

(i) $\dfrac{a}{3} = 8$

1 mark

(ii) $b^2 = 49$

2 marks

(iii) $\dfrac{c}{5} + 4 = 12 - \dfrac{c}{5}$

3 marks

6 Use your calculator to work out $9^3 - 6.4^3$. Give your answer correct to one decimal place.

2 marks

7   A dress maker listed the following costs for making a dress:

   3.5 m of material costing €5.20 per metre

   4 m of lining costing €2.30 per metre

   6 buttons costing 85 cents each

   3 hours of labour costing €6.50 per hour

Find the total cost of making the dress.

4 marks

8   Work out the length of the unknown side of the right angled triangle shown in the diagram.
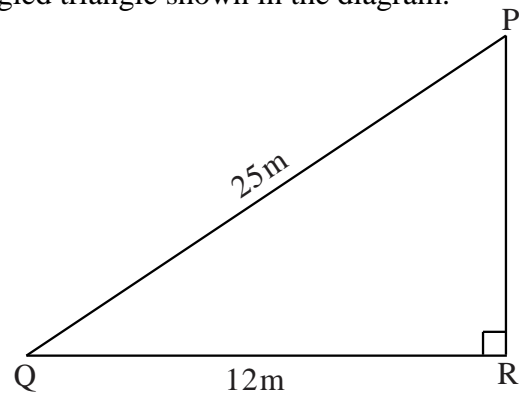

Diagram not drawn to scale

4 marks

9   A car is travelling at a speed of 72 km per hour. Express this speed in metres per second.

3 marks

10   A plan of a Sports Complex is being drawn to a scale of **1:250.**

(i)   The Sports Complex is to include a football pitch measuring 105 m by 68 m.
Work out the length of the sides of the rectangle which represents this football pitch on the plan. **Give your answers correct to the nearest millimetre.**

4 marks

(ii)   A swimming pool is shown on the plan as a rectangle 11 cm long by 9 cm wide.

Work out the area of the actual swimming pool. **Give your answer in square metres correct to one decimal place.**

4 marks

11   The line XY is a tangent to the circle centre O.

Work out the size of the angles marked *a*, *b* and *c.*
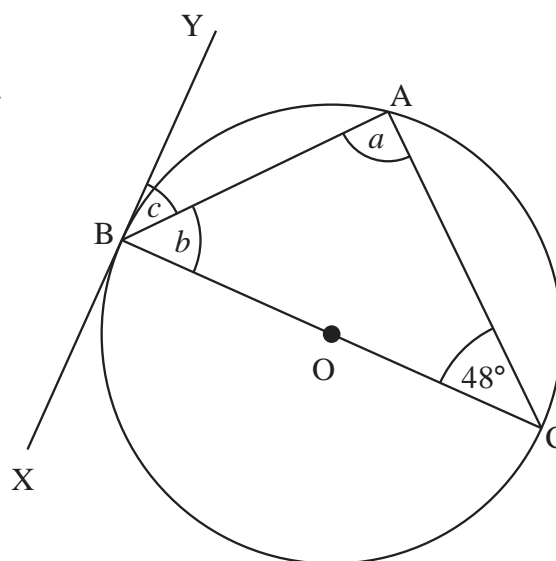
Give reasons for your answers.

Diagram not drawn to scale

6 marks

---

12   A wheel has a diameter of 0.6m.
   (a)   Work out its circumference.

2 marks

   (b)   How many complete turns does the wheel make when it travels a distance of 1 km?
        Show your working clearly.

4 marks

13 The table shows the population of Malta taken at 5-year intervals between 1995 and 2015. Each population figure was taken at the beginning of the corresponding year.

Year	Population of Malta
1995	370 767
2000	385 922
2005	395 940
2010	410 770
2015	418 197

(i) Write the population in 1995 correct to the nearest thousand.

1 mark

(ii) Write the population in 2000 as a number in standard form.

1 mark

(iii) By how much did the population increase between 1995 and 2015?

1 mark

(iv) What is the average yearly increase in the population between 1995 and 2015?

3 marks

(v) What is the percentage increase in the population from 1995 to 2015? Give your answer to 1 decimal place.

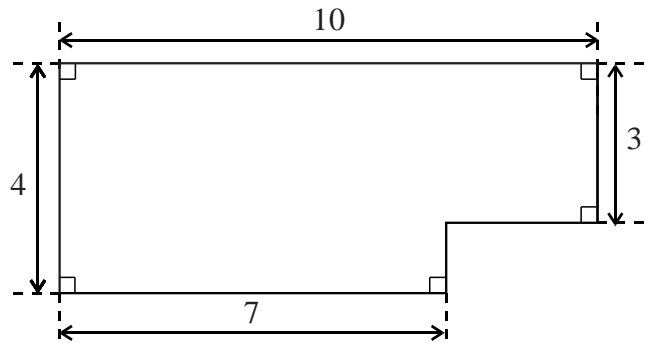**2 marks**

14 Work out:

(i) the perimeter of the shape.

Diagram not drawn to scale

2 marks

(ii) the area of the shape.

2 marks

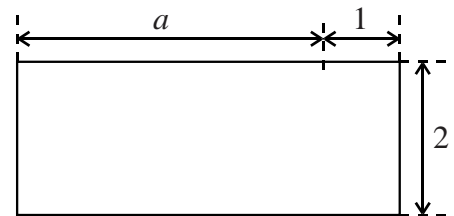**15** Work out:

(i) the perimeter of this rectangle in terms of a.

Diagram not drawn to scale

1 mark

(ii) the area of this rectangle in terms of a.

1 mark

16 **(i)** Franca bought a new car for €15 000 in January 2014.
After one year her car depreciated by 20%.
What was the value of her car in January 2015?

3 marks

(ii) By the end of 2015, Franca's car depreciated by another 20% of its value at the beginning of the year. Franca thinks that her car has depreciated by 40% over two years. Is she correct? Show your working to explain your reasoning.

5 marks

17 Sandra cuts the rectangular Shape A along the curve drawn on it. She rearranges the pieces to obtain Shape B.
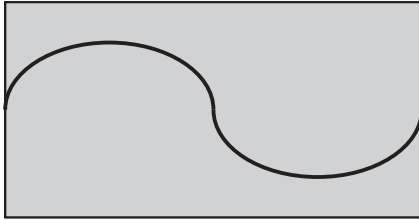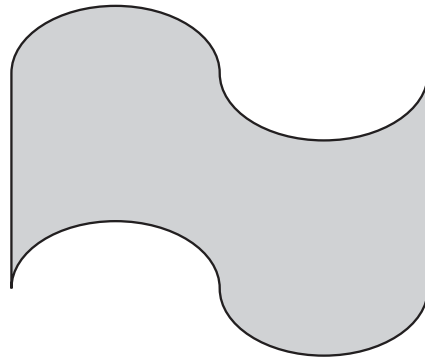
Shape A   Shape B

(i) Does Shape B have the same perimeter as Shape A? Explain your reasoning.

2 marks

(ii) Does Shape B have the same area as Shape A? Explain your reasoning.

2 marks

18 The two triangles in the figure below are similar.
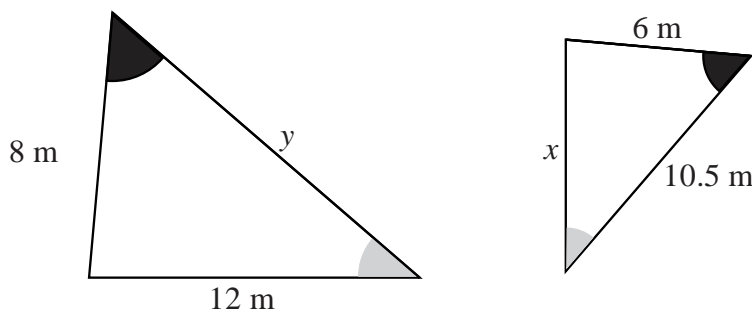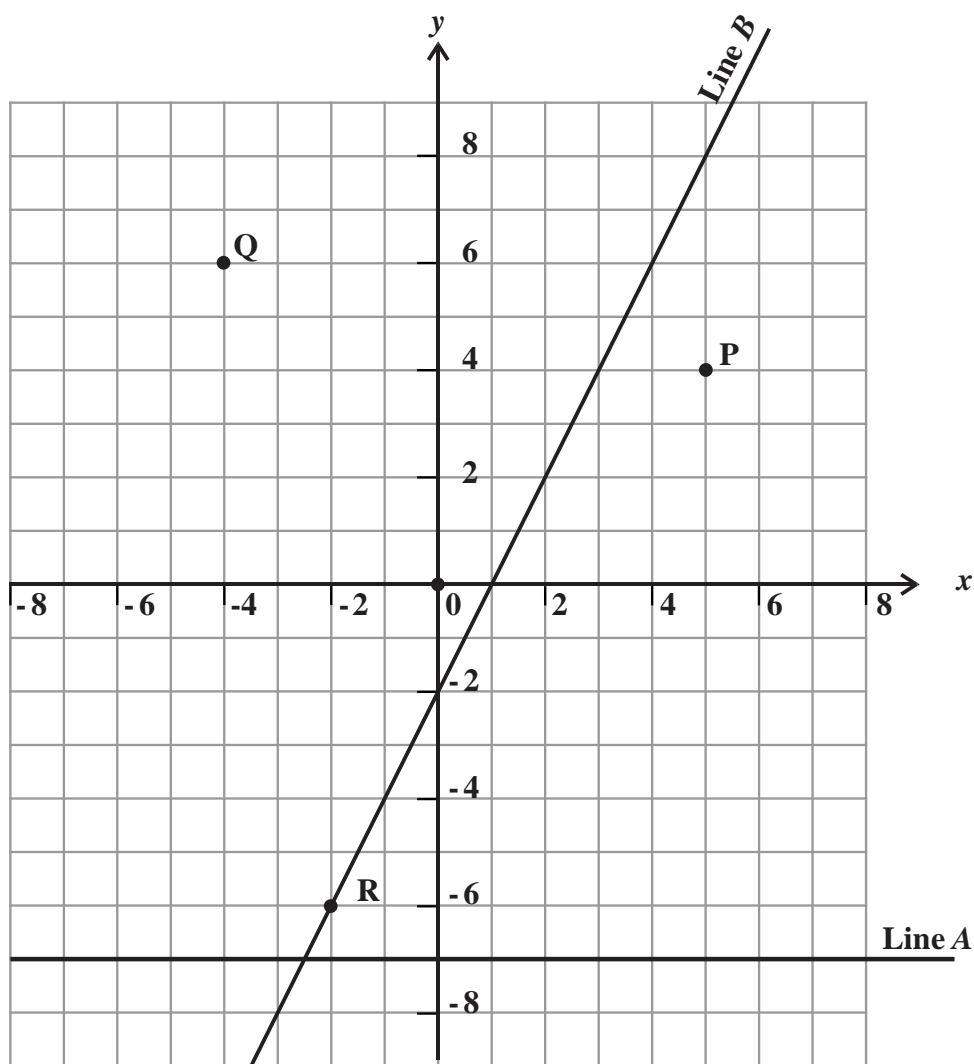
6 m

8 m

y

x

10.5 m

12 m

Diagram not drawn to scale

Use the dimensions in the figure to find the lengths of the sides marked x and y.

6 marks

19

Use the graph above to answer the following:

(i) Write down the coordinates of the points **P**, **Q** and **R**.

3 marks

(ii) What is the equation of **Line** *A*?

1 mark

(iii) What is the equation of **Line** *B*?

3 marks