



**L-Università  
ta' Malta**

MATRICULATION AND SECONDARY EDUCATION  
CERTIFICATE EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL  
2018 MAIN SESSION**

SUBJECT: **Mathematics**  
DATE: 5<sup>th</sup> May 2018

PAPER: I – Section A (Non-Calculator Section)  
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 A restaurant bill amounts to €196.28. The bill is divided equally among seven people. How much does each pay?

**Ans** \_\_\_\_\_

- 2 Calculate:

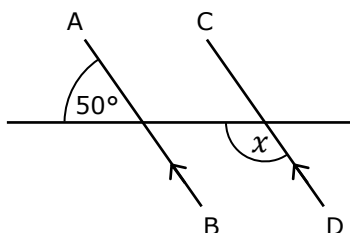
$$1\frac{1}{3} + \frac{5}{12} + \frac{1}{6}$$

**Ans** \_\_\_\_\_

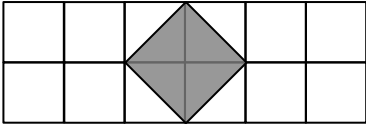
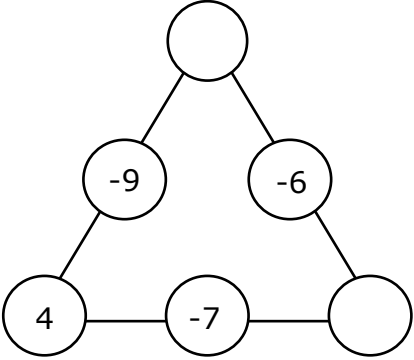
- 3 A film starts at 20:35.  
The film finishes in two hours forty minutes.  
At what time does the film end?

**Ans** \_\_\_\_\_

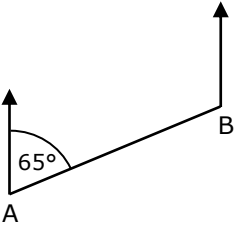
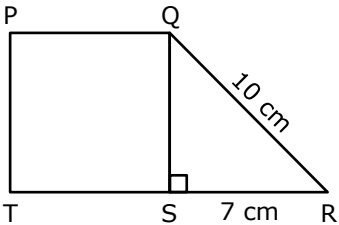
- 4 AB and CD are two parallel lines.  
Find the size of the angle marked  $x$ .



**Ans** \_\_\_\_\_

<p style="text-align: center;"><b>QUESTIONS AND ANSWERS</b> <b>ALL QUESTIONS CARRY ONE MARK</b></p>	<p style="text-align: center;"><b>SPACE FOR ROUGH WORK</b> <b>(IF NECESSARY)</b></p>
<p>5 What fraction of the shape is shaded?</p>  <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>6 Convert 600 Czech Koruna to Euro, given that 1 Euro = 25 Czech Koruna.</p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>7 Solve for <math>x</math> :</p> $5(x - 3) = 35$ <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>8 A bag contains six yellow counters, eight green counters and ten orange counters. Find the probability that a colour picked at random from the bag is <b>not</b> orange.</p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>9 Calculate the size of the angle between the hour hand and the minute hand of a clock at 2 p.m.</p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>10 The numbers along each of the three sides of the triangle add up to <math>-2</math>. Fill in the missing numbers.</p> 	

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (If Necessary)
<p>11 Find the median of the following set of numbers:</p> <p style="text-align: center;">15 19 8 22 10 23 16</p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>12 Find the value of:</p> <p style="text-align: center;"><math>5^0 \times 5^3</math></p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>13 Which <b>ONE</b> of the following statements is correct?</p> <p><b>A.</b> An even number cannot be a prime number.  <b>B.</b> The LCM of 9 and 12 is 36.  <b>C.</b> <math>-5</math> is greater than <math>-1</math>.</p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>14 Calculate the value of:</p> $\frac{1+2+3+4+5}{1 \times 2 \times 3 \times 4 \times 5} + \frac{7}{8}$ <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>15 By rounding each of these numbers to the nearest whole number, estimate the value of:</p> $\frac{116.27 - 16.09}{1.92}$ <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>16 One of the exterior angles of an irregular polygon is <math>40^\circ</math>. What is the sum of the remaining exterior angles of the polygon?</p> <p style="text-align: right;"><b>Ans</b> _____</p>	

<p style="text-align: center;"><b>QUESTIONS AND ANSWERS</b> <b>ALL QUESTIONS CARRY ONE MARK</b></p>	<p style="text-align: center;"><b>SPACE FOR ROUGH WORK</b> <b>(IF NECESSARY)</b></p>
<p>17 Work out the bearing of A from B.</p>  <p style="text-align: center;"><i>Diagram not drawn to scale</i></p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>18 The range of the following set of numbers is 10.</p> <p style="text-align: center;">12   <math>x</math>   14   21   15</p> <p>Suggest a value for <math>x</math>.</p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>19 PQST is a square. TSR is a straight line. Find the area of square PQST.</p>  <p style="text-align: center;"><i>Diagram not drawn to scale</i></p> <p style="text-align: right;"><b>Ans</b> _____</p>	
<p>20 Six female and four male students are attending a course. The average age of the female students is 20 years. The average age of the male students is 25 years. Calculate the average age of the 10 students.</p> <p style="text-align: right;"><b>Ans</b> _____</p>	



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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE  
EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL  
2018 MAIN SESSION**

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SUBJECT: **Mathematics**  
 PAPER NUMBER: I – Section B (Calculator Section)  
 DATE: 5<sup>th</sup> May 2018  
 TIME: 1hr and 45 minutes

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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.

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Sec A	1	2	3	4	5	6	7	8	9	10	11	Total

- 
- 1 (a) Work out:  $(17 + 3) \div (8 - 3)$  (1)
- (b) Express  $2\frac{3}{4}$  hours in minutes. (2)
- (c) Change 50 km per hour to metre per second, giving your answer correct to 1 decimal place. (3)

**(Total: 6 marks)**

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- 2 (a) Expand and simplify:  $8(x - 1) - 2(3x + 5)$  (2)
- (b) Factorise completely:  $15y^2 + 3y^3$  (2)
- (c) Write as a single fraction in its simplest form:  
$$\frac{3x - 1}{6} - \frac{x - 2}{2}$$
- (d) Solve:  $2^x = 2^3 + 2^3$  (3)

**(Total: 10 marks)**

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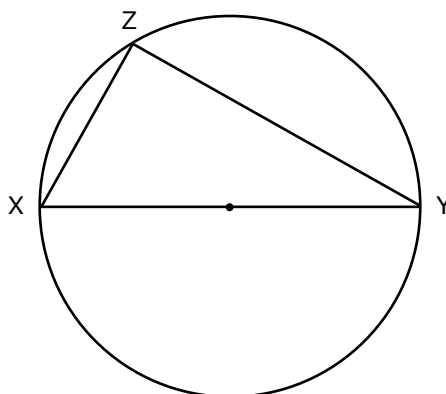
- 3 The table below gives the population of the world by region in the year 2010 and in 2016.

Region	Population in 2010	Population in 2016
Africa	$8.14 \times 10^8$	$1.23 \times 10^9$
America	$8.41 \times 10^8$	$9.98 \times 10^8$
Antarctica	$1.20 \times 10^3$	$1.11 \times 10^3$
Asia	$3.71 \times 10^9$	$4.46 \times 10^9$
Europe	$7.35 \times 10^8$	$7.41 \times 10^8$
Oceania	$3.11 \times 10^7$	$4.01 \times 10^7$

- (a) Which region had the highest population in the year 2010? (1)
- (b) Which regions showed an increase in population from 2010 to 2016? (2)
- (c) Work out the percentage change in the population of Africa from 2010 to 2016. (2)
- (d) The six regions in the table cover the whole world.  
Work out the world population in 2016. Give your answer in standard form. (2)

**(Total: 7 marks)**

- 4 The diameter,  $XY$ , of a circle is 40 cm long.  
Z is a point on the circumference such that  $\angle ZXY$  is twice  $\angle ZYX$ .



*Diagram not drawn to scale*

- (a) Show that  $\angle ZYX = 30^\circ$ .

- (b) Calculate the length of  $XZ$ .

(3)

- (c) Calculate the length of  $YZ$ .

(3)

(3)

**(Total: 9 marks)**



- 
- 5 ABC is an isosceles triangle. One of its angles is  $32^\circ$ . Mark states that each of the other two angles is always  $74^\circ$ . Is Mark correct? Explain.

**(Total: 3 marks)**

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- 6 Tax is calculated on the gross income as follows:

first €9000	tax free
next €5500	15%
next €40 000	25%

- (a) Karen earns €12 500 gross per year. Work out the amount of tax she has to pay.

(3)

- (b) Chris pays €935 in tax. Calculate his gross income.

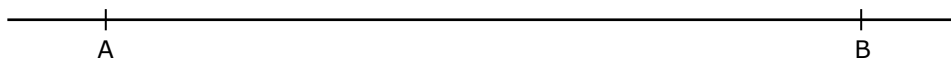
(4)

**(Total: 7 marks)**

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- 7 Use ruler and compasses only in this question.  
Do **not** rub off any construction lines or arcs.

(a) On the line AB, given below, construct  $\angle CAB = 60^\circ$  with line AC = 10 cm.



(3)

(b) Using B as centre and radius 9.5 cm, draw an arc to cut AC at D and E. Measure DE.

(2)

(c) Bisect  $\angle DBE$  and let this bisector cut DE at F. Measure BF and  $\angle EBF$ .

(3)

**(Total: 8 marks)**

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- 8 The interior angles, in degrees, of a cyclic quadrilateral ABCD are such that:  
 $\angle DAB = x + y + 18$ ,  $\angle ABC = 2x + 10$ ,  $\angle BCD = y + 2$  and  $\angle CDA = 3x + y$ .

(a) Show that  $x + 2y = 160$  and  $2x + y = 110$

(4)

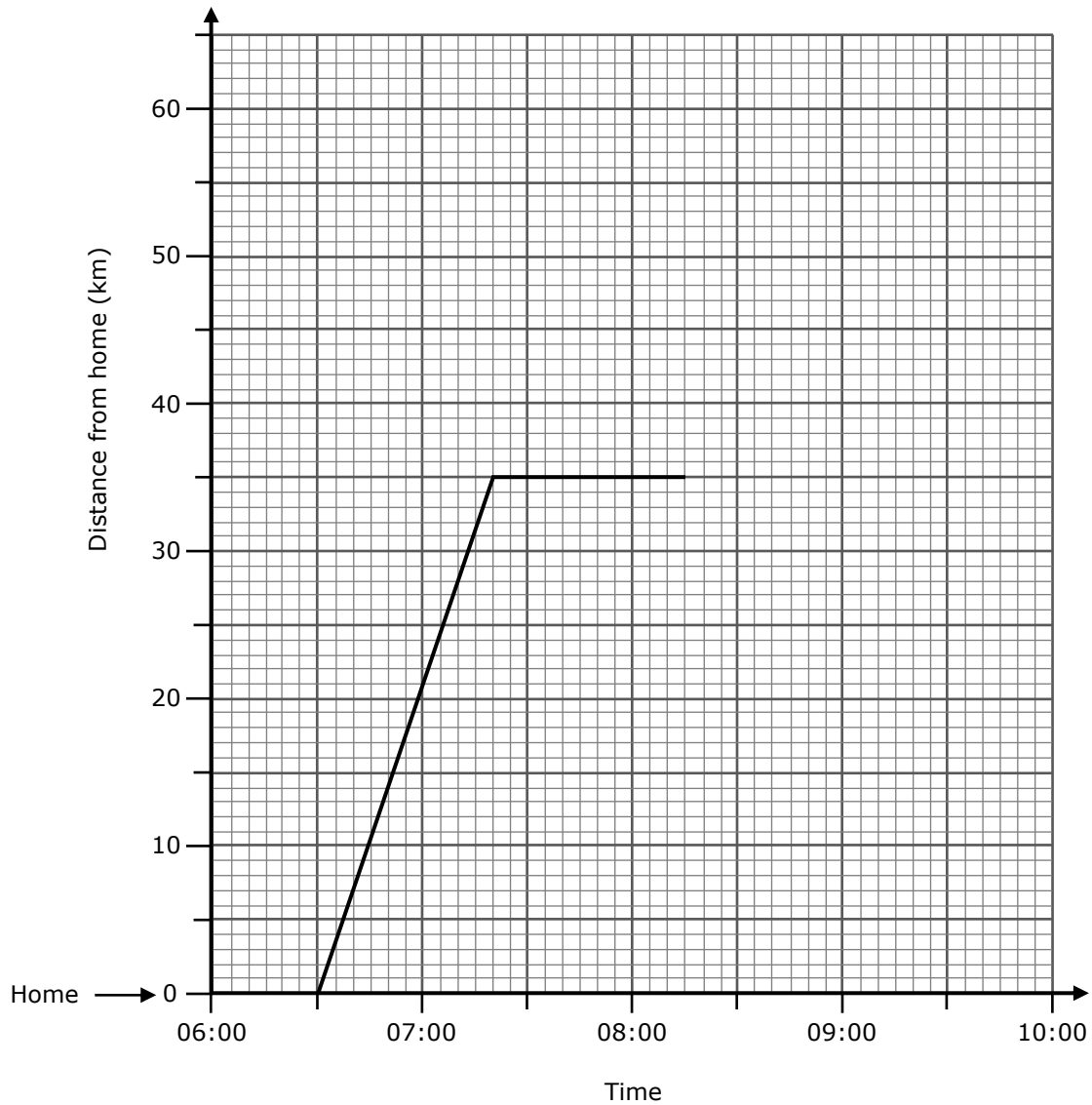
- (b) By solving the equations in part (a), or otherwise, find the values of  $x$  and  $y$ .

(4)

**(Total: 8 marks)**

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- 9 Last Saturday, Oliver travelled from his home in Malta to Wied il-Mielaħ in Gozo. He left his home in Birzebbuga at 06:30 and drove 35 km to Ċirkewwa where he waited for the 08:15 Gozo Ferry. The distance-time graph below shows this first part of his journey.



- (a) Use the distance-time graph to answer the following:
- (i) At what time did Oliver arrive at Ċirkewwa? (1)
  - (ii) For how long did Oliver wait in Ċirkewwa for the Gozo Ferry? (2)

- (b) The ferry left on time and sailed 6 km to Mġarr at constant speed, arriving at 08:50. On the distance-time graph, continue the graph that represents the ferry journey.

(1)

- (c) Oliver waited 10 minutes to get off the ferry. He then drove for 30 minutes at an average speed of 26 km/h to Wied il-Mielaħ. Complete the distance-time graph for his journey.

(3)

- (d) How many kilometres did he travel altogether from Birzebbuga to Wied il-Mielaħ?

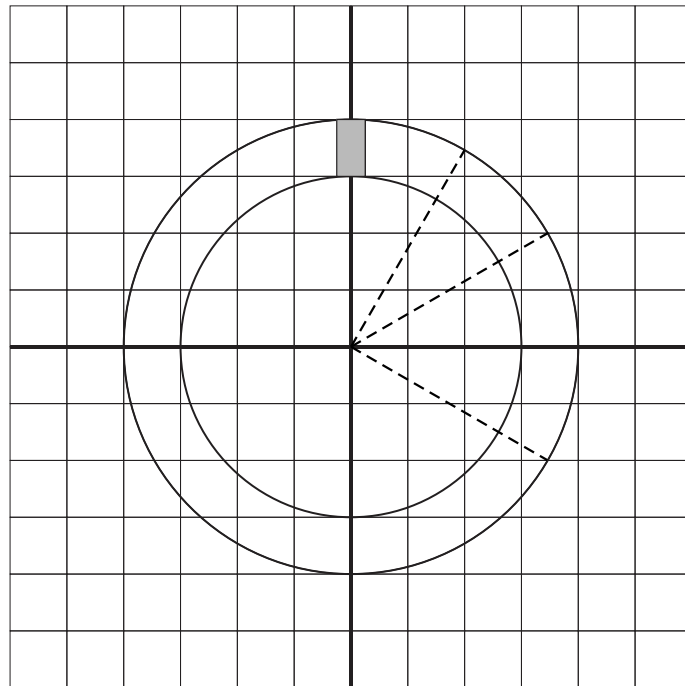
(1)

**(Total: 8 marks)**

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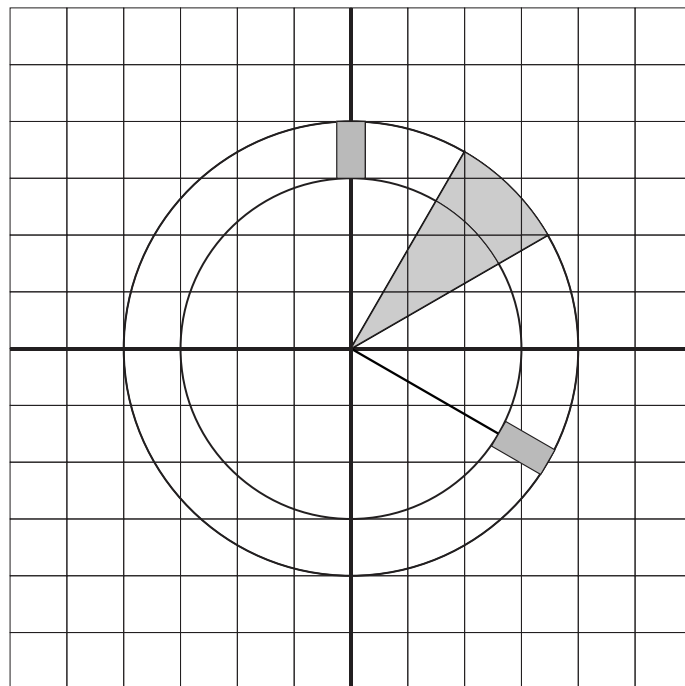
***Please turn the page.***

- 10 (a) Complete the design so that it has **ONE** line of reflective symmetry. Indicate clearly your line of reflective symmetry.



(2)

- (b) Complete the design so that it has rotational symmetry of order 3.



(2)

**(Total: 4 marks)**

11 The members of a youth club come from Attard, Balzan, Mosta and Lija.

40% of all members of the club come from Mosta.

$\frac{1}{5}$  of all members of the club come from Balzan.

There are more members from Attard than from Lija; the difference being 20% of all members of the club.

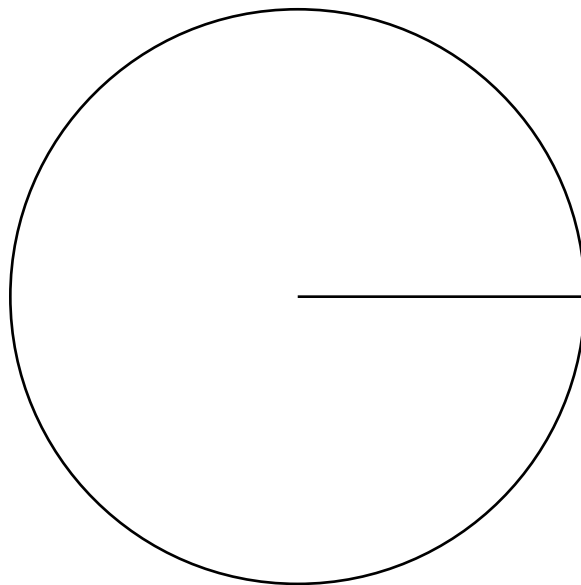
(a) What is the probability that a youth selected at random does **not** come from Mosta?

(2)

(b) Calculate the percentage of all members of the youth club, coming from Lija.

(4)

(c) Use the circle below to draw a pie-chart to illustrate this information.



(4)

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**(Total: 10 marks)**

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EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL  
2018 MAIN SESSION**

SUBJECT:	<b>Mathematics</b>
PAPER NUMBER:	IIA
DATE:	5 <sup>th</sup> May 2018
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.

### Table of formulae

Area of triangle	$\frac{1}{2} ab \sin C$
Curved Surface Area of Right Circular Cone	$\pi r l$
Surface Area of a Sphere	$4\pi r^2$
Volume of a Pyramid / Right Circular Cone	$\frac{1}{3}$ base area $\times$ perpendicular height
Volume of a Sphere	$\frac{4}{3} \pi r^3$
Solutions of the equation $ax^2 + bx + c = 0$	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Sine Formula	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
Cosine Formula	$a^2 = b^2 + c^2 - 2bc \cos A$

### For Office Use Only

1	2	3	4	5	6	7	8	9	10	11	Total

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1 (a) Calculate  $0.01^{-\frac{3}{2}}$

(1)

(b) Find the value of  $n$  in the equation  $3^{2n-1} = 81$

(2)

(c) (i) Lisa invests €10 000 at 2.4% per annum compound interest for a period of 5 years. Calculate the value of the investment, to the nearest euro, at the end of the 5 year term.

(3)

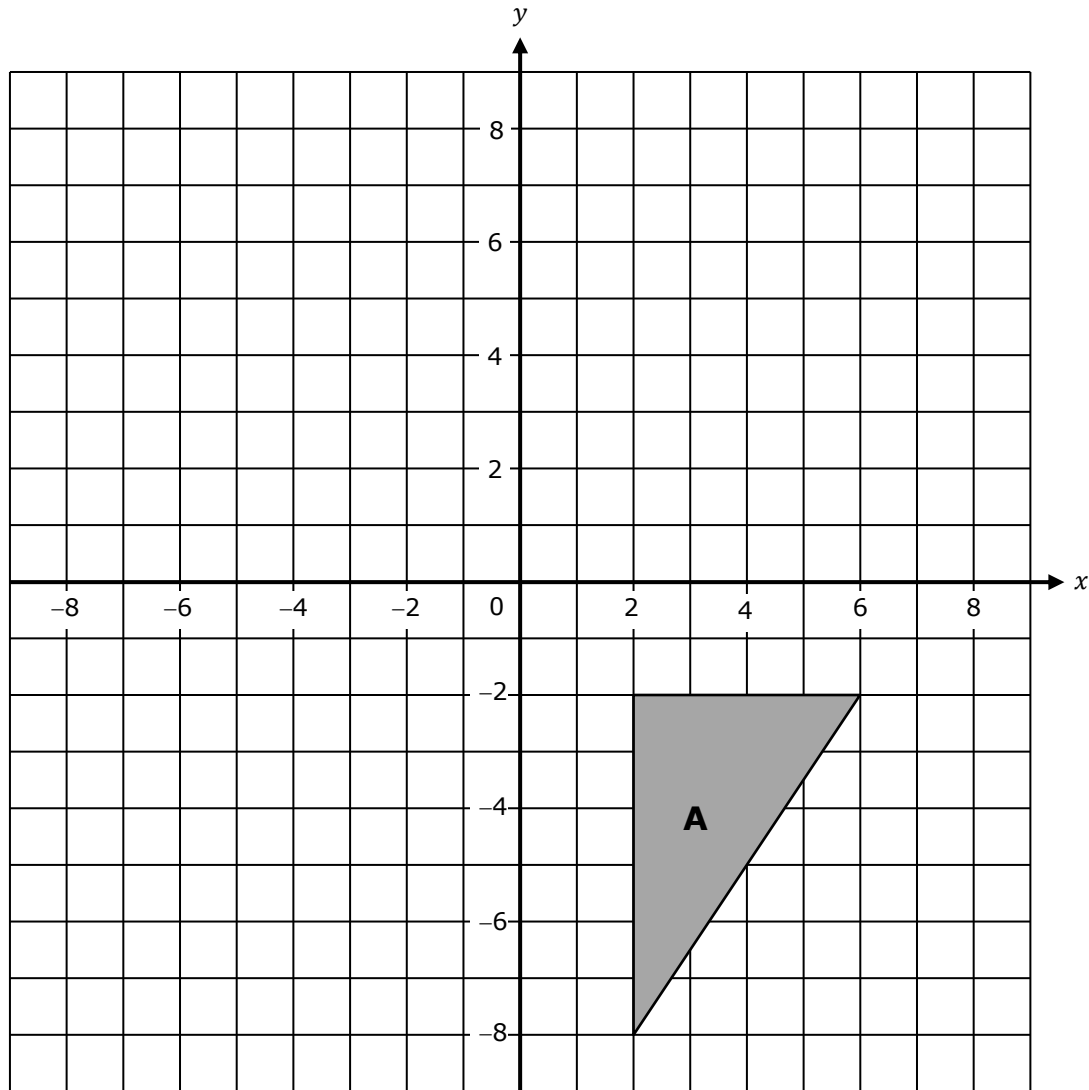
(ii) Calculate the sum of money that Lisa has to invest at 2.4% simple interest for 5 years, in order to gain the same interest as in part (i). Give your answer correct to the nearest 100 euro.

(3)

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**(Total: 9 marks)**

2



- (a) Reflect Shape A in the  $y$ -axis to produce Shape B. (2)
- (b) Reflect Shape B in the line  $y = -x$  to produce Shape C. (2)
- (c) Describe the transformation that maps Shape A directly to Shape C. (2)
- (d) Enlarge Shape A by  $-\frac{1}{2}$  about  $(0, 0)$  to produce Shape D. (2)

**(Total: 8 marks)**

3 (a) Solve the inequality  $\frac{5x - 1}{2} \geq 7$

(2)

(b) Make  $x$  subject of the formula in the equation  $y = \frac{4 - 6x}{x - 1}$

(3)

(c) Write  $\frac{2}{(a + 2)} + \frac{14}{(2a - 3)(a + 2)}$  as a single fraction in its simplest form.

(4)

- (d)  $y$  is directly proportional to the cube of  $x$ .  
If  $y = 5$  when  $x = 2$ , find  $x$  when  $y = 40$ .

(4)

**(Total: 13 marks)**

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- 4 A pump takes 45 minutes (to the nearest minute) to fill a 250 litre (to the nearest 10 litres) water tank.

- (a) Find the upper bound and the lower bound for the time taken to fill the tank completely.

(2)

- (b) Find the upper bound and the lower bound for the volume of water in the tank.

(2)

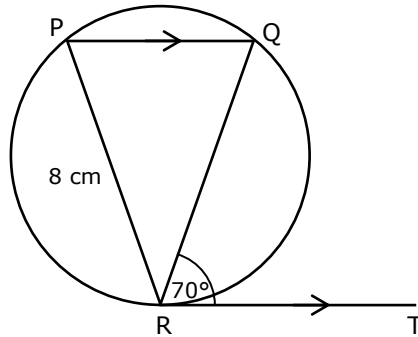
- (c) Find the lower bound for the rate, in litres per minute, at which the pump is working. Give your answer correct to three significant figures.

(3)

**(Total: 7 marks)**

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- 5 P, Q and R are three points on the circumference of a circle.  
 RT is a tangent to the circle and is parallel to PQ.  
 PR is 8 cm long and  $\angle QRT = 70^\circ$ .



*Diagram not drawn to scale*

- (a) Explain why  $\angle RPQ = 70^\circ$ .

(1)

- (b) Calculate the size of  $\angle PRQ$ , giving reasons for your answer.

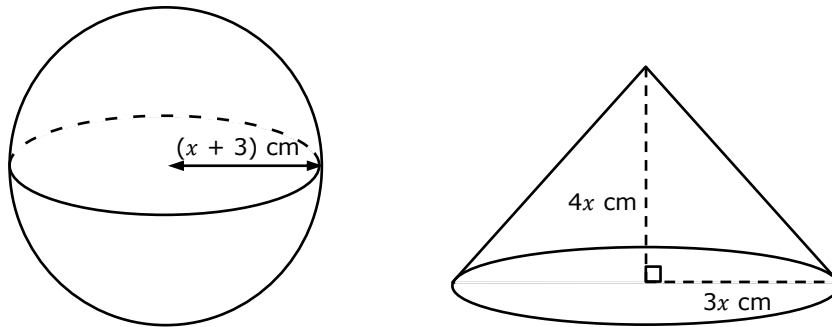
(4)

- (c) Calculate the length of PQ.

(3)

**(Total: 8 marks)**

- 6 The diagrams below show a solid sphere and a solid right circular cone. The sphere has a radius  $(x + 3)$  cm. The cone has base radius  $3x$  cm and height  $4x$  cm.



*Diagrams not drawn to scale*

- (a) Find an expression in terms of  $x$  and  $\pi$  for the surface area of the sphere.

(1)

- (b) Show that the total surface area of the cone is  $24\pi x^2$  cm<sup>2</sup>.

(4)

The surface area of the sphere is equal to the total surface area of the cone.

- (c) Form an equation in  $x$  and solve it to find the value of  $x$ .  
Give your answer correct to 2 places of decimal.

(4)

**(Total: 9 marks)**

7 (a) The table below shows the first five terms of Sequence A.

(i) Complete the table.

<b>Sequence A</b>		
1 <sup>st</sup> term	1	= 1
2 <sup>nd</sup> term	1 + 2	= 3
3 <sup>rd</sup> term	1 + 2 + 3	=
4 <sup>th</sup> term	1 + 2 + 3 + 4	=
5 <sup>th</sup> term		=

(2)

Each term of Sequence A can also be worked out using the formula

$$n^{\text{th}} \text{ term} = \frac{1}{2}n(n + 1)$$

(ii) Use this formula to check the answer obtained for the 5<sup>th</sup> term in the table above.

(2)

(iii) Which term is equal to 120?

(3)



- (b) The table below shows the first five terms of Sequence B. Complete the table.

Sequence B		
1 <sup>st</sup> term	$1^3$	= 1
2 <sup>nd</sup> term	$1^3 + 2^3$	=
3 <sup>rd</sup> term	$1^3 + 2^3 + 3^3$	=
4 <sup>th</sup> term	$1^3 + 2^3 + 3^3 + 4^3$	=
5 <sup>th</sup> term		=

- (c) By comparing the terms in the two sequences, write down the formula for the  $n^{\text{th}}$  term of Sequence B. (2)

(2)

**(Total: 11 marks)**

***Please turn the page.***

- 8 (a) Complete the following table of values for the equation  $y = \frac{6}{x}$ .

$x$	-8	-6	-4	-3	-2	-1	$-\frac{1}{2}$	$\frac{1}{2}$	1	2	3	4	6	8
$y$	-0.75			-2		-6				3		1.5	1	

(2)

- (b) Plot the graph of  $y = \frac{6}{x}$  for the given values of  $x$  between -8 and 8.

(3)

- (c) What do you notice about the value of  $y$  as the value of  $x$  gets close to zero?

(1)

- (d) Using the same axes, plot the graph of  $2y = x - 2$ .

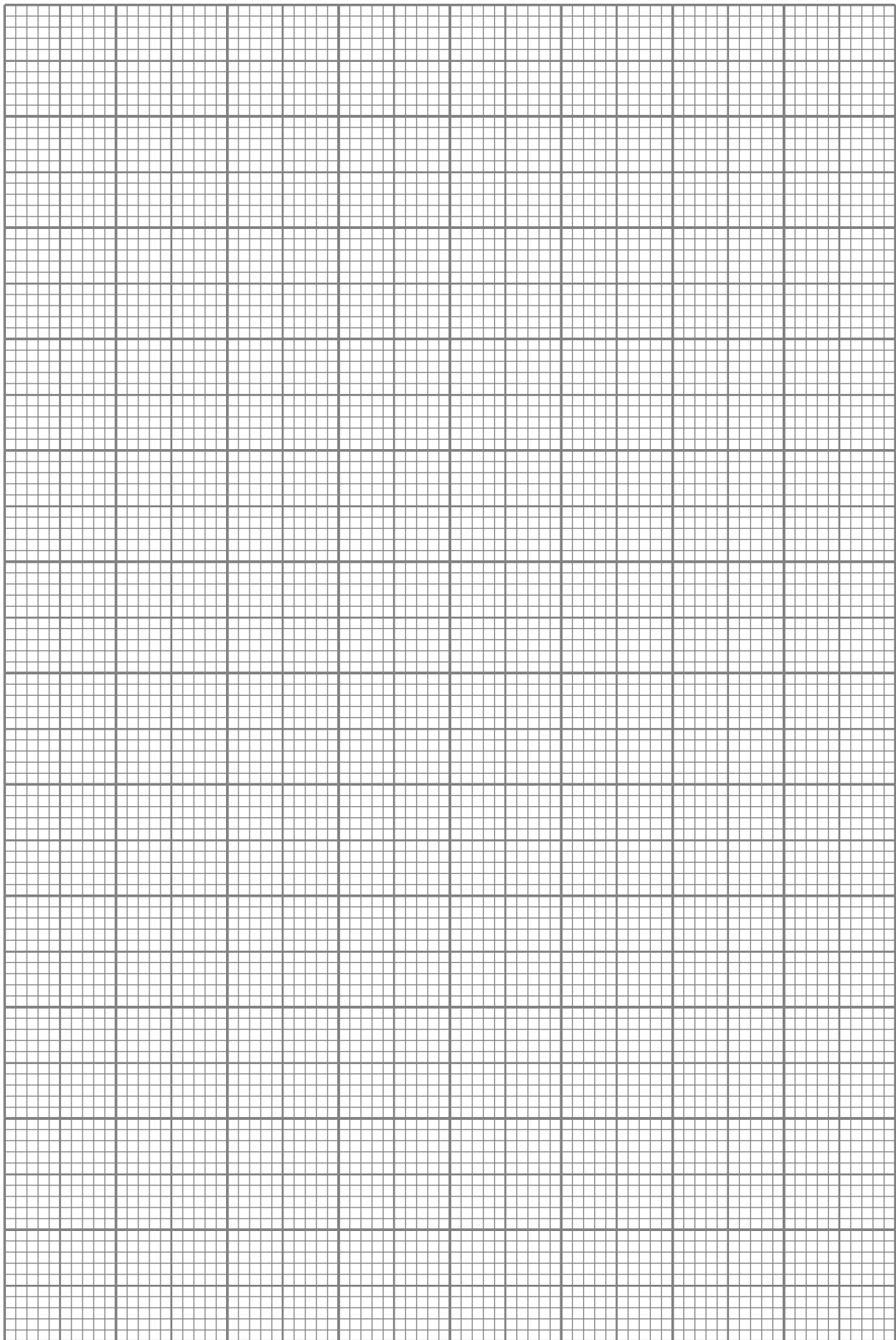
(2)

- (e) Explain why the equation  $x^2 - 2x - 12 = 0$  satisfies the points of intersection of these two graphs.

(2)

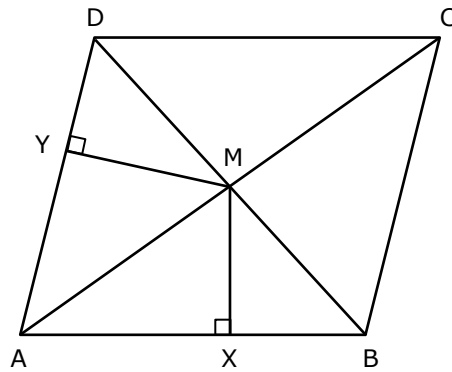
- (f) Use your graph to solve the equation  $x^2 - 2x - 12 = 0$ .

(2)



**(Total: 12 marks)**

- 9 The diagonals of a parallelogram ABCD intersect at M.  
 X is a point on AB such that MX is the altitude of triangle AMB.  
 Y is a point on AD such that MY is the altitude of triangle AMD.  
 M is equidistant from AB and AD.



*Diagram not drawn to scale*

- (a) Prove that triangles YDM and XBM are congruent.

(3)

- (b) Prove that triangles AYM and AXM are congruent.

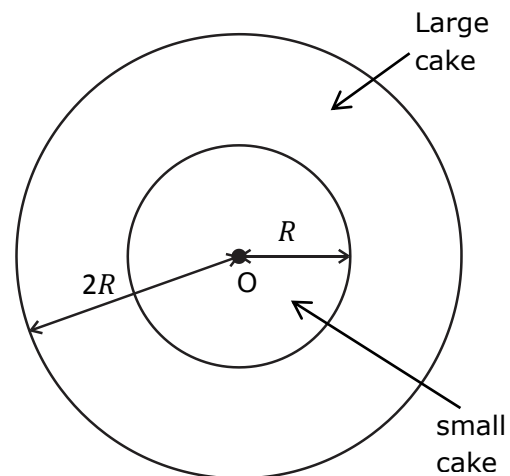
(3)

- (c) Deduce that ABCD is a rhombus.

(3)

**(Total: 9 marks)**

- 10 A large cylindrical cake has centre  $O$  and radius  $2R$ .  
 A circular cut, centre  $O$  and radius  $R$ , is made  
 to form a smaller cake as in Figure 1.



- (a) Write down the value of the following ratio,  
 showing your working.

**Area of top of small cake: Area of top of large cake**

Figure 1

(2)

The cake parts are further divided as in Figure 2.  
 The small cake is divided in 5 equal parts and  
 the outer cake ring is divided in 15 equal parts.

- (b) Show that the area of the top of each  
 of the twenty parts in Figure 2 is the same.

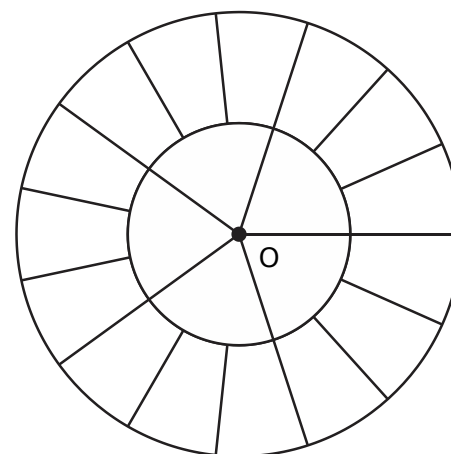


Figure 2

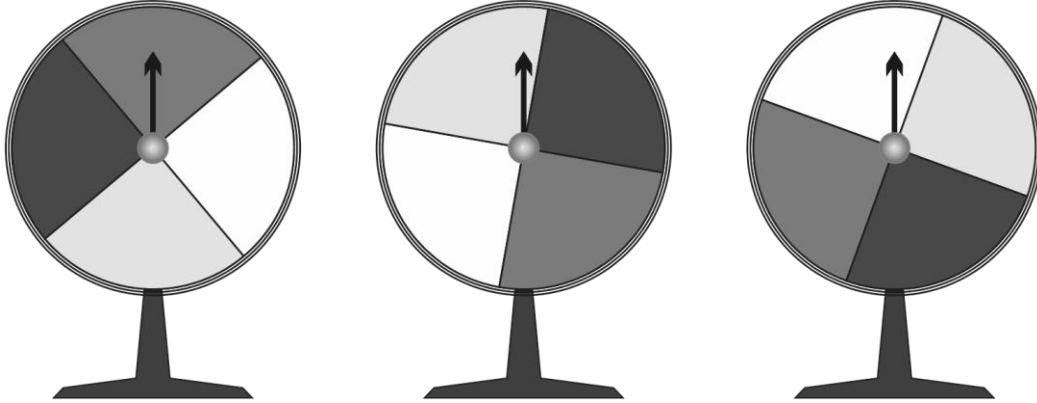
(4)

- (c) Work out the area of the top of each of the twenty parts in Figure 2, when  $R = 8$  cm.

(2)

**(Total: 8 marks)**

- 11 Joanna is in charge of a game involving three identical spinning wheels at a fund raising activity. Each wheel has four colours. When spun the wheel lands on the colour shown by the arrow. For each wheel, the probability of landing on each of the colours is  $\frac{1}{4}$ .



The player pays 50 cents to spin each of the three wheels once. Players win €5 when all three wheels land on the same colour, otherwise they lose.

- (a) Work out the probability that a player wins if he just plays once.

(2)

- (b) How much money can be expected to be raised when 640 players play once?  
Explain your reasoning.

(3)

- (c) Joanna wants to raise more money from the activity. Suggest **ONE** change she might make to the game.

(1)

**(Total: 6 marks)**

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EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL  
2018 MAIN SESSION**

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SUBJECT: **Mathematics**  
 PAPER NUMBER: IIB  
 DATE: 5<sup>th</sup> May 2018  
 TIME: 4:00 p.m. to 6:05 p.m.

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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.

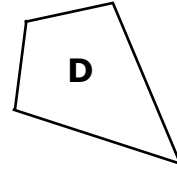
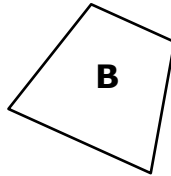
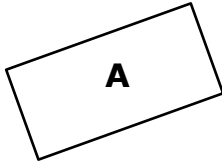
Candidates are allowed to use transparencies for drawing transformations.

This paper carries a total of 100 marks.

<i>For Office Use Only</i>										
<b>Question No</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Mark</b>										
<b>Question No</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
<b>Mark</b>										
									<b>Total Mark</b>	

- 1 Name shapes A, B, C and D by choosing a word for each shape from the box below:

Square      Rhombus      Kite      Trapezium      Rectangle      Parallelogram



- (a) A is called a \_\_\_\_\_ (1)
- (b) B is called a \_\_\_\_\_ (1)
- (c) C is called a \_\_\_\_\_ (1)
- (d) D is called a \_\_\_\_\_ (1)

**(Total: 4 marks)**

- 2 Fill in:

- (a) 7.8 km = \_\_\_\_\_ m (1)
- (b) 3800 ml = \_\_\_\_\_ litres (1)
- (c) 1 kg 85 g = \_\_\_\_\_ kg (1)
- (d) 210 minutes = \_\_\_\_\_ hours (1)

**(Total: 4 marks)**

- 3 Use your calculator to work out the exact value of  $\frac{3.4^3 - \sqrt{48}}{5.1}$  correct to 2 decimal places.

**(Total: 2 marks)**

- 
- 4 (a) Arrange in ascending order:

$$\frac{3}{8}, \frac{3}{4}, \frac{1}{5}, \frac{7}{10}$$

(2)

- (b) Complete the table:

Fraction	Percentage	Decimal
	45%	
		1.2

(4)

**(Total: 6 marks)**

- 
- 5 Water from a tap flows at the rate of 24 litres per minute.

- (a) Julian opens the tap for half an hour to fill a pond.  
Work out the amount of water in the pond.

(2)

- (b) A reservoir with a capacity of 4200 litres is to be filled at the same rate.  
How long does it take, in hours and minutes, to fill the reservoir completely?

(2)

**(Total: 4 marks)**

- 
- 6 Sam uses the following recipe for cream of mushroom soup which serves four people.

<b>Ingredient</b>	<b>Serves four</b>
Mushrooms	240 g
Stock	500 ml
Small onion	1
Flour	30 g
Cream	200 ml

- (a) Calculate the amount of cream needed to serve eight people.

(1)

- (b) Calculate the amount of flour needed to serve six people.

(2)

- (c) Calculate the number of servings Sam can prepare with 750 g of mushrooms.

(3)

**(Total: 6 marks)**

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- 7 (a) Simplify the ratio 1.5 m : 30 cm.

(2)

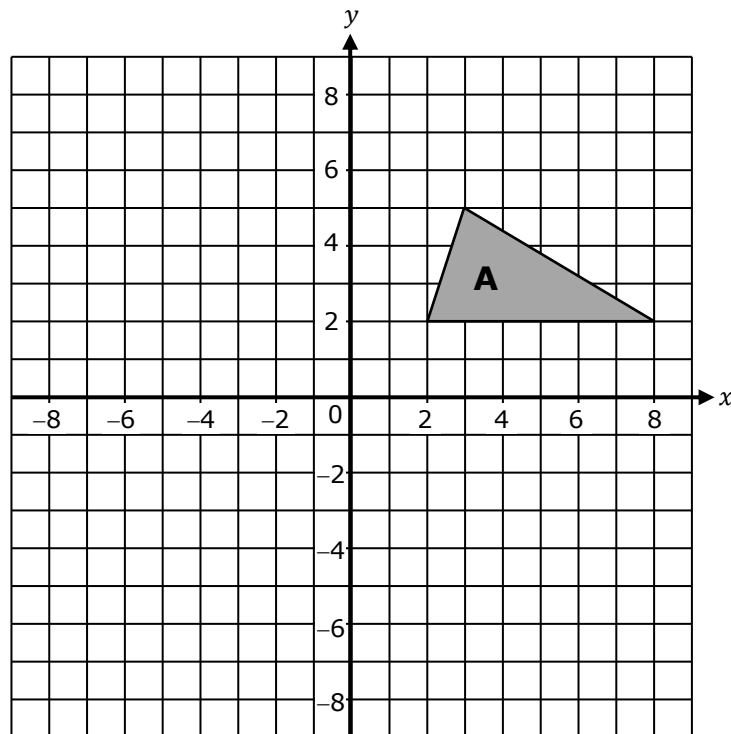
- (b) Anna, Brenda and Carla share €270 in the ratio 2 : 3 : 4 respectively.  
How much does each one get?

(3)

**(Total: 5 marks)**

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8



- (a) Reflect Shape A in the  $y$ -axis to produce Shape B. (2)
- (b) Reflect Shape B in the  $x$ -axis to produce Shape C. (2)
- (c) Describe the single transformation that maps Shape A directly to Shape C. (2)
- (d) Rotate Shape A by  $90^\circ$  clockwise about  $(0, 0)$  to produce Shape D. (2)

**(Total: 8 marks)**

- 9 Four of the interior angles of a pentagon are  $125^\circ$ ,  $72^\circ$ ,  $95^\circ$  and  $132^\circ$ . Calculate the size of the fifth interior angle.

**(Total: 4 marks)**

- 10 (a) In 2018, Joe's gross salary is €1800 per month. In 2019, he will receive a 5% increase. Work out his new salary.

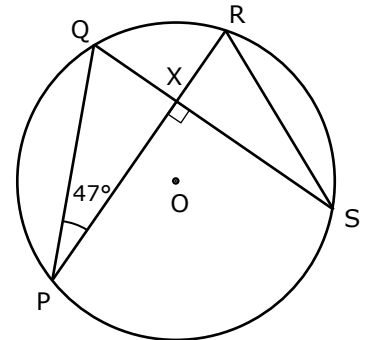
(2)

- (b) In 2020, Joe's gross salary will be €1998. Calculate the percentage increase on his 2018 salary.

(2)

**(Total: 4 marks)**

- 11 Two chords PR and QS of a circle intersect at right angles at a point X inside the circle. O is the centre of the circle and  $\angle QPR$  is  $47^\circ$ .

*Diagram not drawn to scale*

Calculate, giving reasons:

- (a) the size of  $\angle PRS$ .

(3)

- (b) the size of  $\angle POS$ .

(2)

**(Total: 5 marks)**

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12 For the sequence 2, 9, 16, 23, ...

(a) Write down the 7<sup>th</sup> term.

(1)

(b) Write down the expression for the  $n^{\text{th}}$  term.

(2)

(c) Calculate the value of the 100<sup>th</sup> term.

(1)

**(Total: 4 marks)**

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13 There are 36 chocolates in a box. Some are coated in milk chocolate, others in dark chocolate. The chocolates have one of these three fillings: almond, walnut and hazelnut.

The table shows the number of chocolates of each type.

	<b>Almond</b>	<b>Walnut</b>	<b>Hazelnut</b>
<b>Milk chocolate coating</b>	10	8	6
<b>Dark chocolate coating</b>	4	4	4

A chocolate is taken out at random from the box.

(a) What is the probability that it has a dark chocolate coating?

(2)

(b) What is the probability that it has a walnut filling and it is coated with milk chocolate?

(2)

(c) What is the probability that the filling is **not** almond?

(2)

**(Total: 6 marks)**

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14 (a) Find the value of  $3^4$ . (1)

(b) Find the value of  $x$  in the following equation:

$$504 = 2^3 \times 3^x \times 7$$

(2)

**(Total: 3 marks)**

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15 The graph shows the curve  $y = x^2 - 2x - 1$  for values of  $x$  between  $-2$  and  $4$ .

(a) Does the point  $(2, 3)$  lie on the curve?

(1)

(b) On the same graph, draw the line  $y = 2 - x$ .

(2)

(c) Write down the gradient of the line  $y = 2 - x$ .

(1)

(d) Write down the coordinates of the two points where the line  $y = 2 - x$  cuts the  $x$  and  $y$ -axes.

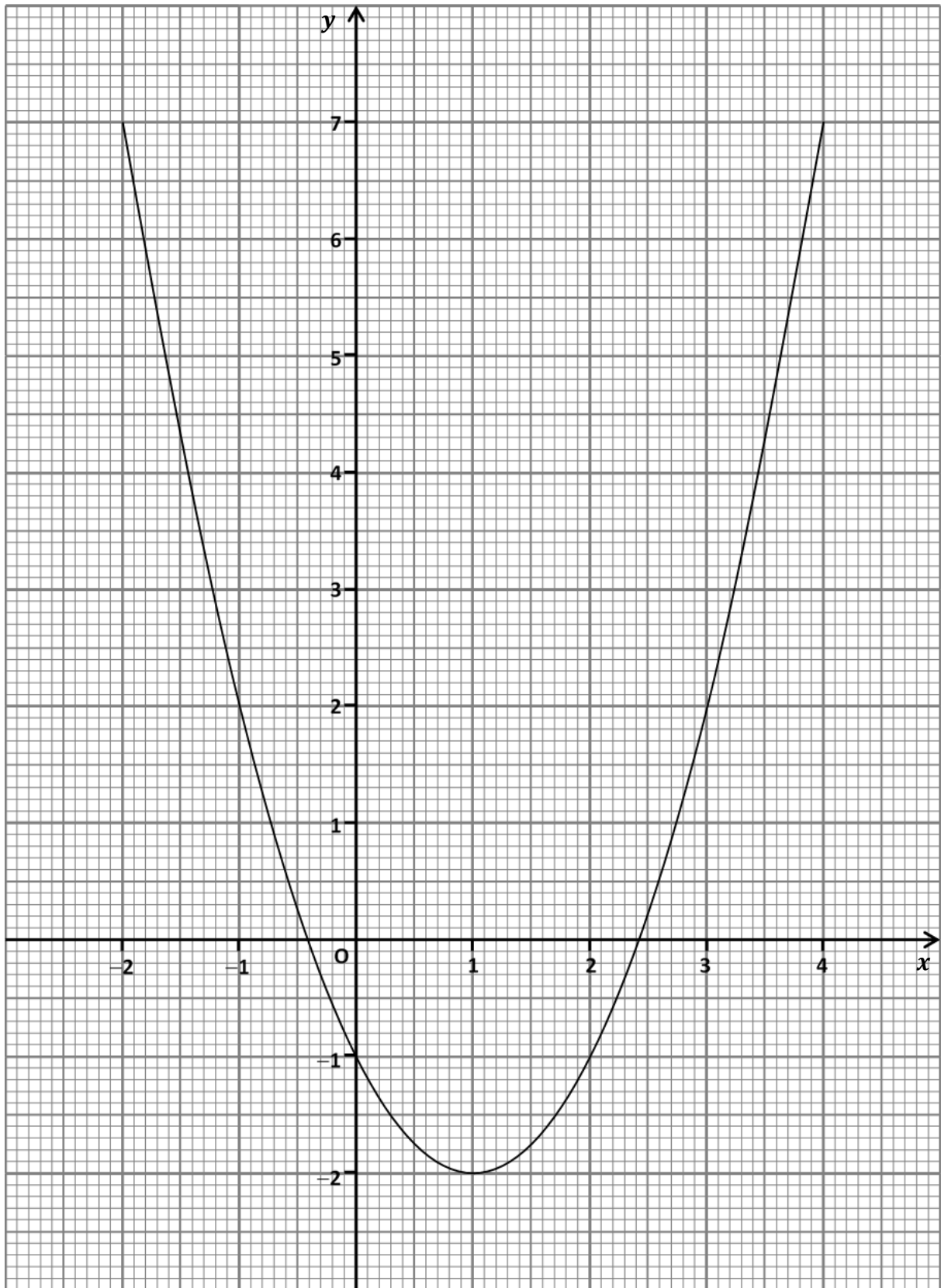
(2)

(e) Use both graphs to find the solution of the equation:

$$x^2 - 2x - 1 = 2 - x$$

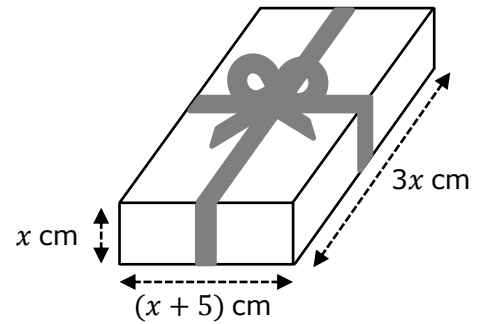
(2)





**(Total: 8 marks)**

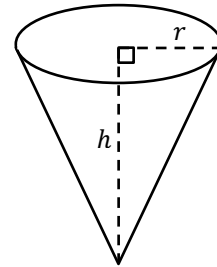
- 16 Sharon uses 77 cm of ribbon to wrap a box as shown. 25 cm of ribbon were used to tie the bow on top. Calculate the height  $x$  of the box.



**(Total: 4 marks)**

- 17 The diagram shows an ice-cream cone of radius  $r$  and height  $h$ .

- (a) Calculate the circumference of the circle at the open end of this ice-cream cone if  $r = 2.8$  cm.



*Diagram not drawn to scale*

(2)

- (b) The formula for the volume  $V$  of a cone with radius  $r$  and height  $h$  is given by  $V = \frac{1}{3}\pi r^2 h$ .

- (i) The ice-cream cone of radius 2.8 cm, has a volume of  $105 \text{ cm}^3$ . Calculate the height  $h$  of the cone.

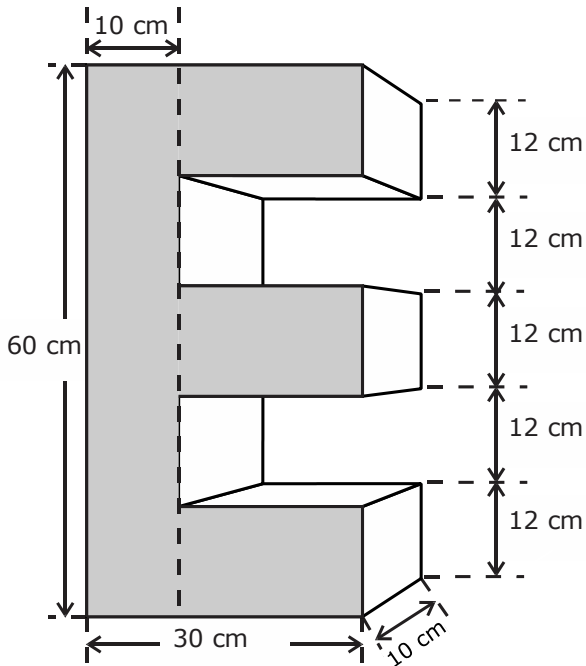
(3)

- (ii) Make  $r$  the subject of the formula  $V = \frac{1}{3}\pi r^2 h$ .

(2)

**(Total: 7 marks)**

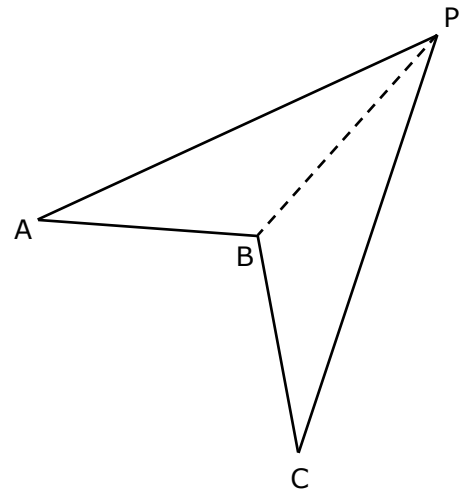
18 The diagram below shows a solid shape E with uniform cross-section. Find its volume.



**(Total: 5 marks)**

19 In the given diagram  $AB = CB$  and  $PA = PC$ .

(a) Show that triangles PAB and PCB are congruent.



*Diagram not drawn to scale*

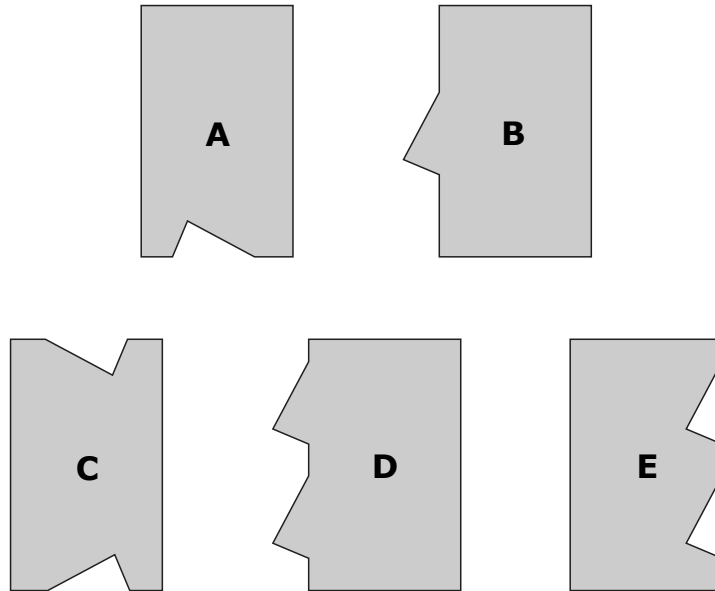
(b) Given that  $\angle APC = 58^\circ$  and  $\angle PAB = 36^\circ$ , find the value of  $\angle PBC$ .

(3)

(3)

**(Total: 6 marks)**

- 20 The shapes below are each made up of the same rectangle with identical triangles added to it or removed from it.



The table gives five statements about Shapes A, B, C, D and E.  
For each statement, put a tick (✓) in the appropriate cell.

	<b>Statement</b>	<b>True</b>	<b>False</b>	
(a)	Shape B has a bigger area than Shape A.			(1)
(b)	Shape B has a bigger perimeter than Shape A.			(1)
(c)	Shape C and Shape D have the same area.			(1)
(d)	Shape C and Shape E have the same area.			(1)
(e)	Shape C, Shape D and Shape E have the same perimeter.			(1)

**(Total: 5 marks)**