



SEC Revision Classes

Secondary Education Certificate
Examination Papers – 2017

Mathematics

© University of Malta.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior permission of the University of Malta.

The University of Malta, including the Matriculation and Secondary Education Certificate Examination Board, shall not be held responsible for any mistakes in the questions as printed or the answers, workings or comments as contained in this publication.



MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

MAY 2017 SESSION

SUBJECT: Mathematics
DATE: 6th May 2017

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 Find the size of the remaining angle of this quadrilateral.

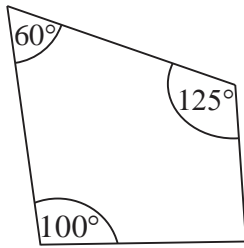


Diagram not drawn to scale

Ans _____

- 2 Give a prime number which lies between 25 and 35.

Ans _____

- 3 Write the number two hundred and three thousand and forty eight in digit form.

Ans _____

- 4 The list below shows the daily midnight temperature recorded over a particular week in Helsinki.

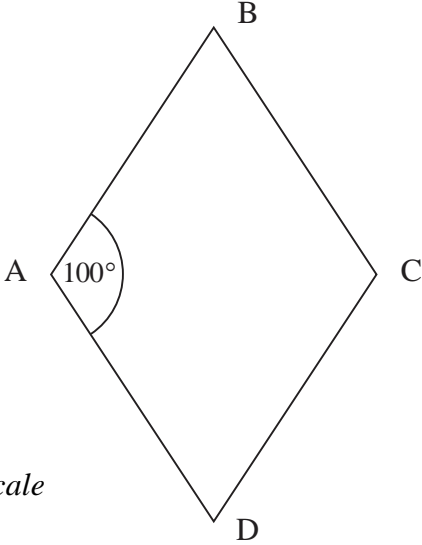
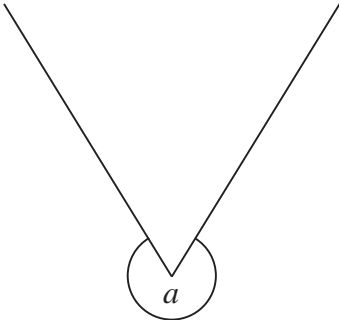
-3°C , -4°C , -2°C , 0°C , 1°C , 0°C , 1°C

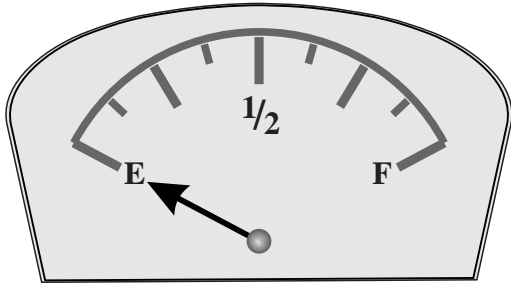
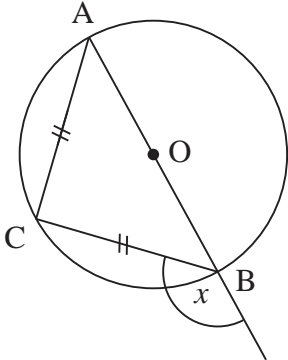
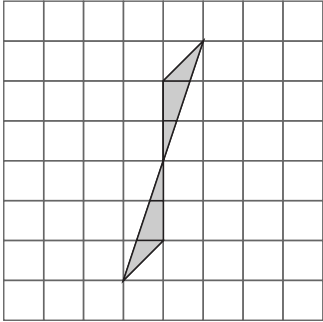
Work out the mean temperature for this week.

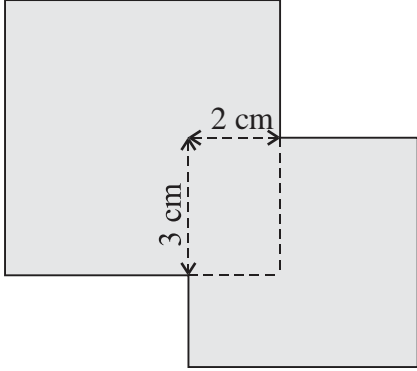
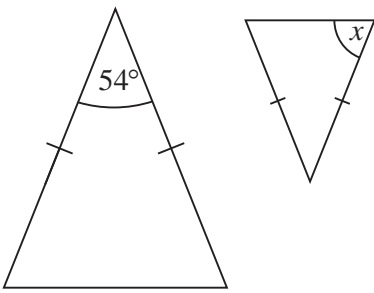
Ans _____

- 5 The population of Germany is 8.13×10^7 .
Write this number as an ordinary number.

Ans _____

<p style="text-align: center;">QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK</p>	<p style="text-align: center;">SPACE FOR ROUGH WORK (IF NECESSARY)</p>
<p>6 ABCD is a rhombus. Find the size of $\angle ADC$.</p> <div style="text-align: center;">  <p style="text-align: center;"><i>Diagram not drawn to scale</i></p> </div> <p style="text-align: right;">Ans _____</p>	
<p>7 Write a number in decimal form that lies between $\frac{1}{4}$ and 0.3.</p> <p style="text-align: right;">Ans _____</p>	
<p>8 Solve $3(x + 2) = 4(1 - x)$</p> <p style="text-align: right;">Ans _____</p>	
<p>9 A TV programme started at 23:20 on Saturday and finished the next morning at 01:17. How long did the programme last?</p> <p style="text-align: right;">Ans _____</p>	
<p>10 Estimate the size of the reflex angle marked a.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">Ans _____</p>	

<p style="text-align: center;">QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK</p>	<p style="text-align: center;">SPACE FOR ROUGH WORK (IF NECESSARY)</p>
<p>11 The fuel tank in Esmail’s car has a capacity of 56 litres. The diagram shows the fuel gauge in this car when the fuel tank is empty.</p>  <p>On the same diagram, mark the position of the pointer when there are 35 litres of fuel in the tank.</p>	
<p>12 The circle below has centre O and diameter AB. The chords AC and BC are equal.</p>  <p>Work out the size of the angle marked x.</p> <p><i>Diagram not drawn to scale</i></p> <p style="text-align: right;">Ans _____</p>	
<p>13 Complete the shape so that its order of rotational symmetry is 4.</p> 	
<p>14 What is the value in Euro of a piece of furniture which costs 150 US Dollars (USD). The exchange rate is 1 USD = €0.922106. Give your answer to the nearest Euro.</p> <p style="text-align: right;">Ans _____</p>	

<p style="text-align: center;">QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK</p>	<p style="text-align: center;">SPACE FOR ROUGH WORK (IF NECESSARY)</p>
<p>15 Two squares, one of sides 5 cm and the other of sides 6 cm are placed as shown in the diagram. Work out the shaded area.</p>  <p style="text-align: center;"><i>Diagram not drawn to scale</i></p> <p style="text-align: right;">Ans _____</p>	
<p>16 The two triangles below are similar. Work out the size of the angle marked x.</p>  <p style="text-align: center;"><i>Diagram not drawn to scale</i></p> <p style="text-align: right;">Ans _____</p>	
<p>17 Find the value of p which satisfies this equation:</p> $p \times 3\frac{1}{2} = 1$ <p style="text-align: right;">Ans _____</p>	
<p>18 Find the value of x when $4^x = \frac{1}{16}$.</p> <p style="text-align: right;">Ans _____</p>	
<p>19 On Sunday evening Mario had €23 in his money box. His mother gives him €5 pocket money each morning. On week days Mario spends €1.50 each morning. How much money does Mario have in his money box by the evening of the following Thursday?</p> <p style="text-align: right;">Ans _____</p>	
<p>20 In this question, x is an integer greater than 0. What is the smallest value of x such that $48x$ is a square number?</p> <p style="text-align: right;">Ans _____</p>	

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

MAY 2017 SESSION

SUBJECT:	Mathematics
PAPER NUMBER:	I – Section B (Calculator Section)
DATE:	6 th May 2017
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.

<i>For Office Use Only</i>												
Sec A	1	2	3	4	5	6	7	8	9	10	11	Total

-
- 1 (a) For each of the following sequences, write down the next term in the space provided.
- (i) 1, 4, 9, 16, 25, ____ (1)
- (ii) 8100, 2700, 900, 300, 100, ____ (1)
- (iii) 1, 2, 4, 8, 16, 32, ____ (1)
- (b) The volume of a sphere is given by the equation $V = \frac{4\pi r^3}{3}$.
- (i) Work out the volume V of a sphere whose radius r is 2.5 cm. (2)
- (ii) Work out the radius r of a sphere whose volume V is 2000 cm^3 . (4)

(4)
(Total: 9 marks)

- 2 Solve the following simultaneous equations:

$$4x - 2y = 11$$

$$5x + 2y = 16$$

(Total: 4 marks)

- 3 Use the given diagram to work out the length of the following distances correct to the nearest cm:

(a) AB

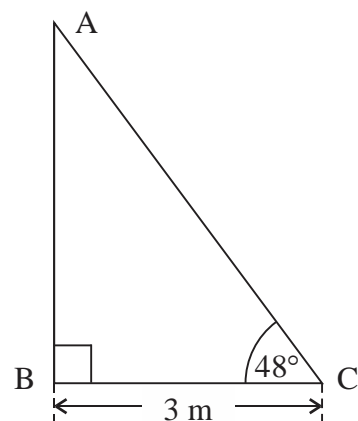


Diagram not drawn to scale

(b) AC

(3)

(3)

(Total: 6 marks)

- 4 Only Party A and Party B contested an election.

All the people who are eligible to vote in an election are called **the electorate**.

In this election, 10% of the electorate did not vote and 2% of the electorate cast an invalid vote.

Party A gained 8% more of **the electorate** than Party B.

If 102,384 people voted for Party A, work out the total number of people that were eligible to vote in this election.

(Total: 5 marks)

5 A boat sails 40 km due South from **A** to **B**.
At **B**, the boat changes direction and travels 35 km on a bearing of 250° to **C**.

- (a) Draw a scale diagram showing the positions of **A**, **B** and **C**.
Write down the scale used.

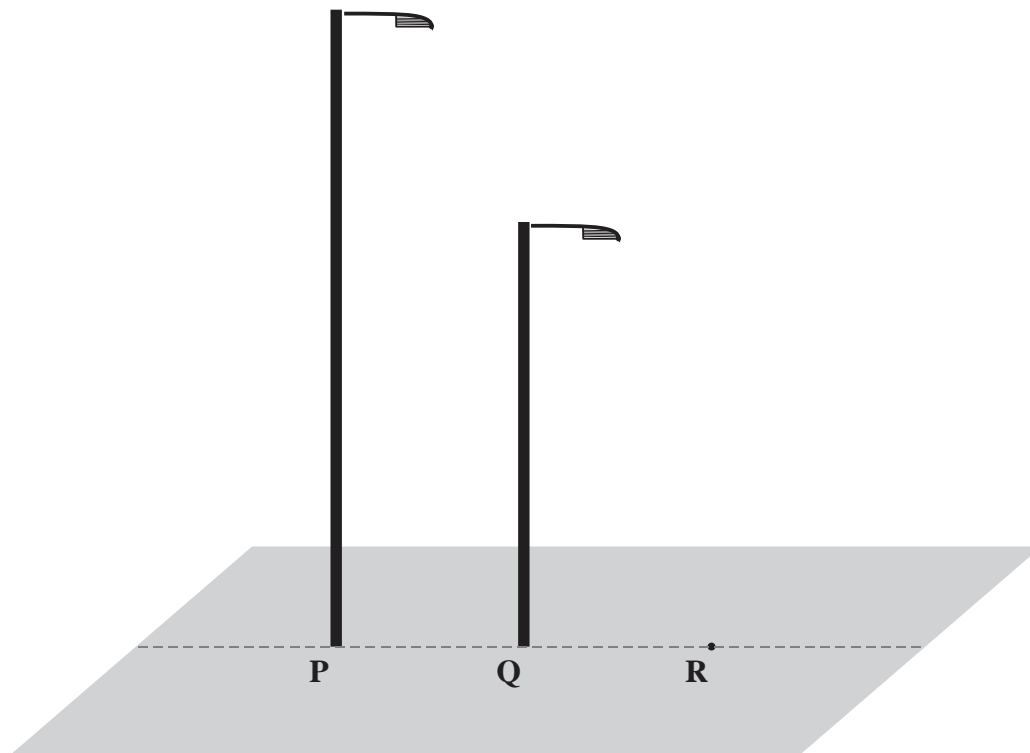
- (b) Use your scale diagram to determine **the distance** and **bearing of C** from **A**.

(5)

(3)

(Total: 8 marks)

- 6 In the diagram, the height of the poles at P and Q are drawn to scale.



- (a) Another pole is to be erected. Its height is $\frac{3}{4}$ of the height of the pole at Q. Using the same scale, draw this pole at R on the diagram above. (2)
- (b) Express the height of the pole at Q as a fraction of the height of the pole at P. (2)
- (c) If the pole at Q is 4.5 m high, work out the height of the pole at P. (2)

(2)
(Total: 6 marks)

- 7 (a) A blend of coffee is made by mixing Coffee A with Coffee B in the ratio 3:2.
Coffee A costs €12 per kg and Coffee B costs €15 per kg.

(i) Calculate the price of 500 g of this blend of coffee.

(3)

(ii) Calculate the price of 1 kg of this blend of coffee if it is sold at a profit of 20%.

(3)

(b) In a primary class, $\frac{3}{5}$ of the children are girls.

$\frac{2}{5}$ of the boys play tennis. None of the girls play tennis.

What fraction of the children in this class play tennis?

(3)

(Total: 9 marks)

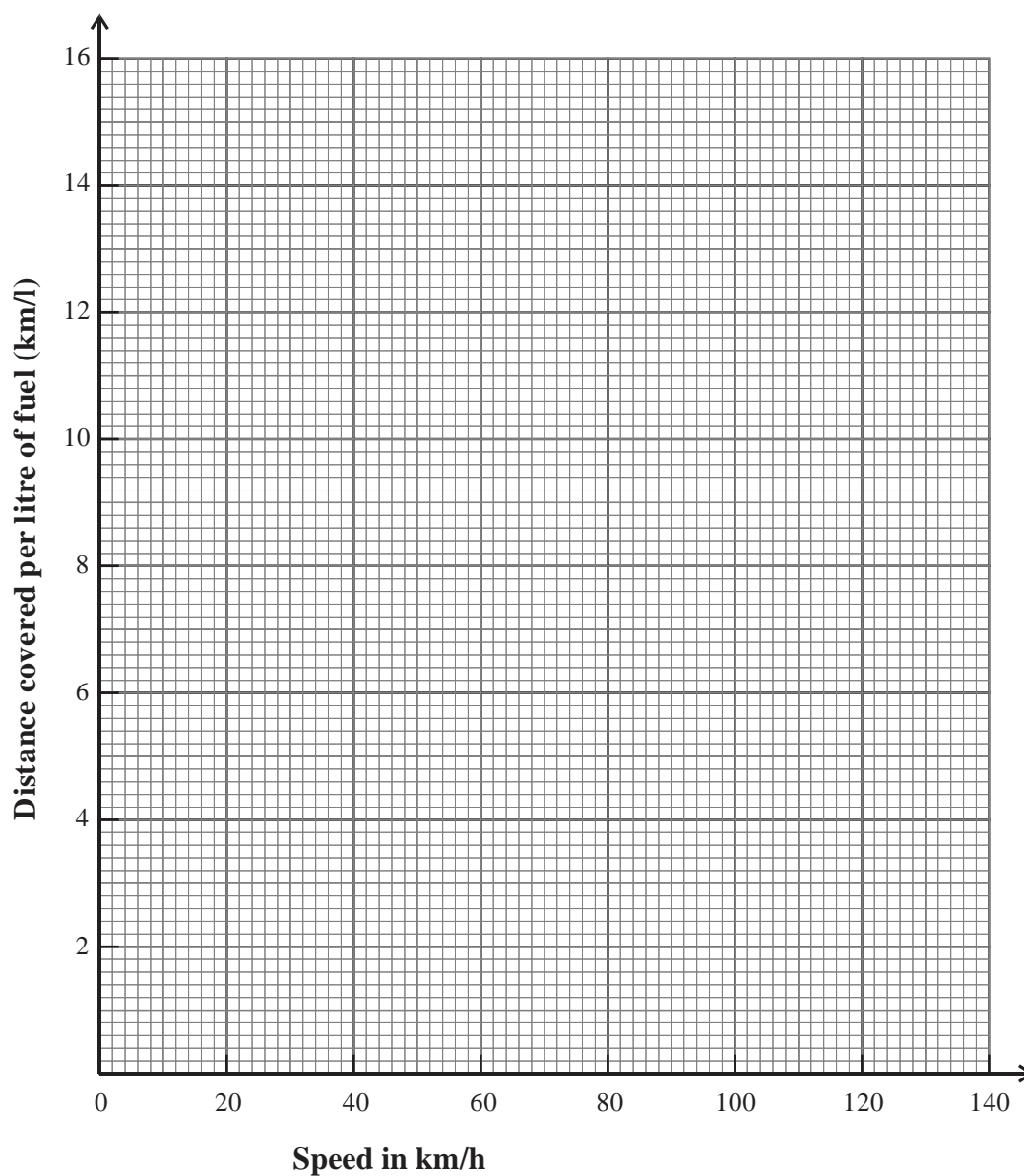
- 8 A car was tested for its fuel consumption at different speeds.
The results are shown in the table below.

Speed in km/h	5	15	50	80	110	130
Distance covered per litre of fuel (km/l)	5	7	12.5	14.2	13.6	8.8

- (a) Plot the information in this table on the grid given in the next page.
Join the plotted points with a smooth curve.

(3)

DO NOT WRITE ABOVE THIS LINE



(b) Use your graph to determine at what speed the car consumes less fuel.

(1)

(c) This car is driven for 30 minutes at an average speed of 50 km/h. How much fuel is consumed during this journey?

(Total: 7 marks)

9 The following table shows information about the workers at Roger's bakery.

Job title	Number of people	Annual Salary in €
General Manager	1	46,000
Assistant Manager	1	32,000
Kitchen Manager	2	28,500
Speciality Chef	1	26,000
Head Baker	1	23,000
Senior Baker	2	22,000
Baker	5	19,000
Decorator	2	19,000

- (a) Calculate the mean salary of the workers at Roger's bakery. Give your answer to the nearest Euro. (3)
- (b) What is the mode of the workers' salaries at Roger's bakery? (1)
- (c) Find the median salary. (1)
- (d) Give an argument which a senior baker may make to ask for a raise in salary. Build your argument by referring to one from **mode**, **median** and **mean**. (2)
- (e) A worker left the bakery and was not replaced. The median salary remained the same after the worker left. Give a possible job title of the worker who left the bakery. (2)

(2)
(Total: 9 marks)

- 10 The diagram shows a gutter which is 5 m long and whose cross-section is a semicircle of radius 10 cm.

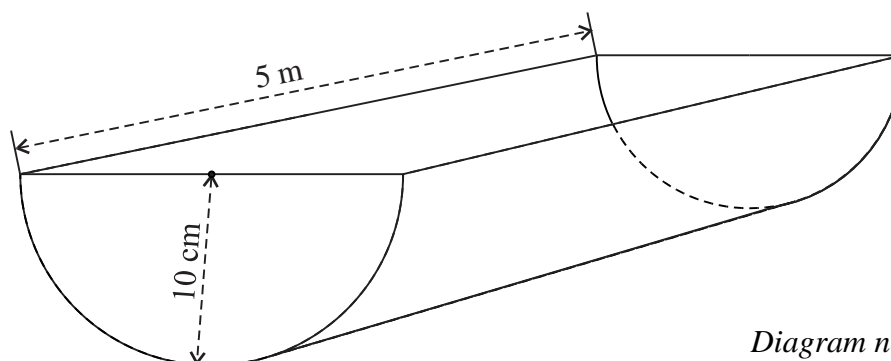


Diagram not drawn to scale

Vince is planning to make this gutter out of a plastic sheet. The gutter will have an open rectangular face but its semicircular faces will be closed with plastic.

- (a) Draw a sketch of the parts that Vince needs to cut out to make this gutter.
Mark clearly the measurements of these parts.

(5)

- (b) Work out the volume of water that the gutter can hold correct to the nearest litre.

(4)

(Total: 9 marks)

11 The table below lists some statements about an unknown number x .

For each statement, put a tick in one of the adjacent cells to show whether the statement is *True for all given values of x* , *False for all given values of x* , or *Sometimes True and Sometimes False*.

Follow the instructions given in the heading of the grey column to complete this column.

The first two statements are given as examples.

Statement	<i>True for all given values of x</i>	<i>False for all given values of x</i>	<i>Sometimes True and Sometimes False</i>	<i>When a statement is Sometimes True and Sometimes False, give an example to illustrate each case. Otherwise, leave the corresponding cell blank.</i>
Example 1 For any x , $x^2 \geq 0$	✓			
Example 2 For any x , $x^2 > x$			✓	$x^2 > x$ is true when $x = 5$. $x^2 > x$ is false when $x = \frac{1}{2}$.
For any x , $2x = x^2$				
When $x > 20$, $2x + 23 = 75$				
When x is negative, x^4 is negative				
When $x > 0$, $(2x)^3 = 2x^3$				

(Total: 8 marks)

Blank Page

Blank Page

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

MAY 2017 SESSION

SUBJECT:	Mathematics
PAPER NUMBER:	IIA
DATE:	6 th May 2017
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	$a^2 = b^2 + c^2 - 2bc \cos A$

<i>For Office Use Only</i>											
1	2	3	4	5	6	7	8	9	10	11	Total

1 (a) Find the value of x so that the expression $15(5^x) + 3$ is equal to 6.

(3)

(b) Solve the inequality $3 - x \leq 5$

(2)

(c) Make y the subject of the formula $\frac{3x}{5} = \frac{y}{y-10}$

(4)

(Total: 9 marks)

2 (a) Simplify $(32x^5y^{10})^{\frac{2}{5}} - (27x^6y^{12})^{\frac{1}{3}}$

(3)

(b) Factorise $5a^2 + 2ab - 3b^2$

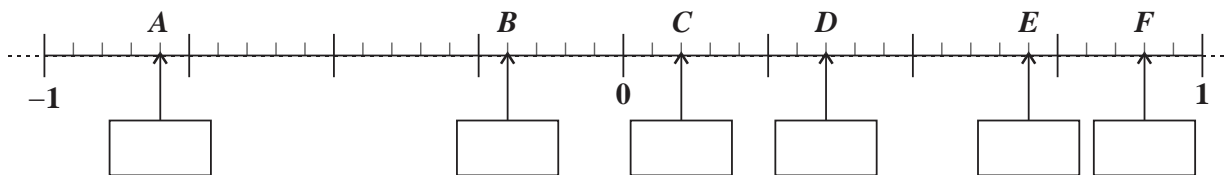
(2)

(c) Write $\frac{2x}{x-1} - \frac{7x-3}{x^2-1}$ as a single fraction in its simplest form.

(4)

(Total: 9 marks)

3 (a) The numbers A, B, C, D, E and F are shown on the number line below.



(i) Write down the values of A, B, C, D, E and F in the corresponding boxes on the diagram above. (2)

(ii) A number x is such that $A < x < B$.
Write down a possible value of x . (1)

(iii) For what value of x is $F = xC - B$? (1)

(b) A lottery is held every week using a packet of 90 tickets. The winning number is drawn from the integers from 1 to 90.
Mona buys five tickets in the first week and one ticket in the second week.

(i) What is the probability that Mona wins in the first week? (1)

Using a tree diagram or otherwise; work out the probability that:

(ii) Mona wins on both weeks; (2)

(iii) Mona wins just once in these two weeks. (3)

(Total: 10 marks)

- 4 (a) Complete the table of values for the graph of $y = \frac{10}{x} - 3$

x	1.0	1.2	1.4	1.6	1.8	2.0
$\frac{10}{x} - 3$	7	5.33	4.14		2.56	

(1)

- (b) The graph of $y = x^3 - 1$ has been plotted on the next page. On the same axes, plot the graph of $y = \frac{10}{x} - 3$

(3)

- (c) Show that the equation $x^4 + 2x - 10 = 0$ is satisfied at the point of intersection of the two graphs.

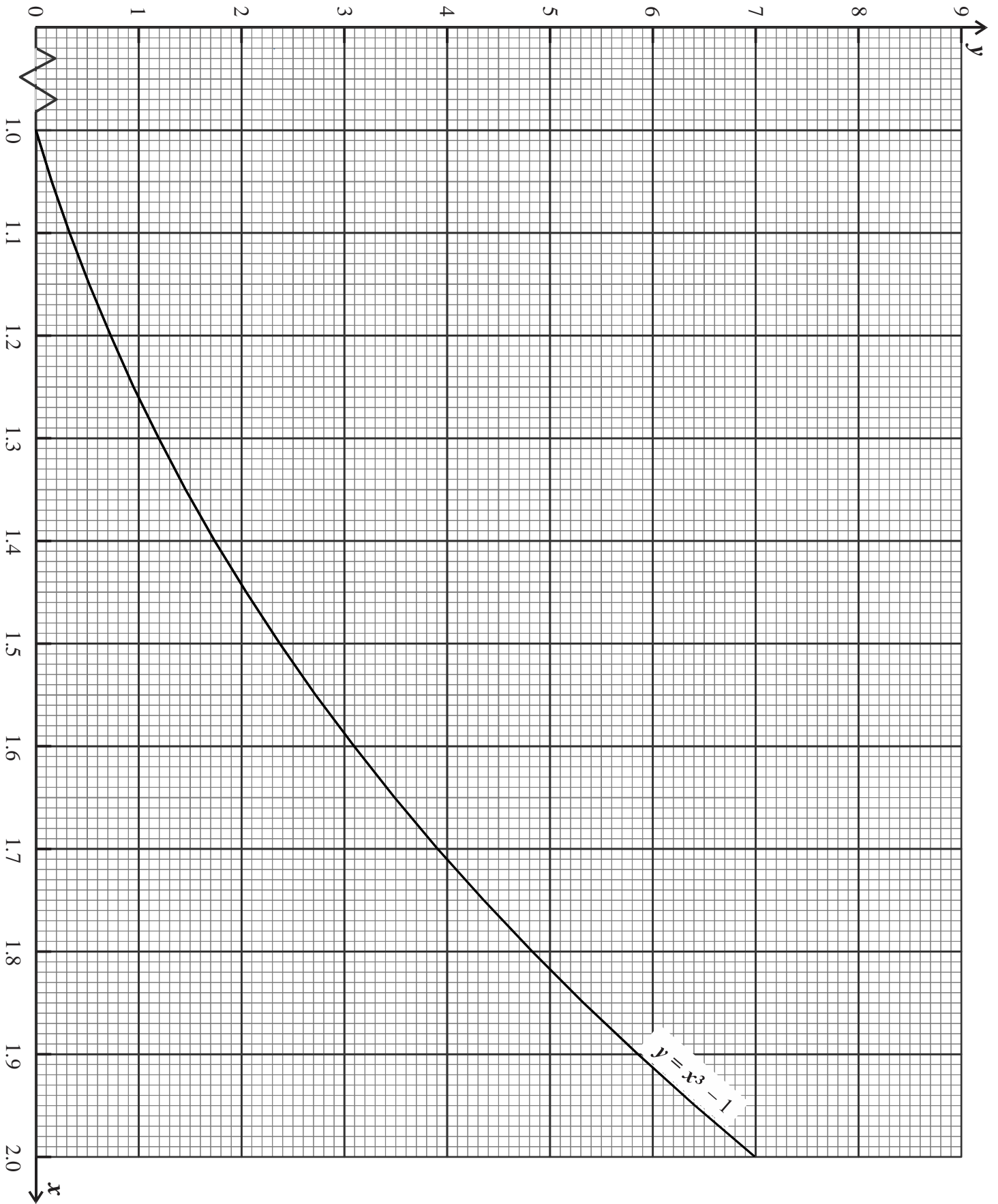
(2)

- (d) Use the trial and improvement method to find the solution of the equation $x^4 + 2x - 10 = 0$ between 1 and 2 correct to 3 decimal places. Show your working.

(4)

(Total: 10 marks)

DO NOT WRITE ABOVE THIS LINE



DO NOT WRITE ABOVE THIS LINE

- 5 Tom's rectangular pool has a perimeter of 20 m.
 The pool is surrounded by a path 75 cm wide.
 The total surface area of the pool and path is 40 m².
 Work out the length l and the width w of the pool.

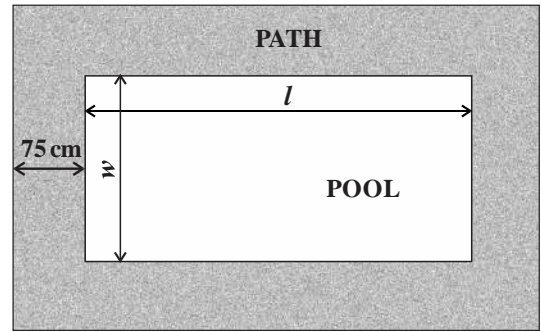


Diagram not drawn to scale

(Total: 6 marks)

- 6 In the given figure, ABCD is a quadrilateral in which AD is parallel to BC, AB = 10 cm, BC = 15 cm, $\angle BCD = 90^\circ$ and $\angle ABC = 60^\circ$.

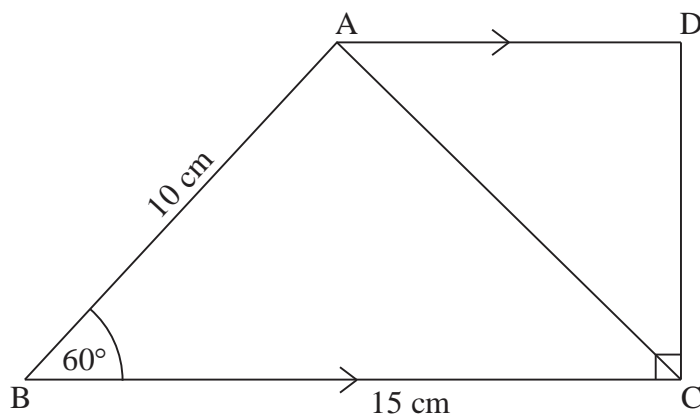


Diagram not drawn to scale

(a) Use the cosine formula to find the length of AC.

(3)

(b) Find the size of angle ACD.

(4)

(c) Work out the lengths of AD and DC.

(4)

(d) Determine the area of quadrilateral ABCD.

(2)

(Total: 13 marks)

7 On 1st January 2010, Simone deposits €2000 in a bank account that offers 3% compound interest compounded annually. She further deposits €100 on the first day of each subsequent year in the same account.

- (a) After how many years will the money in Simone's account exceed €2380? Show your working.

(4)

- (b) The amount A after n years, in such an account, can be worked out using the formula

$$A = dm^n + \frac{x(m^n - m)}{m - 1} \quad \text{where:}$$

d is the initial amount deposited,

$m = 1 + \frac{r}{100}$ where r is the rate of compound interest, and

x is the constant deposit made each subsequent year.

Use this formula to confirm your result in part (a) of this question.

(2)

(Total: 6 marks)

8 (a) Complete the table below so that y is directly proportional to x .

x	3	5	7	9
y			42	

(2)

(b) Complete the table below so that q is inversely proportional to p .

p	2	4	8	10
q	50			

(2)

(c) Four statements are given in the table below. For each statement, determine whether the statement is true or false. Explain your reasoning.

Statement	True or False	Reason
The circumference C of a circle is directly proportional to its radius r .		
The area A of a circle is directly proportional to its radius r .		
The time T taken to run a 10 km race is inversely proportional to the average speed s of the runner.		
The time taken for shirts to dry out in the sun is proportional to the number of shirts hung out on the line.		

(8)

(Total: 12 marks)

- 9 Two quarter circles were cut out from a rectangle as shown in the diagram. The two quadrants meet at D. Use the information given in the diagram to:

(a) find the radii of the two circles;

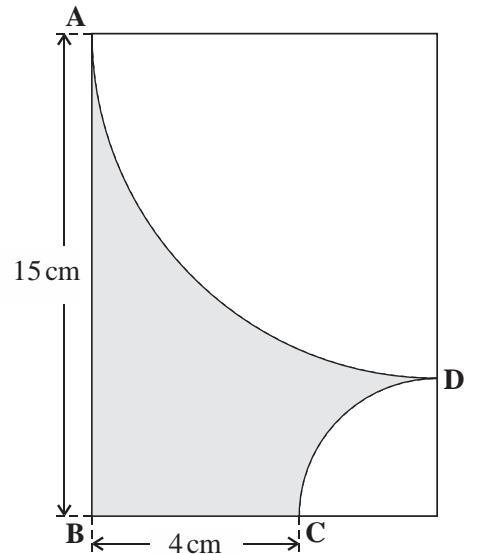


Diagram not drawn to scale

(4)

(b) find the shaded area.

(2)

(Total: 6 marks)

- 10 Mark works at a call centre. He kept a record of the time that clients needed to wait for their telephone calls to be answered. These times are shown in the table below.

Time (minutes)	Frequency	Frequency Density
$0 < t \leq 0.5$	12	
$0.5 < t \leq 1$	15	
$1 < t \leq 3$	21	
$3 < t \leq 6$	9	
$6 < t \leq 10$	2	

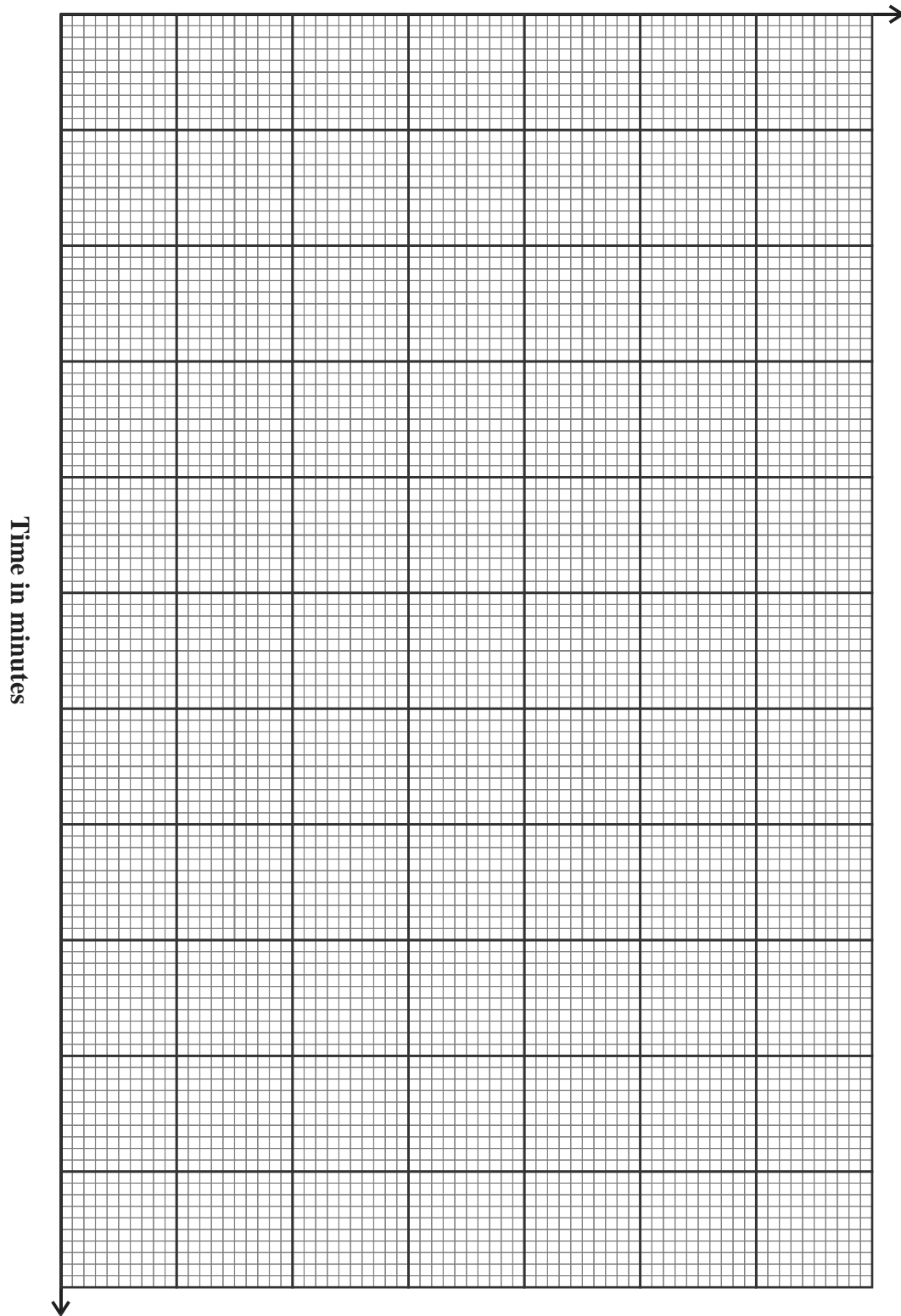
- (a) Work out the frequency density for each class interval to complete the table above. (2)
 (b) Using the information in the above table, draw a histogram on the graph paper provided. Use Time on the horizontal axis and Frequency Density on the vertical axis. (3)
 (c) Estimate the percentage of calls that took between 2 and 5 minutes to be answered.

(3)

(Total: 8 marks)

DO NOT WRITE ABOVE THIS LINE

Frequency Density



- 11 The diagram shows a right cone which has a base radius of 9 cm and is 20 cm high. The cone is cut by a plane parallel to its base and 13 cm away from it. A circular base of radius r is fitted to the frustum to form a **container** with a circular open face of radius 9 cm.

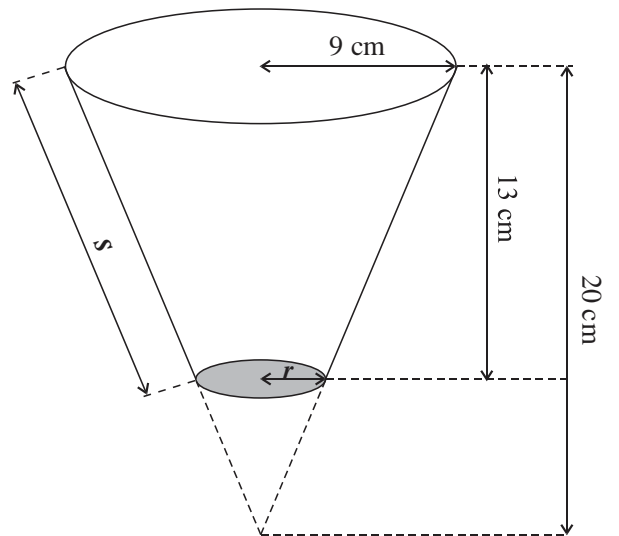


Diagram not drawn to scale

- (a) Show that the radius r of the base of the container is 3.15 cm.

(3)

- (b) Calculate the capacity of the container.

(4)

- (c) Calculate the length of the slant height s of the container.

(4)

(Total: 11 marks)

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

MAY 2017 SESSION

SUBJECT:	Mathematics
PAPER NUMBER:	IIB
DATE:	6 th May 2017
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.

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

1 Fill in the blank spaces to complete the following statements:

(a) $738 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

(b) $1\frac{3}{4} \text{ litres} = \underline{\hspace{2cm}} \text{ ml}$

(c) $1 \text{ day} = \underline{\hspace{2cm}} \text{ minutes}$

(d) $1.5 \text{ cm}^2 = \underline{\hspace{2cm}} \text{ mm}^2$

(e) When rounded to 2 significant figures, the number 346100 becomes $\underline{\hspace{2cm}}$

(f) A number between 0.1 and 0.2 is $\underline{\hspace{2cm}}$

(Total: 6 marks)

2 In the diagram below, the line PQ is parallel to the line RBCS.

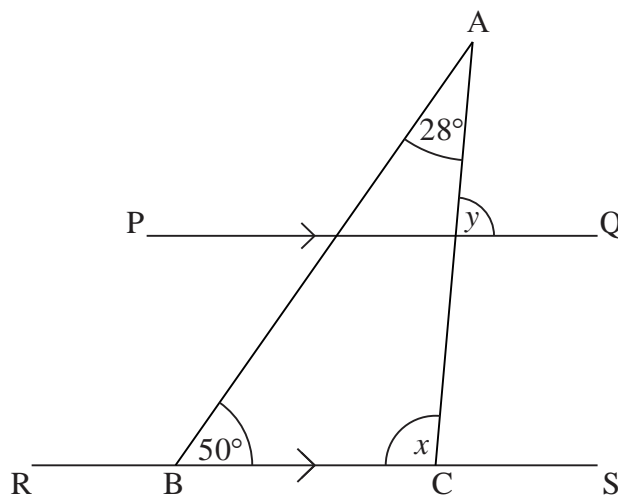


Diagram not drawn to scale

Use the information in the figure to work out the size of the angles marked x and y . Explain your reasoning.

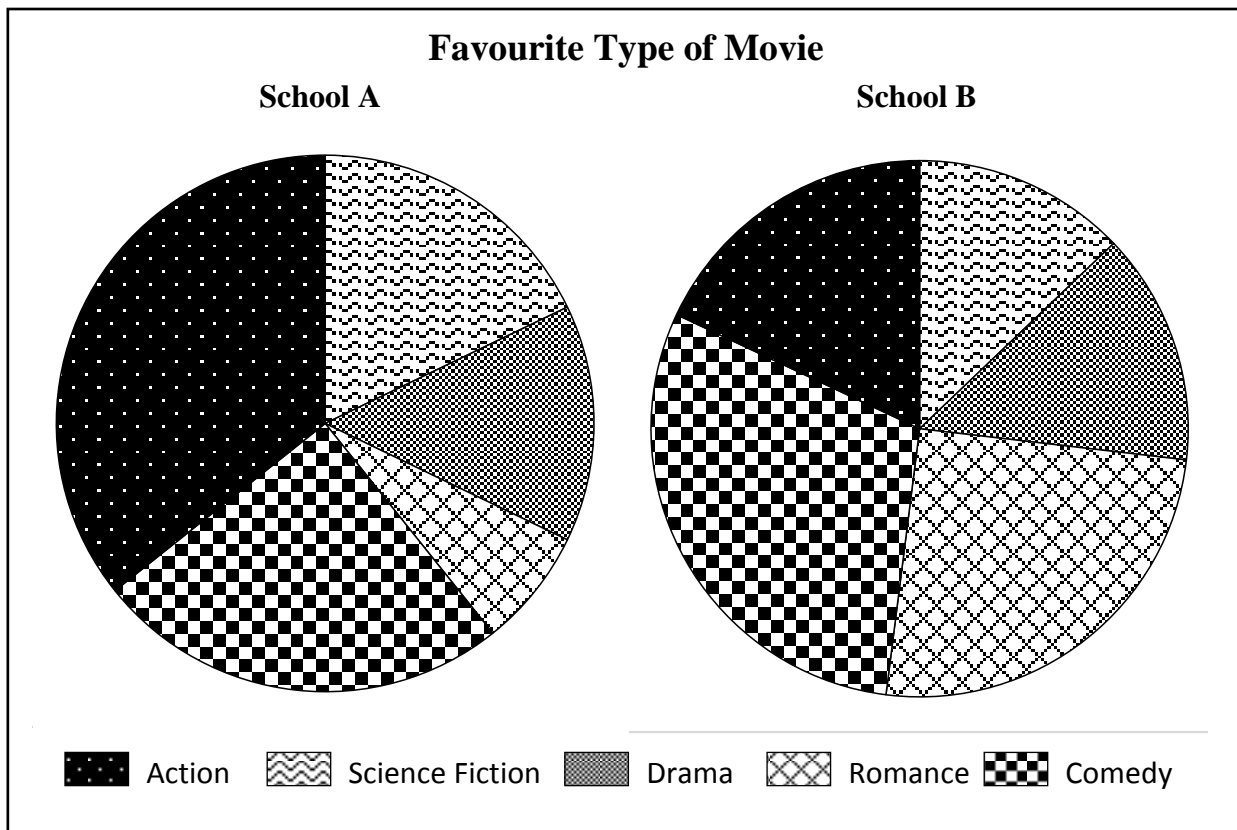
(Total: 4 marks)

3 A survey was carried out in two schools, School A and School B.

In this survey, children were asked for their preference amongst the following types of movies: Action, Science Fiction, Drama, Romance and Comedy.

There were 280 children taking part in the survey in School A and 180 children in School B.

The results of the survey are shown in the Pie Charts below.



(a) Work out the number of children in School A who chose Comedy as their favourite type of movie.

(2)

(b) What percentage of children from the two schools taken together chose Comedy as their favourite type of movie?

(3)

(Total: 5 marks)

4 Use ruler and compasses only in this question.

- (a) Using line AB drawn below as base, construct triangle ABC with $\angle CAB = 60^\circ$ and $AC = 11$ cm. (3)
- (b) Construct the perpendicular bisector of AB.
Name the point where this bisector meets AB as X. (2)
- (c) Construct the bisector of angle CBA.
Name the point where the two bisectors meet as O. (2)
- (d) Draw a circle centre O and radius OX. (1)

A

B

(Total: 8 marks)

5 Karl makes a model of the Big Ben clock tower using a scale of 1 to 200.

- (a) The height of the model is 48.75 cm.
What is the height in metres of the actual clock tower?



(3)

- (b) The minute hand on the actual clock faces is 4.27 m long. How long is the minute hand on the model?

(3)

(Total: 6 marks)

6 In a weekly lottery, the winning number is drawn at random from all the integers from 1 to 90.

- (a) What is the probability that the winning number is a multiple of 10?

(2)

- (b) Four statements about the draws of this lottery are given below. Mark with a tick (✓) in the second column the statement that **is true**.

(a)	A multiple of 10 is drawn in any 10 lottery draws.	
(b)	In 1000 lottery draws, a multiple of 10 is drawn around 300 times.	
(c)	In 1000 lottery draws, a multiple of 10 is drawn around 100 times.	
(d)	In 1000 lottery draws, a multiple of 10 is drawn exactly 90 times.	

(2)

(Total: 4 marks)

7 A supermarket has three options for buying crisps:

Option 1: A pack containing 180 g of crisps costs €1.99.

Option 2: A bag with 6 packs costs €2.70. Each pack contains 25 g of crisps.

Option 3: Buy two packs of crisps and get another pack free. Each pack contains 50g of crisps and costs 65c.

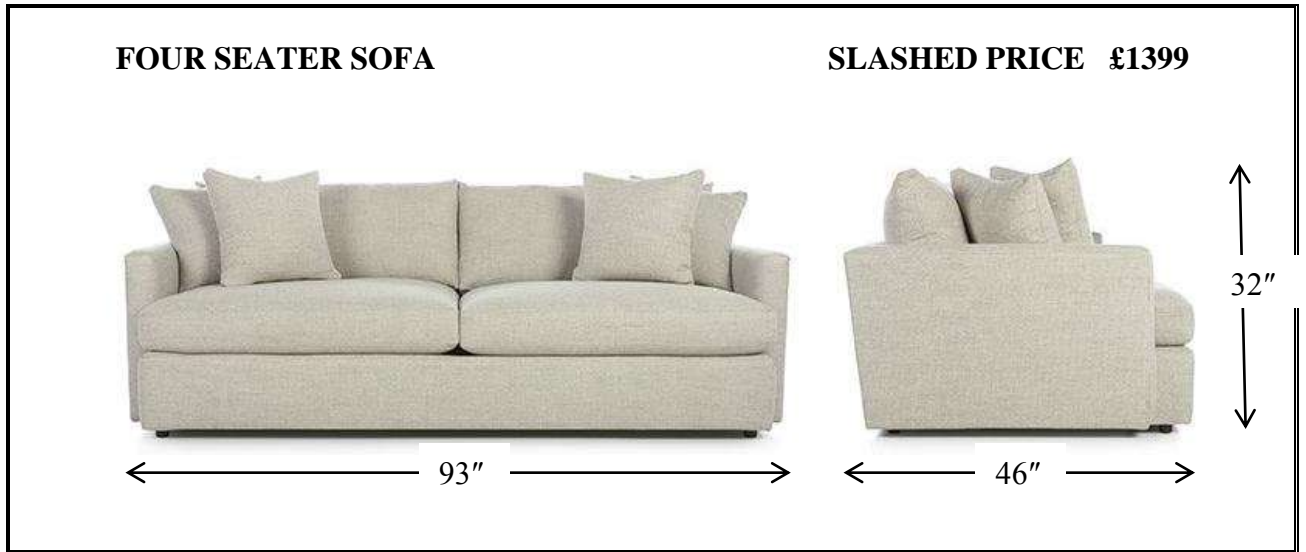
Which option gives the best value for money? Show your working.

(Total: 7 marks)

8 Water increases in volume by 9% when it is frozen.
What volume of water is needed to make 1000 cm^3 of ice?

(Total: 3 marks)

- 9 Sharon is shopping online for a sofa.
She finds the following offer on an English website.



- (a) Calculate the length and width of this sofa in metres. Take 1" (one inch) = 2.54 cm.
Give your answer correct to the nearest centimetre.

- (3)
- (b) To bring this sofa to Malta, Sharon also needs to pay a fee of £350 for shipping and delivery. Work out the total cost in Euro to buy this sofa. Take 1 Sterling (£1) to be equal to €1.169.

(3)
(Total: 6 marks)

- 10 650 tickets were sold for a school concert.
An adult ticket costs €8.50 and a child ticket costs €5.
A total of €4,720 was collected from the sale of tickets.
Work out how many tickets of each type were sold.

(Total: 5 marks)

- 11 (a) The interior angles of a regular polygon are all equal to 160° . How many sides does this polygon have?

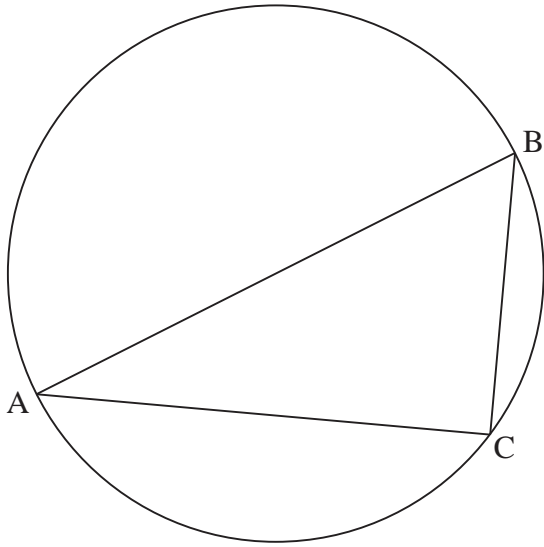
(2)

- (b) Is it possible to draw a regular polygon with interior angles equal to 100° ?
Explain your answer.

(3)

(Total: 5 marks)

- 12 The diagram shows a circle of radius 0.5 m. AB is a diameter of this circle.
AC is a chord of length 0.8 m.



- (a) Explain why ABC is a right-angled triangle.

Diagram not drawn to scale

(1)

- (b) Work out the length of BC.

(3)

- (c) Work out the size of angle ABC.

(2)

(Total: 6 marks)

13 An alloy is made by melting together copper, zinc and tin.

$\frac{7}{10}$ of its weight comes from copper.

$\frac{3}{25}$ of its weight comes from zinc.

(a) What fraction of the weight of this alloy comes from tin?

(2)

(b) How much copper is needed to make 900 g of this alloy?

(1)

(c) What percentage of the weight of this alloy comes from zinc?

(1)

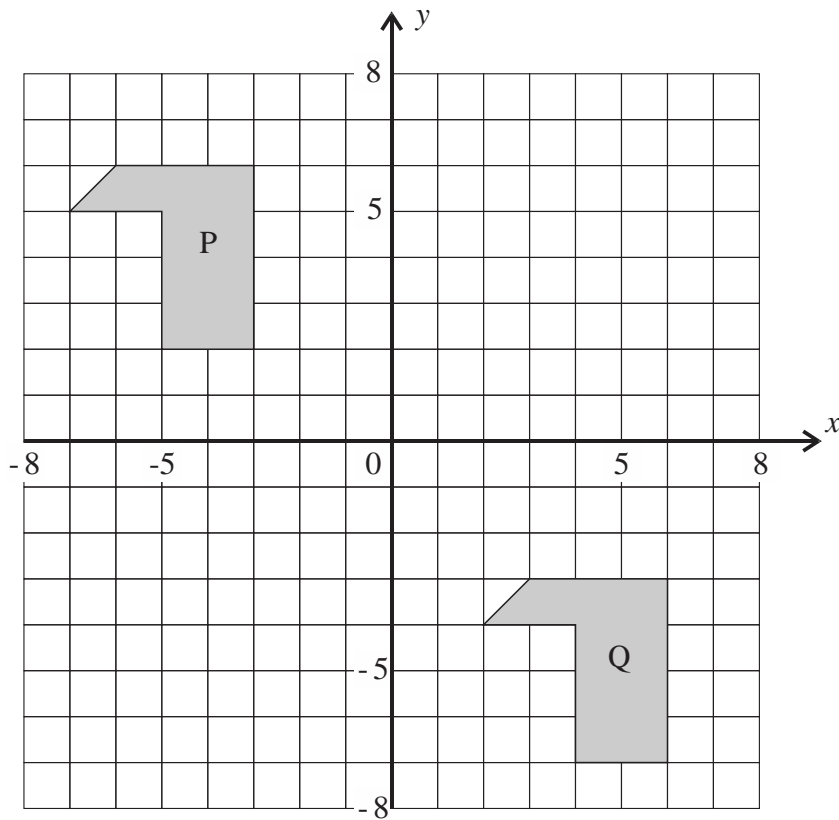
(d) For this alloy, work the following ratio:

weight of copper : weight of zinc : weight of tin

(1)

(Total: 5 marks)

14



(a) Describe fully the transformation which maps shape P onto shape Q.

(2)

(b) Reflect shape P in the x -axis to obtain shape R.

(1)

(c) Rotate shape P by 90° clockwise about $(0, 0)$ to obtain shape S.

(2)

(Total: 5 marks)

- 15 The temperature C measured in degrees Celsius ($^{\circ}\text{C}$) is related to the temperature F measured in degrees Fahrenheit ($^{\circ}\text{F}$) by the equation:

$$\frac{C}{5} = \frac{F-32}{9}$$

- (a) What is the temperature in $^{\circ}\text{C}$ when it is 104°F ?

(1)

- (b) What is the temperature in $^{\circ}\text{F}$ when it is 180°C ?

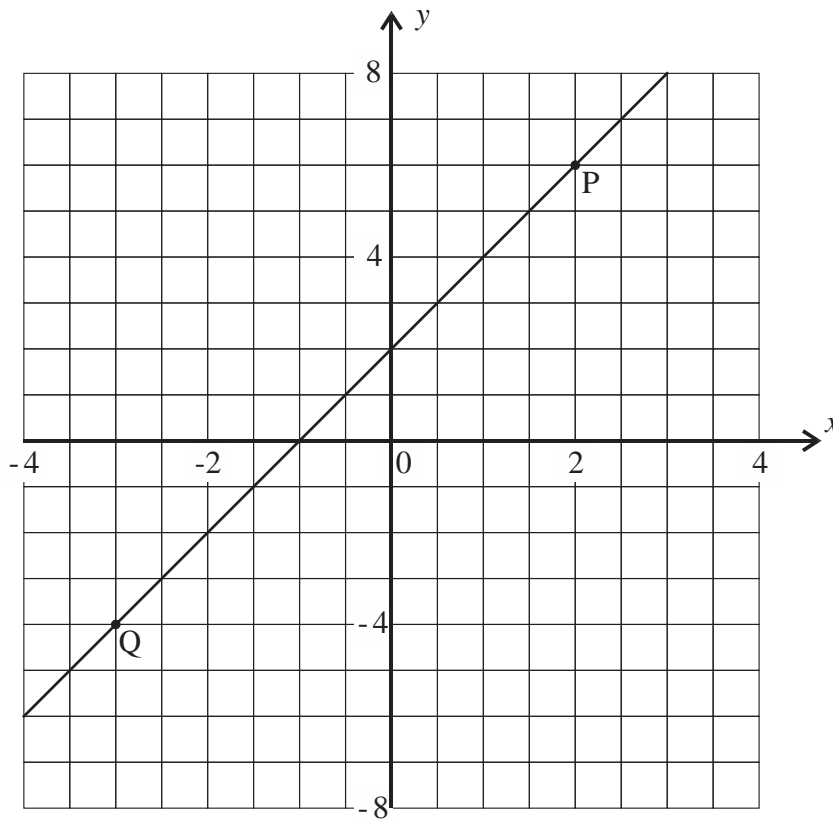
(1)

- (c) Make F the subject of the formula $\frac{C}{5} = \frac{F-32}{9}$

(3)

(Total: 5 marks)

16 The graph below shows a line passing through the points P and Q.



(a) What are the coordinates of points P and Q?

(b) Some of the following equations describe the equation of the line graph which passes through P and Q. Which are they? (2)

- (i) $y = x + 2$
- (ii) $y = 2x + 2$
- (iii) $y = 2$ and $x = -1$
- (iv) $y - 2x = 2$

(2)
(Total: 4 marks)

17 A bolt of lightning starts at a point P.

The speed of sound in air is 340 m/s and the speed of light in air is 300, 000 km/s.

Point Q is 5 km away from point P.

(a) How long does it take the thunder sound to travel from P to Q?

Give your answer correct to the nearest second.

(3)

(b) How long does it take the flash of lightning to travel from P to Q?

Give your answer in standard form correct to 3 significant figures.

(3)

(c) Which arrives first at Q, the flash or the sound of lightning? Give the time difference correct to the nearest second.

(2)

(Total: 8 marks)

18 Mary buys a pack of sugar paste to cover her cakes. The pack is in the shape of a cuboid measuring 5 cm by 8 cm by 9 cm.

- (a) She rolls out her sugar paste into a rectangular sheet of pastry of uniform thickness measuring 30 cm by 60 cm. Work out the thickness of this rectangular sheet.

- (b) As shown in the diagram, Mary cuts out two circular pieces of pastry, each of diameter 25 cm, from her rectangular sheet of pastry. What volume of pastry remains when she removes these two circular pieces of pastry?

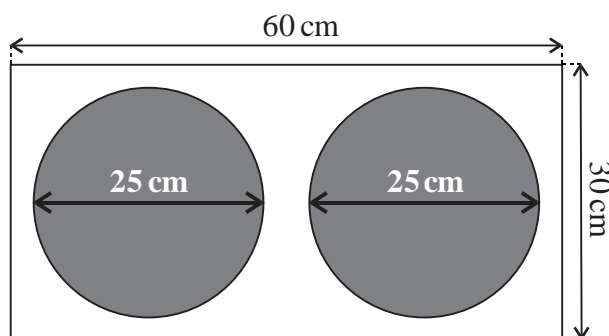


Diagram not drawn to scale

(4)
(Total: 8 marks)

Blank Page

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2017 SESSION

SUBJECT: Mathematics

PAPER: I – Section A (Non-Calculator Section)

DATE: 6th September 2017

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 Determine the value of x .

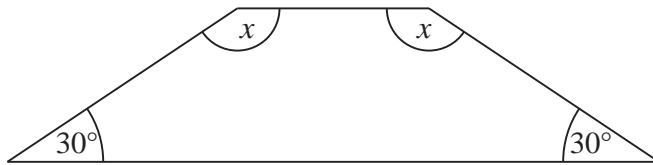


Diagram not drawn to scale

Ans _____

- 2 Which of the following letters have reflective symmetry?

O, P, X, Y, S

Ans _____

- 3 A clock is 17 minutes fast. What time is shown on this clock when the correct time is 08:15?

Ans _____

- 4 Write the number **seven and a half million** in standard form.

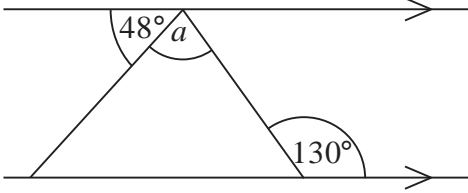
Ans _____

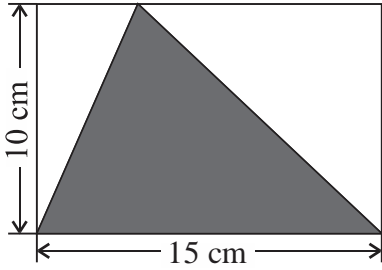
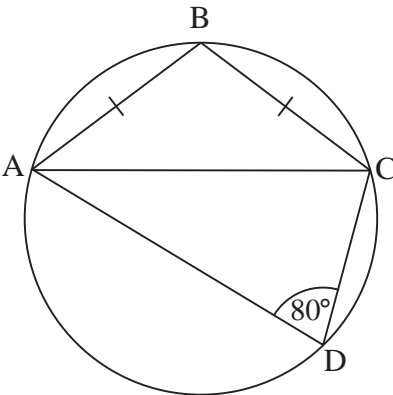
- 5 The daily temperature recorded in a particular place during the first week of September is shown below.


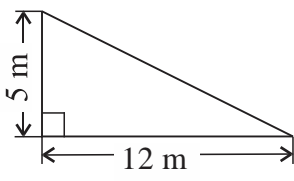
-5°C , -3°C , 2°C , -2°C , 1°C , 0°C , 3°C

Work out the range of these values.

Ans _____

<p style="text-align: center;">QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK</p>	<p style="text-align: center;">SPACE FOR ROUGH WORK (IF NECESSARY)</p>
<p>6 What is the Least Common Multiple of 16 and 12.</p> <p style="text-align: center;">Ans _____</p>	
<p>7 Use the diagram below to calculate the size of the angle marked a.</p> <div style="text-align: center;">  <p style="text-align: center;"><i>Diagram not drawn to scale</i></p> </div> <p style="text-align: center;">Ans _____</p>	
<p>8 Write the following numbers in order, starting with the smallest number.</p> <p style="text-align: center;">$0.0077, \quad \frac{1}{2}, \quad 0.3, \quad 0.7$</p> <p style="text-align: center;">Ans _____, _____, _____, _____</p>	
<p>9 Write the following expression in its simplest possible form.</p> $\frac{5x + 3}{2} - \frac{x + 1}{2}$ <p style="text-align: center;">Ans _____</p>	
<p>10 What is the value of a which satisfies these two equations?</p> $a + 4b = 7$ $a - 4b = 5$ <p style="text-align: center;">Ans _____</p>	

<p style="text-align: center;">QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK</p>	<p style="text-align: center;">SPACE FOR ROUGH WORK (IF NECESSARY)</p>
<p>11 The diagram shows a rectangle. Work out the area of the shaded triangle.</p>  <p style="text-align: right;"><i>Diagram not drawn to scale</i></p> <p style="text-align: right;">Ans _____</p>	
<p>12 A shoe shop is offering a discount of 20% on the marked prices. How much is to be paid for a pair of sandals with a marked price of €45?</p> <p style="text-align: right;">Ans _____</p>	
<p>13 ABCD is a cyclic quadrilateral with $AB = BC$. Work out the size of $\angle BAC$.</p>  <p style="text-align: right;"><i>Diagram not drawn to scale</i></p> <p style="text-align: right;">Ans _____</p>	
<p>14 Which of the following is the smallest number?</p> <p style="text-align: center;">$1, 10^{-5}, 10^1, 10^{-3}$</p> <p style="text-align: right;">Ans _____</p>	
<p>15 Work out the value of $\frac{1}{2.5}$. Give your answer as a decimal number.</p> <p style="text-align: right;">Ans _____</p>	

<p style="text-align: center;">QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK</p>	<p style="text-align: center;">SPACE FOR ROUGH WORK (IF NECESSARY)</p>
<p>16 Work out the value of this expression.</p> $\frac{11 \times 30 + 60}{15}$ <p style="text-align: right;">Ans _____</p>	
<p>17 Use the number line below to read the number indicated by the arrow.</p>  <p style="text-align: right;">Ans _____</p>	
<p>18 One Australian Dollar (AUD) is about two thirds of a Euro. Estimate the value of €100 in AUD.</p> <p style="text-align: right;">Ans _____</p>	
<p>19 What is the length of the unknown side of this right-angled triangle?</p>  <p style="text-align: right;"><i>Diagram not drawn to scale</i></p> <p style="text-align: right;">Ans _____</p>	
<p>20 A worker has an eight hour shift that starts at 22:30. When he finishes work, he takes 45 minutes to arrive home. At what time does he arrive home, the next morning?</p> <p style="text-align: right;">Ans _____</p>	

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL**SEPTEMBER 2017 SESSION**

SUBJECT:	Mathematics
PAPER NUMBER:	I – Section B (Calculator Section)
DATE:	6 th September 2017
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.

<i>For Office Use Only</i>												
Sec A	1	2	3	4	5	6	7	8	9	10	11	Total

1 (a) Simplify $4a - 3b + 9a - 5b$

(1)

(b) Expand $3x(2 + x)$

(2)

(c) Factorise $5a + 125$

(1)

(d) Solve $7r + 5 = 9 - r$

(2)

(e) The time T in seconds for a full swing of a pendulum of length L (in metres) is given by the equation

$$T = 2\pi \sqrt{\frac{L}{9.8}}$$

Work out the value of T when $L = 0.9$ m.

(2)

(Total: 8 marks)

DO NOT WRITE ABOVE THIS LINE

2 Vanessa works 8 hours a day on Monday, Tuesday and Wednesday, and 6 hours a day on Thursday and Friday. She earns €270 a week.

(a) How much does she earn in euro per hour?

(3)

(b) Vanessa pays 10% of her wage on National Insurance. What is her annual salary after National Insurance is deducted?

(3)

(Total: 6 marks)

DO NOT WRITE ABOVE THIS LINE

3 A blue dice and a red dice are tossed together.

(a) Complete the table below to show the set of all possible outcomes.

		Number on the Blue Dice					
		1	2	3	4	5	6
Number on the Red Dice	1	(1, 1)	(2, 1)	(3, 1)	(4, 1)		
	2	(1, 2)	(2, 2)	(3, 2)	(4, 2)		
	3	(1, 3)	(2, 3)	(3, 3)	(4, 3)		
	4	(1, 4)	(2, 4)	(3, 4)	(4, 4)		
	5	(1, 5)	(2, 5)	(3, 5)	(4, 5)		
	6	(1, 6)	(2, 6)	(3, 6)	(4, 6)		

(b) What does the entry (2, 6) in the table above represent? (2)

(c) What is the probability that both dice show the same number? (1)

(d) The Total Score is the sum of the scores on the two dice. (2)
Which Total Score is most likely? What is the probability of obtaining this Total Score?

(3)

(Total: 8 marks)

4 Katia and Franco go to a confectionery.

Katia gets 4 cheesecakes and 2 pies for €4.

Franco gets 6 cheesecakes and 4 pies for €7.20.

If c stands for the cost, in cents, of a cheesecake and p stands for the cost, in cents, of a pie, write two equations involving c and p .

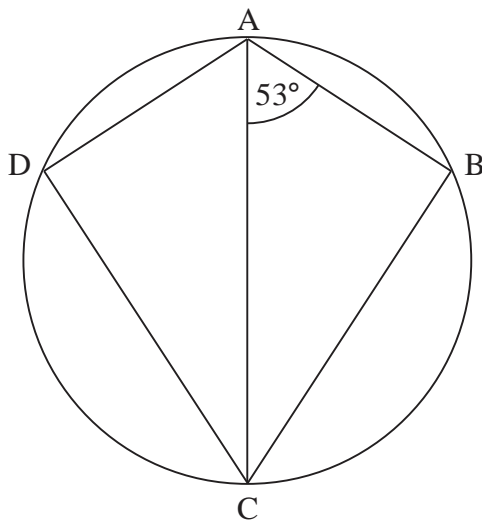


Use your equations to work out the cost of a cheesecake and the cost of a pie.

(Total: 6 marks)

DO NOT WRITE ABOVE THIS LINE

- 5 In the figure below, AC is a line of symmetry and the vertices of the quadrilateral ABCD lie on a circle. Angle BAC is equal to 53° .

*Diagram not drawn to scale*

Work out the size of the following angles.
In each case, give a reason for your answer.

(a) $\angle DAC$

(2)

(b) $\angle ABC$

(2)

(c) $\angle ACD$

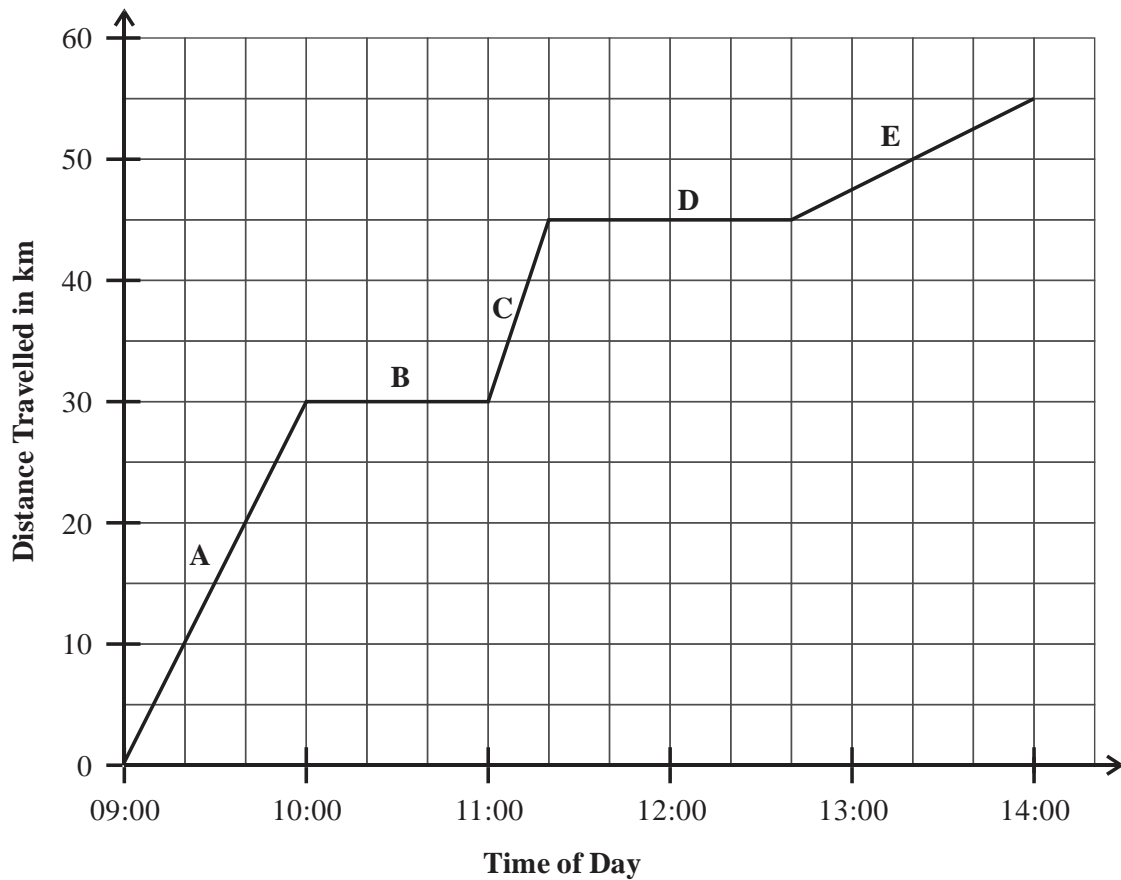
(2)

(d) $\angle ABD$

(2)

(Total: 8 marks)

6 On her last day in the U.K., Jane left her hotel by car at 09:00. On her way to the airport, she visited two shops. The distance-time graph shows her journey.



- (a) How much time did she spend visiting the two shops? (2)
- (b) What distance was travelled to go from one shop to the other? (1)
- (c) How many kilometres did she travel altogether to reach the airport? (1)
- (d) What was her speed in km/h during Part E of her journey? (2)
- (e) During which part of the journey was her speed the fastest? Explain your reasoning. (3)

(Total: 9 marks)

- 7 The diagram shows a running track.

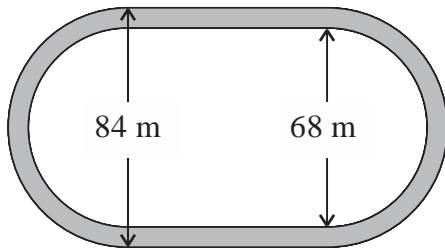


Diagram not drawn to scale

The perimeter of the track is made up of straight lines and semicircles.
The length of the outer perimeter is 400 m.
The diameter of the outer semicircle is 84 m.

- (a) Find the length of **ONE** straight section of the track.

(3)

The diameter of the inner semicircle is 68 m.

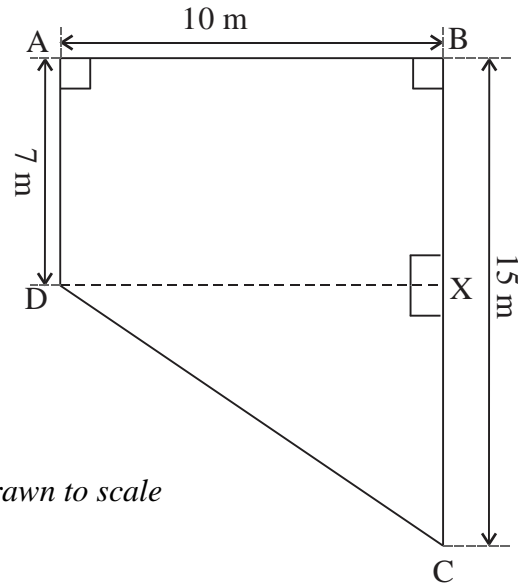
- (b) Find the area of the track (the shaded area).

(5)

(Total: 8 marks)

8 The diagram shows a hall ABCD where $\angle DAB$ and $\angle ABC$ are both right angles. X is a point on BC so that the line DX is perpendicular to BC.

(a) Give a reason why DX is 10 m long.



(1)

Diagram not drawn to scale

(b) Work out the length of CD in metres, correct to one decimal place.

(3)

(c) Work out the size of $\angle BCD$.

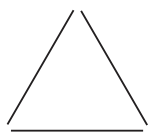
(3)

(d) Work out the size of $\angle ADC$.

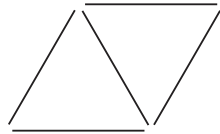
(2)

(Total: 9 marks)

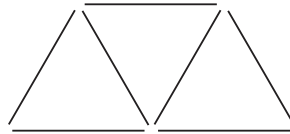
9 A sequence of shapes is made from sticks.



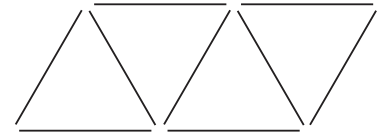
Shape 1



Shape 2



Shape 3



Shape 4

(a) Complete the table below for the number of sticks in different shapes.

Number of Sticks for Different Shapes

Shape Number	1	2	3	4	5		10		n
Number of sticks	3								

(4)

(b) Which of the following statements is correct?
 Mark this statement by placing a tick (✓) in the adjacent box.

The number of sticks in each shape of the sequence is:

Always even

Always odd

Sometimes even and sometimes odd

(1)

(c) What is the shape number of the shape which is made up of 3001 sticks?

(2)

(Total: 7 marks)

10 (a) Maria mixed bleaching liquid with water to make two mixtures.

Mixture **A**: 2 parts bleaching liquid and 5 parts water

Mixture **B**: 3 parts bleaching liquid and 8 parts water

Which mixture is more concentrated? Show your working.

(3)

(b) A sum of money is to be divided among three people.

John will take half the sum.

Maria will take twice as much as Sandra.

Work out the ratio:

John's share: Maria's share: Sandra's share

(3)

(Total: 6 marks)

DO NOT WRITE ABOVE THIS LINE

- 11 A motorist makes a journey of 200 km. Over the first 50 km, the motorist drives at an average speed of 40 km/h. Over the rest of the journey, he drives at an average speed of 80 km/h.

Work out the average speed of the motorist over the whole journey.

(Total: 5 marks)

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2017 SESSION

SUBJECT:	Mathematics
PAPER NUMBER:	IIB
DATE:	6 th September 2017
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.

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

1 Fill in the blank spaces to complete the following statements:

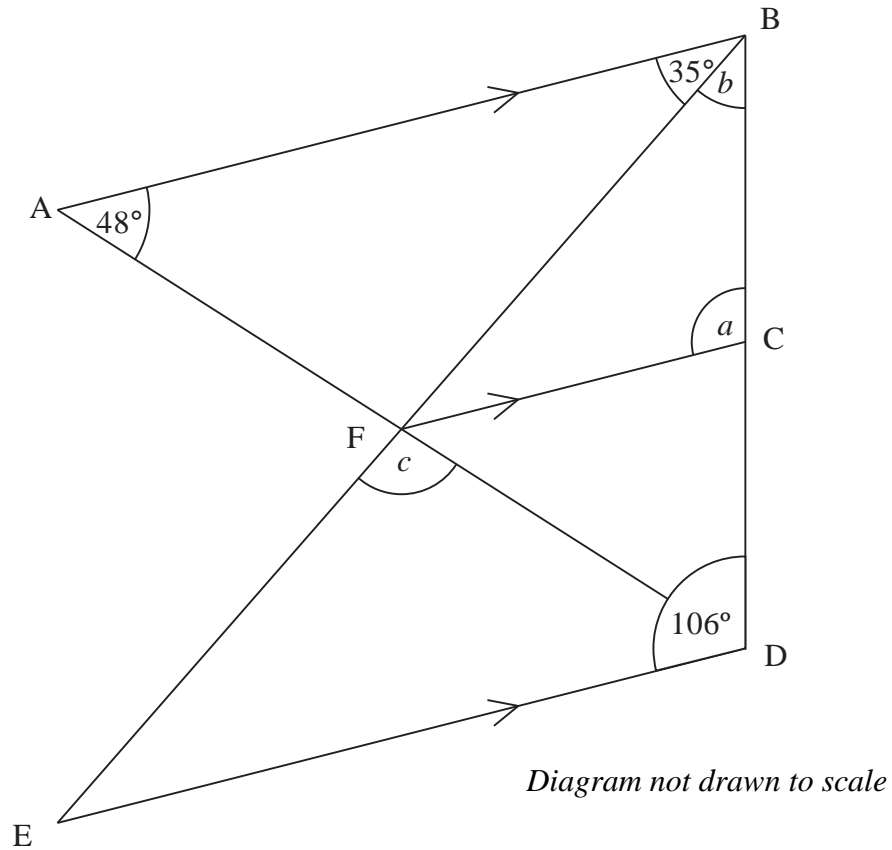
- (a) 366 centimetres = _____ metres
- (b) The value of $\frac{3}{4}$ as a percentage is _____
- (c) The value of 4.5×10^{-2} as a decimal number is _____
- (d) _____ is the square number between 15 and 20
- (e) _____ is a prime number between 15 and 20
- (f) When rounded to the nearest cent, €2.112 is _____
- (g) When written as a fraction in its simplest form, 0.015 is _____

(Total: 7 marks)

2 A car is travelling at 45 miles per hour. The speed limit on the road is 60 km/h.
Is the car travelling below the speed limit? You must show your working.
Use 1km = 0.62137 miles.

(Total: 3 marks)

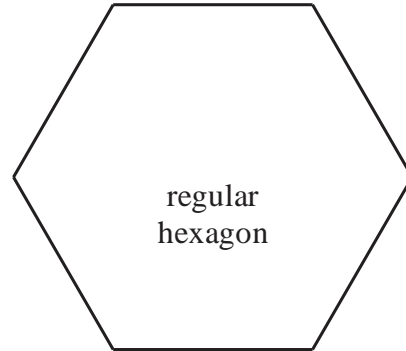
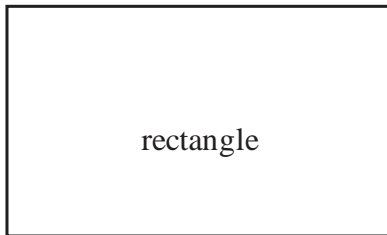
- 3 In the diagram below, the lines AB, FC and ED are parallel.
AFD, BCD and BFE are straight lines.



Use the information in the figure to work out the size of the angles marked a , b and c .
Give reasons for your answers.

(Total: 6 marks)

- 4 Mark all the lines of reflective symmetry for each shape.

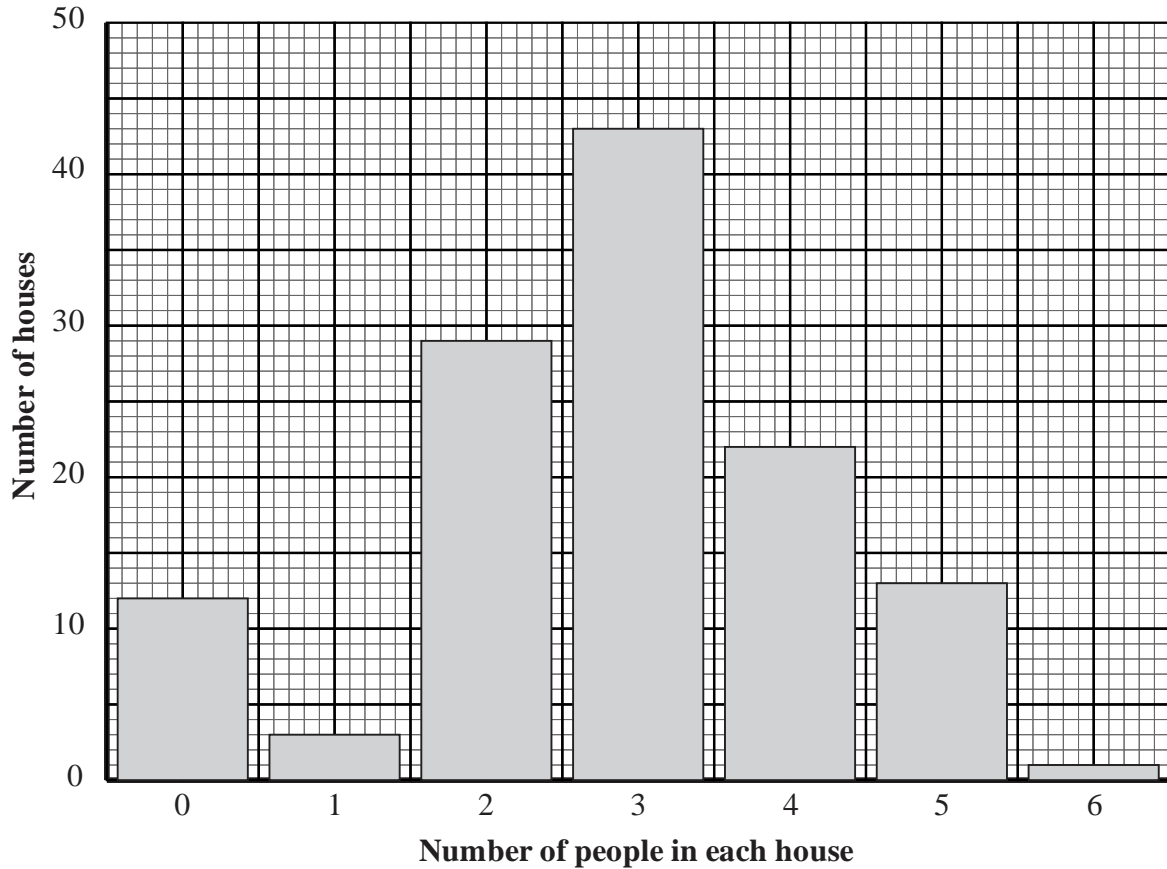


(Total: 5 marks)

- 5 Katia sits for four tests. She gets promoted if her mean mark on the four tests is 75% or more. Katia's results on the first three tests are 81%, 72% and 73%. What is the least mark that Katia needs on her fourth test to be promoted?

(Total: 4 marks)

- 6 A survey recorded the number of people in each house of a particular street. This information was used to plot the bar chart shown below.



- (a) Use the bar chart to find:
- (i) the number of houses with no people living in them; (1)
 - (ii) the number of houses with more than 2 people living in them; (2)
 - (iii) the total number of houses in the street. (2)
- (b) Work out the number of houses with no people living in them as a percentage of the total number of houses in the street.

(2)

(Total: 7 marks)

7 Diesel costs €1.14 per litre.

A car that runs on diesel covers an average of 640 km with €40 of diesel.

(a) Calculate the amount of diesel in litres bought for €40. Give your answer correct to the nearest litre.

(2)

(b) Work out the average cost, in cents, for each km the car travels.

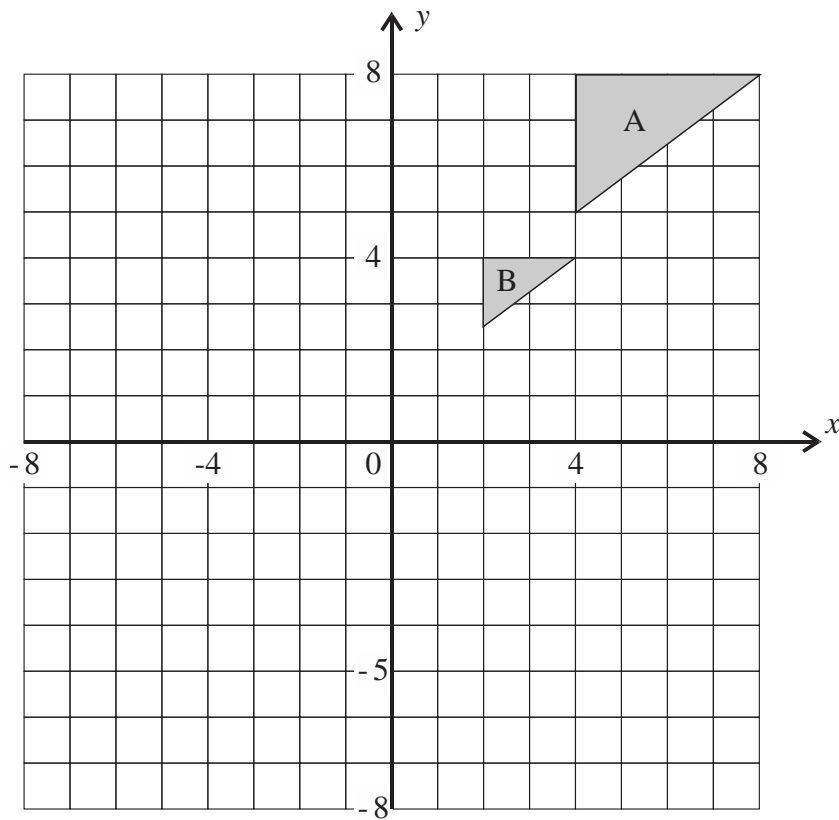
(2)

(c) Find the average distance that the car travels with each litre of diesel.

(2)

(Total: 6 marks)

8



(a) Describe fully the transformation which maps Triangle A onto Triangle B.

(2)

(b) Translate Triangle A by $\begin{pmatrix} -9 \\ -2 \end{pmatrix}$ to obtain Triangle C.
Draw and label Triangle C.

(1)

(c) Rotate Triangle A by 180° about the origin to obtain Triangle D.
Draw and label Triangle D.

(1)

(Total: 4 marks)

DO NOT WRITE ABOVE THIS LINE

-
- 9 (a) A flight leaves Malta at 10:50 am and arrives in Istanbul at 2:10 pm local time. Istanbul is one hour ahead of Malta. Find the duration of this flight.

- (2)
- (b) A flight from Istanbul arrives in Malta at 3:00 am. If the flight took the same flying time as the one in part (a), work out the local time at which it left Istanbul.

(3)

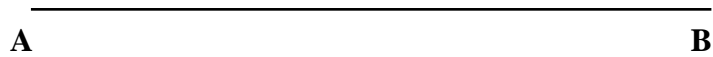
(Total: 5 marks)

- 10 A restaurant offers a 15% discount on its prices on Mondays.
Last Monday, Arnold paid €38.25 for a meal.
What price would he have paid for the same meal on a Tuesday?

(Total: 3 marks)

DO NOT WRITE ABOVE THIS LINE

-
- 11 Use ruler and compasses only in this question.
- (a) Using line AB drawn below as base, construct triangle ABC with $\angle CAB = 90^\circ$ and $BC = 12$ cm. (3)
 - (b) Using BC as base, construct triangle BCD so that $CD = 9.6$ cm and $BD = 7.2$ cm. (2)
 - (c) Construct the perpendicular bisector of BC. (2)
 - (d) Draw a circle with diameter BC. (1)



(Total: 8 marks)

- 12 Martha has a ream of paper. There are 500 sheets of paper in a ream.
The ream has a thickness of $4\frac{3}{4}$ cm.



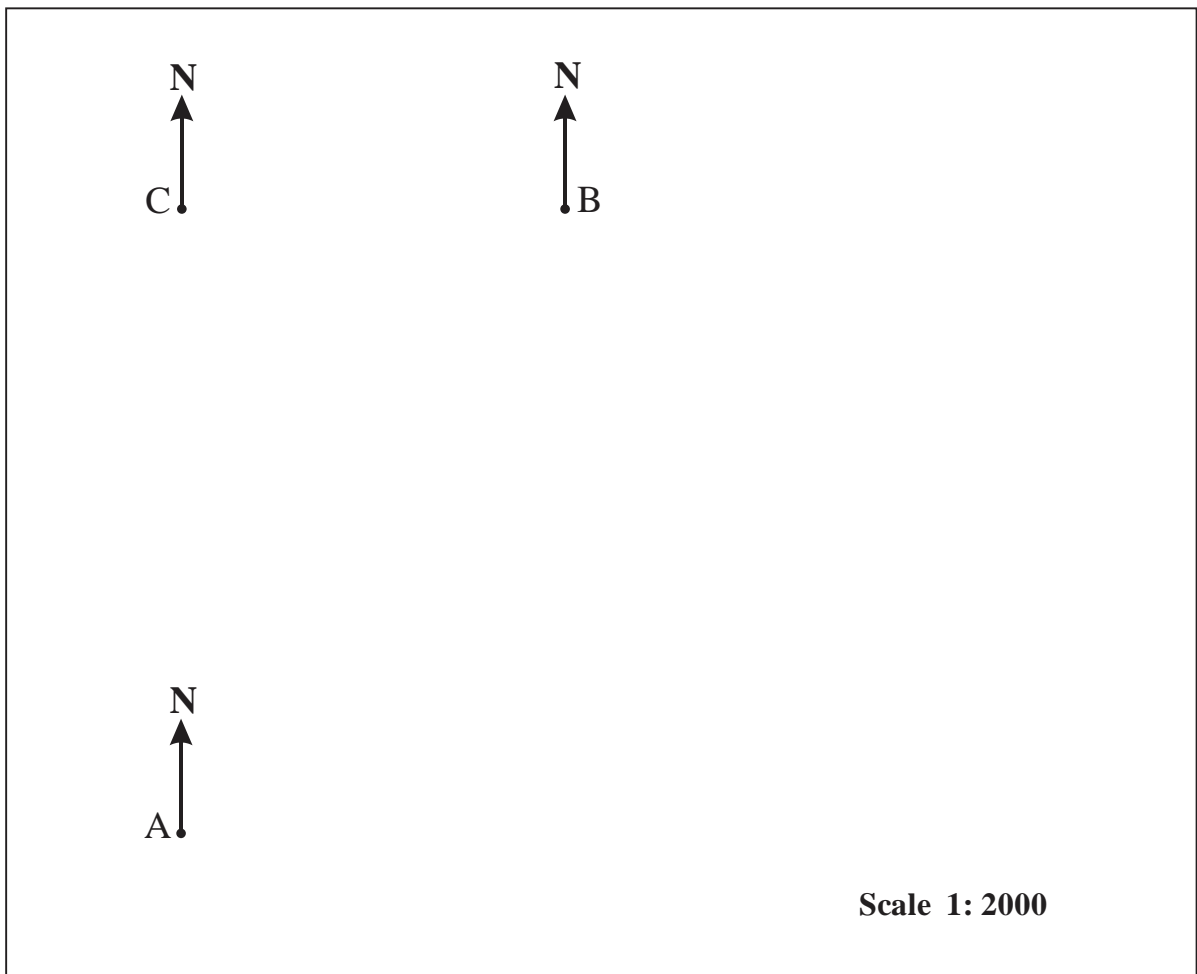
- (a) What is the thickness, in mm, of one of the sheets of paper?
- (b) Martha removes 300 sheets of paper from this ream. How thick will the remaining pile of pages be?

(3)

(2)

(Total: 5 marks)

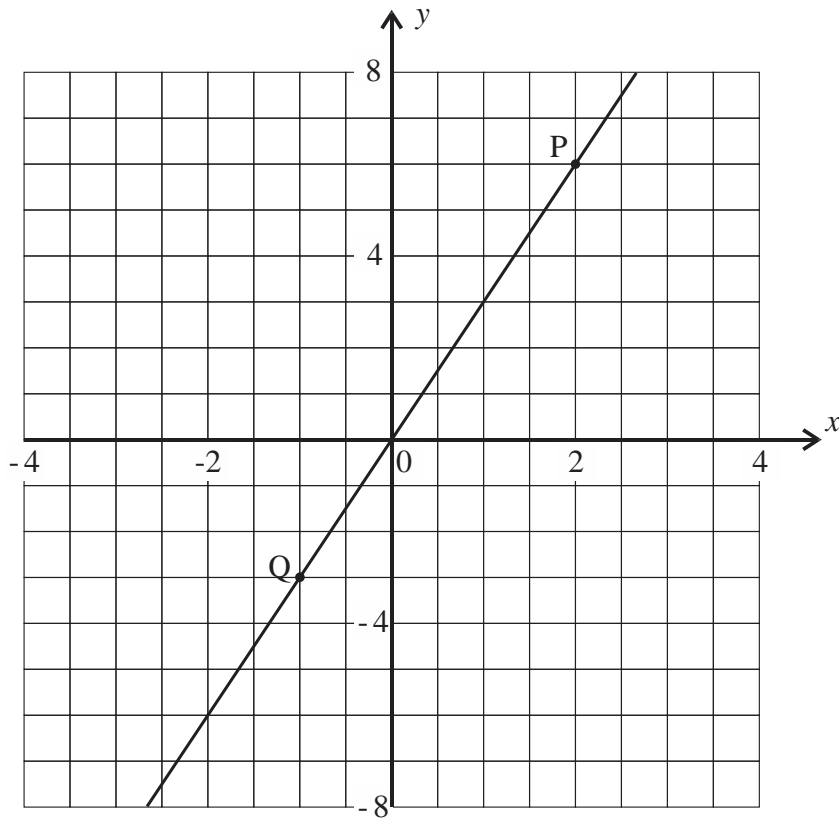
- 13 The figure shows a scale drawing of the position of three places A, B and C on a map. The North direction is shown at each of these three places with an arrow.



- (a) What is the bearing of B from C? (1)
- (b) What is the actual distance BC in metres? (2)
- (c) What is the bearing of B from A? (1)
- (d) Use the figure to mark the position of a place P so that:
 PA = PB = 160 m and
 P and C are on opposite sides of AB. (3)

(Total: 7 marks)

14



(a) Write down the coordinates of the points P and Q.

(2)

(b) Write down the equation of the line passing through the points P and Q.

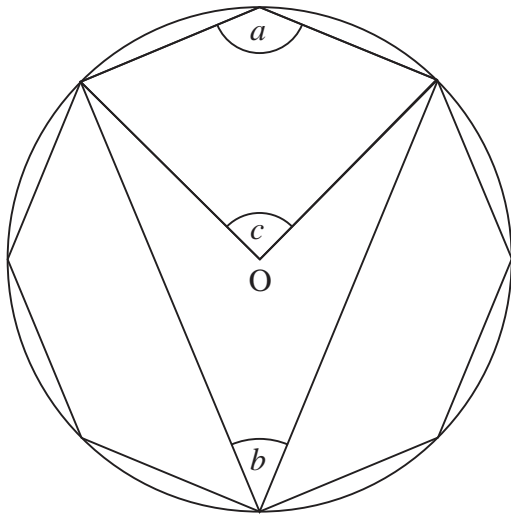
(1)

(c) On the same graph, draw the line with equation $y = -4$.

(1)

(Total: 4 marks)

- 15 The figure shows a circle with centre O . The vertices of a regular octagon lie on this circle.



- (a) Use a protractor to measure the angles marked a , b and c .

(2)

- (b) Use a method, other than measuring, to work out the size of:

(i) angle a

(ii) angle b

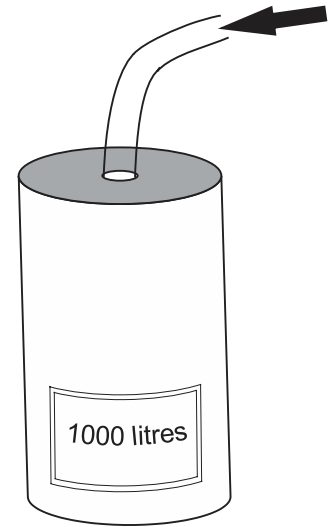
(iii) angle c

(6)

(Total: 8 marks)

- 16 An empty tank has a capacity of 1000 litres.
It is filled from a water tap at a rate of 75 ml/s.

- (a) How many litres of water flow into the tank:
(i) in one minute?



- (ii) in one hour?

- (b) How long does it take to fill the tank?
Give your answer in hours and minutes, correct to the nearest minute.

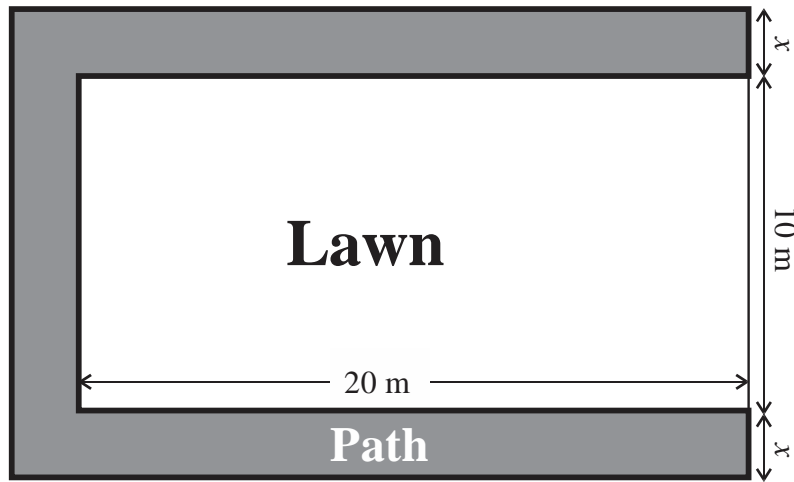
(2)

(1)

(3)

(Total: 6 marks)

- 17 A rectangular lawn measuring 20 metres by 10 metres is surrounded on three sides by a path of width x metres as shown in the diagram.



The **total** perimeter of the path is 112 m.

- (a) Find the width x of the path.

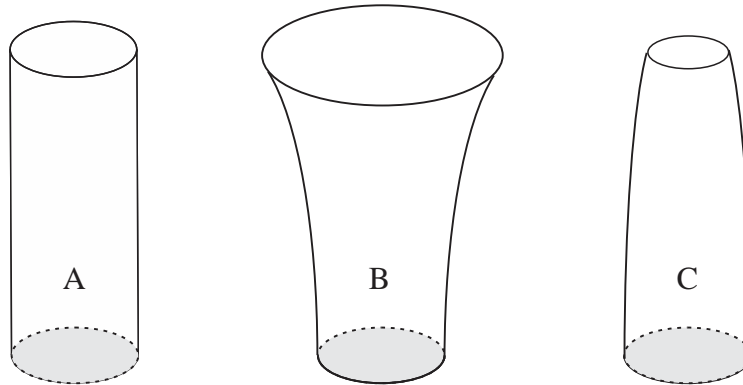
- (b) Find the area of the path.

(4)

(3)

(Total: 7 marks)

- 18 (a) The three containers shown in the figure all have a circular base of radius 5 cm.
A litre of water is poured into each container.



- (i) Which container has the highest level of water? (1)
- (ii) Which container is in the shape of a cylinder? (1)
- (iii) What is the height of water in container A? (1)

(3)

(Total: 5 marks)