

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

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2015 SESSION

SUBJECT: Mathematics
DATE: 3rd September 2015

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 movie starts at 22:50 on Sunday and ends on 01:00 on Monday. How long is the movie?

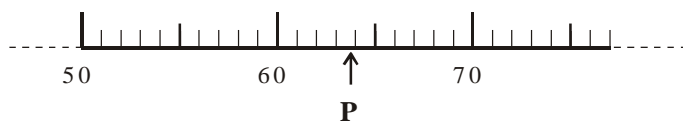
Ans _____

2 This list shows the height of five children in cms. Work out their median height.

115, 143, 160, 155, 133

Ans _____

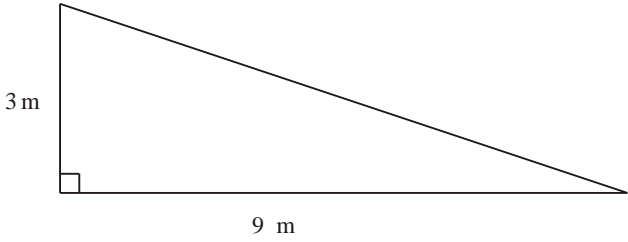
3 Read the position of P to the nearest whole number.

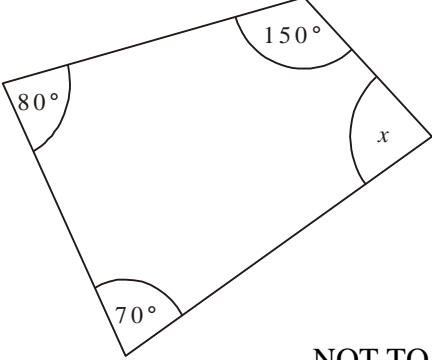


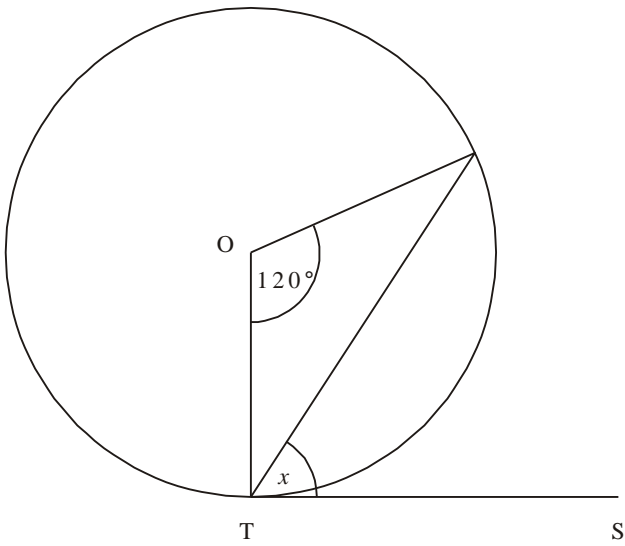
Ans _____

4 Write the number 87,436,880 to three significant figures.

Ans _____

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)
<p>5 Find the value of p which satisfies the equation:</p> $3p + 5 = -10$ <p style="text-align: right;">Ans _____</p>	
<p>6 Work out $0.7 - 0.03$</p> <p style="text-align: right;">Ans _____</p>	
<p>7 Put the following numbers in order, starting from the smallest.</p> $\frac{1}{2}, \quad -\frac{1}{4}, \quad \frac{5}{8}, \quad -\frac{3}{4}$ <p style="text-align: right;">Ans _____</p>	
<p>8 Find the area of this triangle.</p>  <p style="text-align: right;">Ans _____</p>	
<p>9 Factorise $15a + 5b$</p> <p style="text-align: right;">Ans _____</p>	
<p>10 Give one prime number between 20 and 30.</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>11 Work out the size of the missing angle x of this quadrilateral.</p> <div style="text-align: center;">  <p style="margin-top: 10px;">NOT TO SCALE</p> </div> <p style="text-align: right;">Ans _____</p>	
<p>12 Find the value of:</p> $3.5 \times 997 + 3.5 \times 3$ <p style="text-align: right;">Ans _____</p>	
<p>13 Give a fraction between $\frac{2}{7}$ and $\frac{2}{5}$.</p> <p style="text-align: right;">Ans _____</p>	
<p>14 Write 18 as a product of prime factors.</p> <p style="text-align: right;">Ans _____</p>	
<p>15 How many small bottles with capacity 250 ml can be filled from a can which holds 4.5 litres of liquid?</p> <p style="text-align: right;">Ans _____</p>	
<p>16 Write the ratio 1.5 : 3000 in its simplest form.</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>17 Two hundred and forty tickets are sold in a raffle. One ticket will be drawn to determine the prize winner. Rita has 0.1 chance of winning this prize. How many tickets did Rita buy?</p> <p style="text-align: right;">Ans _____</p>	
<p>18 Work out an approximate value for the following expression, giving your answer to one significant figure.</p> $\frac{2.98 + 3885}{1.99}$ <p style="text-align: right;">Ans _____</p>	
<p>19 In this question use the fact that $178 \times 43 = 7654$. Work out the exact value of 1780×0.0043</p> <p style="text-align: right;">Ans _____</p>	
<p>20 This circle has centre at O. The line TS is a tangent to the circle. Find the size of the angle marked x.</p>  <p style="text-align: center;">NOT TO SCALE</p> <p style="text-align: right;">Ans _____</p>	

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

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2015 SESSION

SUBJECT:	Mathematics
PAPER NUMBER:	I – Section B (Calculator Section)
DATE:	3 rd September 2015
TIME:	1hr and 40 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	Total

1 A shop is offering a discount of 35% on all items.

(i) What is the sale price of an object which costs €55 before the sale?

3 marks

(ii) One of the items in the shop costs €18.20 during the sale. What was the cost of this item before the sale?

3 marks

2 Samira prints invitation cards in her shop.

The invitation cards are all the same size. They come in materials of three different thicknesses: Very Thick (**V**), Medium Thick (**M**) and Thin (**T**).

All the invitation cards are white but they have a coloured border. For each thickness, the borders can be Gold (**G**), Silver (**S**), Red (**R**) and Blue (**B**).

(i) List all the possible types of invitation cards. The first one has been done for you.

VG,

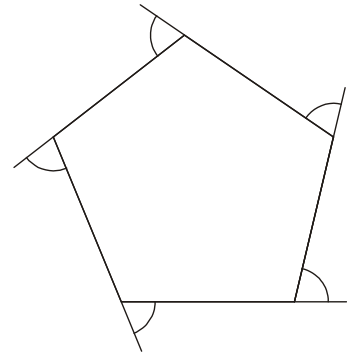
3 marks

(ii) Paul orders invitations from Samira's shop for a party. He chooses the type of card at random.

What is the probability he chooses very thick cards with a gold or silver border?

2 marks

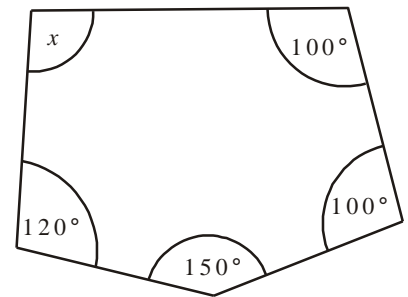
- 3 (i) Find the size of the exterior angle of a regular pentagon.
Show your working.



NOT TO SCALE

2 marks

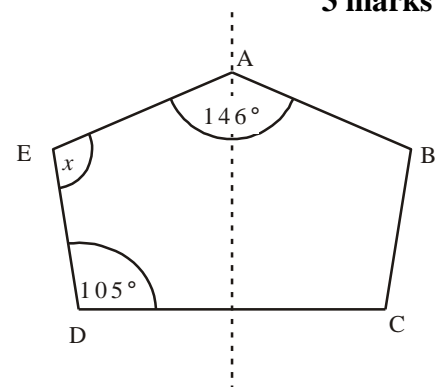
- (ii) Four of the interior angles of this pentagon are 100° , 100° , 150° and 120° . Work out the size of the remaining angle marked x .



NOT TO SCALE

3 marks

- (iii) The pentagon shown on the right is symmetrical about the dotted line. Use the measurements given in the diagram to find the size of the angle marked x .



NOT TO SCALE

3 marks

-
- 4 (i) The table shows the area in km^2 of five of the largest deserts on Earth.

Desert	Area in km^2
Arabian Desert	2.33×10^6
Great Basin Desert	4.92×10^5
Great Victoria Desert	6.47×10^5
Patagonian Desert	6.71×10^5
Sahara Desert	9.48×10^6

- (a) Which is the largest of the deserts in the list?

1 mark

- (b) Which is the smallest of the deserts in the list?

1 mark

- (c) The area of Malta is 316 km^2 . What is the ratio Area of Malta: Area of Sahara?
Give your answer in the form $1 : n$.

2 marks

- (ii) The Earth is roughly a sphere of radius 6370 km.

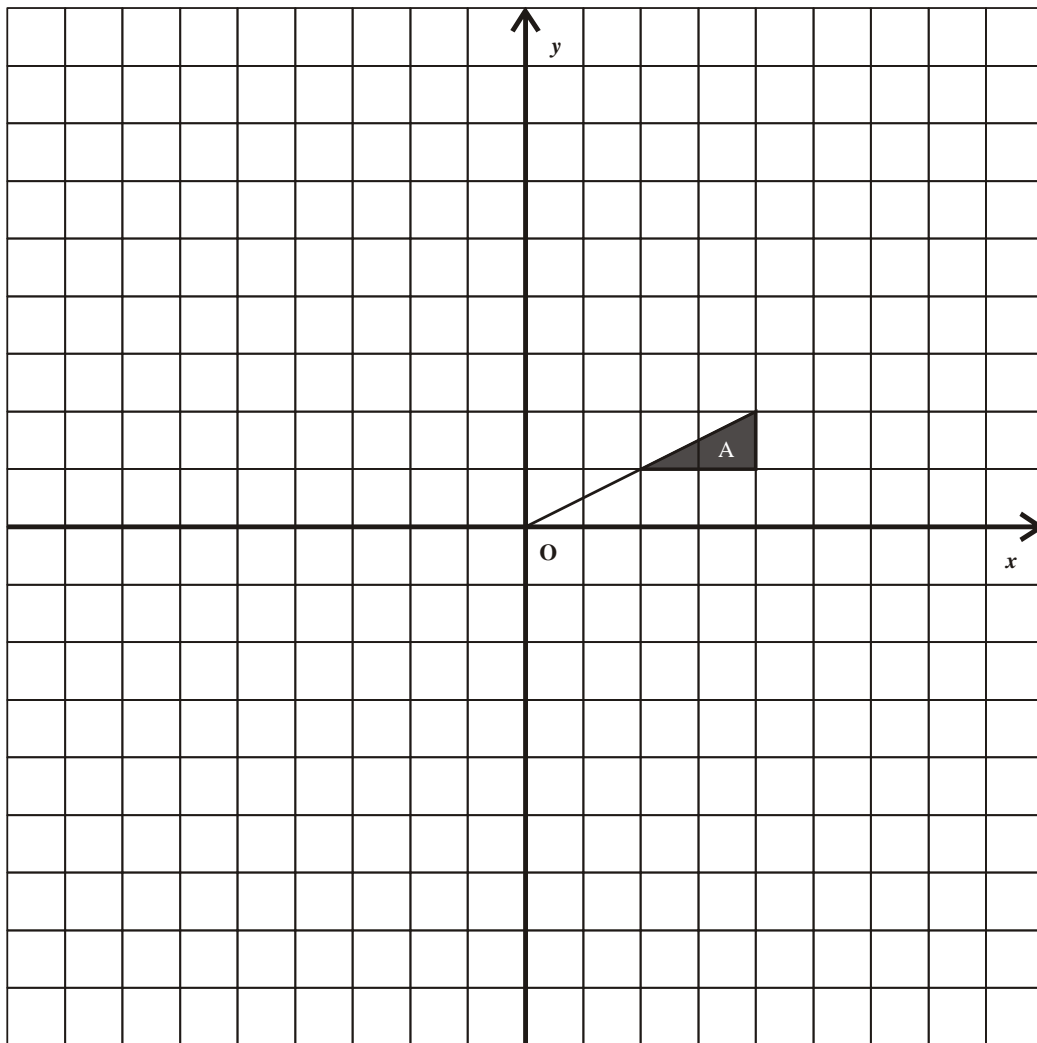
- (a) The surface area A of a sphere is given by the equation $A = 4\pi r^2$ where r is the radius of the sphere. Use this equation to work out the total surface area of Earth to the nearest million square kilometre.

3 marks

- (b) Work out the total percentage of the Earth's surface that is covered by the Sahara Desert. Give your answer to one decimal place.

3 marks

5



Shape A has been drawn on the grid. This shape includes a line and a triangle.

- (i) Reflect Shape A in the x axis and label the image as B. **1 mark**
- (ii) Enlarge Shape A by 2 about the point O and label the image as C. **2 marks**
- (iii) What transformation maps Shape C onto Shape A? **2 marks**
- (iv) Rotate Shape A by 90° anticlockwise about the point O and label the image as D. **2 marks**
- (v) Rotate Shape D by 180° about the point O and label the image as E. **1 mark**
- (vi) Describe the single transformation that maps Shape A directly onto Shape E

2 marks

6 One of the equations below is never true, whatever the value of x .

Another is true for all values of x .

One equation is true for two values of x .

Some equations are true for one value of x only.

A. $7x - 5x + 20 = 20 + 2x$

B. $x^2 = 25$

C. $x^3 = 8$

D. $5x + 27 = 27$

E. $3x = 3x + 2$

F. $100 - 3x = 58$

(i) Which of the above equations is never true for any value of x ? Explain your reasoning.

2 marks

(ii) Which of the above equations is true for all values of x ?

1 mark

(iii) Which of the above equations is true for two values of x ? Solve this equation.

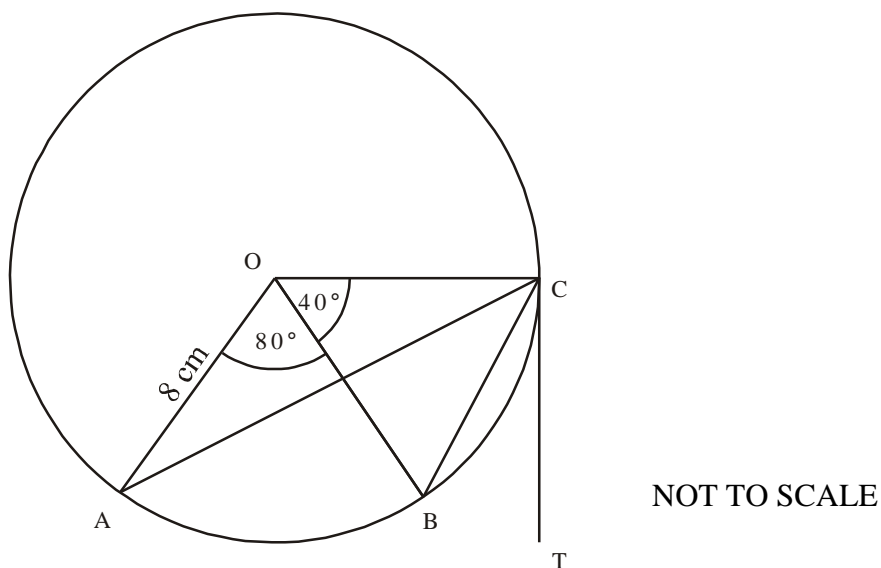
3 marks

(iv) Which of the above equations are true for one value of x only? Solve these equations.

6 marks

DO NOT WRITE ABOVE THIS LINE

- 7 The diagram shows a circle centre O and radius 8 cm . The points A , B and C lie on the circle. CT is a tangent to the circle at C and $\angle AOB = 80^\circ$ and $\angle BOC = 40^\circ$.



- (i) What is the size of $\angle OCA$? Explain your answer.

2 marks

- (ii) What is the size of $\angle ACB$? Explain your answer.

2 marks

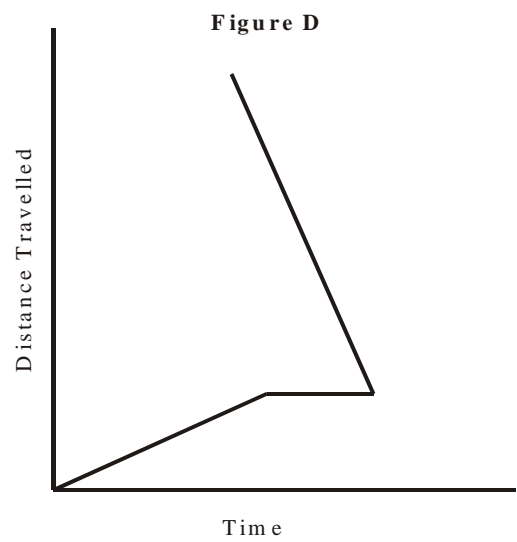
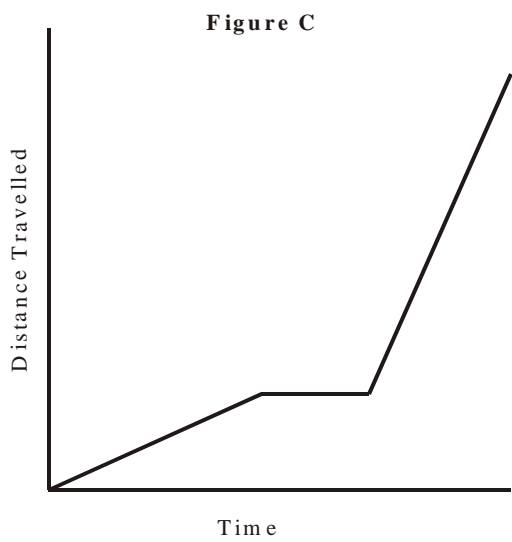
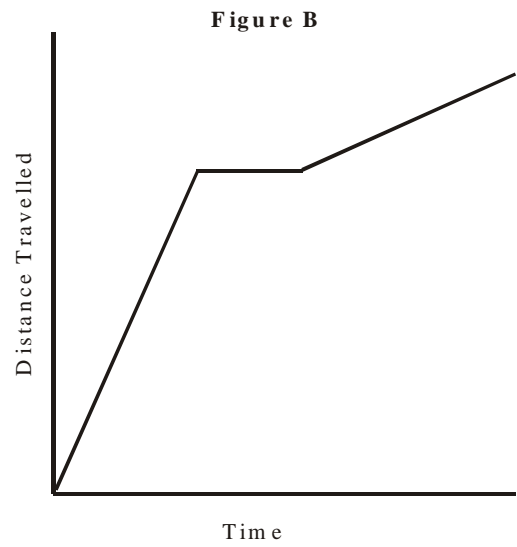
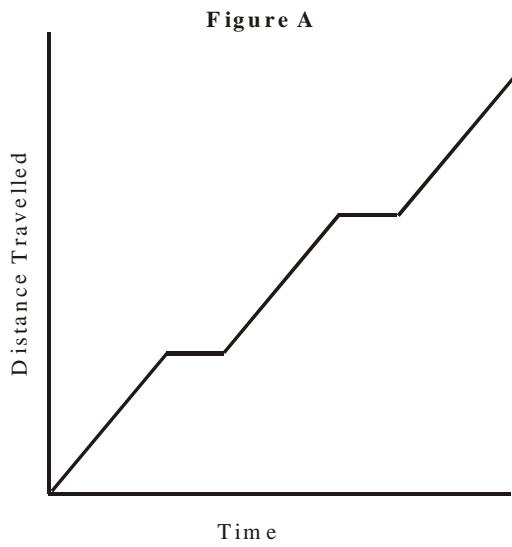
- (iii) What is the size of $\angle BCT$? Explain your answer.

3 marks

- (iv) Work out the length of the minor arc AB .

2 marks

8 This question is about the four Distance-Time graphs shown in Figures A, B, C and D.



- (i) Which of the above Distance - Time graphs could never represent a real journey? Explain why you think so.

2 marks

-
- (ii) Which one of the four graphs represents the journey described in the box below?
Explain why you are choosing this graph and not the three others.

Alex walked for 30 minutes at an average speed of 6 km/h to a bus station where he had to wait 15 minutes for his bus. The bus travelled for 20 minutes at an average speed of 30 km/h.

4 marks

- 9 (i) The volume V of a sphere of radius r is given by the equation $V = \frac{4\pi r^3}{3}$.
Rearrange this equation to make r the subject.

3 marks

- (ii) A block of metal of volume 40 cm^3 is molten and cast into a sphere. Calculate the radius of this sphere.

2 marks

- 10 (a)** Sue prepares two drinks.
Drink A is prepared by mixing 12 teaspoons of cocoa powder with 1 litre of milk.
Drink B is prepared by mixing 8 teaspoons of cocoa powder with 600 ml of milk.

Which drink is more chocolaty? Explain your reasoning.

3 marks

- (b)** A merchant imports three types of coffee bean; A, B and C. He uses these beans to make a mixture of coffee so that the weights of A, B and C are in the ratio 1 : 3 : 4.

The merchant wants to prepare a stock of 100 kg of this coffee mixture. What weight of each coffee bean does he need?

3 marks

- (c)** When driving at an average speed of 40 km/h, Vera takes 30 minutes to drive from home to work. How long does she take when she travels at an average speed of 60 km/h?

3 marks

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UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2015 SESSION

SUBJECT:	Mathematics
PAPER NUMBER:	IIB
DATE:	3 rd September 2015
TIME:	4:00 p.m. to 6:00 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	10
Mark										
Question No	11	12	13	14	15	16	17	18	19	
Mark										
										Total Mark

DO NOT WRITE ABOVE THIS LINE

1 Fill in the blank spaces to complete the statements below.

(i) 0.25 hour = _____ minutes

(ii) 1 litre = _____ cm³

(iii) $\frac{1}{8}$ kg = _____ grams

(iv) 150 seconds = _____ minutes

(v) 57 mm = _____ cm

5 marks

2 Malcolm's car uses an average of 25 litres of petrol for every 400 km driven.

(i) How many kilometers will the car travel on a litre of petrol?

1 mark

(ii) Malcolm filled his petrol tank completely. After travelling 512 km, he used up all the petrol in his tank. What is the capacity of his petrol tank?

1 mark

3 Use your calculator to find the value of $\sqrt{13.8^2 + 5.3^2}$.
Give your answer correct to one decimal place.

3 marks

DO NOT WRITE ABOVE THIS LINE

4 Stephen bought a bag of frozen shrimps. The storing instructions on this bag read as follows:

Store at a temperature equal or lower than -18°C .

- (i) Name two possible temperatures at which Stephen can store the shrimps so as to keep them in good quality.

2 marks

- (ii) Stephen has two freezers. One of these is set at a temperature of -19°C , the other is set at a temperature of -12°C . What is the difference in temperature of the two freezers?

2 marks

5 (a) Simplify:

(i) $4a + 3b + a + 7b$ _____

(ii) $7ab - 6 + 4ab$ _____

2 marks

(b) Write in another way by removing brackets:

(i) $a + (2a + 5)$ _____

(ii) $(a + 10) - (10 - a)$ _____

(iii) $a(2a + 5)$ _____

3 marks

- 6** Find the values of x and y that satisfy the two equations below:

$$3x - 2y = 9$$

$$x + 4y = 7$$

4 marks

- 7** The ages of Mark, Thomas and Ella add up to 88 years.
Thomas is 4 years older than Ella and Mark is twice as old as Ella.
Work out Mark's age.

5 marks

DO NOT WRITE ABOVE THIS LINE

-
- 8 Elaine is flying from London to Malta. During her flight, food is being sold at the prices shown below. Payment can be made using the Euro (€) or the British Pound (£).

PRICE LIST	
Croissant	€4.00
Sandwich	€4.50
Chips	€3.50
Chocolate bar	€1.80
Coffee	€3.00
Soft Drink	€2.50
Exchange Rate	€1 = £0.75

Elaine buys 2 sandwiches, a chocolate bar and a coffee.

She pays part of the cost with her last £5 note, then the rest in Euro.

How much does Elaine pay in Euro?

5 marks

DO NOT WRITE ABOVE THIS LINE

- 9 The following are three offers from three different shops for the same model of a smartphone.

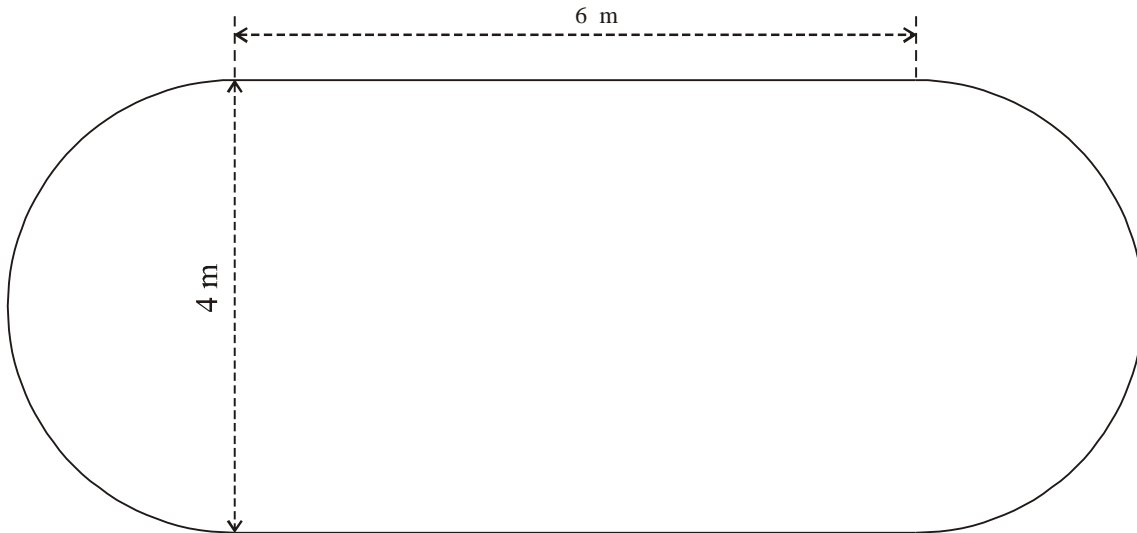
SHOP A	SHOP B	SHOP C
Price €220	Price €240	€50 deposit PLUS
25% discount	$\frac{1}{3}$ off the marked price	€20 a month for 6 months



Which is the cheapest offer? Show your working.

7 marks

- 10** The diagram shows the plan of a swimming pool.
Each of the curved section is in the shape of a semi-circle with diameter 4 m.
The two straight sections are each 6 m long.



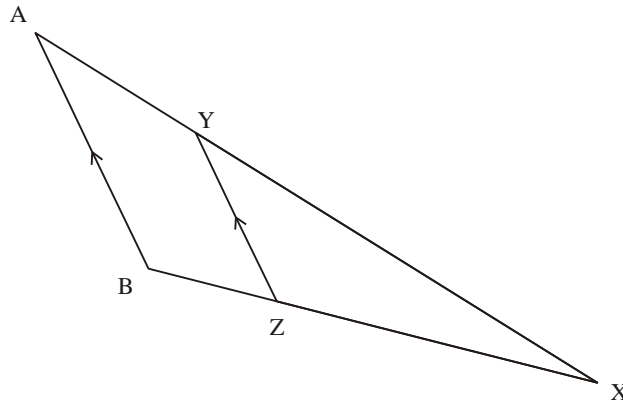
- (i) Calculate the total surface area of the swimming pool, giving your answer to the nearest square metre.

4 marks

- (ii) The swimming pool is empty and the entire floor of the swimming pool is horizontal. Work out the volume of water, in m^3 , required to fill the swimming pool to a depth of 120 cm. Give your answer to the nearest m^3 .

4 marks

- 11** The figure shows a triangle XAB .
The point Y lies on AX and Z lies on BX .
The line YZ is parallel to AB .

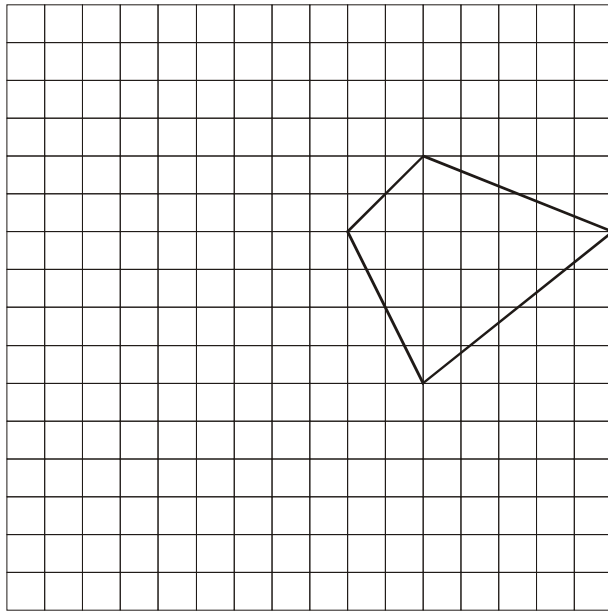


- (i) Show that triangle XAB is similar to triangle XYZ .

2 marks

- (ii) When $XZ = 30$ cm, $BZ = 15$ cm and $YZ = 24$ cm, work out the length of AB .

3 marks

12

Jenny is drawing a figure on squared paper.

She has already drawn a quadrilateral on squared paper as shown above.

She would like to draw more lines so as to produce a figure that has two lines of symmetry.

Show Jenny one way of completing her figure.

6 marks

13 Kim has two types of batteries in her store.

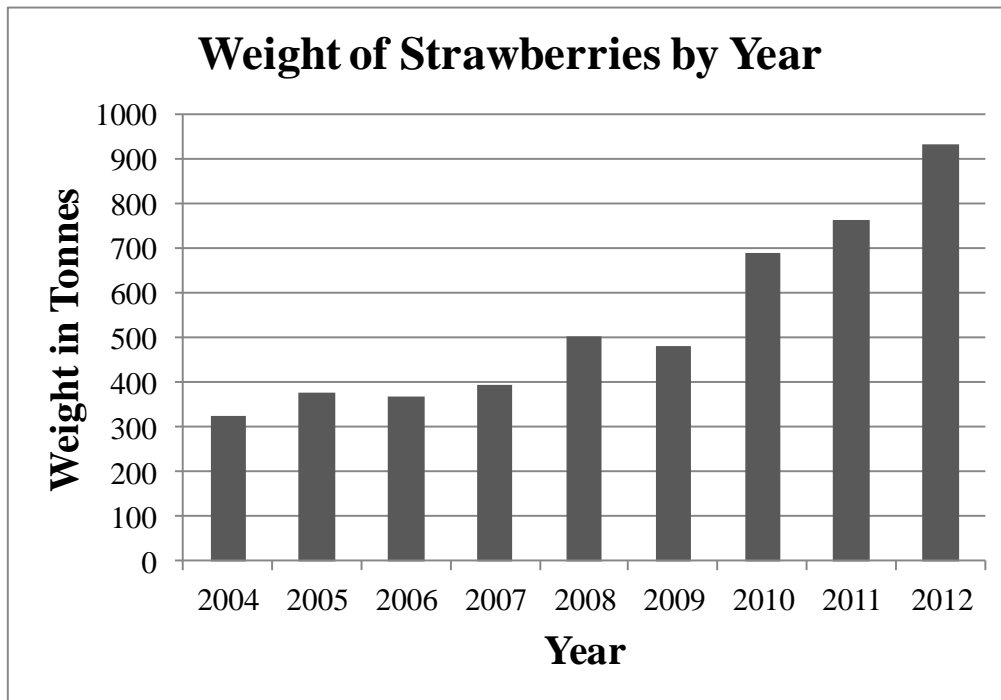
She tested 100 batteries of type A and found 4 to be defective.

She also tested 200 batteries of type B and found 5 to be defective.

Which type of battery is more likely to be defective? Explain your reasoning.

3 marks

- 14 The weight of strawberries produced in Malta in different years is shown in this bar chart.



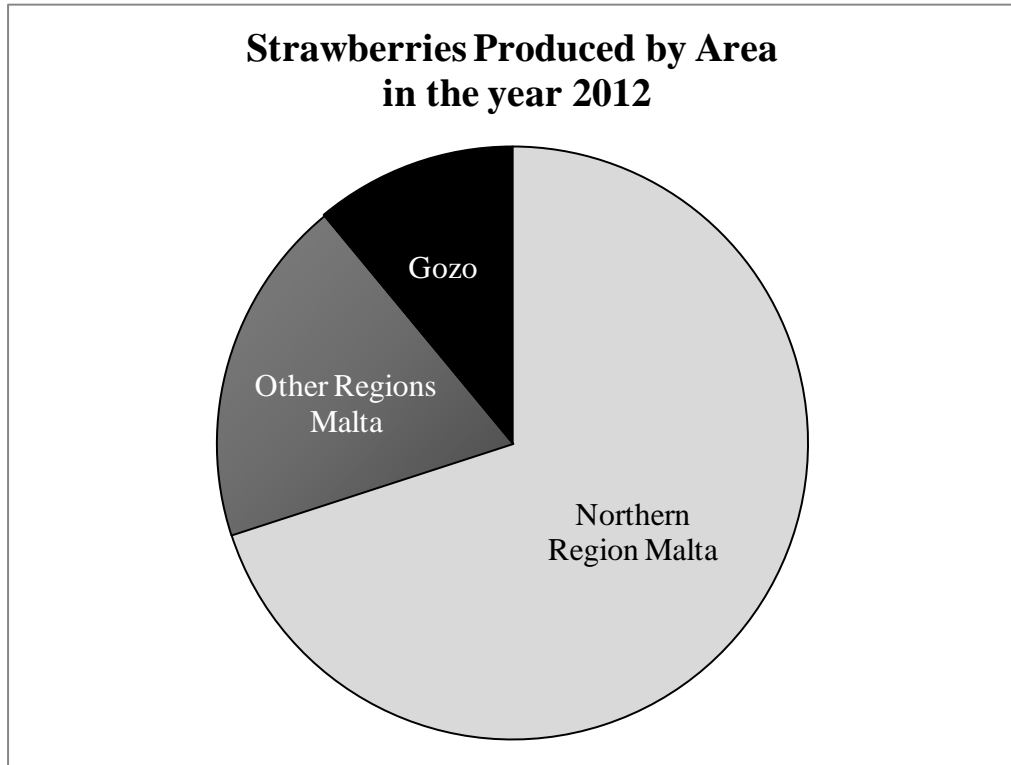
- (i) Use your graph to write a statement about the change in production of strawberries in Malta for the years 2004 to 2012.

1 mark

- (ii) Estimate the increase in the production of strawberries from 2011 to 2012 as a percentage of the production in 2011.

4 marks

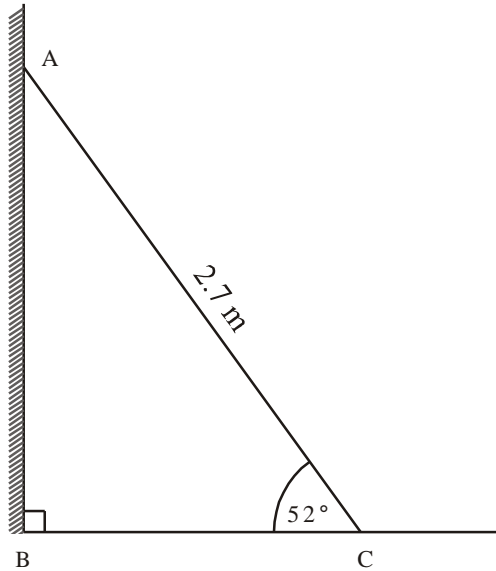
- (iii) The pie chart shows the distribution of strawberries grown in 2012 by the locality where grown.



Use both the above pie chart and the given bar chart to determine an estimate of the weight of strawberries grown in the Northern Region Malta in 2012.

4 marks

- 15 A uniform ladder AC of length 2.7 metres leans against a vertical wall making an angle of 52° with the ground.



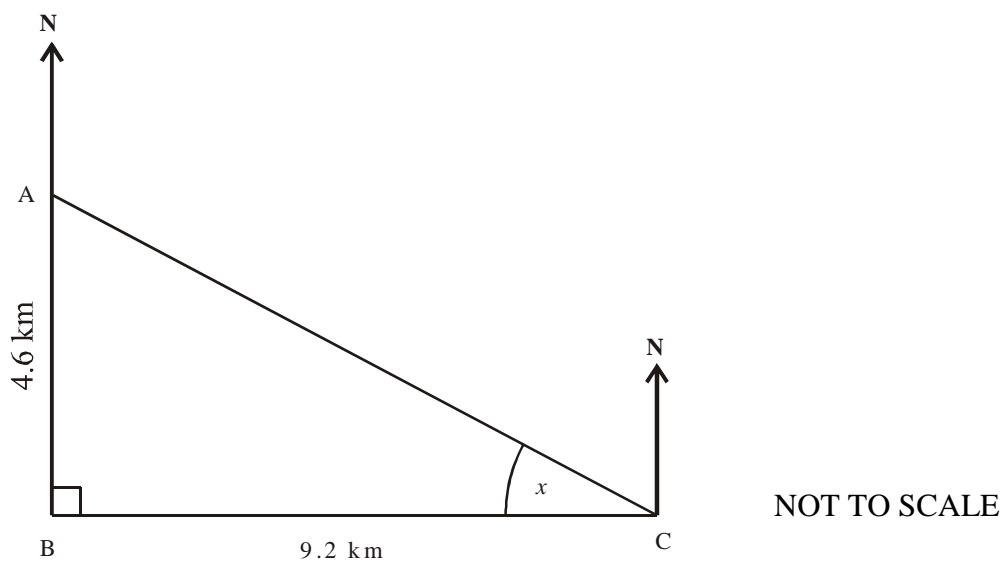
- (i) Find the value of AB, the distance that the ladder goes up the wall. Give your answer correct to the nearest cm.

3 marks

- (ii) Find the value of BC, the horizontal distance between the wall and the foot of the ladder. Give your answer correct to the nearest cm.

3 marks

- 16 The position of three boats A, B and C are shown in this diagram. Boat B is 9.2 km west of boat C. Boat A is 4.6 km north of boat B.



- (i) Calculate the size of the angle marked x . Give your answer to the nearest degree.

3 marks

- (ii) Work out the distance from boat A to boat C. Give your answer in km to one decimal place.

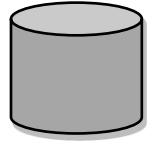
2 marks

- (iii) Find the bearing of boat C from boat A. Give your answer to the nearest degree.

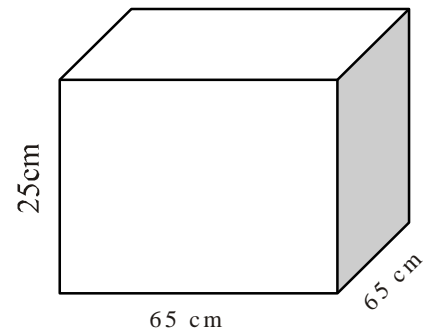
2 marks

DO NOT WRITE ABOVE THIS LINE

- 17 (i) A metal can is in the shape of cylinder with diameter 15 cm and height 8 cm.
Find the volume of the can.



- (ii) How many such metal cans fit into a box which is in the shape of a cuboid with a square base of sides 65 cm and 25 cm high? **2 marks**

**3 marks**

18

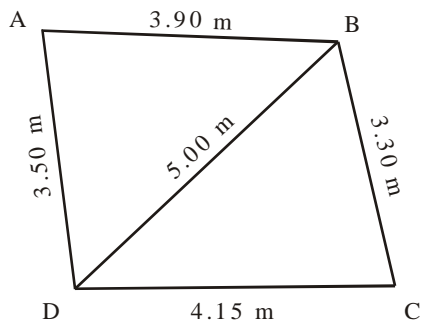


Figure 1

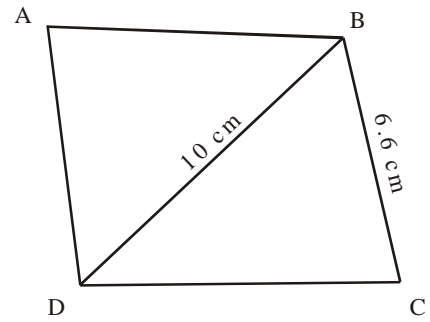


Figure 2

In Figure 1, ABCD represents the four walls of a room. The diagram, which is not drawn to scale, gives the lengths of the walls of the room and of the diagonal BD.

- (i) In Figure 2, show the measures you would need to make in order to draw a scale diagram of the room where 2 cm represent 1m in the room. Two sides have already been worked out.

2 marks

- (ii) Use your answer to part (i) to construct a scale diagram of the room.

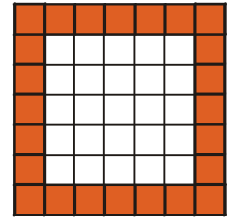
4 marks

- (iii) Measure the size of angle BAD.

1 mark

DO NOT WRITE ABOVE THIS LINE

- 19** A company makes square mats in different sizes all using the same design. This mat with each side 7 small squares long is called a 7 by 7 mat.



7 by 7 mat

- (i) How many small dark squares are there on the perimeter of a 7 by 7 mat?

1 mark

- (ii) How many small dark squares are there on the perimeter of a 10 by 10 mat?

1 mark

- (iii) How many small dark squares are there on the perimeter of an N by N mat?

2 marks