

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE

J567/04

MATHEMATICS B

Paper 4 (Higher Tier)

FRIDAY 14 JUNE 2013: Morning

DURATION: 1 hour 45 minutes
plus your additional time allowance

MODIFIED ENLARGED

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

Loose sheet for Question 14

OTHER MATERIALS REQUIRED:

Geometrical instruments

Tracing paper (optional)

Scientific or graphical calculator

<p>YOU ARE PERMITTED TO USE A CALCULATOR FOR THIS PAPER</p>
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READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

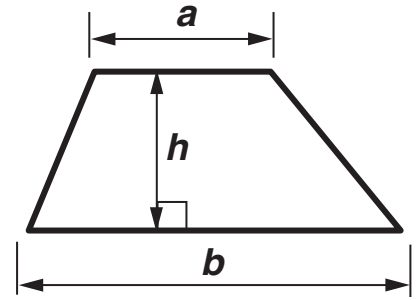
- Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer ALL the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

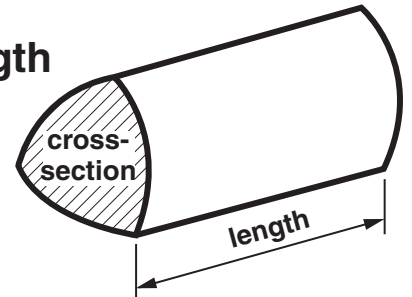
- The number of marks is given in brackets [] at the end of each question or part question.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is 100.
- Any blank pages are indicated.

FORMULAE SHEET: HIGHER TIER

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism $= (\text{area of cross-section}) \times \text{length}$

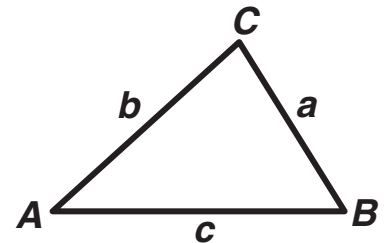


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

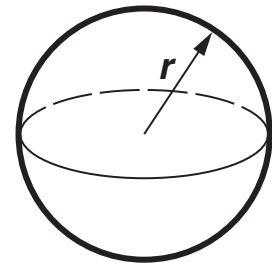
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle $= \frac{1}{2} ab \sin C$



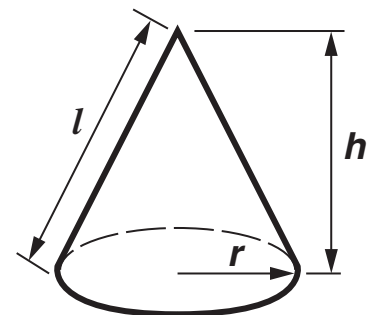
Volume of sphere $= \frac{4}{3} \pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3} \pi r^2 h$

Curved surface area of cone $= \pi r l$

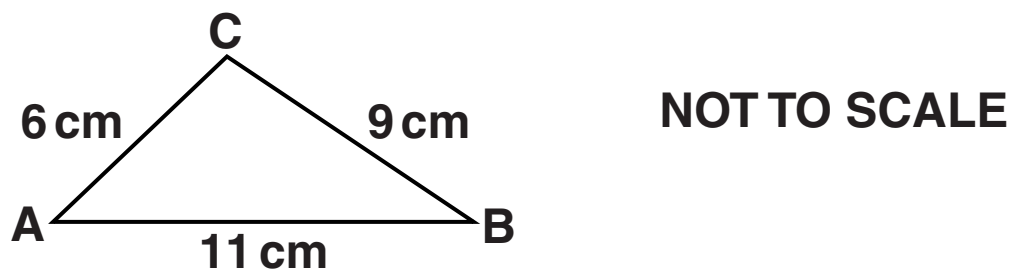


The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- 1 (a) ABC is a triangle. The measurements of the triangle are shown on the following diagram.



Make a full-size drawing of triangle ABC in the space below.

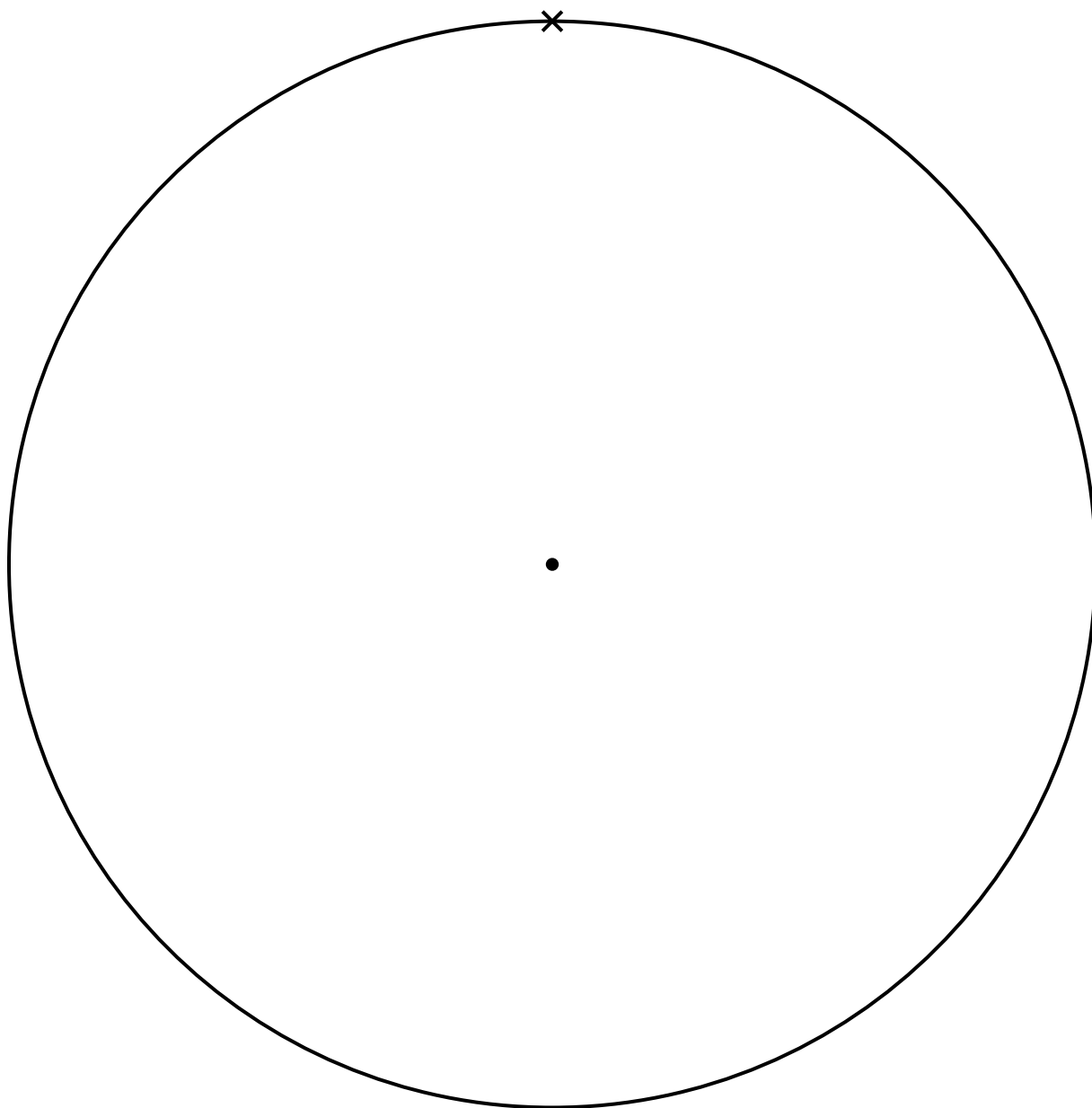
The line AB has been drawn for you.

Leave in all your construction lines.



[2]

- (b) Construct a regular pentagon inside this circle.
Make sure the vertices of the pentagon lie on the
circumference of the circle.
One vertex has been marked for you.**



[2]

2 The price of a car increases from £10 400 to £11 284.

Calculate the percentage increase.

_____ % **[3]**

3 (a) Solve.

$$7x + 6 = 3x - 4$$

(a) $x =$ _____ [3]

(b) Rearrange this formula to make W the subject.

$$T = 5W - 8$$

(b) _____ [2]

- 4 A train completes a journey of 288 miles in 4 hours 30 minutes.**

Calculate the average speed of the train.

_____mph [3]

- 5 A shop sells boxes of a cereal in two sizes. There are two offers:**

Offer A

750 g box

Special offer price £4.80

Offer B

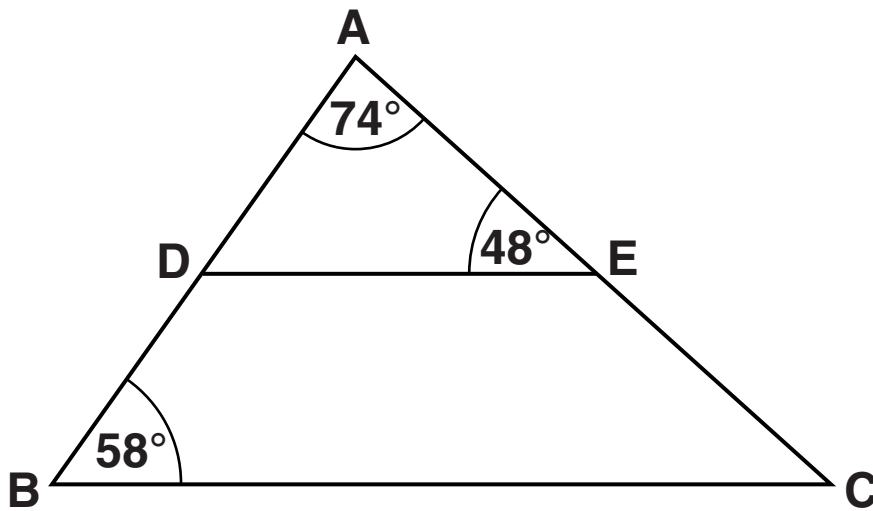
300 g box

Two boxes for £3.90

**Which offer gives the better value?
Show how you decide.**

[3]

- 6 **ABC** is a triangle with point **D** on **AB** and point **E** on **AC**. This is shown on the following diagram.



NOT TO SCALE

Explain why **DE is parallel to **BC**.**
Use angle properties to explain your reasons.

[3]

- 7 Henry's class is given a test.
The mean mark for all 20 pupils is 3.3.**

**Henry's test paper is lost.
Here is a summary of the marks for the rest of his class.**

Test mark	1	2	3	4	5
Number of pupils	4	2	4	3	6

**Work out Henry's mark.
You must show all your working.**

_____ **[4]**

- 8 Alice surveys the families in her village about their last holiday.**

The table below shows the probability that one of the families, chosen at random, went to a destination.

Destination	Probability
UK	0.42
Rest of Europe	0.25
USA	p
Rest of the World	0.08
No holiday	0.03

- (a) Work out the value of p in the table.**

(a)_____ [2]

- (b) Calculate the probability that a family, chosen at random, went to the UK or the Rest of Europe for their last holiday.**

(b)_____ [1]

- (c) Calculate the probability that a family, chosen at random, did NOT go to the UK for their last holiday.**

(c)_____ [2]

- (d) There are 842 families in the village.**

Use the results from Alice's survey to estimate the number of these families who will go to the UK for their next holiday.

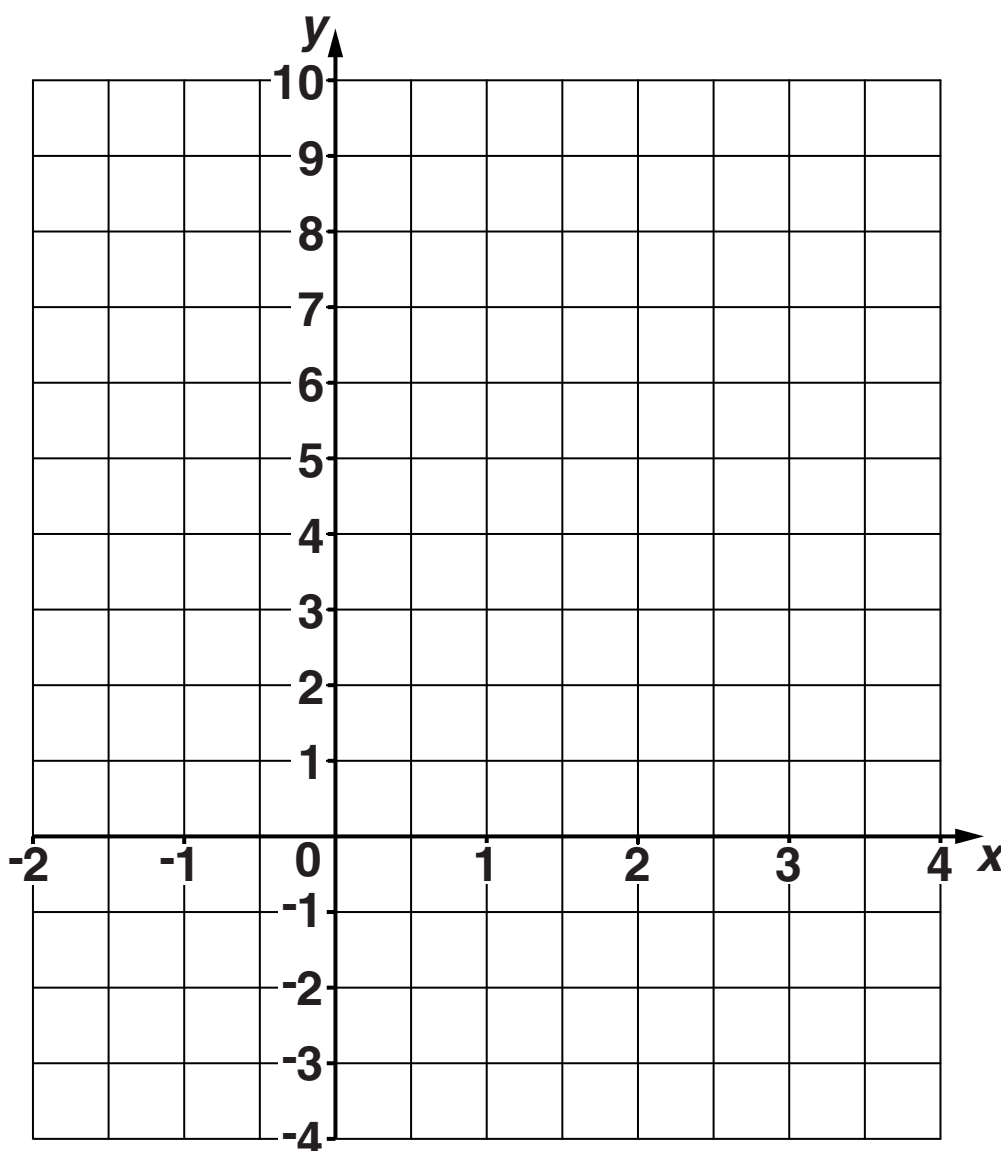
(d)_____ [2]

- 9 (a) Complete the following table for $y = x^2 - 3x$. There are two missing values.

x	-2	-1	0	1	2	3	4
y		4	0	-2		0	4

[2]

- (b) On the grid below draw the graph of $y = x^2 - 3x$.



[2]

(c) Use your graph to solve the equation $x^2 - 3x = 2$.

(c) $x =$ _____ or $x =$ _____ [2]

- 10 (a)* Webtravel advertise holidays on their website. Some of these holidays, and their prices, are shown in the following table.**

Destination	7 nights	14 nights
Majorca	£380 pp	£600 pp
Cyprus	£620 pp	£980 pp
Madeira	£478 pp	£768 pp
Rhodes	£840 pp	£1400 pp
Portugal	£890 pp	£1380 pp

**Note:
prices are per person (pp),**

holidays include flights from London Heathrow airport,

flights from other airports have an extra charge of £50 pp per holiday.

Webtravel offer an online discount of 8% off the total cost of each booking.

Mr Dawe has £1850 for a holiday for himself and his wife.

They want to book online and fly from Birmingham airport.

**Can they afford to go to Cyprus for 14 nights?
Show all your working clearly.**

[5]

- (b) Alistair paid £1643 for a holiday in 2012.
This was an increase of 6% on the cost of the
same holiday in 2011.**

Calculate the cost of the holiday in 2011.

(b) £ _____ [3]

11 Solve algebraically these simultaneous equations.

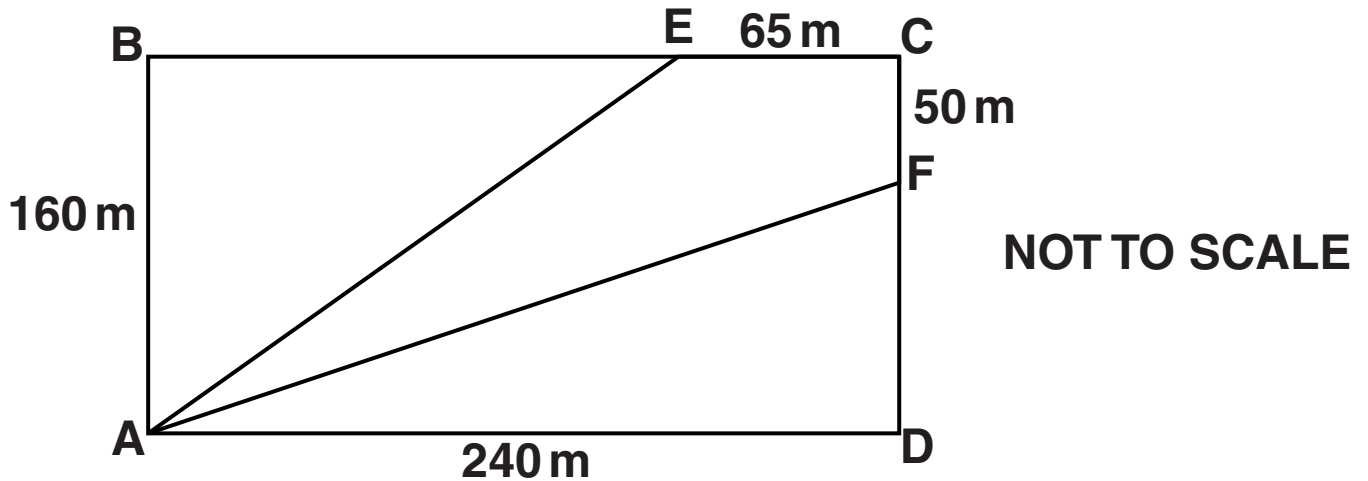
$$5x + 3y = 24$$

$$3x - 4y = 26$$

$$x = \underline{\hspace{10cm}}$$

$$y = \underline{\hspace{10cm}} \quad [4]$$

12 Here is a diagram of a park, ABCD.



**E is a point on BC and F is a point on CD.
EC = 65 m and CF = 50 m.**

**The perimeter of the park is a rectangle measuring
160 m by 240 m.**

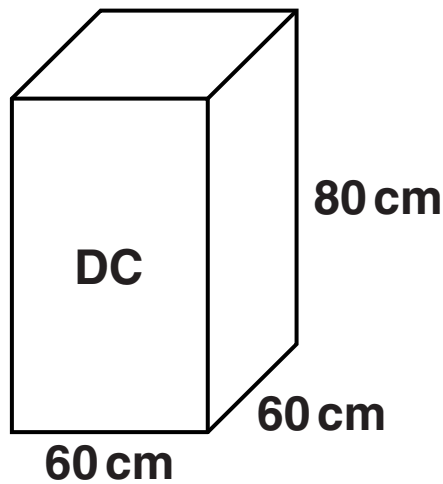
**There are straight paths around the perimeter of the
park and from A to E and A to F.**

Mary has to use the paths.

**Calculate the shortest distance she has to walk to get
from A to C.**

_____m [5]

- 13 (a) Darnby Council uses this litter bin in parks. It is a cuboid. The dimensions of the bin are shown in the diagram below.



Calculate the volume of the bin.
Write your answer in litres.

(a) _____ litres [3]

- (b) Hemby Council's bins have a volume of 120 litres. They change to a bin with all dimensions DOUBLE those of their original bin.**

Calculate the volume of the larger bin.

(b) _____ litres [2]

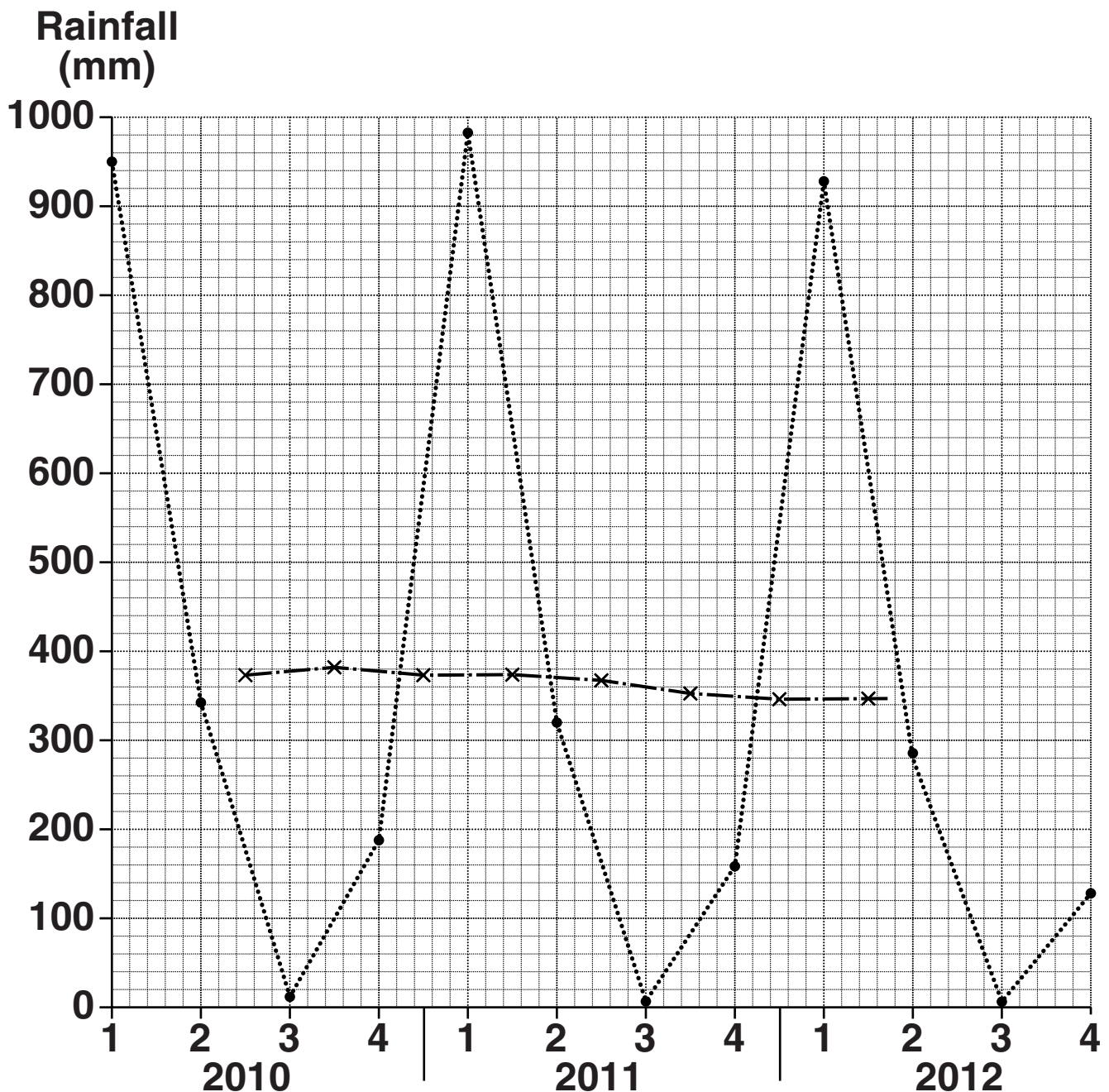
- (c) Fairmead Council uses a bin with width 45 cm, depth 55 cm and height 60 cm. They want a new bin which is mathematically similar and has THREE times the volume.**

Calculate the height of the new bin.

(c) _____ cm [3]

14 The amount of rainfall, in mm, for Moortown is recorded each quarter for 3 years. The table summarising the rainfall for each quarter, together with the 4-point moving average is provided on the loose sheet.

All of the rainfall figures and some of the 4-point moving averages from the table have been plotted in the graph below.



- (a) (i) Calculate the missing 4-point moving average in 2012, labelled *a* in the table.**

(a)(i)_____ mm [2]

- (ii) Plot this 4-point moving average on the graph. [1]**

- (b) (i) Describe the seasonal variation in the rainfall.**

_____ [2]

- (ii) Describe the general trend in the rainfall.**

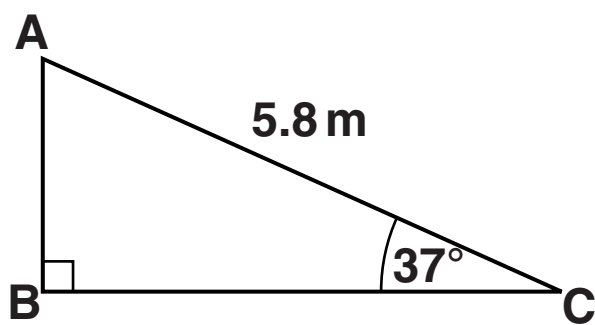
_____ [1]

(c) The final 4-point moving average in the table has been estimated as 330.

Use this figure to estimate the rainfall for the first quarter of 2013.

(c)_____ mm [2]

- 15 **ABC** is a right-angled triangle. The diagram below shows information about triangle **ABC**.



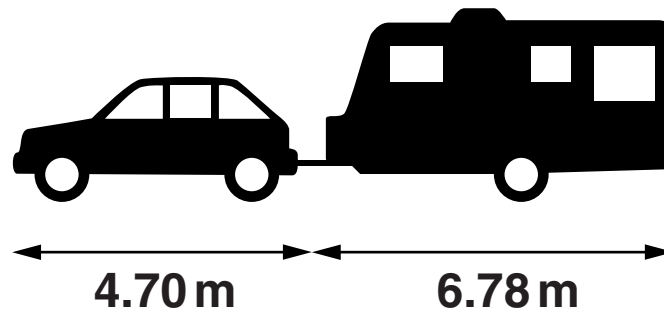
NOT TO SCALE

Calculate AB.

_____m [3]

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16 The following diagram shows a car towing a caravan.



A car's length is 4.70 m and a caravan's length is 6.78 m, both correct to 2 decimal places.

(a) Write down the upper bound of the length of the car.

(a) _____ m [1]

(b) Calculate the upper bound of the total length of the car and the caravan.

(b) _____ m [2]

(c) Calculate the lower bound of the difference in the lengths of the caravan and the car.

(c) _____ m [2]

- 17 A population of birds decreases at a rate of 5% each year.
On 1st January 2010 the population was 16 800.**

The formula for working out N , the size of the population, t years after 1st January 2010 is

$$N = 16\,800 \times A^t.$$

- (a) Explain why the value of A is 0.95.**

[1]

- (b) Calculate the population on 1st January 2016.**

(b)_____ [1]

(c) Find the year in which the population will fall below 8000.

(c)_____ [3]

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18 Solve this equation, writing your answers correct to 2 decimal places.

$$3x^2 + 5x - 1 = 0$$

_____ **[3]**

- 19 (a) The graph of $y = x^2$ is translated using the vector $\begin{pmatrix} 0 \\ -1 \end{pmatrix}$.

Write down the equation of the translated graph.

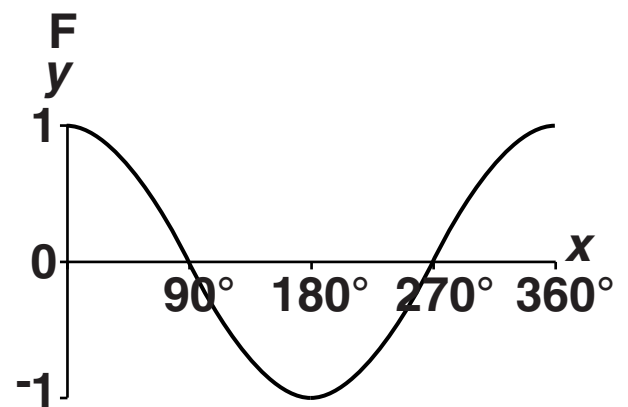
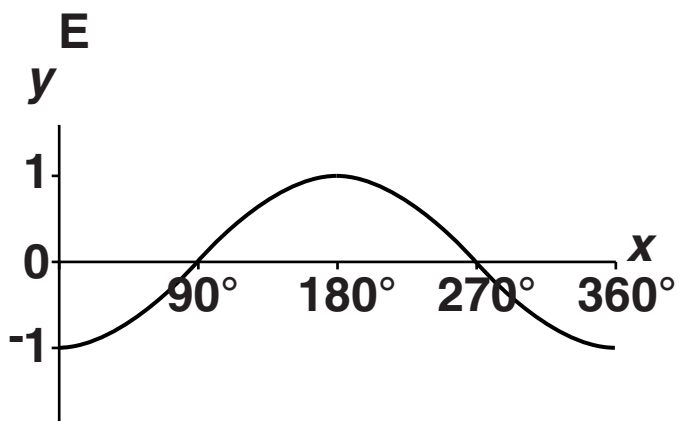
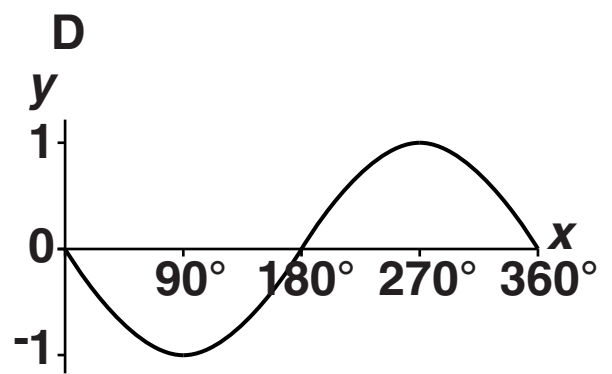
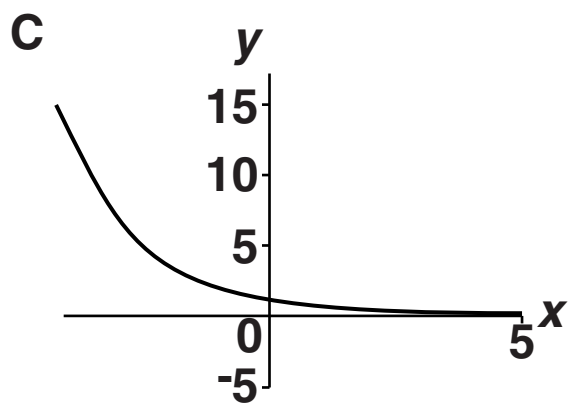
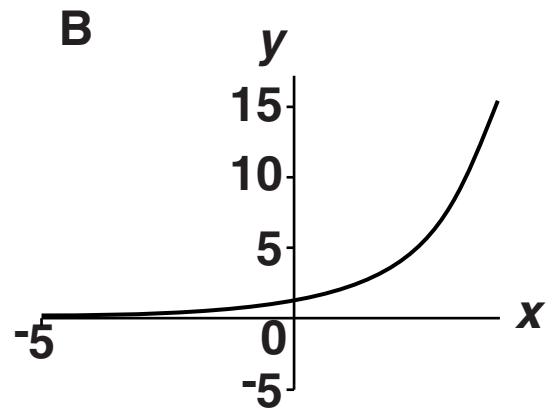
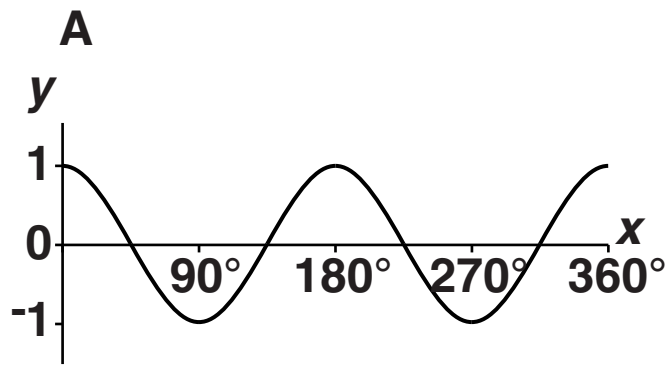
(a) _____ [1]

(b) The graph of $y = x^2$ is translated using the vector $\begin{pmatrix} 4 \\ 0 \end{pmatrix}$.

Write down the equation of the translated graph.

(b) _____ [1]

20 (a) Here are six graphs.

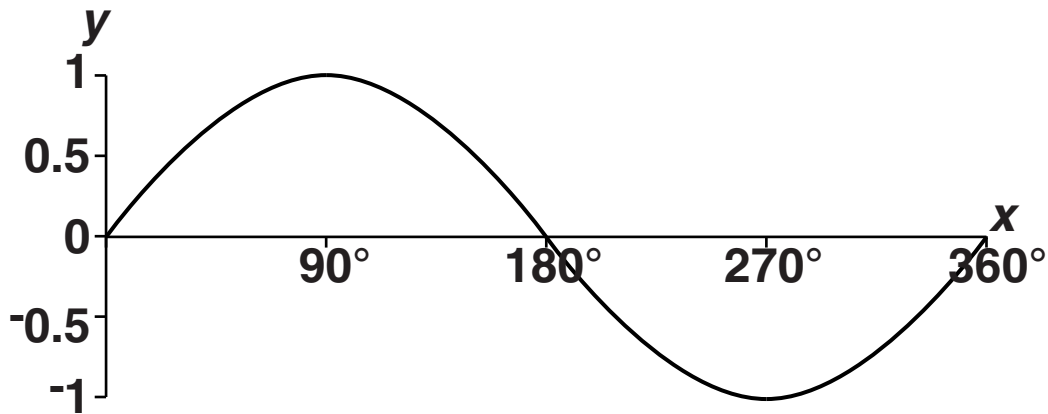


Choose the correct letter to complete these sentences.

The graph of $y = 2^x$ is graph _____ .

The graph of $y = \cos x$ is graph _____ . [2]

- (b) Solve, to the nearest degree, $\sin x = 0.53$ where $0^\circ \leq x \leq 360^\circ$.
Use your calculator and the graph below to help you.



(b) _____ [2]

TURN OVER FOR QUESTION 21

21 Solve, algebraically, $\frac{5}{x+2} + \frac{3}{4x-1} = 5$.

$x =$ _____ or $x =$ _____ [7]

END OF QUESTION PAPER

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