

Write your name here

Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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Mathematics B

Unit 3: Number, Algebra, Geometry 2 (Calculator)

Higher Tier

Monday 11 November 2013 – Morning

Time: 1 hour 45 minutes

Paper Reference

5MB3H/01

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.



Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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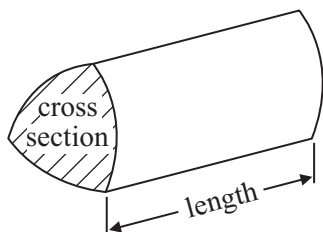
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GCSE Mathematics 2MB01

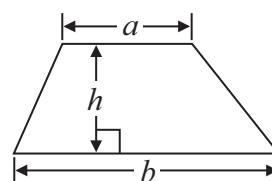
Formulae: Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section \times length

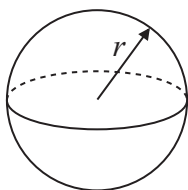


Area of trapezium = $\frac{1}{2} (a + b)h$



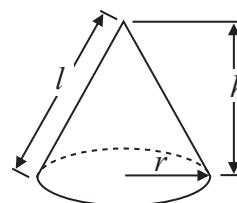
Volume of sphere = $\frac{4}{3} \pi r^3$

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

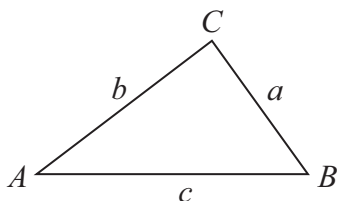


Volume of cone = $\frac{1}{3} \pi r^2 h$

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



In any triangle ABC



The Quadratic Equation

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

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

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 = $\frac{1}{2} ab \sin C$

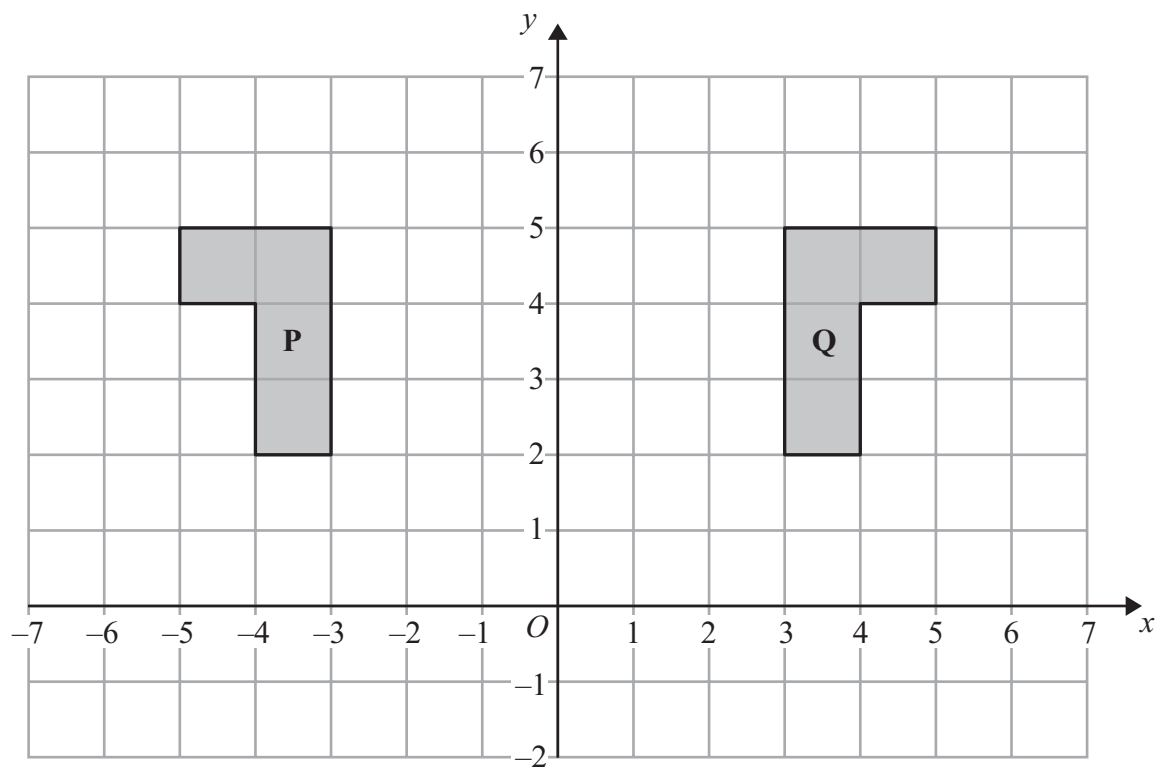


Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1 Two shapes are shown on the grid.



- (a) Describe fully the single transformation that maps shape **P** onto shape **Q**.

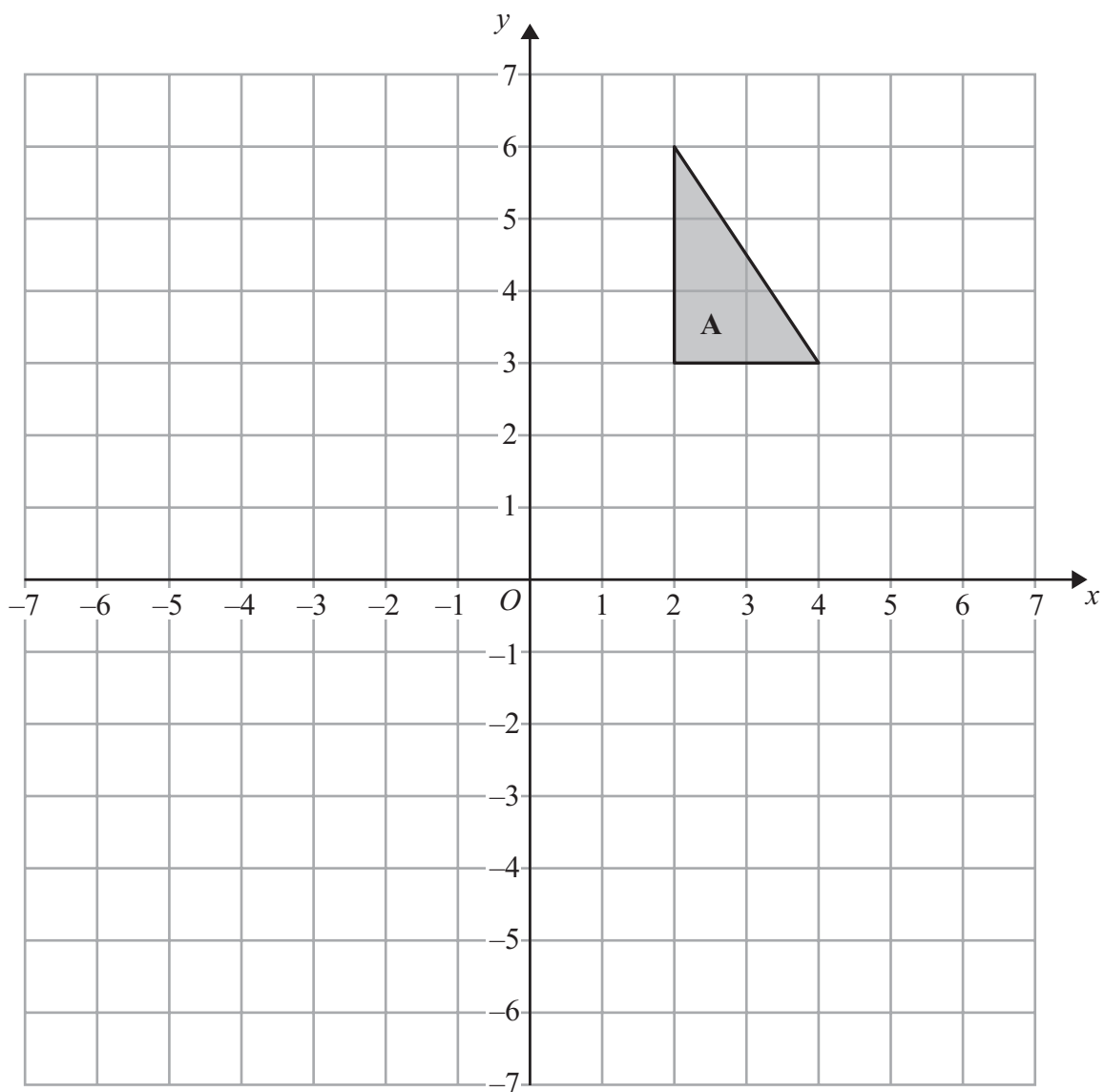
.....

.....

.....

(2)





- (b) Rotate triangle A 90° clockwise about the point (0, 2).
Label the new triangle **B**.

(2)

(Total for Question 1 is 4 marks)



2 One day a supermarket has 8420 customers.

65% of the customers pay with a debit card.

$\frac{1}{5}$ of the customers pay with a credit card.

The rest of the customers pay with cash.

Work out how many customers pay with cash.

.....
(Total for Question 2 is 4 marks)

3 The equation $x^3 + 4x = 60$ has a solution between 3 and 4

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show **all** your working.

$x =$

(Total for Question 3 is 4 marks)



4 Lewis has a copper pipe with a length of 150 cm and a mass of 800 grams.

He cuts a piece of the copper pipe with a length of 90 cm.

Work out the mass of this piece of copper pipe.

..... grams

(Total for Question 4 is 2 marks)

*5 Vicky makes 8 purses and 9 key rings to sell for charity.

The price of a purse will be twice as much as the price of a key ring.

Vicky wants to get a total of exactly £40 when she sells all the purses and all the key rings.

Work out the price Vicky needs to charge for each purse and for each key ring.

(Total for Question 5 is 4 marks)



6 Mrs Evans is planning a trip to the zoo.

She finds out this information.

July

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Ticket Prices

	Peak	Off peak
Adult	£20.50	£19.50
Child	£15.50	£15.00
Senior citizen	£19	£18

Family Offer

10% Discount	2 adults and 2 children or 1 adult and 3 children
--------------	--

Off peak Peak

Mrs Evans will go to the zoo on Friday 17th July.
She will need to buy tickets for 1 adult and 3 children.

Mrs Evans wants to buy the tickets as cheaply as possible.

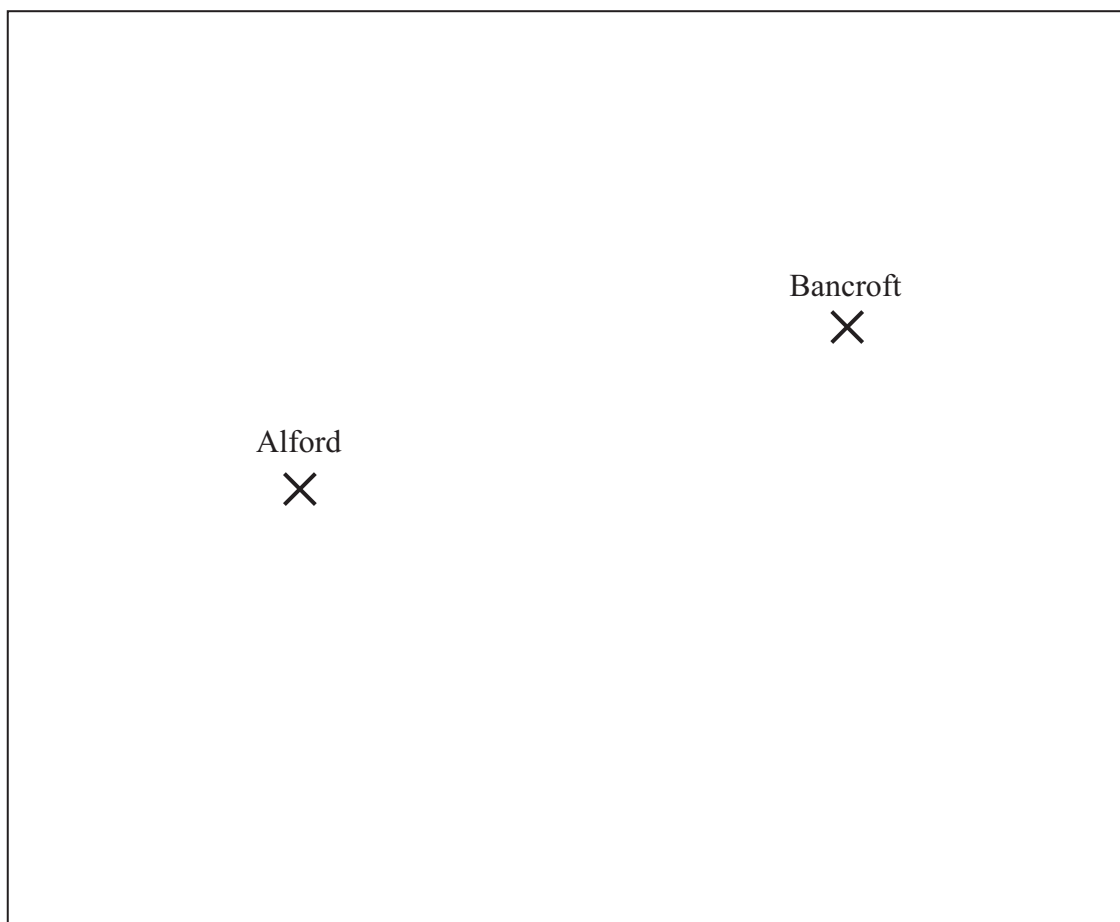
Work out the total cost of the tickets.

£

(Total for Question 6 is 4 marks)



7 The map shows the positions of two schools, Alford and Bancroft.



Scale 1 cm represents 1 km

A new school is going to be built.

The new school will be less than 5 kilometres from Alford.

It will be nearer to Bancroft than to Alford.

Shade the region on the map where the new school can be built.

(Total for Question 7 is 3 marks)



***8** A shop sells toothpaste in 3 different sizes of tube.

A 70 ml tube of toothpaste costs £1.79

A 100 ml tube of toothpaste costs £2.75

A 150 ml tube of toothpaste costs £3.99

Which size of tube is the best value for money?

You must show all your working.

(Total for Question 8 is 4 marks)

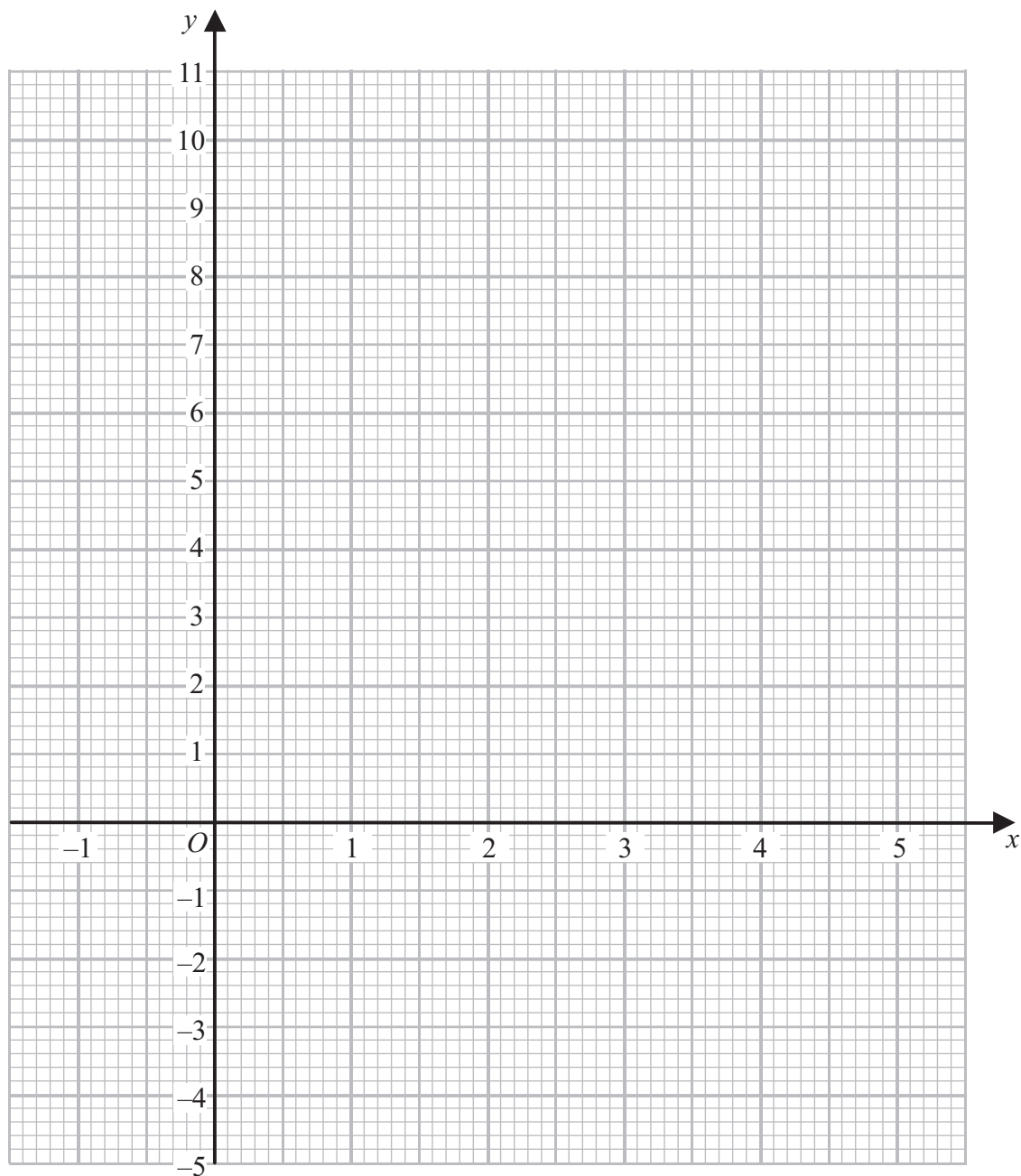


9 (a) Complete the table of values for $y = x^2 - 5x + 3$

x	-1	0	1	2	3	4	5
y		3	-1		-3		3

(2)

(b) On the grid below, draw the graph of $y = x^2 - 5x + 3$ for values of x from $x = -1$ to $x = 5$



(2)



(c) Find estimates of the solutions of the equation $x^2 - 5x + 3 = 0$

$$x = \dots\dots\dots$$

$$\text{or } x = \dots\dots\dots$$

(2)

(Total for Question 9 is 6 marks)

10 (a) Solve $4(y - 7) = 13$

$$y = \dots\dots\dots$$

(2)

(b) Make t the subject of the formula $P = 4t - 3$

.....
(2)

(Total for Question 10 is 4 marks)



11

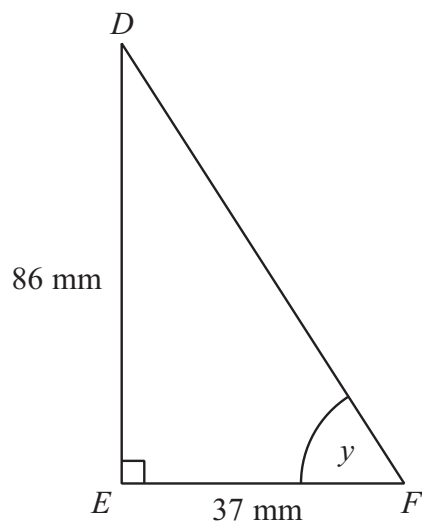


Diagram **NOT**
accurately drawn

DEF is a right-angled triangle.

$DE = 86\text{ mm}$

$EF = 37\text{ mm}$

Calculate the size of the angle marked y .

Give your answer correct to 1 decimal place.

.....
(Total for Question 11 is 3 marks)

12



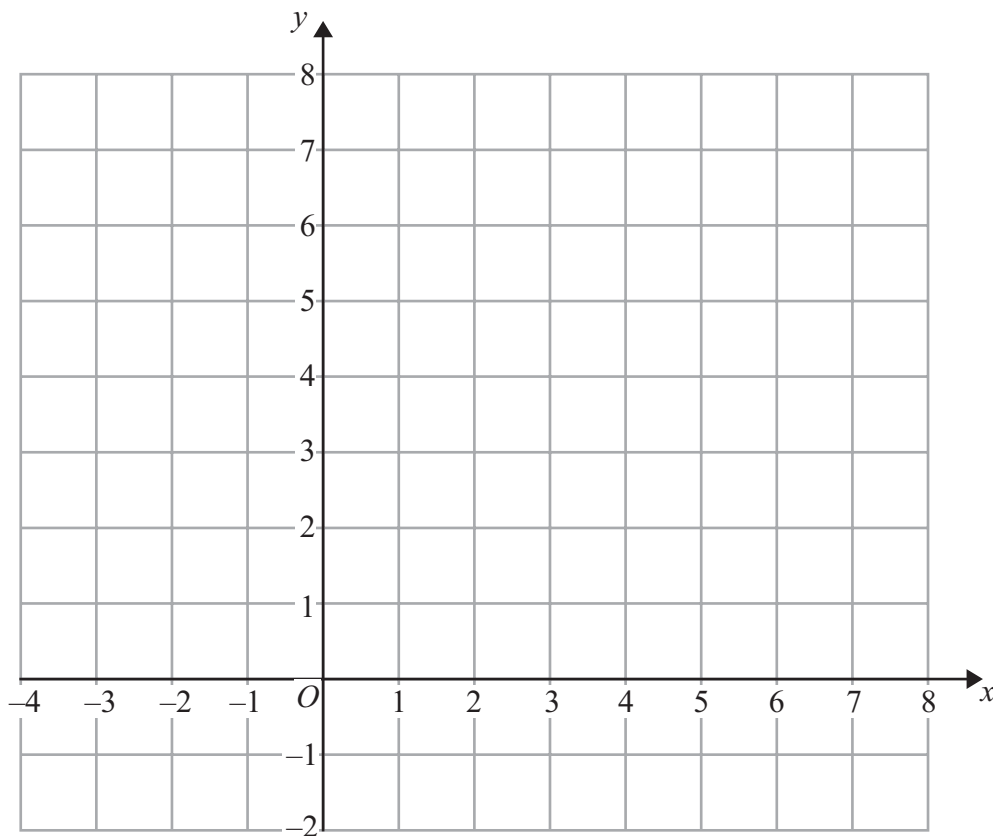
12 On the grid below, show by shading, the region defined by the inequalities

$$x + y < 6$$

$$x > -1$$

$$y > 2$$

Mark this region with the letter R.



(Total for Question 12 is 4 marks)



13 ABC is a triangle.

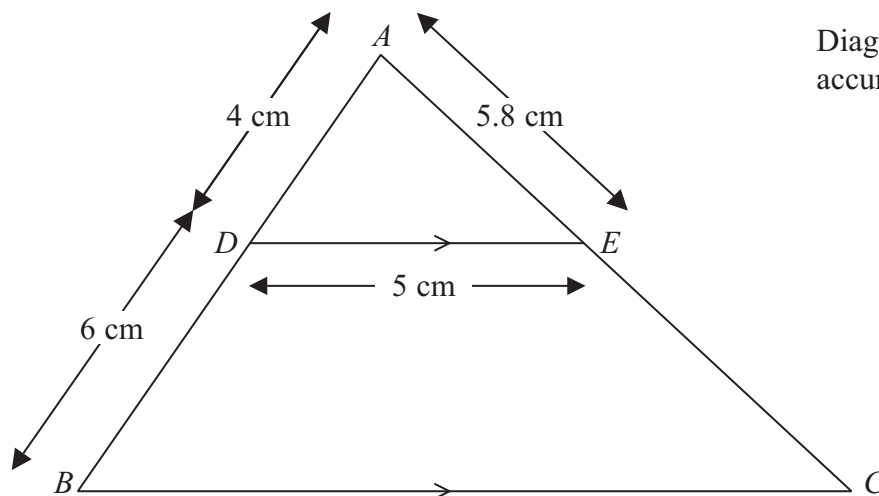


Diagram **NOT**
accurately drawn

D is a point on AB and E is a point on AC .

DE is parallel to BC .

$AD = 4$ cm, $DB = 6$ cm, $DE = 5$ cm, $AE = 5.8$ cm.

Calculate the perimeter of the trapezium $DBCE$.

.....cm

(Total for Question 13 is 4 marks)



14 Solve the simultaneous equations

$$4x - 5y = 33$$

$$3x + y = 1$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 14 is 3 marks)

15 (a) (i) Use your calculator to work out $\frac{\sqrt{46.2 - 17.5}}{2.39 \times 0.7}$

Write down all the figures on your calculator display.

.....

(ii) Give your answer to (i) correct to 3 significant figures.

.....

(3)

(b) Work out $(2.34 \times 10^5) \times (5 \times 10^4)$
Give your answer in standard form.

.....

(2)

(Total for Question 15 is 5 marks)



16 Jane has a flower bed in the shape of an equilateral triangle.
The perimeter of the flower bed is 15 metres.

- (a) Work out the area of the flower bed.
Give your answer correct to 1 decimal place.

.....m²
(3)

Jane has some containers in the shape of hemispheres with diameter 35 cm.

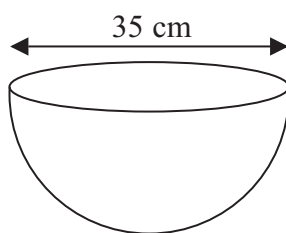


Diagram **NOT**
accurately drawn

Jane is going to fill the containers completely with compost.
She has 80 litres of compost.
1 litre = 1000 cm³.

- (b) Work out how many containers Jane can fill completely with compost.

.....
(4)

(Total for Question 16 is 7 marks)



17 Make x the subject of the formula $y = \frac{x^2 + 9}{x^2 - 7}$

.....
(Total for Question 17 is 4 marks)



*18

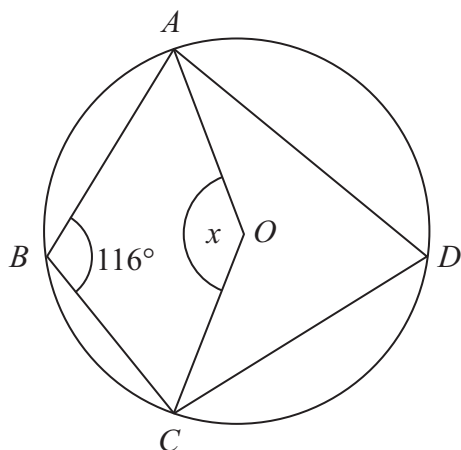


Diagram **NOT**
accurately drawn

A , B , C and D are points on the circumference of a circle with centre O .
Angle $ABC = 116^\circ$

Find the size of the angle marked x .
Give reasons for your answer.

(Total for Question 18 is 4 marks)



19

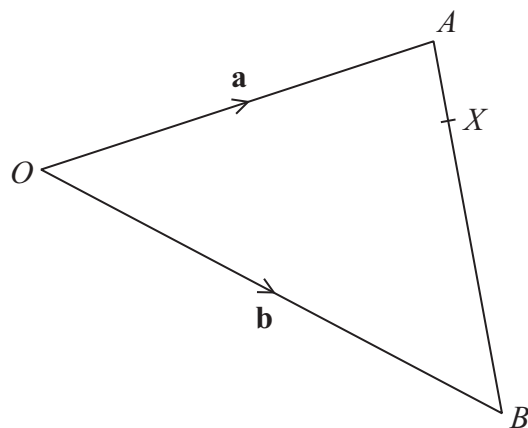


Diagram **NOT**
accurately drawn

OAB is a triangle.

$$\vec{OA} = \mathbf{a}$$

$$\vec{OB} = \mathbf{b}$$

(a) Write down the vector \vec{AB} in terms of \mathbf{a} and \mathbf{b} .

.....
(1)

X is the point on AB such that $AX : XB = 1 : 4$

(b) Express the vector \vec{OX} in terms of \mathbf{a} and \mathbf{b} .

$$\vec{OX} = \text{.....}$$

(3)

(Total for Question 19 is 4 marks)

Turn over for Question 20



20 Solve, by factorising, the equation $8x^2 - 30x - 27 = 0$

.....
(Total for Question 20 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

