Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics B

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

Higher Tier

Tuesday 14 June 2016 – 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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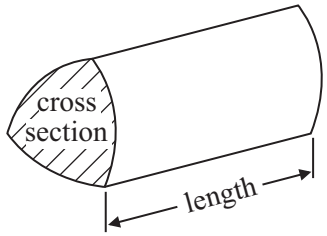
PEARSON

GCSE Mathematics 2MB01

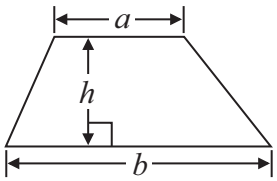
Formulae: Higher Tier

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 × length

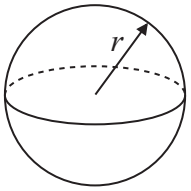


Area of trapezium = $\frac{1}{2}(a + b)h$



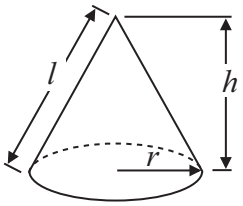
Volume of sphere = $\frac{4}{3}\pi r^3$

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

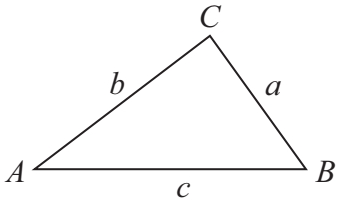


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



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

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Answer ALL questions.

Write your answers in the spaces provided.

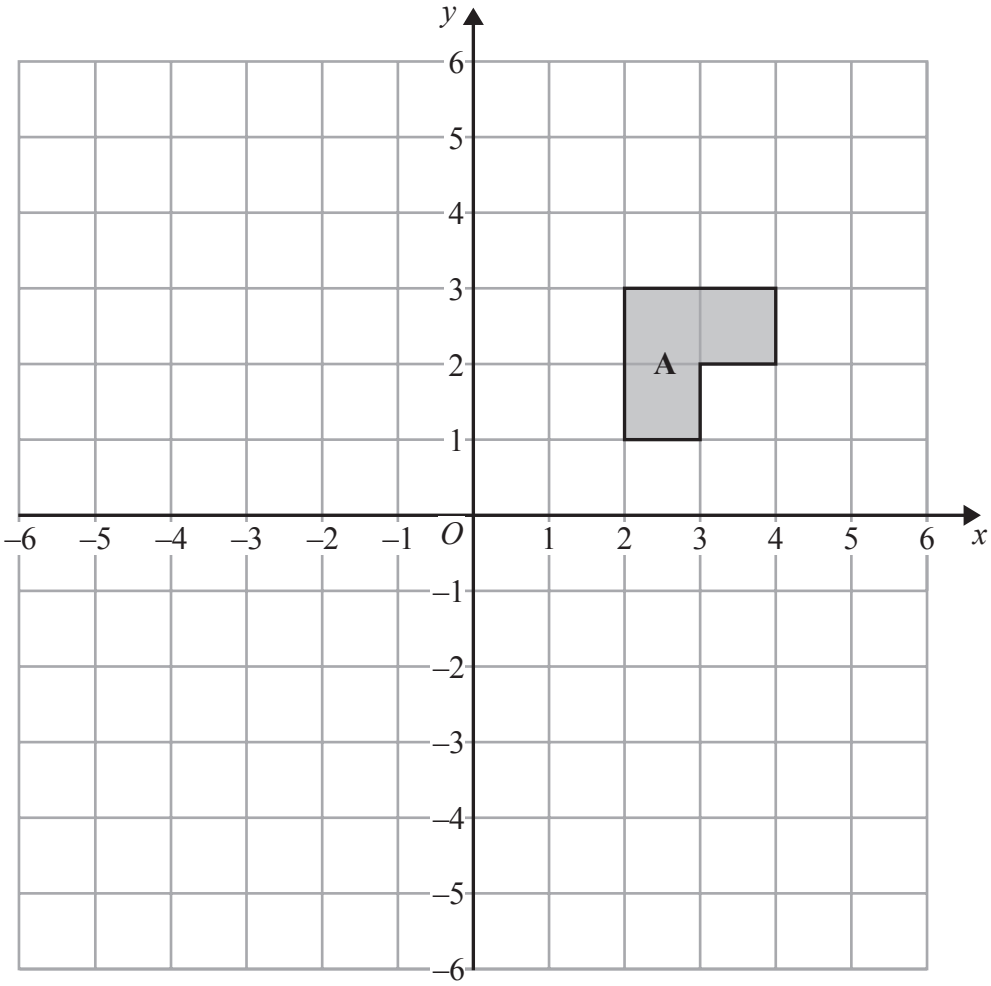
You must write down all stages in your working.

***1** 3 litres of juice are needed to fill 15 identical glasses.

Are 5 litres of juice enough to fill 24 of these glasses?

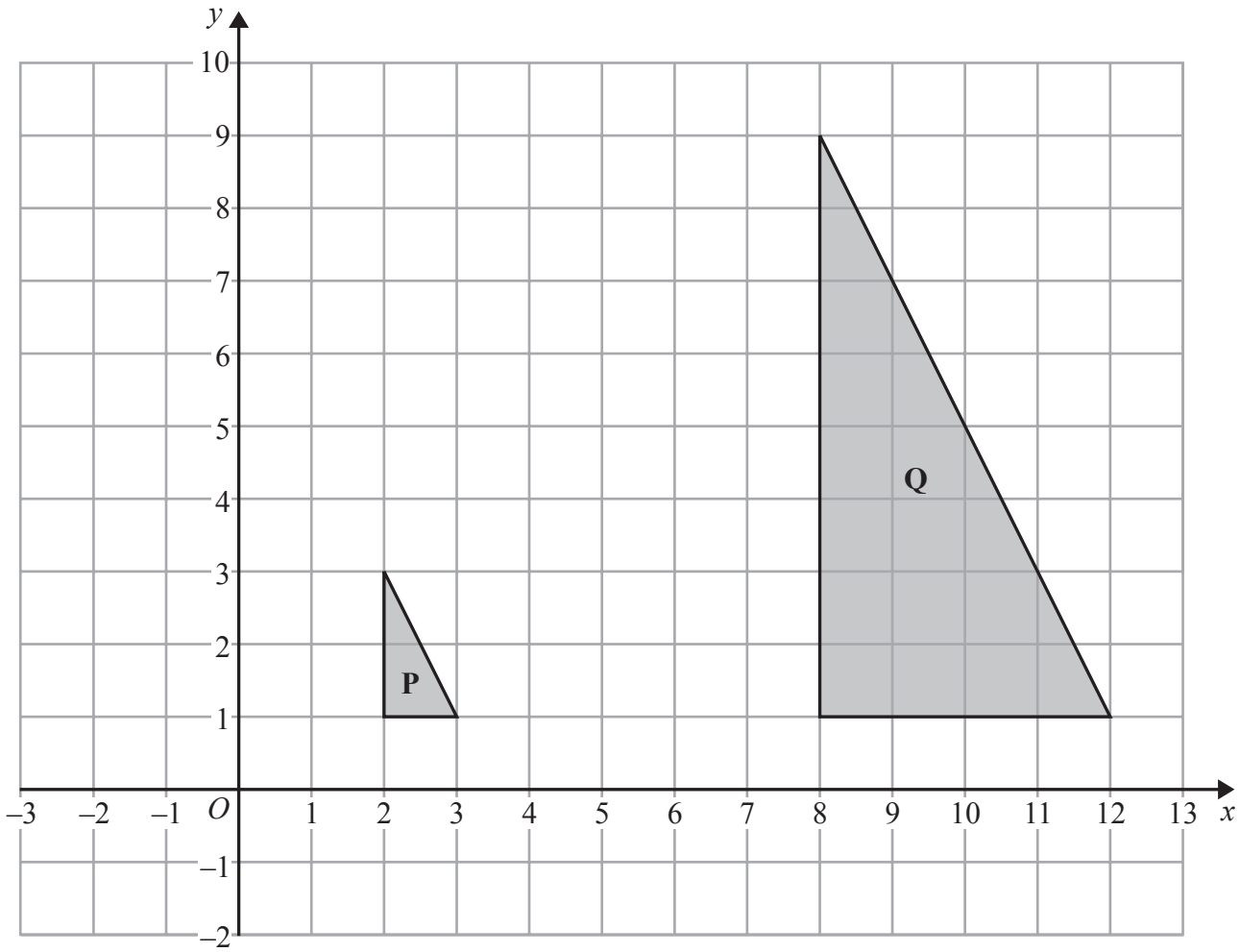
(Total for Question 1 is 3 marks)

2



(a) Rotate shape **A** 180° about the point (0, 0).

(2)



(b) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

.....

(3)

(Total for Question 2 is 5 marks)

3 Make w the subject of $d = 2w - 5$

.....

(Total for Question 3 is 2 marks)

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4 PQR is an isosceles triangle.

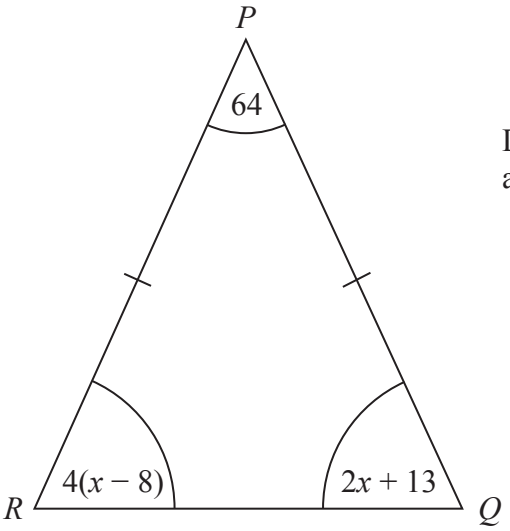


Diagram **NOT** accurately drawn

$PQ = PR$
All the angles are in degrees.

Work out the value of x.

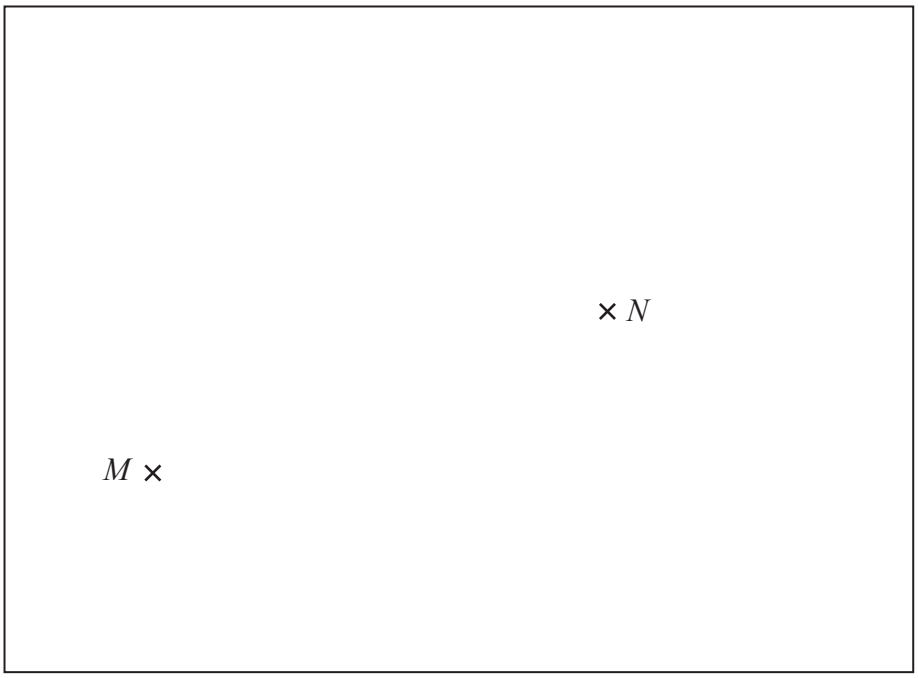
$x =$ .....

(Total for Question 4 is 4 marks)

5 Here is a map.
The map shows two towns Marlford (*M*) and Newborough (*N*).

A company is going to build a supermarket.
The supermarket will be more than 10 km from Marlford and less than 6 km from Newborough.

Find and shade the region on the map where the company can build the supermarket.



Scale: 1 cm represents 2 km.

(Total for Question 5 is 3 marks)

***6** The diagram shows the surface of a pond in the shape of a circle.

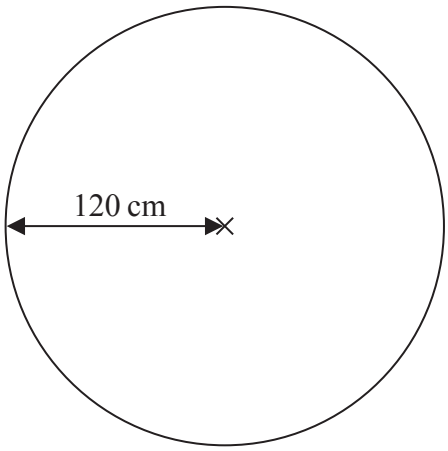


Diagram **NOT** accurately drawn

The circle has a radius of 120 cm.

Mark wants to put 20 fish into the pond.
There needs to be a surface area of 1800 cm^2 for each fish.

Show that the surface of the pond is large enough for Mark to put 20 fish into the pond.

(Total for Question 6 is 4 marks)

7 Bhavin buys a car in a sale.

Before the sale, the cost of the car was £6720
In the sale, the cost of every car is reduced by 20%.

Bhavin pays a deposit of £1500
He will pay the rest of the cost in 24 equal monthly payments.

Work out the amount of each monthly payment.
You must show all your working.

£ .....

(Total for Question 7 is 5 marks)

8 The equation $x^3 + 5x = 70$ 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 8 is 4 marks)

9 Here is a solid prism.

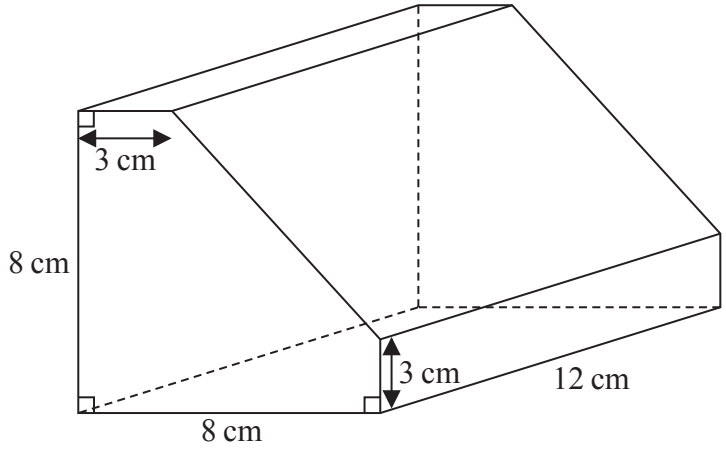


Diagram **NOT** accurately drawn

Work out the volume of the prism.
You must show all your working.

..... cm^3

(Total for Question 9 is 4 marks)

10

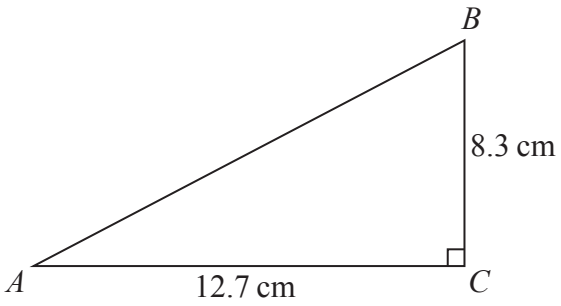


Diagram **NOT** accurately drawn

(a) Calculate the length of AB.
Give your answer correct to one decimal place.

..... cm

(3)

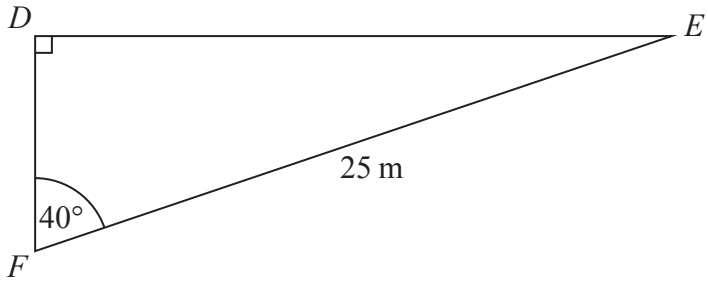


Diagram **NOT** accurately drawn

(b) Calculate the length of DE.
Give your answer correct to three significant figures.

..... m

(3)

(Total for Question 10 is 6 marks)

11 (a) Calculate the value of $\dfrac{\sqrt{100 - 4.5^3}}{0.73}$

Give your answer correct to 3 decimal places.

.....

(2)

(b) Calculate the value of $\dfrac{1.2 \times 10^3}{3 \times 10^5}$

Give your answer in standard form.

.....

(2)

(Total for Question 11 is 4 marks)

---

12 Solve the inequality $3 - \frac{1}{2}x > x$

.....

(Total for Question 12 is 2 marks)

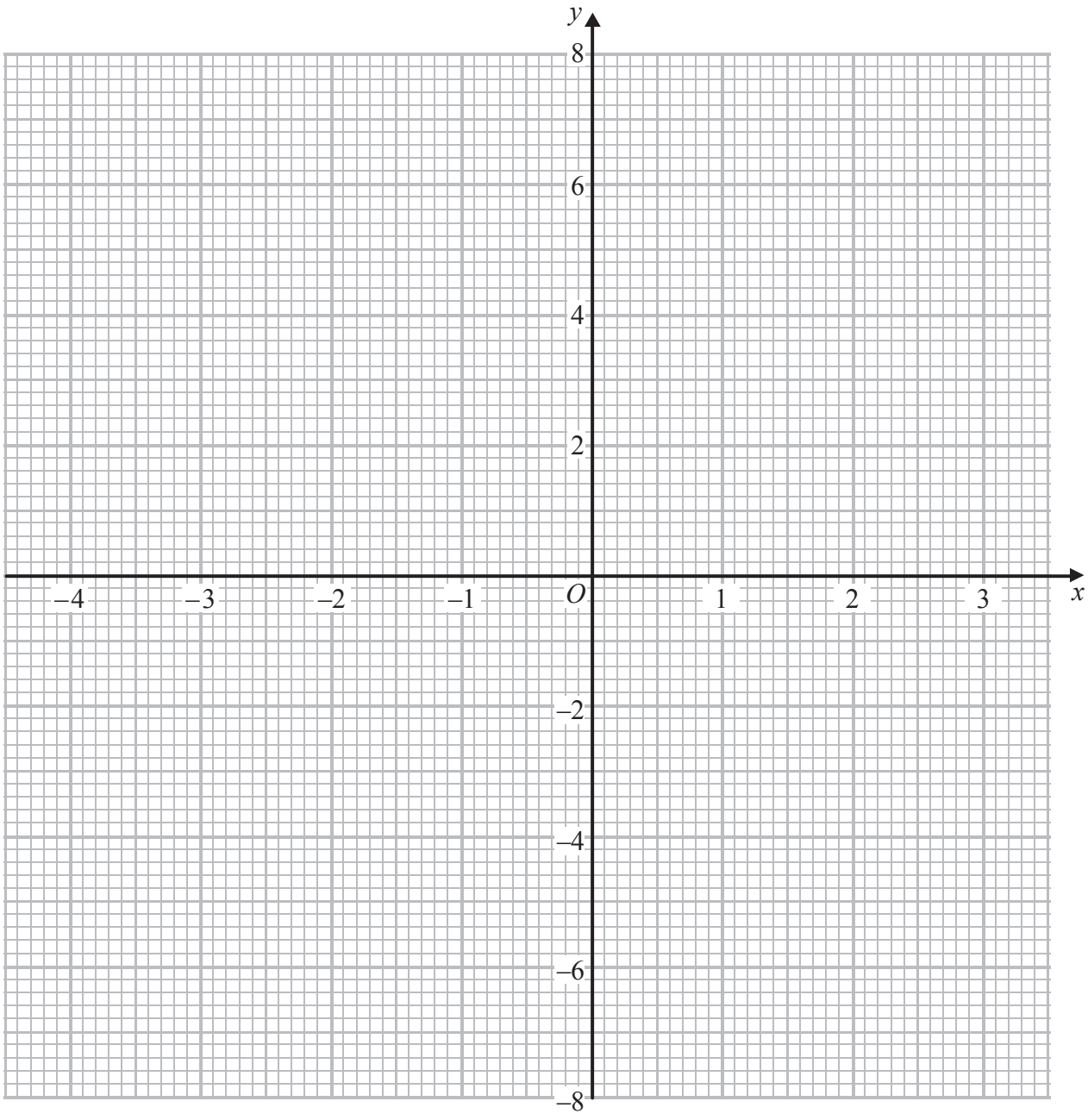
---

13 (a) Complete the table for the values for $y = 6 - x - x^2$

x	−4	−3	−2	−1	0	1	2	3
y	−6		4	6			0	

(2)

(b) On the grid, draw the graph of $y = 6 - x - x^2$ for values of x from −4 to 3



(2)

(c) Find estimates for the solutions of the equation $6 - x - x^2 = 2$

.....

(2)

(Total for Question 13 is 6 marks)

***14** During a 10 year period, the number of people living in Sherbury increased by 5% to 20 265

In the same period, the number of people living in Yaston increased by 7.5% to 13 502

Compare the increase in the number of people living in Sherbury with the increase in the number of people living in Yaston during this 10 year period.

(Total for Question 14 is 3 marks)

15 Solve the simultaneous equations

$$4x + 2y = 7$$
$$3x - 5y = -24$$

$x =$ .....

$y =$ .....

(Total for Question 15 is 4 marks)

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16

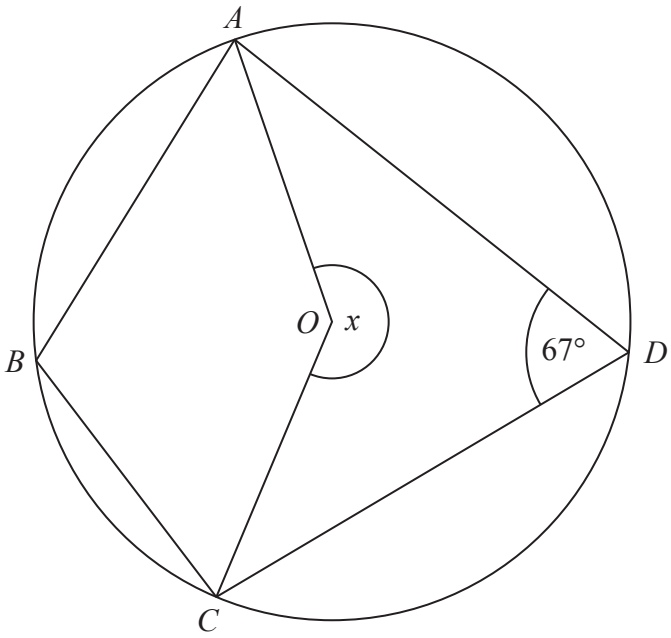

Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.
Angle *ADC* = 67°

Find the size of the angle marked *x*.

.....°

(Total for Question 16 is 2 marks)

17 Solve $x^2 - 17x - 56 = 0$
Give your solutions correct to 2 decimal places.

.....

(Total for Question 17 is 3 marks)

18

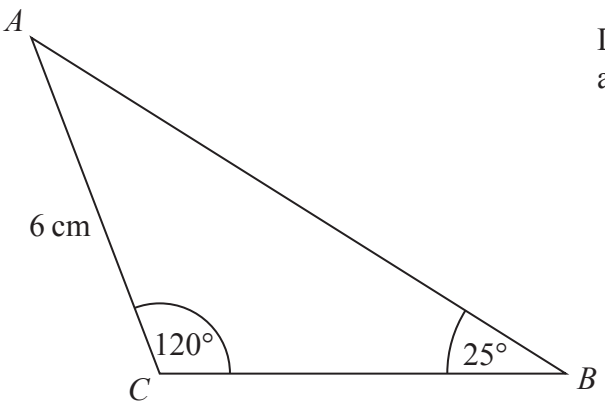

Diagram **NOT** accurately drawn

In triangle ABC,
$AC = 6$ cm
Angle $ACB = 120°$
Angle $ABC = 25°$

Work out the area of triangle ABC.
Give your answer correct to 1 decimal place.
You must show all your working.

..... cm^2

(Total for Question 18 is 4 marks)

***19** $p = \sqrt{\frac{s}{t}}$

s = 10.8 correct to 1 decimal place.
t = 75.06 correct to 2 decimal places.

By considering bounds, work out the value of p to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

(Total for Question 19 is 5 marks)

20 y is inversely proportional to the square root of x.

When $x = 4$, $y = 9$

Work out the value of y when $x = 6$
Give your answer correct to 3 significant figures.

.....

(Total for Question 20 is 3 marks)

***21**

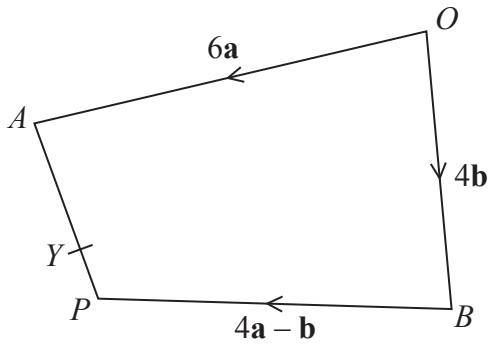

Diagram **NOT** accurately drawn

OBPA is a quadrilateral.

$\overrightarrow{OA} = 6\mathbf{a}$

$\overrightarrow{OB} = 4\mathbf{b}$

$\overrightarrow{BP} = 4\mathbf{a} - \mathbf{b}$

Y is the point on *AP* such that *AY* : *YP* = 2 : 1

Show that $\overrightarrow{OY}$ is parallel to the vector $7\mathbf{a} + 3\mathbf{b}$

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

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