



General Certificate of Secondary Education
2024

Centre Number

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Candidate Number

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Mathematics

Unit M8 Paper 2

(With Calculator)

Higher Tier



MV24

[GMC82]

MONDAY 3 JUNE, 10.45 am–12 noon

Time

1 hour 15 minutes, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write on blank pages or tracing paper.

Complete in black ink only.

Answer **all twelve** questions.

All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.

You **may** use a calculator for this paper.

Information for Candidates

The total mark for this paper is 50.

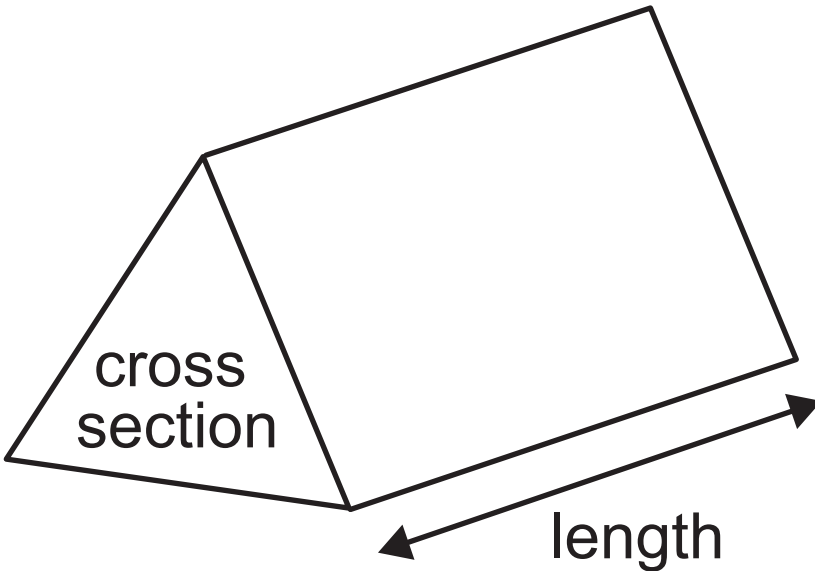
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

You should have a calculator, ruler, compasses and a protractor.

The Formula Sheet is on pages 3, 4 and 5.

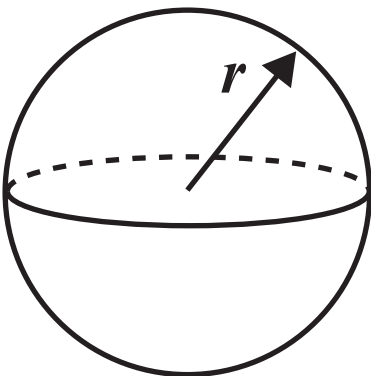
Formula Sheet

Volume of prism = area of cross section \times length



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

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



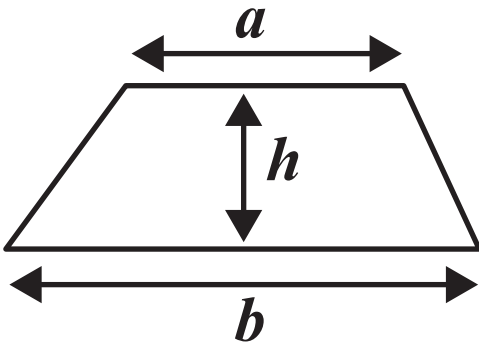
Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

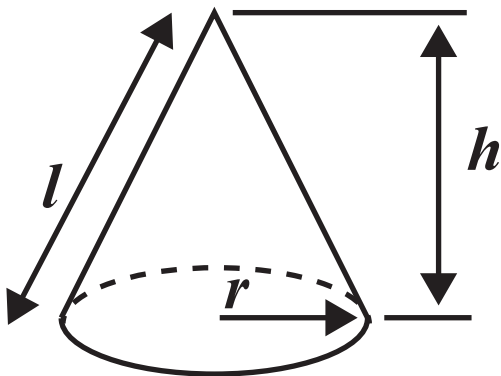
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

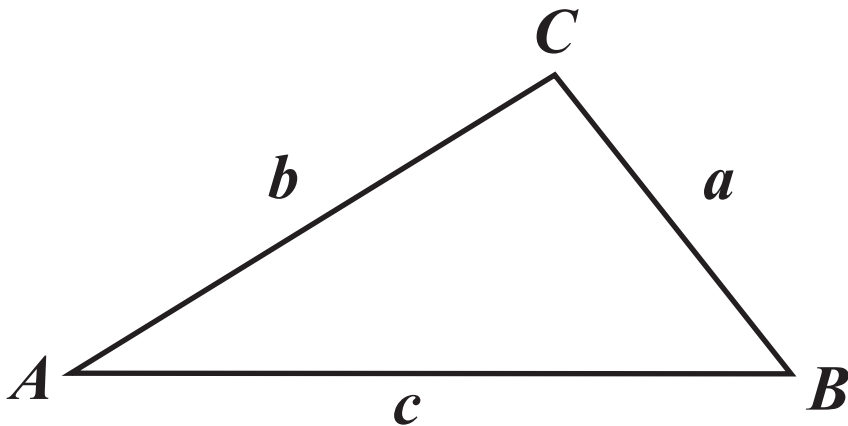


Volume of cone = $\frac{1}{3} \pi r^2 h$

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



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

1 Sarah rolls a fair dice and tosses a fair coin.

What is the probability that she gets a number less than 5 and a Head?

[2 marks]

Show your working out.

Answer _____

2 $x^a \times x^4 = x^{12}$

Find the value of a . [1 mark]

Answer $a =$ _____

3 The equation $x^3 - 12x - 2 = 0$ has a solution between 2 and 5

Use a trial and improvement method to find this solution, correct to one decimal place.
[4 marks]

You must show all your working.

x	$x^3 - 12x - 2$
-----	-----------------

Answer $x =$ _____

4 The table shows the probability of getting each number on a biased dice.

Number on dice	1	2	3	4	5	6
Probability	0.18	0.2	0.3	0.1	0.1	0.12

The dice is rolled twice and the numbers are added together.

What is the probability of getting a total of 5? [4 marks]

Answer _____

5 A varies directly as the square of x .

When $x = 5$, $A = 20$

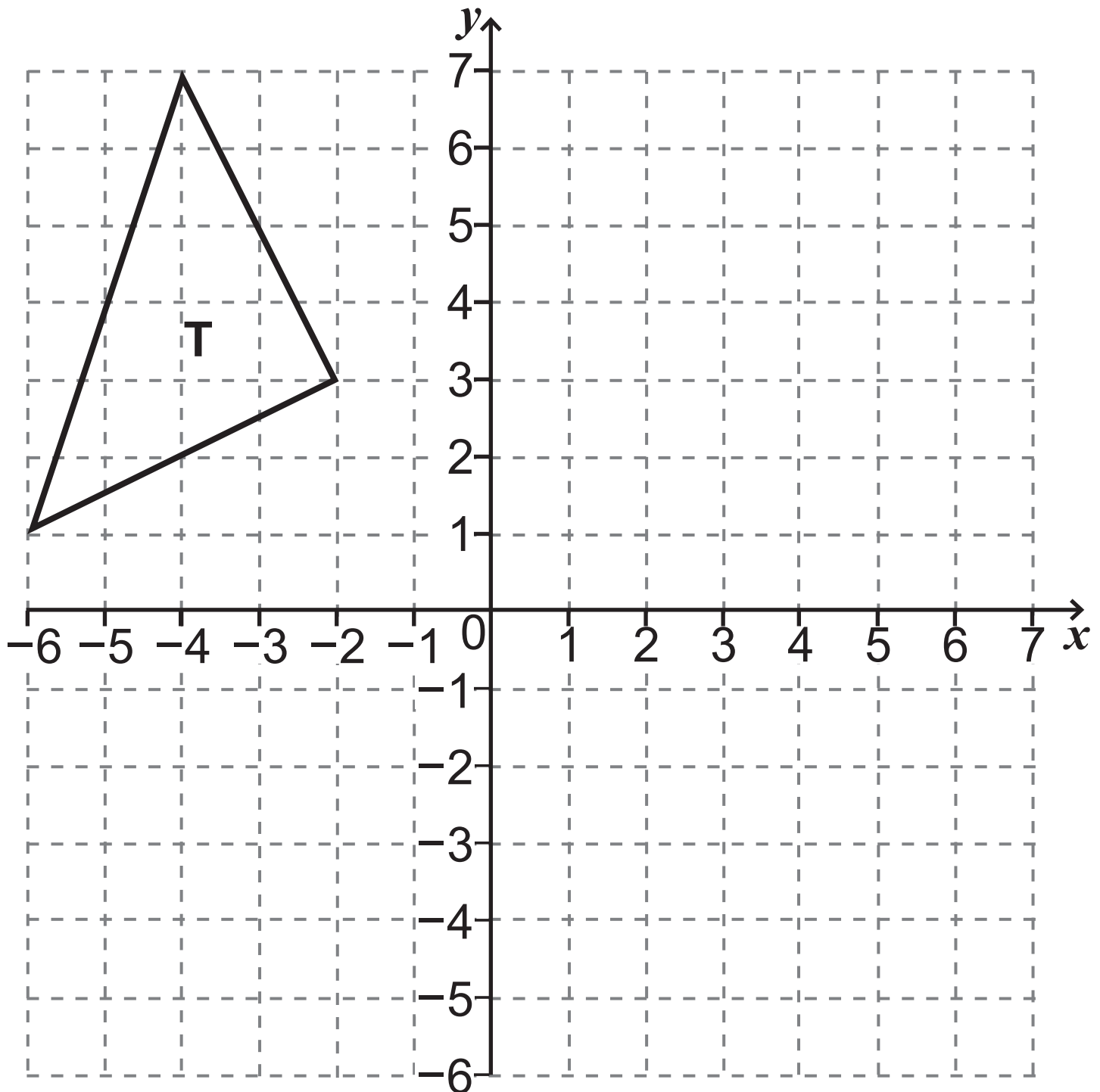
Calculate the value of x when $A = 45$
[4 marks]

Answer $x =$ _____

- 6 Triangle T is reflected in the line $y = x$ and then enlarged by a scale factor of $\frac{1}{2}$ using the centre of enlargement $(7, 2)$.

Draw the final image and label it F.

[4 marks]



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(Questions continue overleaf)

7 There are 200 students in Year 8 and 160 students in Year 9

There are 120 girls in Year 8 and 100 girls in Year 9

The probability that a girl plays a musical instrument is 0.3

The probability that a boy plays a musical instrument is 0.25

A student is taken at random from the students who play a musical instrument.

What is the probability that it is a boy?
[4 marks]

Answer _____

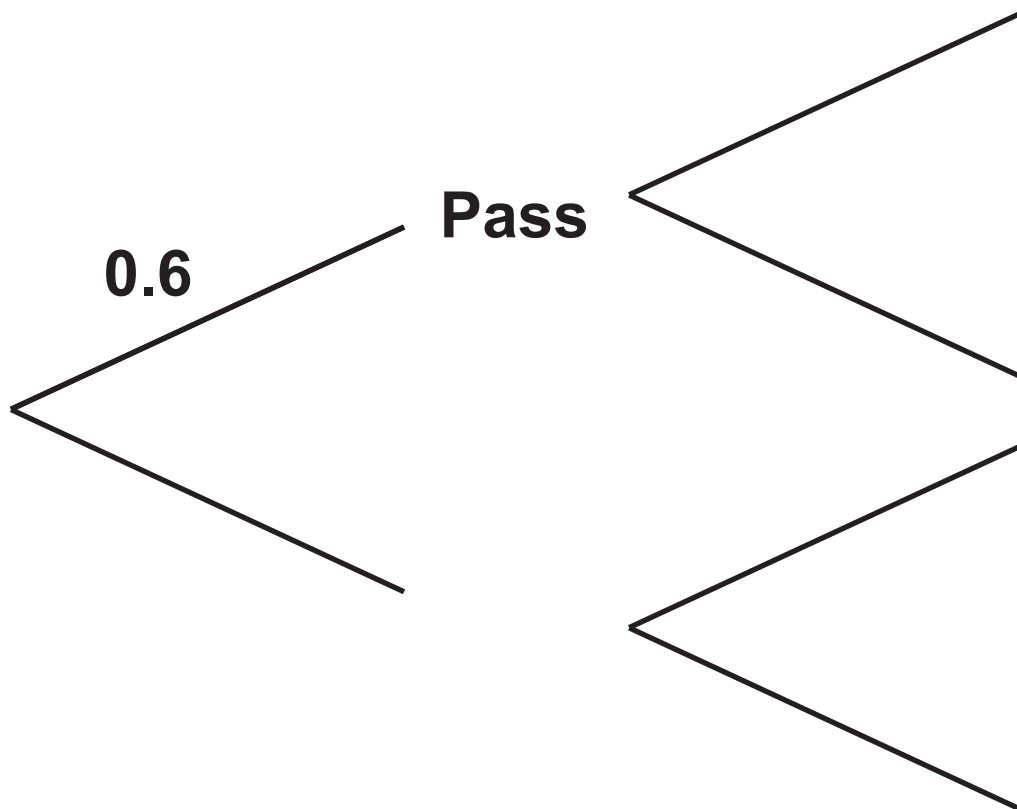
8 (a) Athletes at a fitness course complete two fitness tests.

The probability of passing the first test is 0.6

If the athlete passes the first test, the probability of passing the second test is 0.75

If the athlete fails the first test, the probability of passing the second test is 0.45

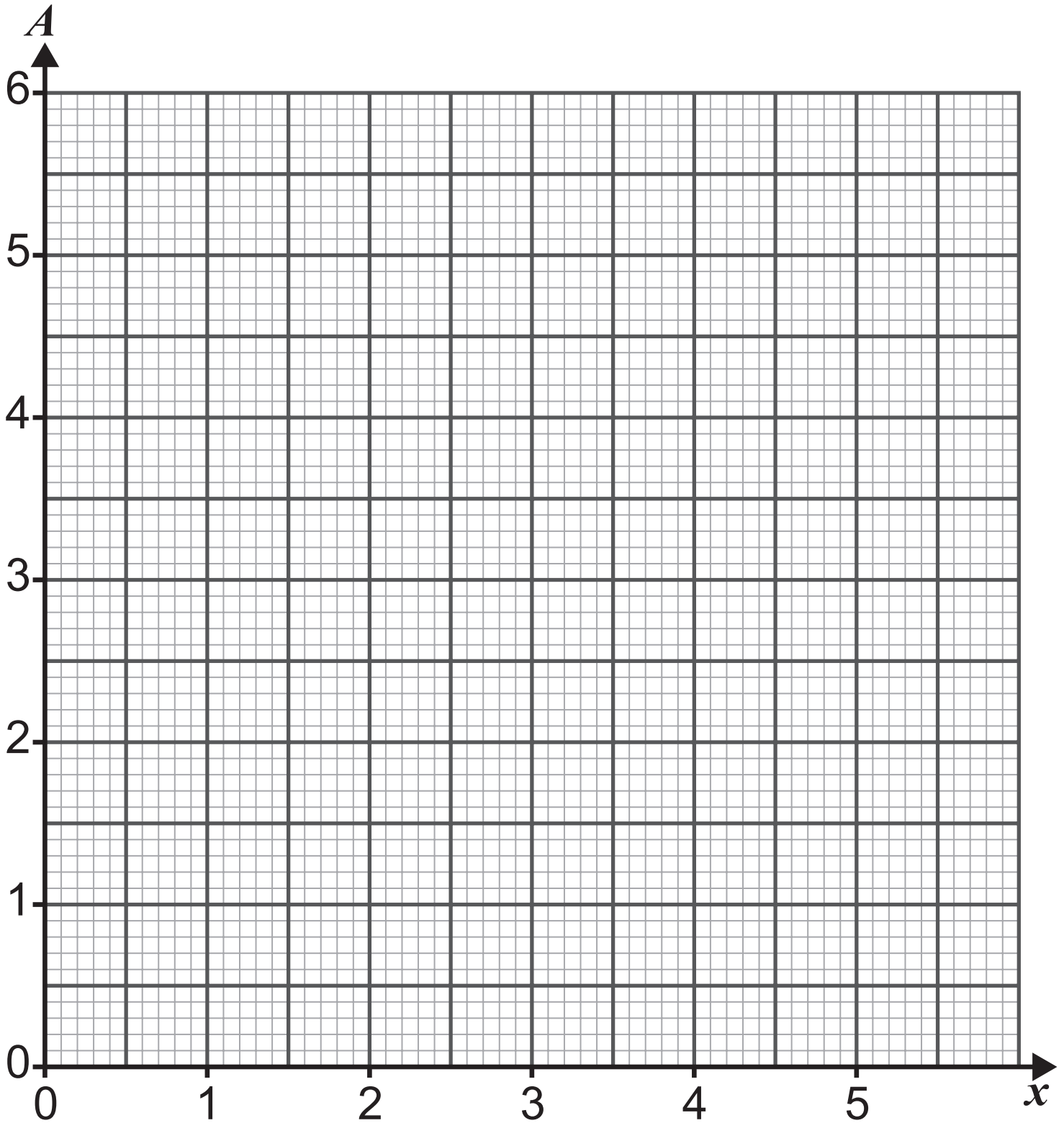
Complete the tree diagram. [1 mark]



(b) Work out the probability of an athlete passing only one of the tests.
[2 marks]

Answer _____

- 9 (a) Draw the graph of $A = (1.5)^x$
for values of x between 0 and 4
[3 marks]



- (b)** Use the graph to find when the initial value of A has trebled in value.
[1 mark]

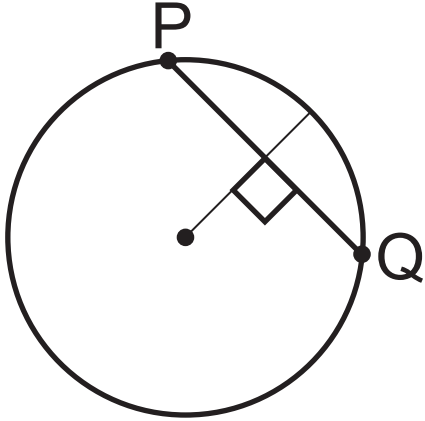
Answer $x =$ _____

- (c)** By drawing a suitable line on the graph, estimate the instantaneous rate of increase in the value of A when $x = 3$
[2 marks]

Answer _____

10 PQ is a chord of the circle $x^2 + y^2 = 160$

(4, 8) is the midpoint of PQ.



(a) What is the gradient of the radius of the circle which passes through (4, 8)?
[1 mark]

Answer _____

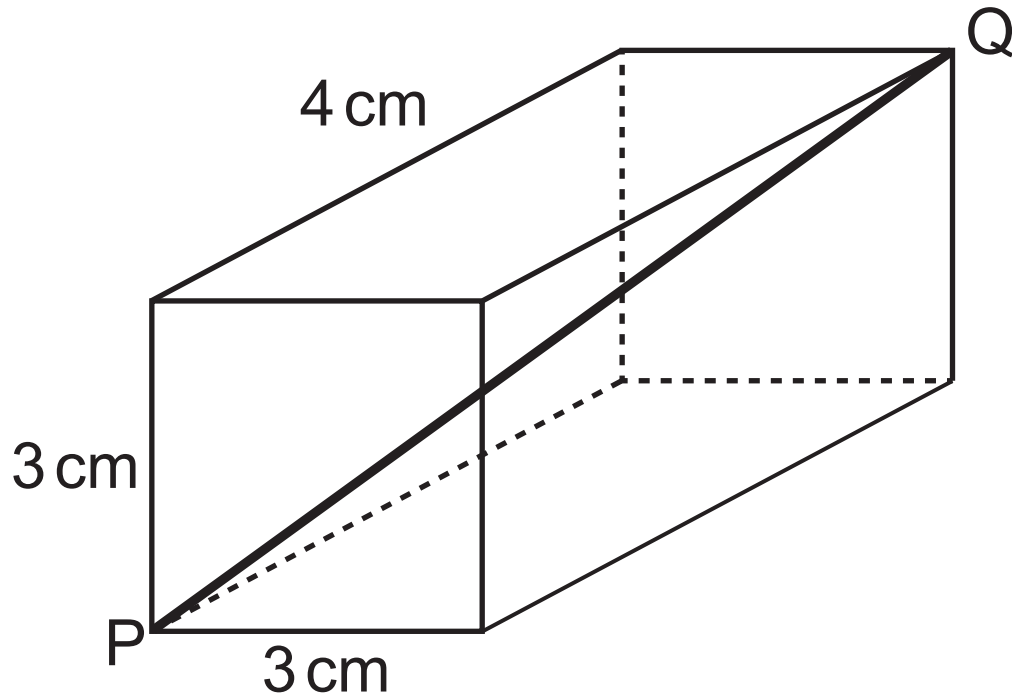
(b) The radius intersects the chord at right angles.

Show that the equation of the chord PQ is $2y + x = 20$ [3 marks]

(c) Find the coordinates of P and Q.
[5 marks]

Answer _____ and _____

- 11 Calculate the angle between the space diagonal PQ and the base of the cuboid.
[3 marks]



Answer _____ °

23

12 Work out the area of ABCD. [6 marks]

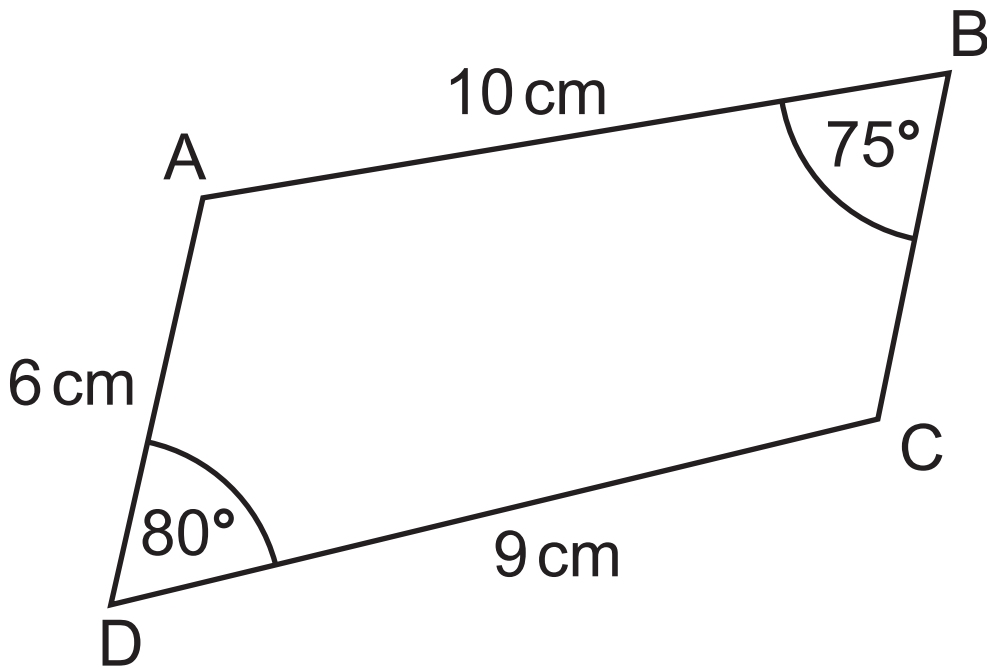


diagram
not drawn
accurately

Answer _____ cm²

**This is the end of the
question paper**

SOURCES

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

Examiner Number

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