



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

[GMC82]



\*GMC82\*

**MONDAY 3 JUNE, 10.45 am–12 NOON**

## TIME

1 hour 15 minutes.

## 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 outside the boxed area on each page, on blank pages or tracing paper.**

Complete in black ink only. **Do not write with a gel pen.**

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 down the right-hand side of pages indicate the marks awarded to each question or part question.

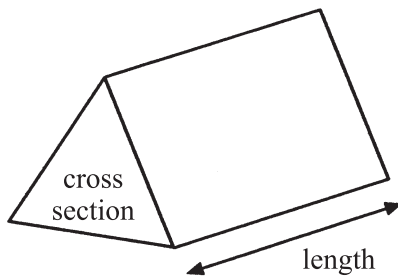
You should have a calculator, ruler, compasses and a protractor.

The Formula Sheet is on page 2.

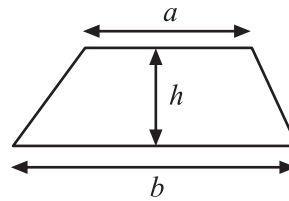


# Formula Sheet

**Volume of prism** = area of cross section  $\times$  length

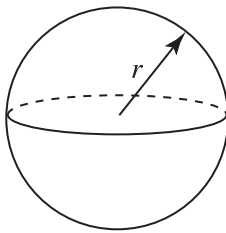


**Area of trapezium** =  $\frac{1}{2}(a+b)h$



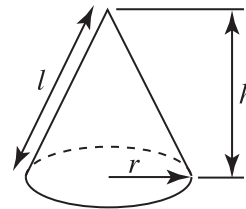
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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

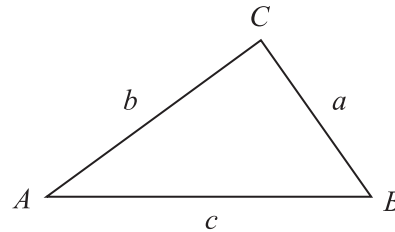


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

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



**In any triangle ABC**



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



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?

Show your working out.

Answer \_\_\_\_\_ [2]

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

Find the value of  $a$ .

Answer  $a =$  \_\_\_\_\_ [1]

[Turn over





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?

Answer \_\_\_\_\_ [4]



5  $A$  varies directly as the square of  $x$ .

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

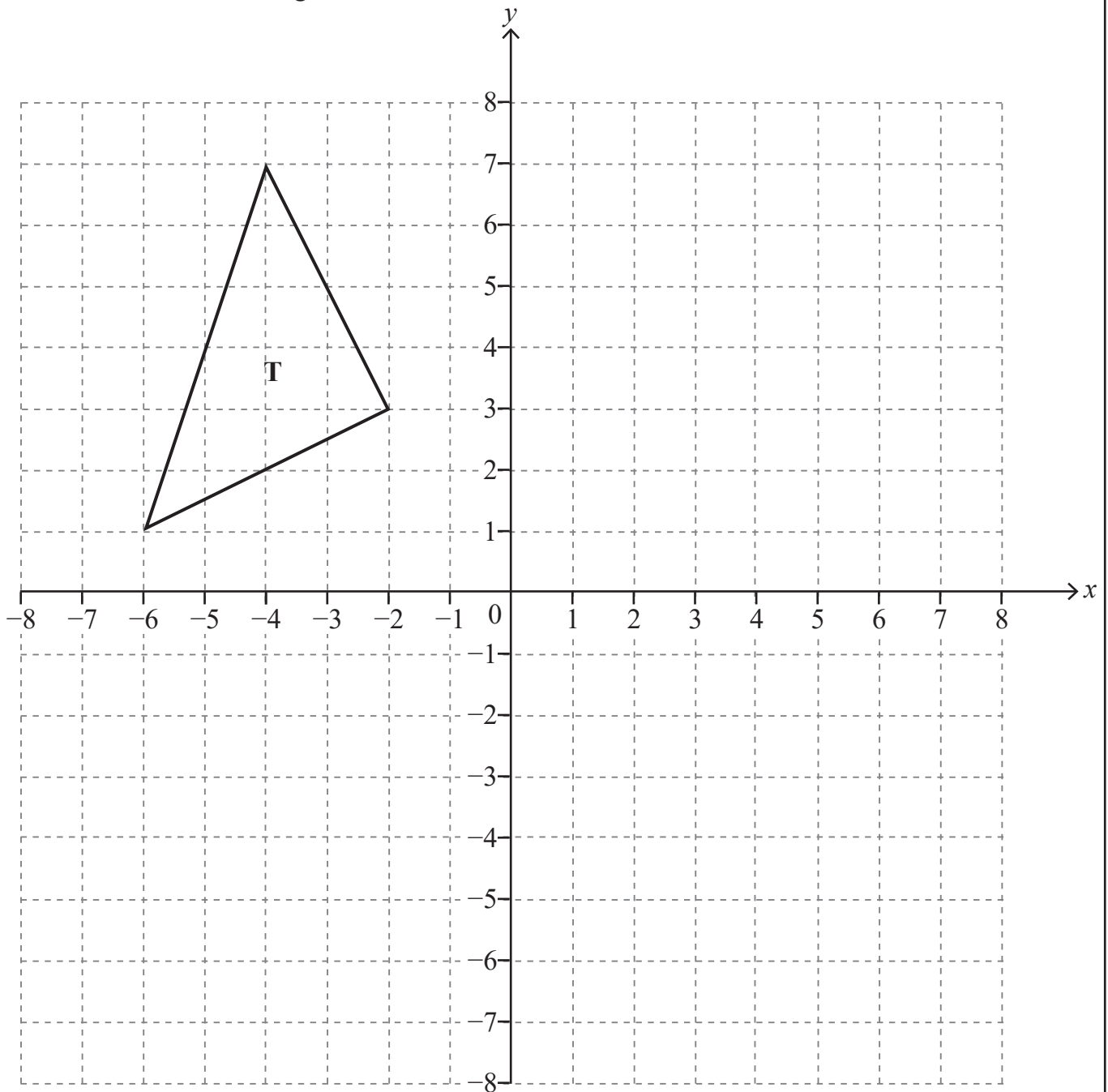
Calculate the value of  $x$  when  $A = 45$

Answer  $x =$  \_\_\_\_\_ [4]



- 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]

[Turn over



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?

Answer \_\_\_\_\_ [4]





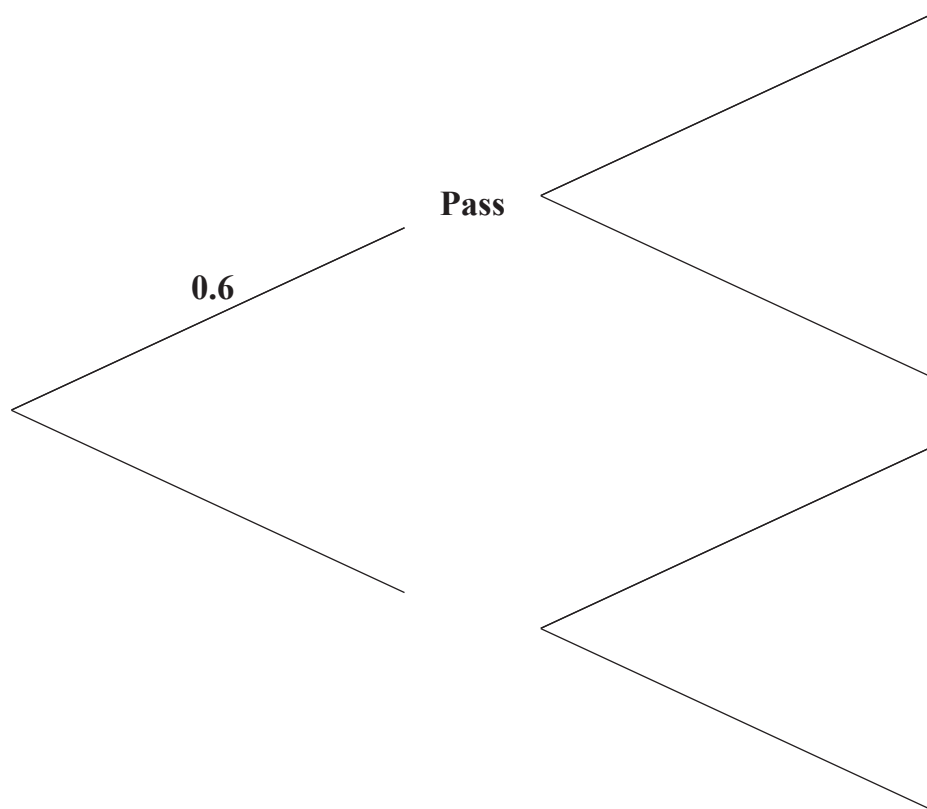
8 (a) Athletes at a fitness course complete two fitness tests.

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]

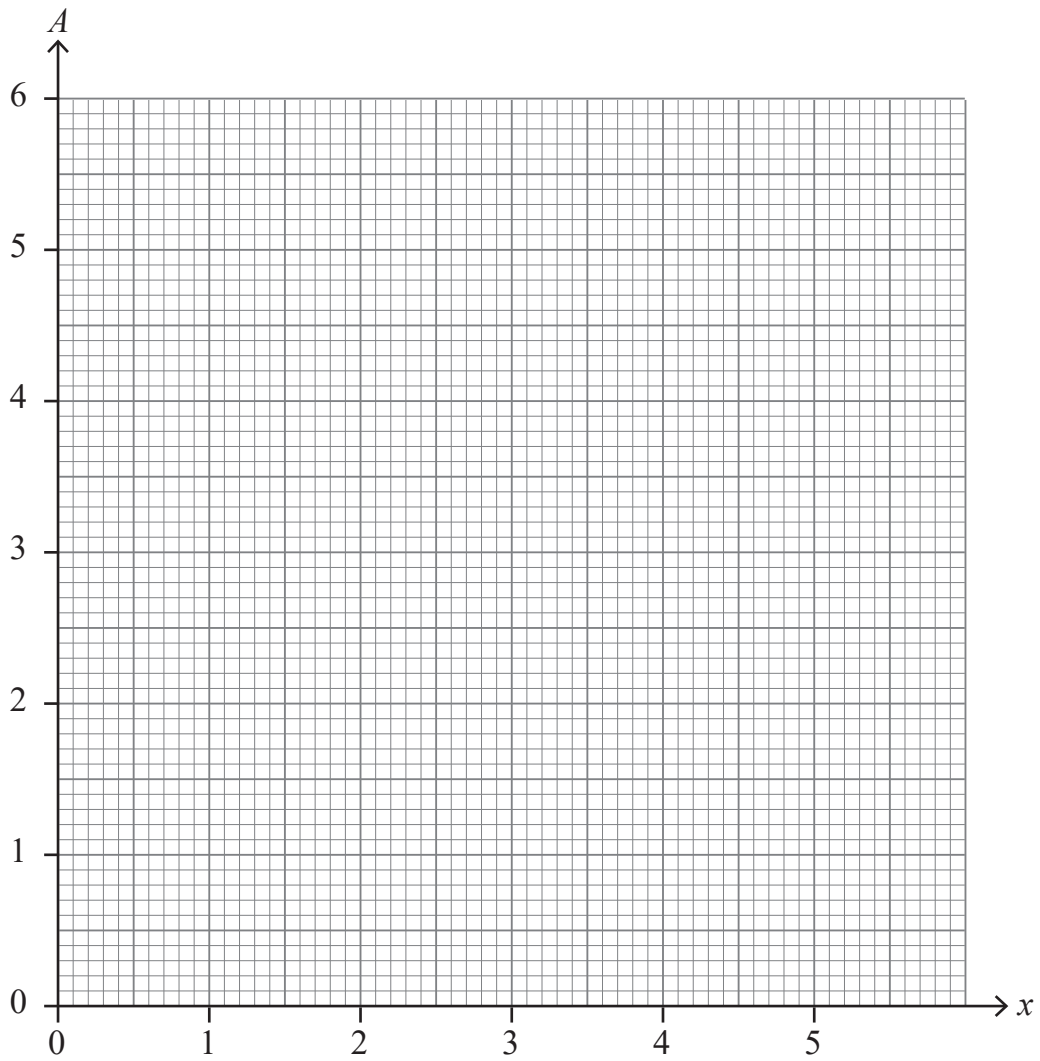
(b) Work out the probability of an athlete passing only one of the tests.

Answer \_\_\_\_\_ [2]

[Turn over



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



[3]



(b) Use the graph to find when the initial value of  $A$  has trebled in value.

Answer  $x =$  \_\_\_\_\_ [1]

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

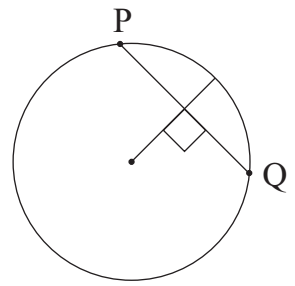
Answer \_\_\_\_\_ [2]

[Turn over



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)?

Answer \_\_\_\_\_ [1]

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

Show that the equation of the chord PQ is  $2y + x = 20$

[3]



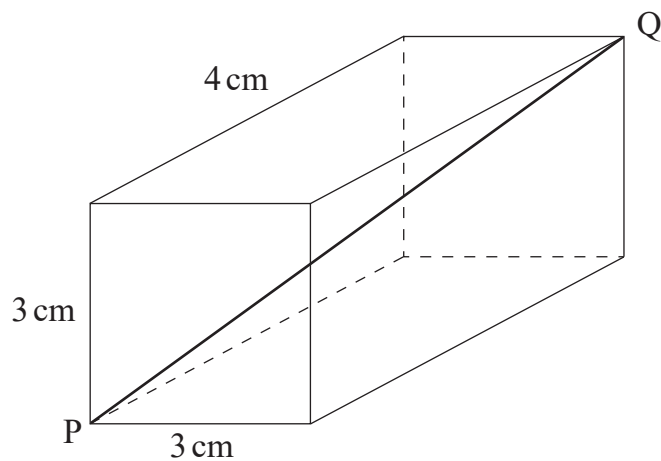
(c) Find the coordinates of P and Q.

Answer \_\_\_\_\_ and \_\_\_\_\_ [5]

[Turn over



11 Calculate the angle between the space diagonal PQ and the base of the cuboid.



Answer \_\_\_\_\_° [3]



12 Work out the area of ABCD.

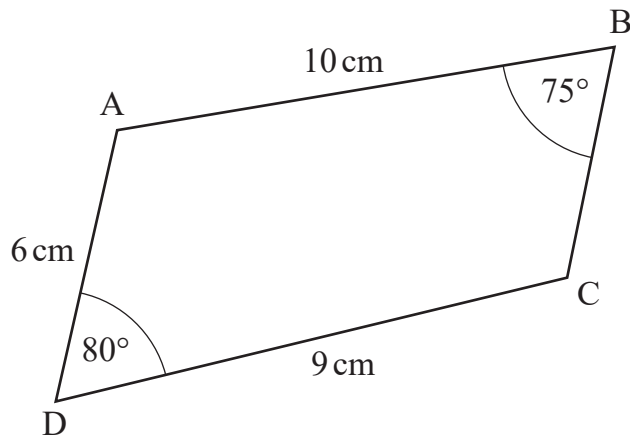


diagram not  
drawn accurately

Answer \_\_\_\_\_  $\text{cm}^2$  [6]



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**THIS IS THE END OF THE QUESTION PAPER**

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For Examiner's use only	
Question Number	Marks
1	
2	
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<b>Total Marks</b>	
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Examiner Number

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