OXFORD

INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

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I declare this is my own work.

INTERNATIONAL GCSE

MATHEMATICS

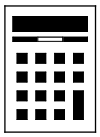
E

Extension Tier Paper 1E

Time allowed: 2 hours

Materials

For this paper you must have:



- a calculator
- mathematical instruments
- the Formulae Sheet (enclosed).

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.
- If your calculator does not have a π button, take the value of π to be 3.142

Advice

- Show all necessary working; otherwise marks for method may be lost.

For Examiner's Use	
Pages	Mark
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	
TOTAL	

Do not write outside the box

Answer **all** questions in the spaces provided.

1 Use your calculator to work out $\tan^{-1} 1.5$

Circle the answer to 2 significant figures.

[1 mark]

0.026° 34° 38° 56°

2 The vector $\begin{pmatrix} -3 \\ 0 \end{pmatrix}$ translates shape A to shape B.

Circle the vector that translates shape B to shape A.

[1 mark]

$\begin{pmatrix} -3 \\ 0 \end{pmatrix}$ $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$

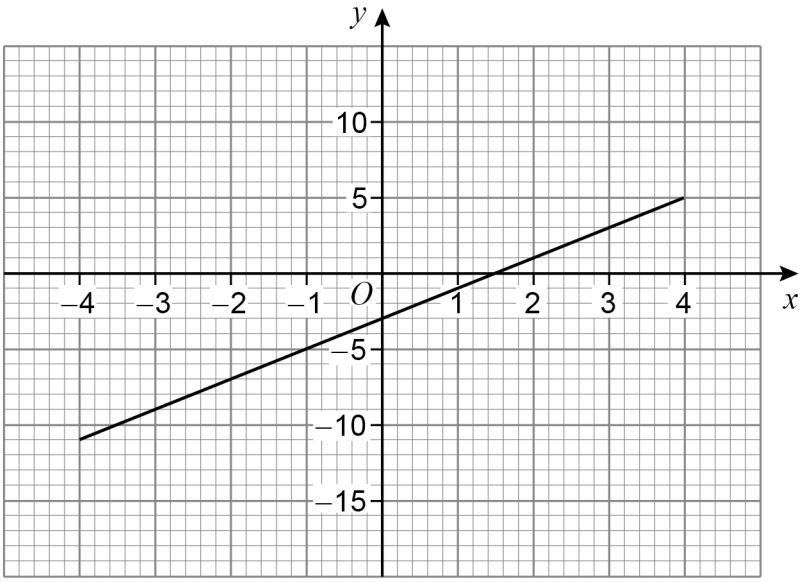
3 Circle the number that is equivalent to $(1 \text{ million})^2 \times \sqrt{1 \text{ million}}$

[1 mark]

10^{12} $10^{12.5}$ 10^{15} $10^{17.5}$

Do not write outside the box

4 Here is a straight line graph.



Circle the gradient of the line.

[1 mark]

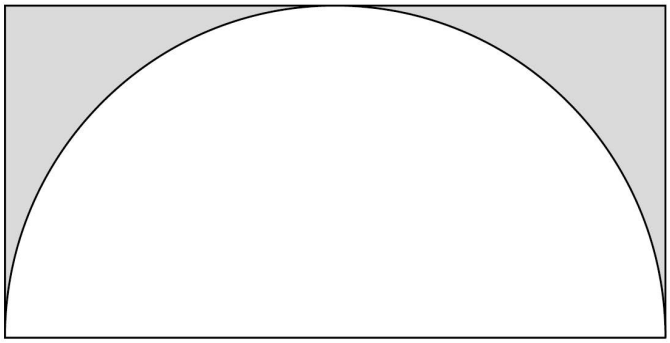
0.5 2 0.4 1.25

Turn over for the next question

4

Do not write outside the box

5 A semicircle of radius 9 cm just fits inside a rectangle as shown.



Not drawn accurately

Show that the shaded area is **more** than 20% of the area of the rectangle.

[4 marks]

Do not write outside the box

6 A biased spinner is spun 10 times.

Here are the results.

Red	Not Red
3	7

6 (a) Write down the relative frequency of Red.

[1 mark]

Answer _____

6 (b) Is the answer to part (a) a **reliable** estimate of the probability of Red for this spinner?

Give a reason for your answer.

[1 mark]

_____

_____

_____

6 (c) The spinner is spun another 10 times.

How many of these spins will be Red?

Tick **one** box.

[1 mark]

Less than 3 ☐

Exactly 3 ☐

More than 3 ☐

Cannot tell ☐

7

Do not write outside the box

7 (a) Factorise $y^2 - 49$

[1 mark]

Answer _____

7 (b) p is a prime number greater than 2

Work out an expression in terms of p for the highest common factor of $4p$ and $6p^2$

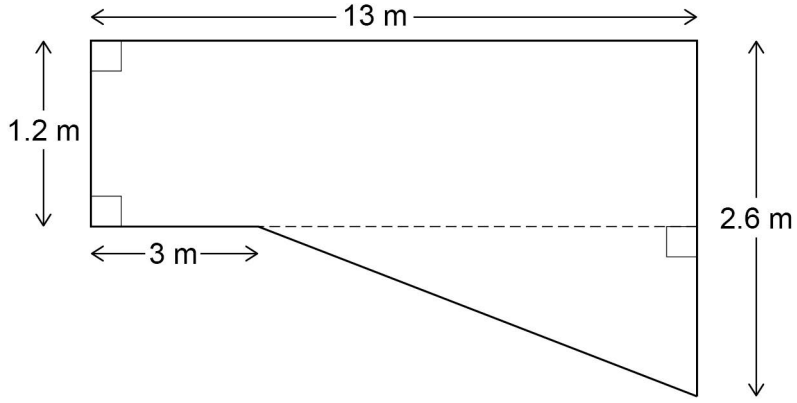
[2 marks]

Answer _____

Do not write outside the box

8 A swimming pool is in the shape of a prism.

The diagram shows the cross-section of the pool.



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8 (a) Show that the area of the cross-section is 22.6 m^2

[2 marks]

8 (b) The pool is 9 m wide.

1 litre = 0.001 m^3

Work out the number of litres of water that the pool can hold.

[2 marks]

Answer _____ litres

7

Turn over ►

Do not write outside the box

9 Simplify $\frac{3x + 1}{2} + \frac{x}{4}$

Give your answer as a single fraction in its simplest form.

[3 marks]

Answer _____

10 Jamal invests $2800 in a savings account for 5 years.

The account has a compound interest rate of 2% per year.

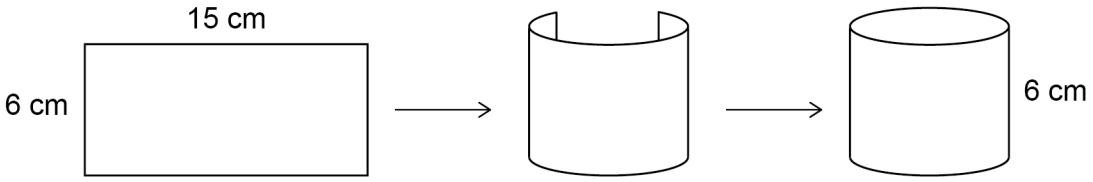
How much is in the account after the 5 years?

[3 marks]

Answer $ _____

Do not write outside the box

11 A 15 cm by 6 cm rectangular card is rolled to form a cylinder, with no overlap.



Work out the radius of the cylinder.

[2 marks]

Answer _____ cm

12 Simplify fully $\dfrac{15w^{16}}{3w^4 \times w^2}$

[2 marks]

Answer _____

10

Turn over ►

Do not write outside the box

13 A farmer has 3850 trees.

They are apple trees and pear trees in the ratio apple : pear = 2 : 5

He plants

300 more apple trees

50 more pear trees.

What fraction of the trees are now apple trees?

Give your answer in its simplest form.

[4 marks]

Answer _____

Do not write outside the box

14 An elevator rises from one floor to another.

The elevator travels from rest

with constant acceleration for 4 seconds

then

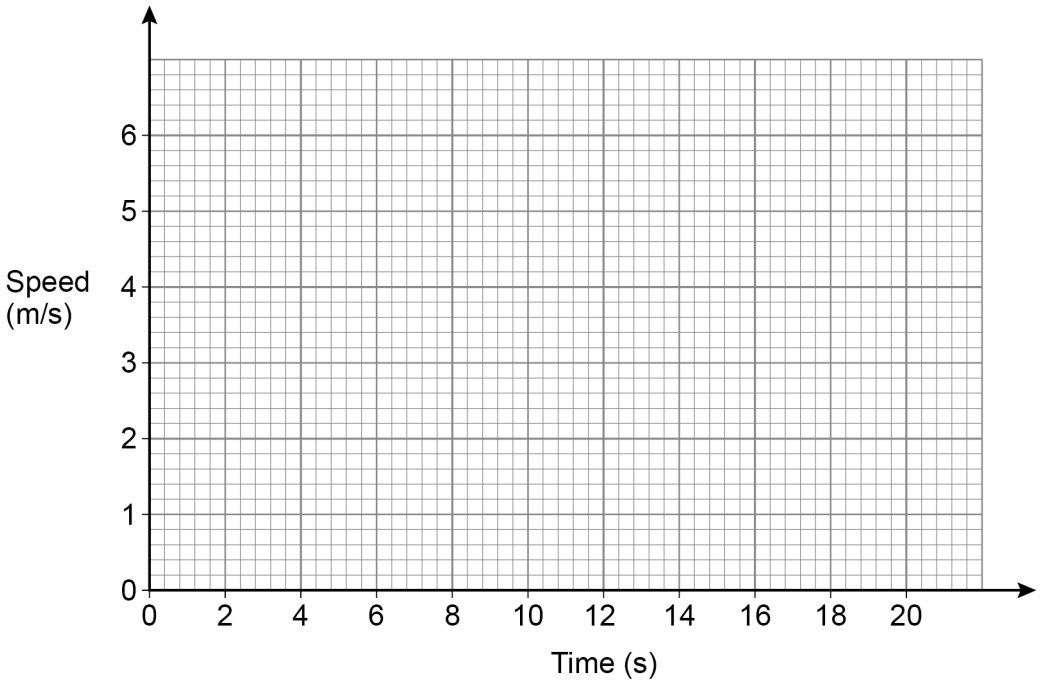
at a constant speed of 5 m/s for 10 seconds

then

with constant deceleration for 6 seconds, coming to rest.

Draw the speed-time graph.

[3 marks]



Turn over for the next question

7

Turn over ►

Do not write outside the box

15 Here is the term-to-term rule for a sequence.

Multiply by 2 and add x

When the second term is 3 the fourth term is 45

…… 3 …… 45

Work out the value of the first term.

[4 marks]

Answer _____

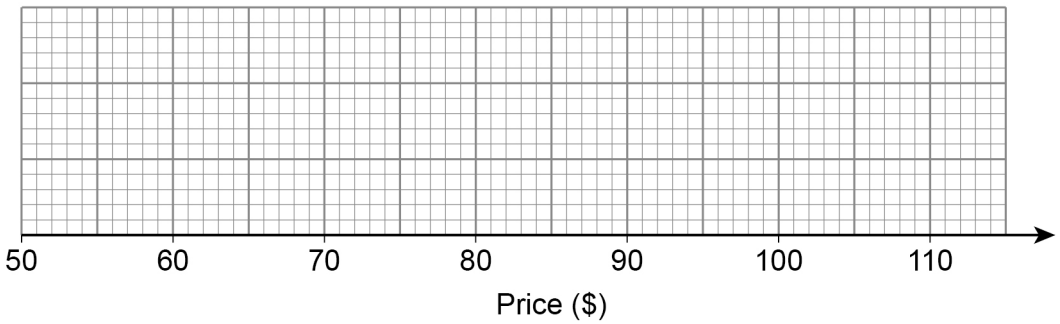
Do not write outside the box

16 The table shows information about the price of concert tickets at an arena.

Cheapest price	$52
Lower quartile	$70
Median	$90
Interquartile range	$27
Range	$54

Draw a box plot to show the information.

[4 marks]

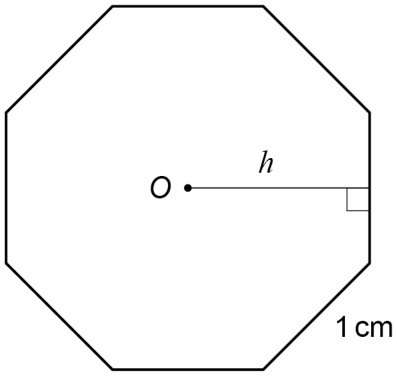


Turn over for the next question

8

Do not write outside the box

17 A white tile is a regular octagon with side length 1 cm and centre O.



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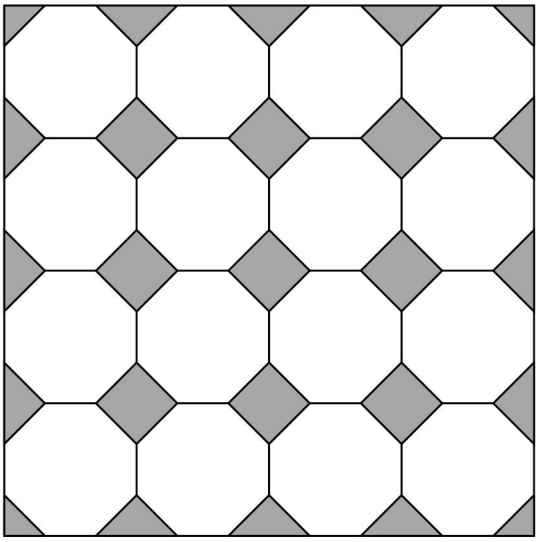
17 (a) Show that $h = 1.207$ cm to 3 decimal places.

[3 marks]

Do not write outside the box

17 (b) 16 of the white tiles form a square pattern with grey tiles as shown.



Not drawn accurately

Work out the ratio area of white : area of grey

Give your answer in the form 1 : n

[3 marks]

Answer _____ : _____

6

Do not write outside the box

18 Airlines pay a charge to each country that a plane flies over.

This formula is used to calculate the charge, C euros, to fly over Germany.

$$C = 0.7665d \times \sqrt{\frac{m}{50}}$$

where d = distance flown in km

m = mass, in tonnes, of aircraft at take-off

18 (a) The mass of an aircraft at take-off is 435 tonnes.

It flies 734 km over Germany.

Work out the charge.

[2 marks]

Answer _____ euros

18 (b) A different aircraft flies 682 km over Germany.

The charge is 1250 euros.

Work out the mass of the aircraft at take-off.

[3 marks]

Answer _____ tonnes

Do not write outside the box

19 The base of a pyramid has n sides.

Circle an expression for the **total** number of edges of the pyramid.

[1 mark]

n $n + 1$ $2n$ $3n$

20 In 2010 the population of a village was V.

t years after 2010 the population, y, is given by $y = V(0.85)^t$

Circle the annual change in the population.

[1 mark]

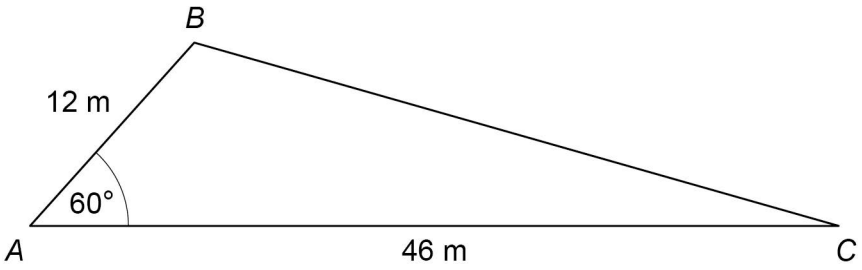
growth of 85% growth of 15% decay of 85% decay of 15%

Turn over for the next question

7

Do not write outside the box

21 Triangle *ABC* represents a plot of land.



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21 (a) Work out the area of the plot of land.

[2 marks]

Answer _____ m^2

21 (b) Work out the length *BC*.

[3 marks]

Answer _____ m

Do not write outside the box

22 A regular hexagon has side length 8.2 cm, correct to 1 decimal place.

Work out upper bound of perimeter length – lower bound of perimeter length

You **must** show your working.

[3 marks]

Answer _____ cm

23 $\cos x < 0$ and $\tan x > 0$

Circle the inequality that represents the possible values of x.

[1 mark]

$0° < x < 90°$ $90° < x < 180°$ $180° < x < 270°$ $270° < x < 360°$

Turn over for the next question

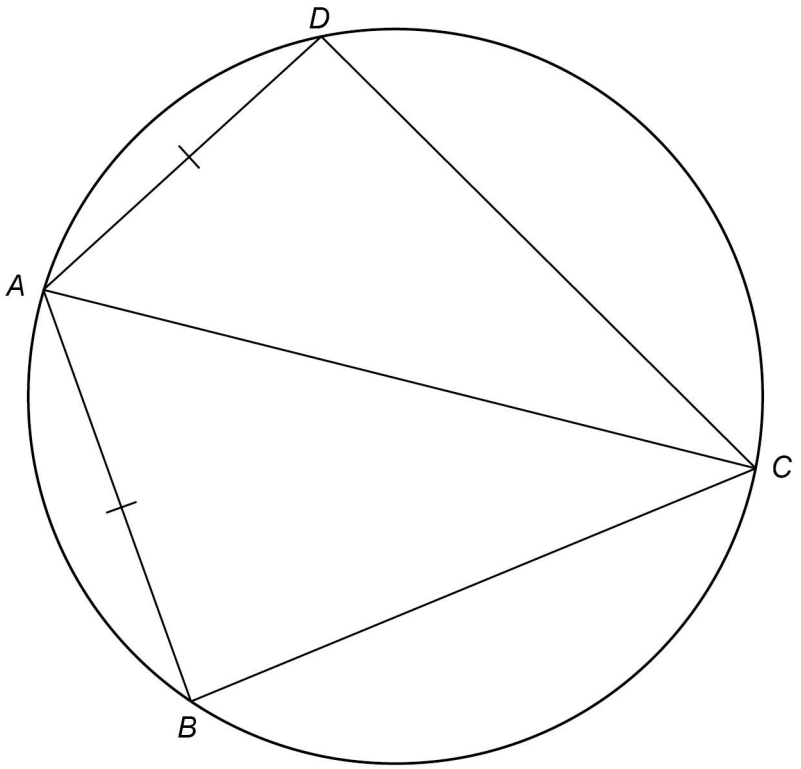
9

Do not write outside the box

24 A, B, C and D are points on a circle.

AC is a diameter.

$AD = AB$



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Prove that ADC and ABC are congruent triangles.

[3 marks]

Do not write outside the box

25 (a) $\mathbf{A} = \begin{pmatrix} 2 & -1 \\ 4 & 3 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 6 & 2 \\ -8 & 4 \end{pmatrix}$

Show that $\mathbf{BA} = k\mathbf{I}$ where k is an integer.

[3 marks]

25 (b) The unit square in the x-y plane is transformed using matrix $k\mathbf{I}$.

Describe the transformation.

[2 marks]

8

Do not write outside the box

26 $y = a \times b^{(x-1)}$ where a and b are positive numbers.

When $x = 1$ $y = 20$

When $x = 3$ $y = 8.192$

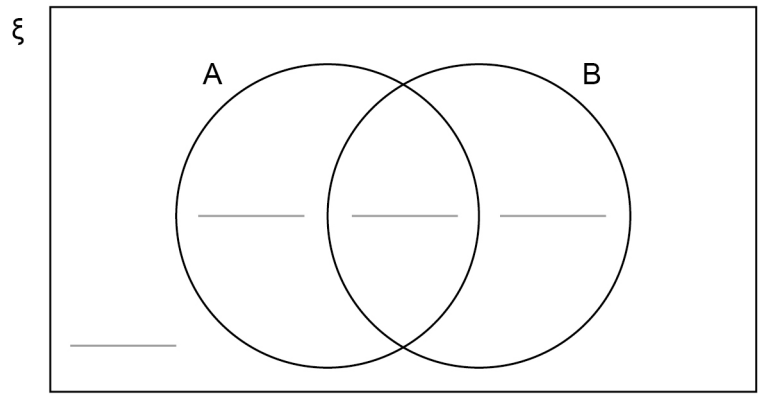
Work out the values of a and b.

[3 marks]

$a =$ _____ $b =$ _____

Do not write outside the box

27 The Venn diagram represents two **independent** events, A and B.



$P(A) = \frac{2}{5}$ and $P(B) = \frac{3}{4}$

Complete the Venn diagram with the correct probability for each section.

[4 marks]

Turn over for the next question

7

Do not write outside the box

28 Expand and simplify fully $(2x + 5)^3 - 25(6x + 5)$

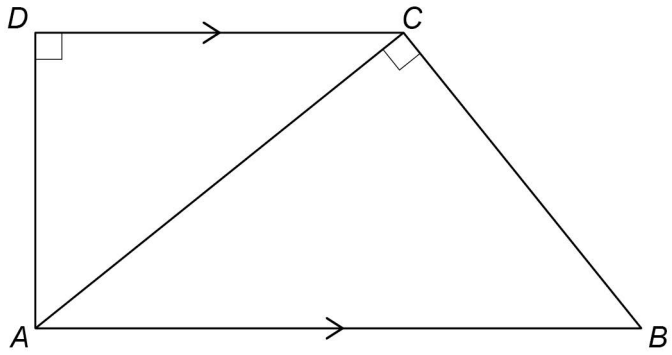
[4 marks]

Answer _____

Do not write outside the box

29 *ABCD* is made from two similar right-angled triangles.

AB is parallel to *DC*.



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ABC has area 150 cm^2

ADC has area 96 cm^2

Work out the ratio *AD* : *BC*

Give your answer in the form $a : b$ where a and b are integers.

[2 marks]

Answer _____ : _____

Turn over for the next question

6

Do not write outside the box

30 $f(x) = \dfrac{2x - 5}{3}$

Work out $f^{-1}(x)$

[3 marks]

Answer _____

31 The equation of a curve is $y = 3x^2 - 12x + 5$

By completing the square, work out the turning point of the curve.

[3 marks]

Answer (_____ , _____)

Do not write outside the box

32 Convert $\frac{0.\dot{1}\dot{8}}{0.\dot{5}}$ to a fraction in its simplest form.

You **must** show your working.

[4 marks]

Answer _____

10

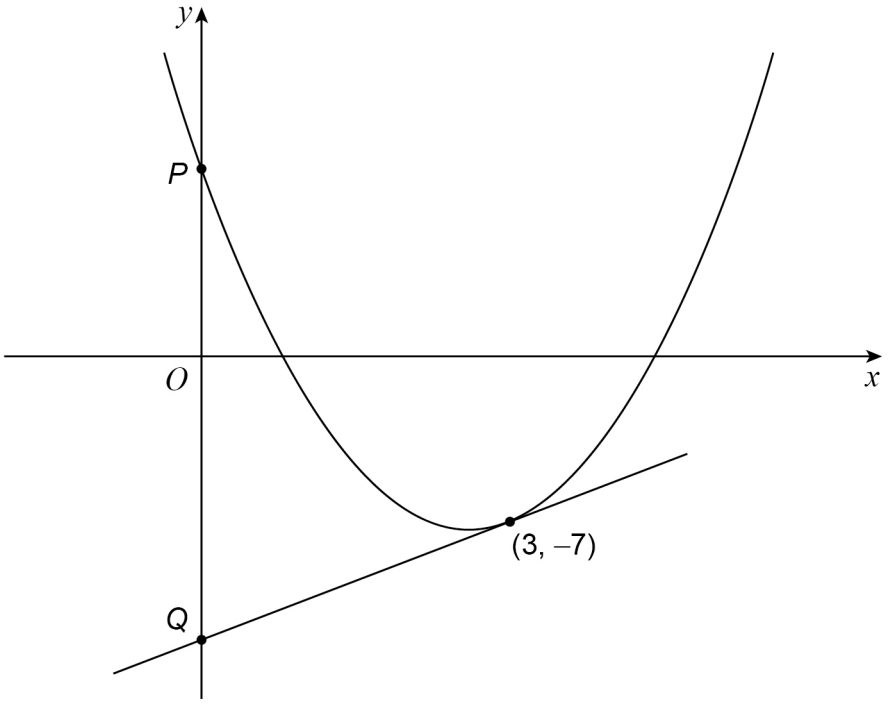
Turn over ►

Do not write outside the box

33 A sketch of the curve $y = 2x^2 - 11x + 8$ is shown.

P is the y-intercept of the curve.

Q is the point where the tangent to the curve at (3, –7) intersects the y-axis.



Work out the length PQ.

[4 marks]

Answer _____ units

END OF QUESTIONS

4

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ANSWER IN THE SPACES PROVIDED

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Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

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