

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

INTERNATIONAL GCSE MATHEMATICS EXTENSION

E

Paper 2E

Wednesday 13 November 2019

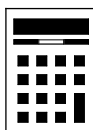
07:00 GMT

Time allowed: 2 hours

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



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	



N 0 V 1 9 9 2 6 0 2 E 0 1

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

- 1 Circle the expression equivalent to $(5x^3)^2$ [1 mark]

$25x^5$

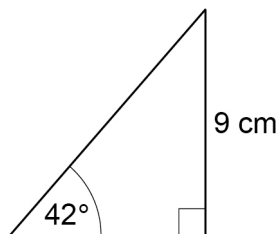
$25x^6$

$10x^5$

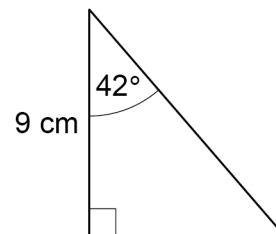
$10x^6$

- 2 Which **two** of these triangles are congruent?

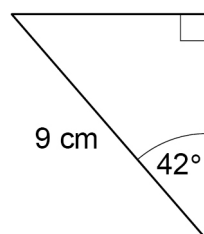
A



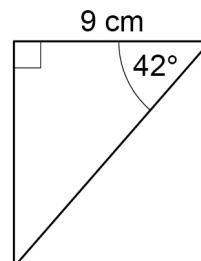
B



C



D



Not drawn
accurately

Circle your answer.

[1 mark]

A and B

A and C

B and D

C and D



- 3 Work out 5 as a percentage of 2
Circle your answer.

[1 mark]

2.5%

40%

150%

250%

- 4 Circle the gradient of the line $y = 5x - 7$

[1 mark]

-7

-5

5

7

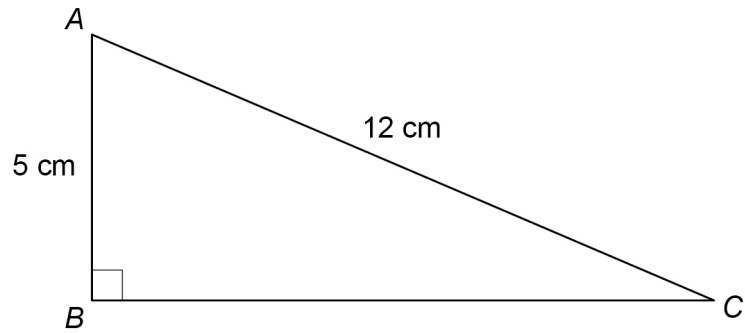
- 5 Use approximations to 1 significant figure to estimate the value of $0.192 \times \sqrt[3]{8054}$
You **must** show your working.

[2 marks]

Answer _____



6

Not drawn
accurately

Use Pythagoras' theorem to work out the length BC .

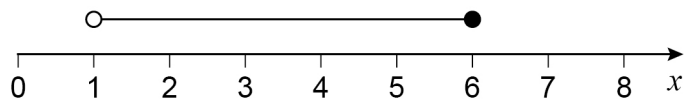
Give your answer as a decimal.

[3 marks]

Answer _____ cm



- 7 (a) The diagram represents an inequality.



Write down the integers that satisfy the inequality.

[2 marks]

Answer _____

- 7 (b) c is an integer.

$$-5 < c < 3$$

Work out the **smallest** possible value of c^3

[1 mark]

Answer _____

Turn over for the next question



8 Here is some information about 80 students.

One fifth have brown eyes **and** dark hair.

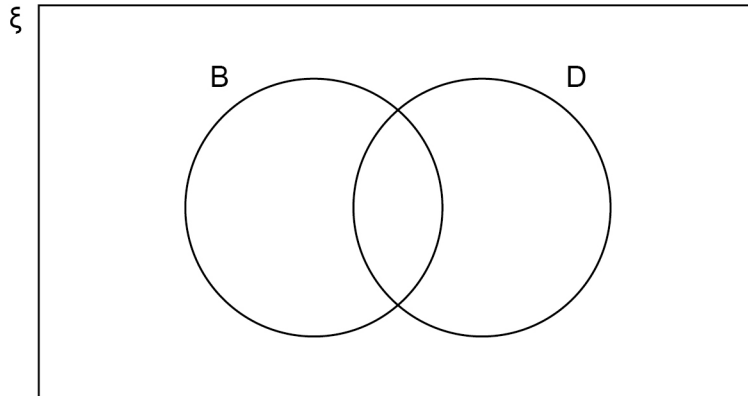
28 have neither brown eyes **nor** dark hair.

Half of the remaining students have brown eyes.

In total, how many students have brown eyes?

You may use the Venn diagram to help you.

[4 marks]



Answer _____



9 (a) Factorise $9 - x^2$

[1 mark]

Answer _____

9 (b) Work out the value of $x\left(10 + \frac{1}{x}\right)$ when $x = \frac{1}{10}$

[2 marks]

Answer _____

9 (c) Expand $3xy(4x^2 + y^2)$

[2 marks]

Answer _____



10 Some men and some women started a fitness programme.

Three samples of men were taken.

The table shows how many men in each sample completed the programme.

	Number in sample	Number completing programme
Sample A	10	3
Sample B	25	7
Sample C	200	48

10 (a) For **Sample B**, circle the relative frequency of men completing the programme.

[1 mark]

$$\frac{7}{18}$$

$$\frac{7}{25}$$

$$\frac{7}{58}$$

$$\frac{7}{235}$$

10 (b) Of the three samples, the results for **C** give the best estimate of the probability of a man completing the programme.

Give a reason why this is true.

[1 mark]



10 (c)

A sample of 200 women was also taken.

The relative frequency of women completing the programme was 0.38

Based on these samples, who is more likely to complete the programme?

Tick a box.

☐

Men

☐

Women

☐

Equally likely

Show working to support your answer.

[1 mark]

11

 a , b and c are **different** numbers. a is a factor of b . a is a factor of c .Tick **one** box for each statement.

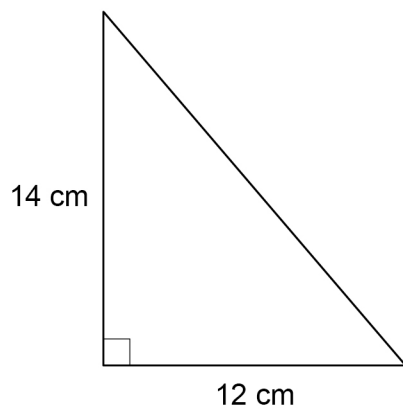
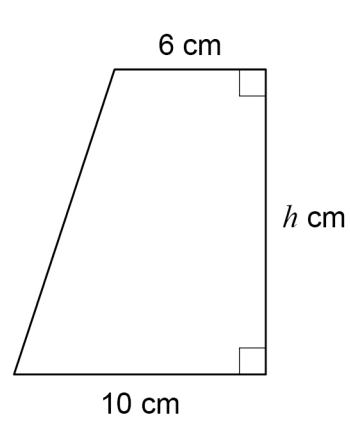
[3 marks]

	True	May be true	Not true
a is a factor of bc	☐	☐	☐
a is a factor of $(b + c)$	☐	☐	☐
b is a factor of c	☐	☐	☐
c is a factor of a	☐	☐	☐



12

The area of the triangle is equal to the area of the trapezium.



Not drawn
accurately

Work out the value of h .

[4 marks]

Answer _____



13

A shop sells knives and forks.

cost of a knife : cost of a fork = 3 : 2

6 knives and 6 forks cost \$22.80

Work out the cost of a knife.

[4 marks]

Answer \$ _____

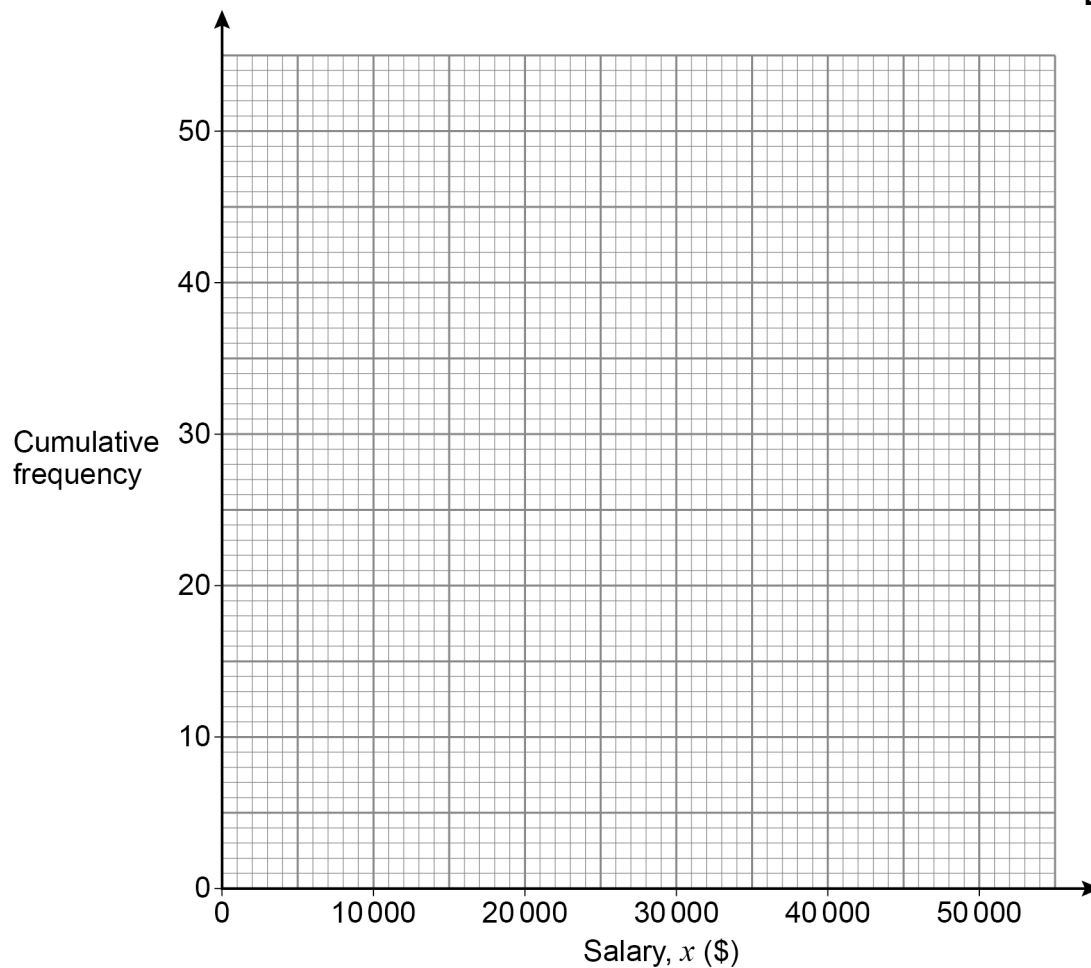
Turn over for the next question

- 14** The table shows information about the salaries of 48 workers.

Salary, x (\$)	Frequency	
$0 < x \leq 10\,000$	2	
$10\,000 < x \leq 20\,000$	4	
$20\,000 < x \leq 30\,000$	23	
$30\,000 < x \leq 40\,000$	15	
$40\,000 < x \leq 50\,000$	4	

- 14 (a)** Draw a cumulative frequency diagram for the data.

[3 marks]



- 14 (b)** Estimate how many of the 48 workers have a salary of more than \$25 000

[2 marks]

Answer _____

- 15** The n th term of a sequence is $\frac{n}{n+7}$

One term has a value of $\frac{8}{9}$

Work out the value of n for this term.

[3 marks]

Answer _____

Turn over ►



16

Ken cycles

2 km from A to B at a speed of 15 km/h

12 km from B to C at a speed of 20 km/h

Work out his average speed between A and C.

Give your answer in km/h

[3 marks]

Answer _____ km/h

17Circle the expression equivalent to $\frac{1}{a} - \frac{1}{b}$ **[1 mark]**

$$\frac{1}{a-b}$$

$$\frac{1}{ab}$$

$$\frac{a-b}{ab}$$

$$\frac{b-a}{ab}$$



18

A drink is made with 9 litres of juice and 28 litres of water.

How much **more** juice should be added so that 30% of the drink is made of juice?

[3 marks]

Answer _____ litres

Turn over for the next question



19 Expand and simplify fully $(x - 1)(x - 2)(x + 3)$

[4 marks]

Answer _____



20

Some boys and some girls take a test.

Which of these would show that the boys have more consistent scores?

Tick **one** box.

[1 mark]

The boys have a higher median

☐

The boys have a lower median

☐

The boys have a larger interquartile range

☐

The boys have a smaller interquartile range

☐

21

Work out the gradient of the curve $y = 10 - \frac{1}{4}x^3$ at the point $(-2, 12)$

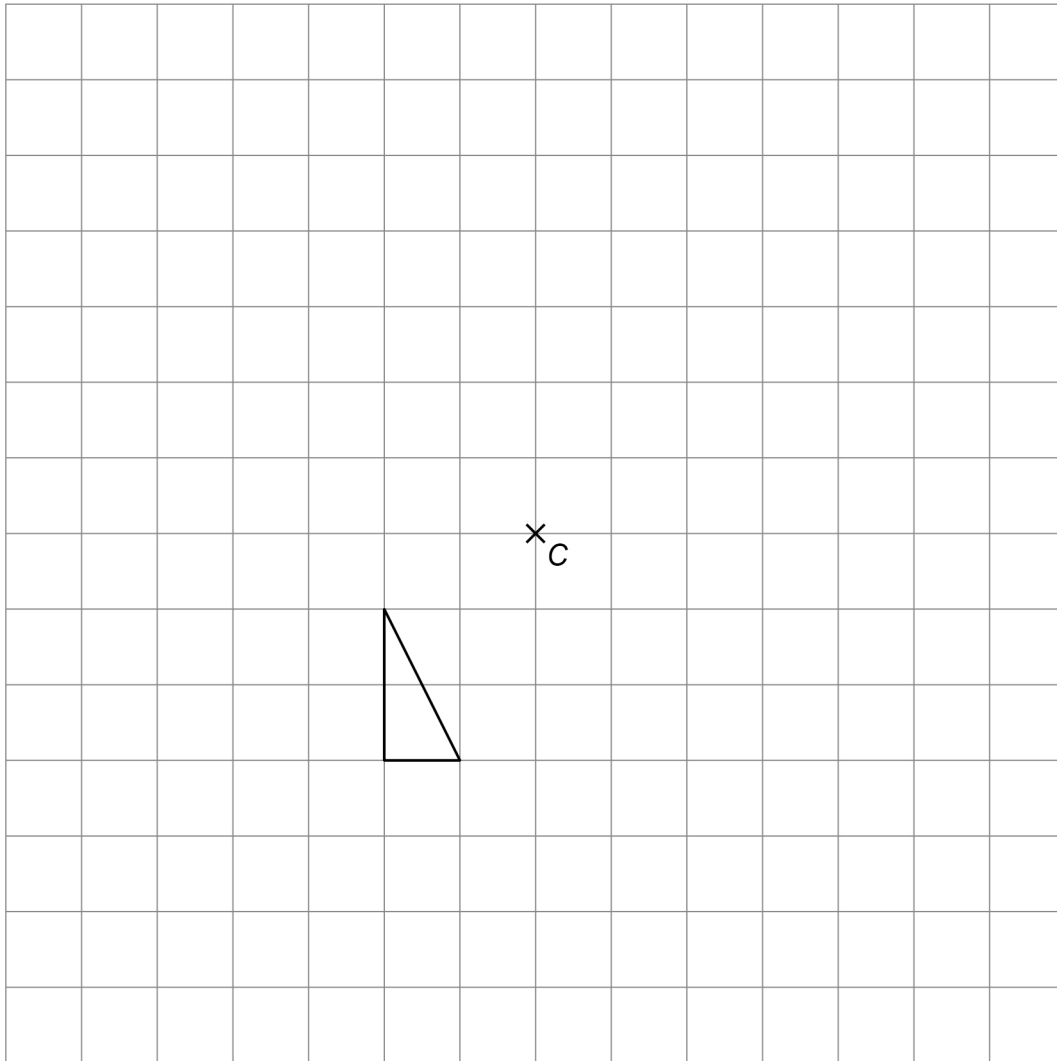
[3 marks]

Answer _____

Turn over ►



22

Enlarge the triangle by scale factor -2 , centre C.**[2 marks]**

[4 marks]

[illegible]

Answer _____



24 Show that $\sqrt{300}$ can be written as $10\sqrt{3}$

[1 mark]

25 Simplify $\frac{4 \times 2^5}{8^{\frac{1}{3}}}$

Give your answer in the form 2^k where k is an integer.

You **must** show your working.

[3 marks]

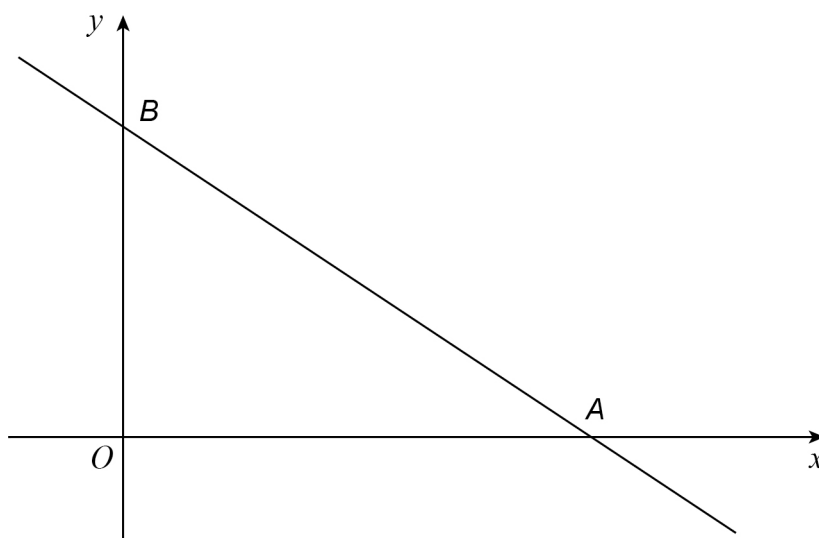
Answer _____



*Do not write
outside the
box*

26

The line $3x + 4y - 12 = 0$ intersects the axes at A and B , as shown.



Not drawn accurately

Work out the equation of the perpendicular bisector of AB .

Give your answer in the form $y = mx + c$

[6 marks]

[illegible]

Answer _____



- 27 Circle the line of symmetry of the quadratic graph $y = (x + 3)^2 - 36$

[1 mark]

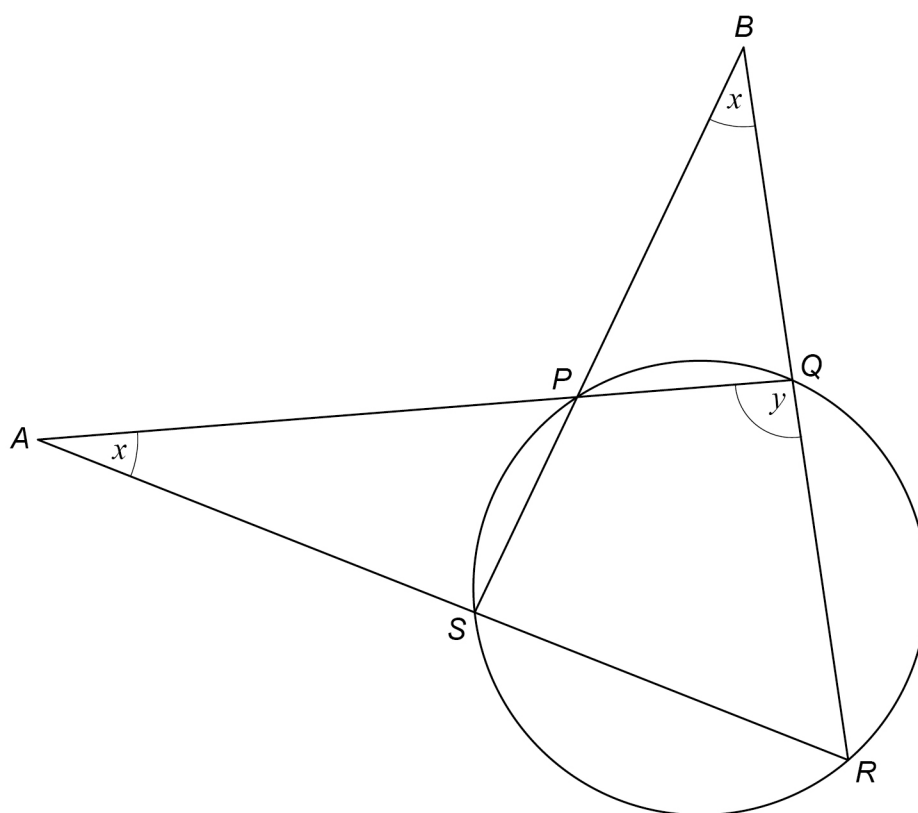
$x = -3$

$x = 3$

$x = -36$

$x = 36$

- 28 P, Q, R and S are points on a circle.
 RSA, QPA, SPB and RQB are straight lines.

Not drawn
accurately

- 28 (a) Give a reason why angle $PSR = 180^\circ - y$

[1 mark]



[4 marks]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

6

30

Daniel has 13 socks in a drawer.

8 are black and 5 are red.

He takes two socks at random, without replacement.

Work out the probability that he takes two socks of the same colour.

[3 marks]

Answer _____

31

Convert $0.\dot{6}4\dot{8}$ to a fraction in its simplest form.

You **must** show your working.

[3 marks]

Answer _____

11

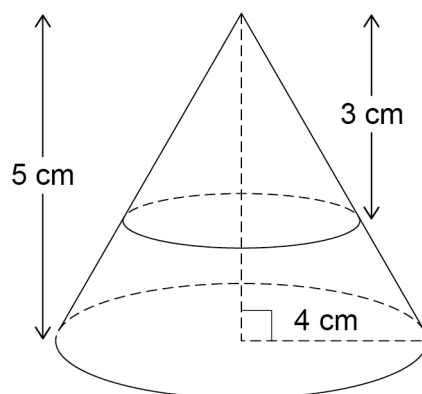
Turn over ►



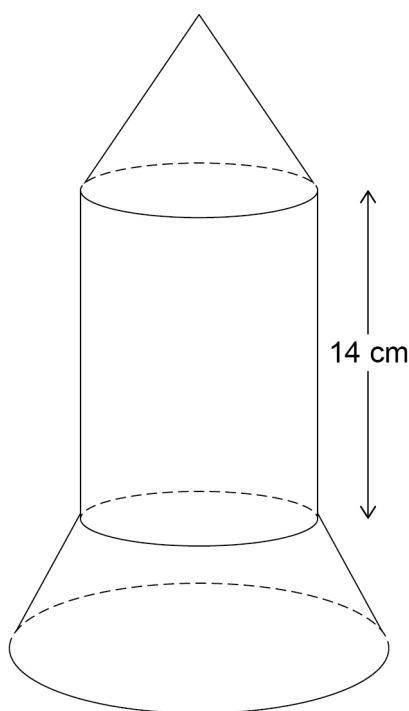
32

A cone has perpendicular height 5 cm and base radius 4 cm

The cone is cut parallel to the base, 3 cm from the top.



A toy rocket is made by putting a cylinder of height 14 cm between the two pieces as shown.



[4 marks]

[illegible]

Turn over for the next question



33

Work out the coordinates of the points of intersection of the graphs

$$y = 4x^2 + 8x + 3 \quad \text{and} \quad y = x + 5$$

[5 marks]

Answer (_____ , _____) and (_____ , _____)

END OF QUESTIONS

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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.



