

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

Paper 1E

E

Tuesday 5 November 2019

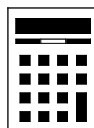
07:00 GMT

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	
TOTAL	



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

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

- 1** The first four terms of a linear sequence are

-16 -9 -2 5

Circle the expression for the n th term.

[1 mark]

$n + 7$

$7n - 16$

$7n - 23$

$-9 - 7n$

- 2** Circle the ratio equivalent to $\frac{2}{3} : 12$

[1 mark]

$1 : 8$

$1 : 18$

$8 : 1$

$18 : 1$

- 3** A is the set of single-digit even numbers.
B is the set of single-digit prime numbers.

Circle the value of $n(A \cap B)$

[1 mark]

1

2

7

0



- 4** Two triangles each have angles of 51° , 34° and 95°
One triangle is larger than the other.
Circle the word that describes the triangles.

[1 mark]

congruent

similar

corresponding

regular

- 5** The price of a watch increases from \$160 to \$194
Work out the percentage increase in the price.

[3 marks]

Answer _____ %

Turn over for the next question

6 Two villages, A and B, are connected by a road of length 9 km

Sabine left B at 10.20, running towards A at a speed of 6 km/h

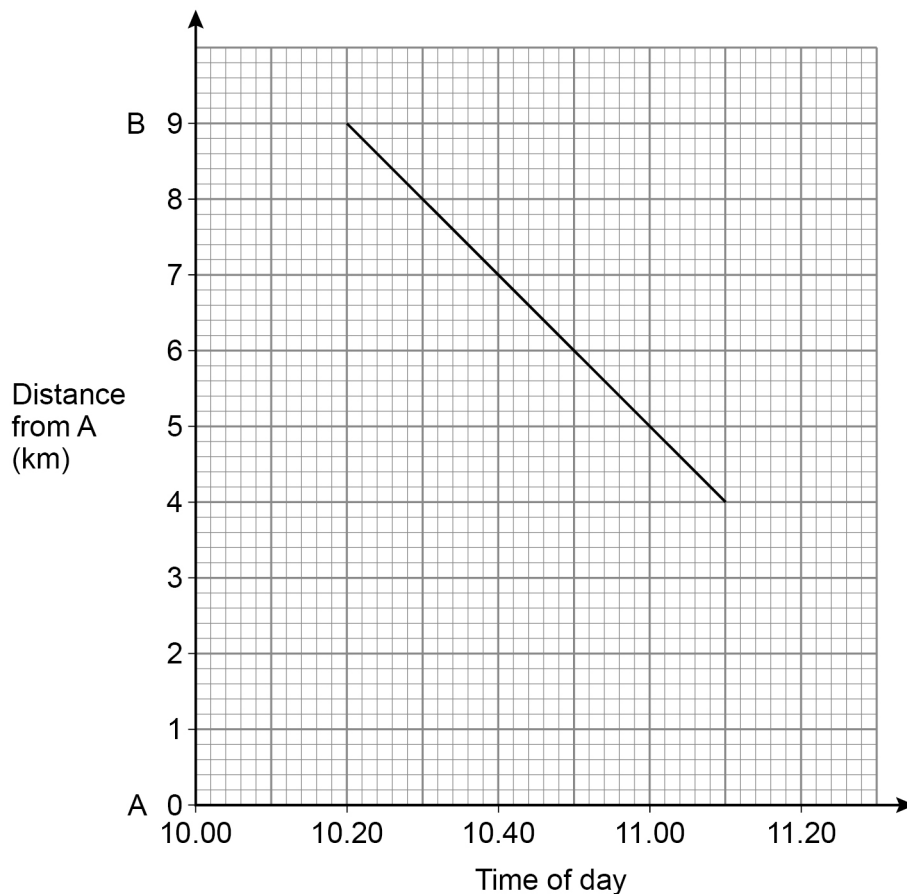
A distance-time graph for Sabine is shown on the grid.

Nadia left A at 10.00, walking towards B at a speed of 5 km/h

After walking 4 km she stopped and waited for Sabine to arrive.

6 (a) On the same grid, draw a distance-time graph for Nadia.

[3 marks]



6 (b) Use the two graphs to work out how long Nadia waited for Sabine to arrive.

[1 mark]

Answer _____ minutes



7

The table shows information about the widths of 80 picture frames.

Width, w (cm)	Frequency	Midpoint	
$20 \leq w < 30$	18		
$30 \leq w < 40$	20		
$40 \leq w < 50$	33		
$50 \leq w < 60$	9		
	Total = 80		

Work out an estimate of the mean width.

[3 marks]

Answer _____ cm

Turn over for the next question



8

$$x^c \div x^4 = x^6 \times x^8$$

Work out the value of c .**[2 marks]**

Answer _____

9

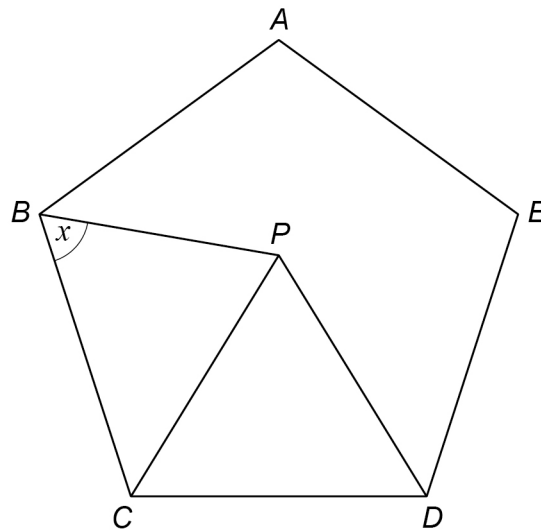
Simplify fully $\frac{5x-6}{3} + \frac{7x+4}{2}$

[3 marks]

Answer _____



10

 $ABCDE$ is a regular pentagon. CPD is an equilateral triangle.Angle $CBP = x$ Not drawn
accuratelyWork out the size of angle x .**[5 marks]**

Answer _____ °



11

Two numbers are in the ratio 9 : 13

The difference between the numbers is 504

Work out the two numbers.

[3 marks]

Answer _____ and _____



12

Use a ruler and compasses for this question.

X, Y and Z are points on horizontal ground.

A ball is rolled along the ground.

The ball stops

6 m from Z

an equal distance from X and Y.

On the scale diagram, show the point where the ball stops.

Label this point *B*.

[4 marks]

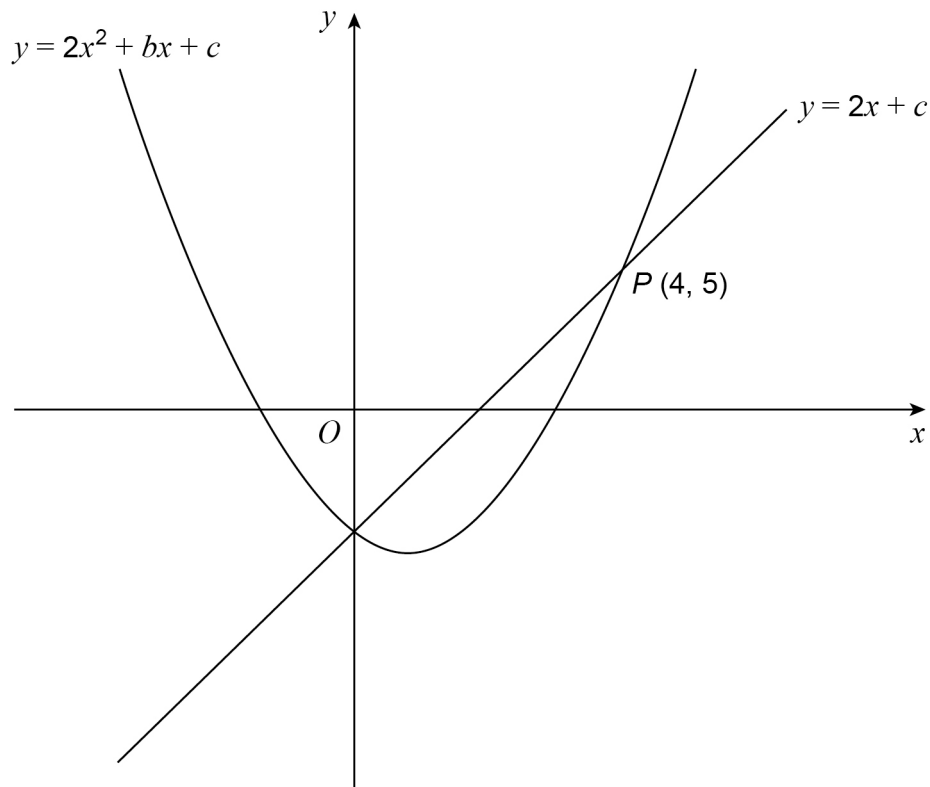
Scale: 1 cm represents 1 m



13

Here are sketch graphs of

$$y = 2x + c \quad \text{and} \quad y = 2x^2 + bx + c$$

 $P(4, 5)$ is a point of intersection.**13 (a)** Show that $c = -3$ **[1 mark]**

13 (b) Work out the value of b .**[3 marks]**

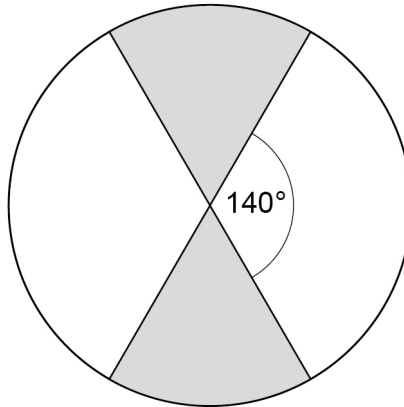
Answer _____



14

A circle has radius 15 cm

Two diameters divide the circle into four sectors as shown.

Not drawn
accurately

Work out the total shaded area.

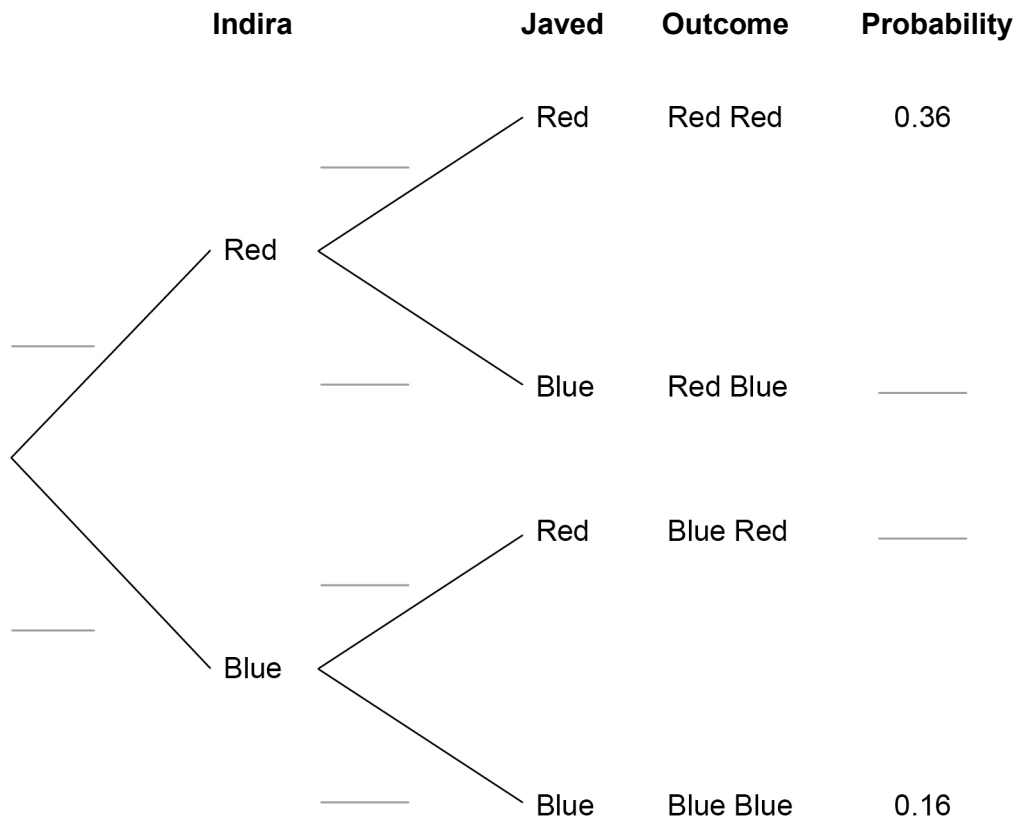
[3 marks]

Answer _____ cm^2 **Turn over for the next question****Turn over ►**

A bag contains counters.
Each counter is either red or blue.

In a game, Indira takes a counter at random from the bag and then replaces it. Javed then takes a counter at random from the bag.

[4 marks]



- 15 (b)** Indira wins if the counters are the same colour.
Javed wins if the counters are different colours.
Indira says,
"I am more likely to win than Javed is."

Is Indira correct?

You **must** show your working.

[2 marks]

- 16** m is directly proportional to the cube of r .
 $m = 1000$ when $r = 2.5$

Work out the value of m when $r = 6.5$

[4 marks]

Answer _____



- 17 (a)** Aakif's height is 2.00 metres, correct to the nearest centimetre.

Circle the **minimum** height, in metres, Aakif could be.

[1 mark]

1.9

1.95

1.995

1.99

- 17 (b)** Bags of sweets each have mass 250 grams, correct to the nearest 10 grams.

Work out the upper bound for the total mass of 80 bags of sweets.

Give your answer in kilograms.

[3 marks]

Answer _____ kilograms



18 $y = 5x^2 - 4x$

18 (a) Work out the coordinates of the two points where the curve intersects the x -axis.

[3 marks]

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

18 (b) The gradient of the curve at the point (n, p) is 1

Work out the values of n and p .

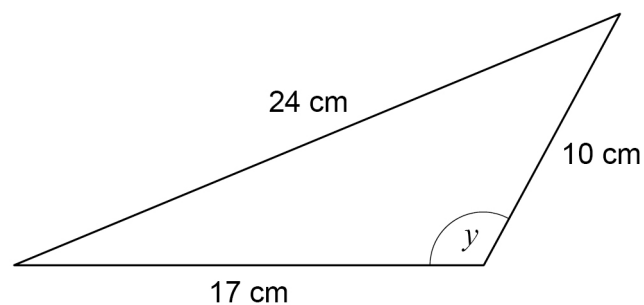
[4 marks]

$n =$ _____ $p =$ _____



19

Here is a triangle.

Not drawn
accuratelyWork out the size of angle y .

Give your answer to 1 decimal place.

[4 marks]

Answer _____°

20

Solve $-12x < 3$

Circle your answer.

[1 mark]

$x < -4$

$x > -4$

$x < -\frac{1}{4}$

$x > -\frac{1}{4}$



21 The ratio of the lengths of two similar solids is $1 : 4$

Circle the ratio of their surface areas.

[1 mark]

$1 : 4$

$1 : 8$

$1 : 16$

$1 : 64$

22 (a) Circle the number that is written in standard form.

[1 mark]

35×10^8

3.5×10^6

$3.5 \times 10^{0.4}$

0.35×10^2

22 (b) $4b \times 10^{2b}$ is a number written in standard form.

Work out **all** the possible values of b .

[2 marks]

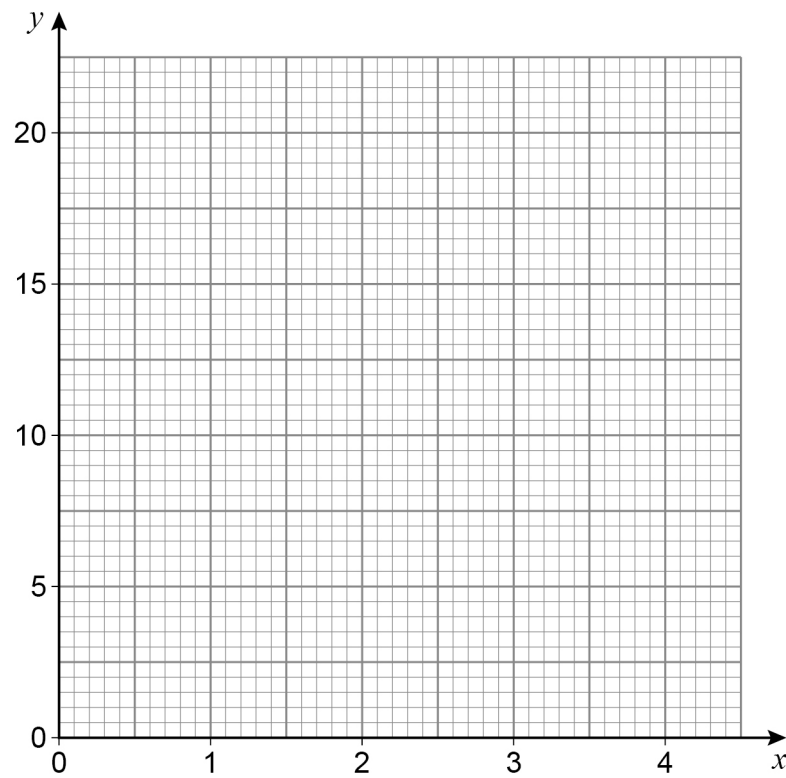
Answer _____



23 (a) Draw the graph of $y = 2^x$ for $0 \leq x \leq 4$

[2 marks]

x	0	1	2	3	4
y					



23 (b) Use your graph to estimate the solution of $2^x = 10$

[1 mark]

Answer _____



24 $\mathbf{A} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$

24 (a) Work out the matrix **BA**

[1 mark]

Answer $\begin{pmatrix} \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \end{pmatrix}$

24 (b) Describe geometrically the transformations represented by the following matrices.

[3 marks]

A _____

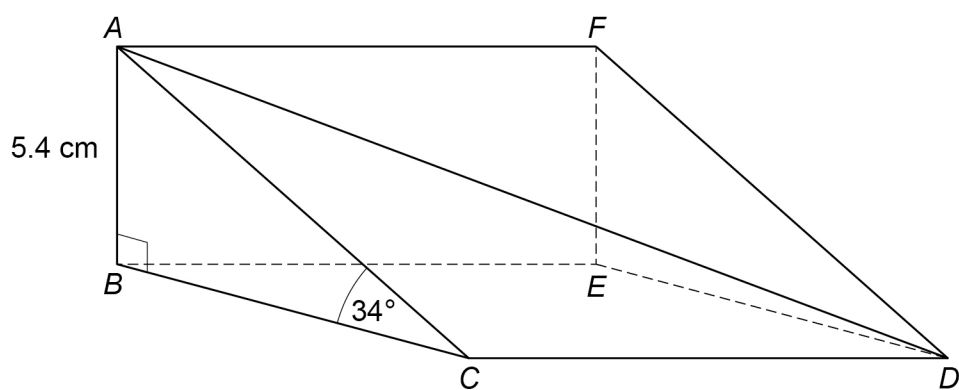
B _____

BA _____

Turn over for the next question



- 25** $ABCDEF$ is a right-angled triangular prism.



- 25 (a)** Work out BC .

[2 marks]

Answer _____ cm

- 25 (b)** $AD = 17$ cm

Work out the size of angle ADB .

[2 marks]

Answer _____ °



26

By rationalising the denominator, show that $\frac{4 + 6\sqrt{5}}{4 + 2\sqrt{5}}$

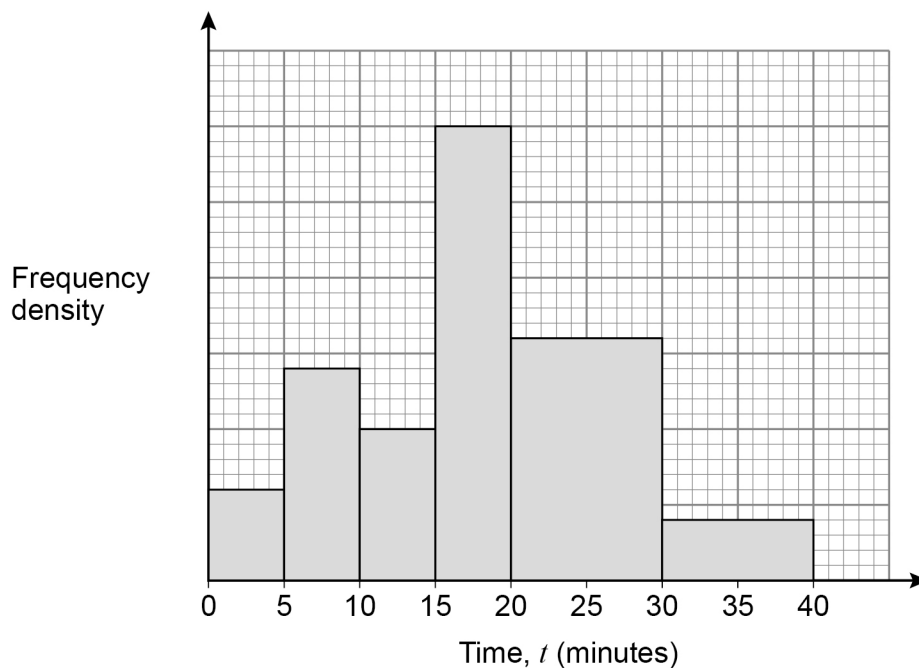
can be written in the form $a + b\sqrt{5}$ where a and b are integers.

[4 marks]

Turn over for the next question**Turn over ►**

27

The histogram shows information about the total time that patients spent at a doctors' surgery in one month.



27 (a) Work out the percentage of patients with a total time in the interval $20 < t \leq 30$

[3 marks]

Answer _____ %



27 (b) 120 patients spent 5 minutes or less at the surgery.

Work out the total number of patients at the surgery that month.

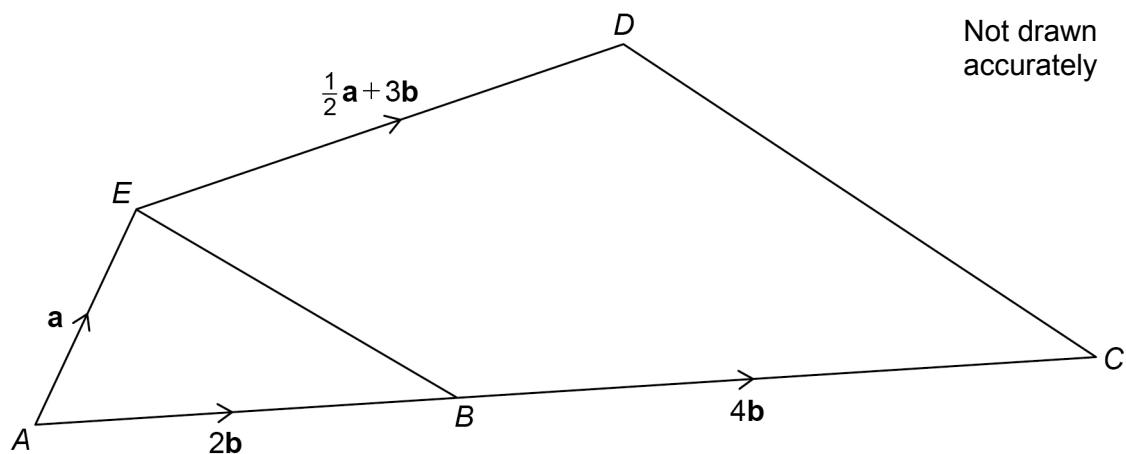
[2 marks]

Answer _____

Turn over for the next question



28



Show that BE is parallel to CD .

[3 marks]

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outside the
box



29

 n is an **even** square number.

Show that the next even square number can be written in the form $n + a\sqrt{n} + a$ where a is an integer.

[3 marks]

Turn over for the next question**Turn over ►**

30 $f(x) = x^2 - x - 1$

$$g(x) = 1 + \frac{1}{x} \quad x \neq 0$$

30 (a) Write $f(x)$ in the form $(x - a)^2 - b$ where a and b are constants.

[2 marks]

Answer _____

30 (b) State the range of $f(x)$

[1 mark]

Answer _____



30 (c) Work out an expression for $g^{-1}(x)$

[3 marks]

Answer _____

END OF QUESTIONS



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3 2



1 9 B Y 9 2 6 0 / 1 E

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