

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

INTERNATIONAL GCSE MATHEMATICS

Extension Tier Paper 1E

E

Tuesday 7 November 2023

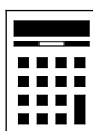
07:00 GMT

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	
28–29	
TOTAL	



N 0 V 2 3 9 2 6 0 1 E 0 1

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

1 (a) Write $(3^5)^2$ as a single power of 3

[1 mark]

Answer _____

1 (b) Write $5^6 \times 5^9$ as a single power of 5

[1 mark]

Answer _____

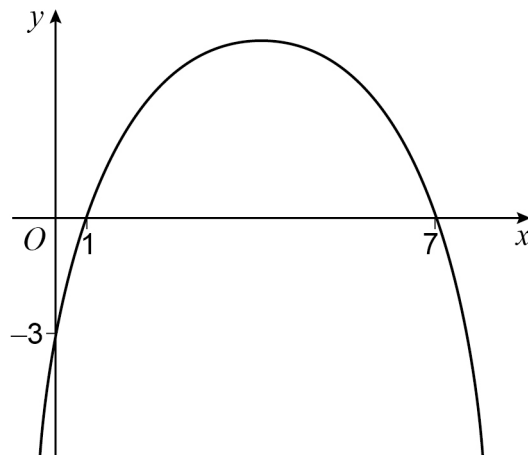
1 (c) Write $11^{14} \div 11^2$ as a single power of 11

[1 mark]

Answer _____



- 2** Here is a sketch of a graph of a quadratic function.



- 2 (a)** Write down the coordinates of the y -intercept.

[1 mark]

Answer (_____ , _____)

- 2 (b)** Write down the equation of the line of symmetry.

[1 mark]

Answer _____



- 3 Here is some information about the heights of 200 people.

Height, h (metres)	Frequency
$1.1 \leq h < 1.3$	16
$1.3 \leq h < 1.5$	21
$1.5 \leq h < 1.7$	99
$1.7 \leq h < 1.9$	64

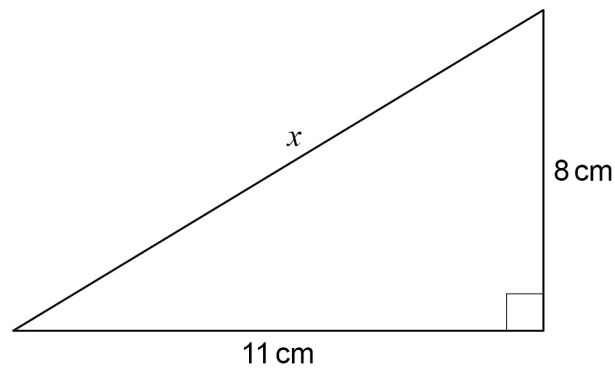
Tick **one** box for each statement.

[3 marks]

	Definitely true	Might be true	Cannot be true
30 people had a height greater than 1.8 metres	☐	☐	☐
The median height is in the class interval $1.5 \leq h < 1.7$	☐	☐	☐
The range is 1.9 metres	☐	☐	☐



4

Not drawn
accurately

Use Pythagoras' theorem to work out the value of x .

Give your answer as a decimal.

[3 marks]

$x =$ _____ cm

Turn over for the next question

- 5 Three numbers are in the ratio $7 : 2 : 3$
The **smallest** number is 34
Do the three numbers add up to 204 ?
You **must** show your working.

[3 marks]



7 ξ is a group of people.

For sets X and Y

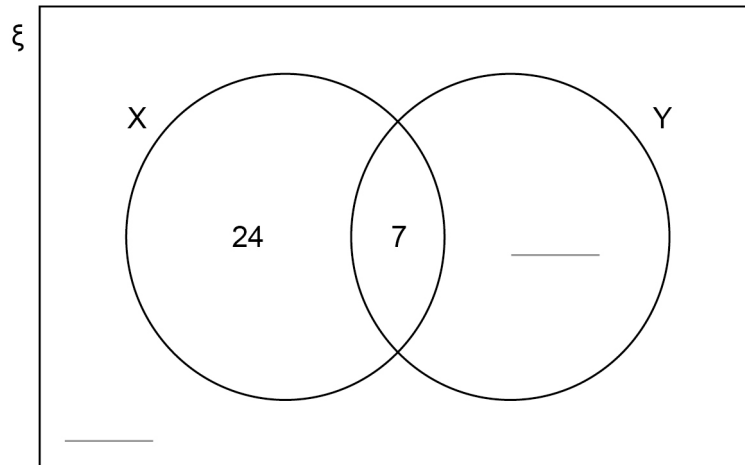
$$n(X) = 31$$

$$n(Y) = 23$$

$$n(X') = 29$$

7 (a) Complete the number of elements in each region of the Venn diagram.

[2 marks]



7 (b) A person from the group is chosen at random.

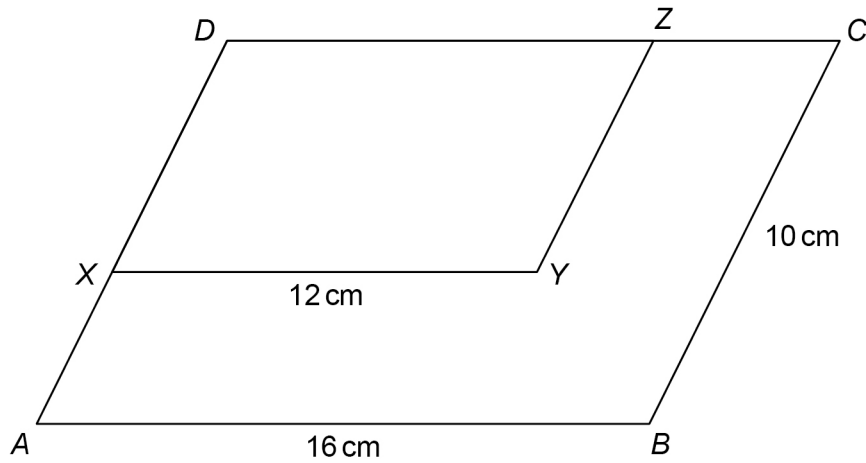
Work out $P(X)$

[2 marks]

Answer _____



- 8 $ABCD$ and $XYZD$ are two similar parallelograms.



Not drawn
accurately

Work out the length of AX .

[3 marks]

Answer _____ cm



- 9 (a)** Here are the first four terms of two linear sequences, A and B.

Sequence A 3 6 9 12

Sequence B -367 -359 -351 -343

$k\text{th term of A} = k\text{th term of B}$

Work out the value of k .

[4 marks]

$k =$ _____



9 (b) The n th terms of some sequences are given.

How many terms of each sequence are multiples of 5 ?

Tick **one** box for each sequence.

[4 marks]

	All	Some	None
$20n$	☐	☐	☐
$7n - 2$	☐	☐	☐
$4n + 1$	☐	☐	☐
$5n - 1$	☐	☐	☐

10 Michael buys a house using a deposit **and** a mortgage.

The mortgage is \$93 925

The mortgage is 85% of the house price.

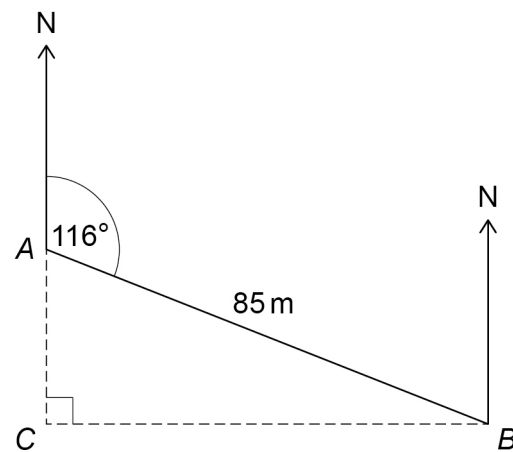
How much is the deposit?

[3 marks]

Answer \$ _____



11

The bearing of B from A is 116° Not drawn
accuratelyUse trigonometry to work out the length AC .**[3 marks]**

Answer _____ m



A logo is made from a circle that just fits inside a semicircle.

A diagram of a semi-circular arch with a radius of 60 mm. Inside the arch is a shaded circular opening. The opening is tangent to the arch at its base and touches the arch's sides. The diameter of the opening is indicated by a horizontal line with arrows at both ends, labeled 60 mm.

You **must** show your working.

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

13 (a) Expand and simplify fully $3x(x^2 - 4y^2) + 2y(5y + 7xy)$

[3 marks]

Answer _____

13 (b) Solve $\frac{8a-5}{3a} = \frac{7}{2}$

[3 marks]

$a =$ _____



14 On Monday there were 104 people in a museum.
The ratio of children to adults was 4 : 9

On Tuesday there were
16 more children than on Monday
50% more adults than on Monday.

Show that the ratio of children to adults on Tuesday was also 4 : 9

[4 marks]

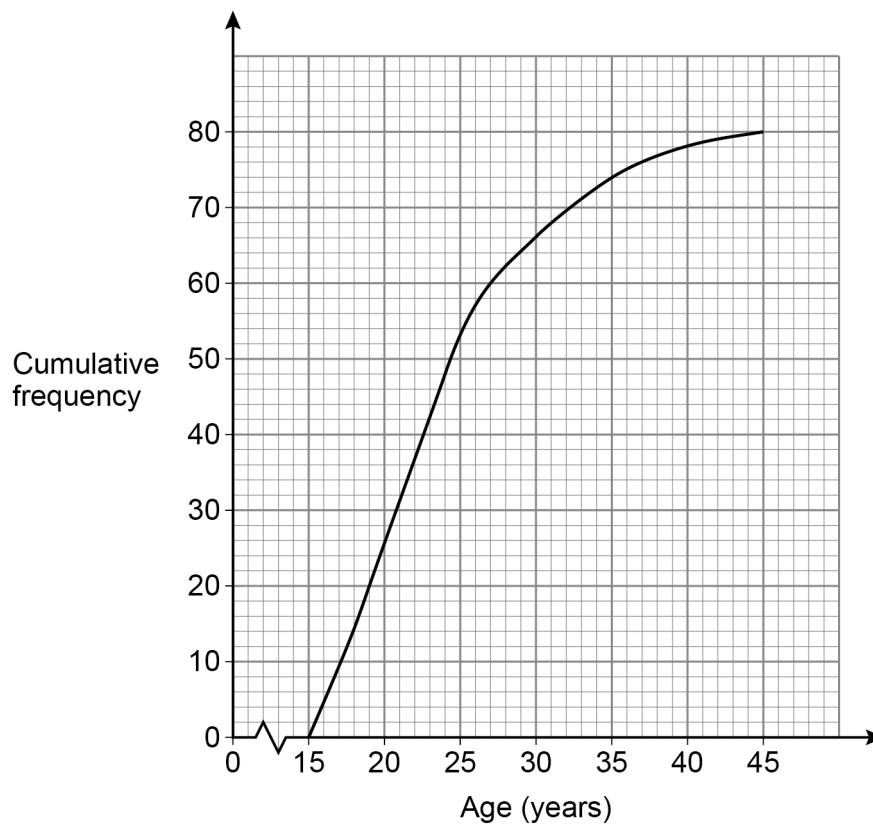
Turn over for the next question



15

There are 80 athletes at a club.

The cumulative frequency graph shows information about their ages.



15 (a) Use the graph to estimate how many athletes are at least 40 years old.

[1 mark]

Answer _____



- 15 (b)** The table shows information about the ages of cyclists at a different club.

Lower quartile	22 years
Upper quartile	33 years

Are the ages of the athletes more consistent than the ages of the cyclists?

Tick a box.

Yes

☐

No

☐

Show working to support your answer.

[3 marks]

16

Simplify fully $\frac{12x - 4}{3x^2 - 7x + 2}$

[3 marks]

Answer _____

Turn over ►

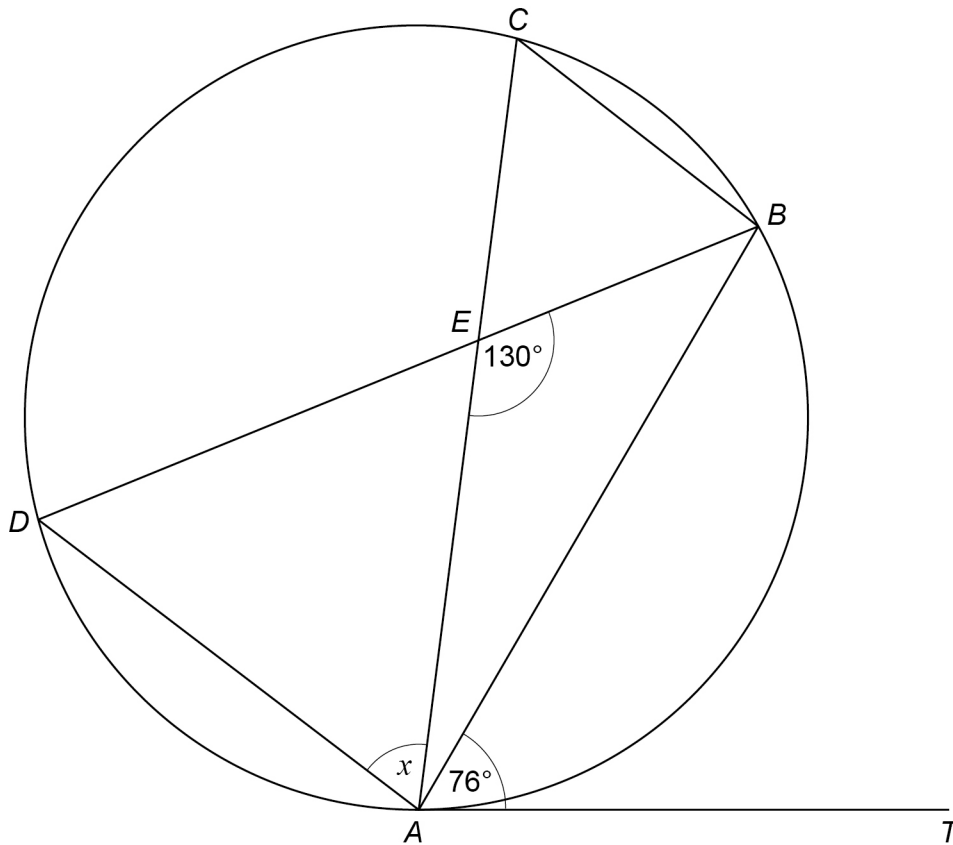


17

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

AC and BD intersect at E .

AT is a tangent.



Not drawn
accurately

Work out the size of angle x .

[3 marks]

$x =$ _____ $^\circ$



18 y is **inversely** proportional to $\sqrt{x}$
 $y = 7.5$ when $x = 36$

18 (a) Work out an equation connecting y and x .

[3 marks]

Answer _____

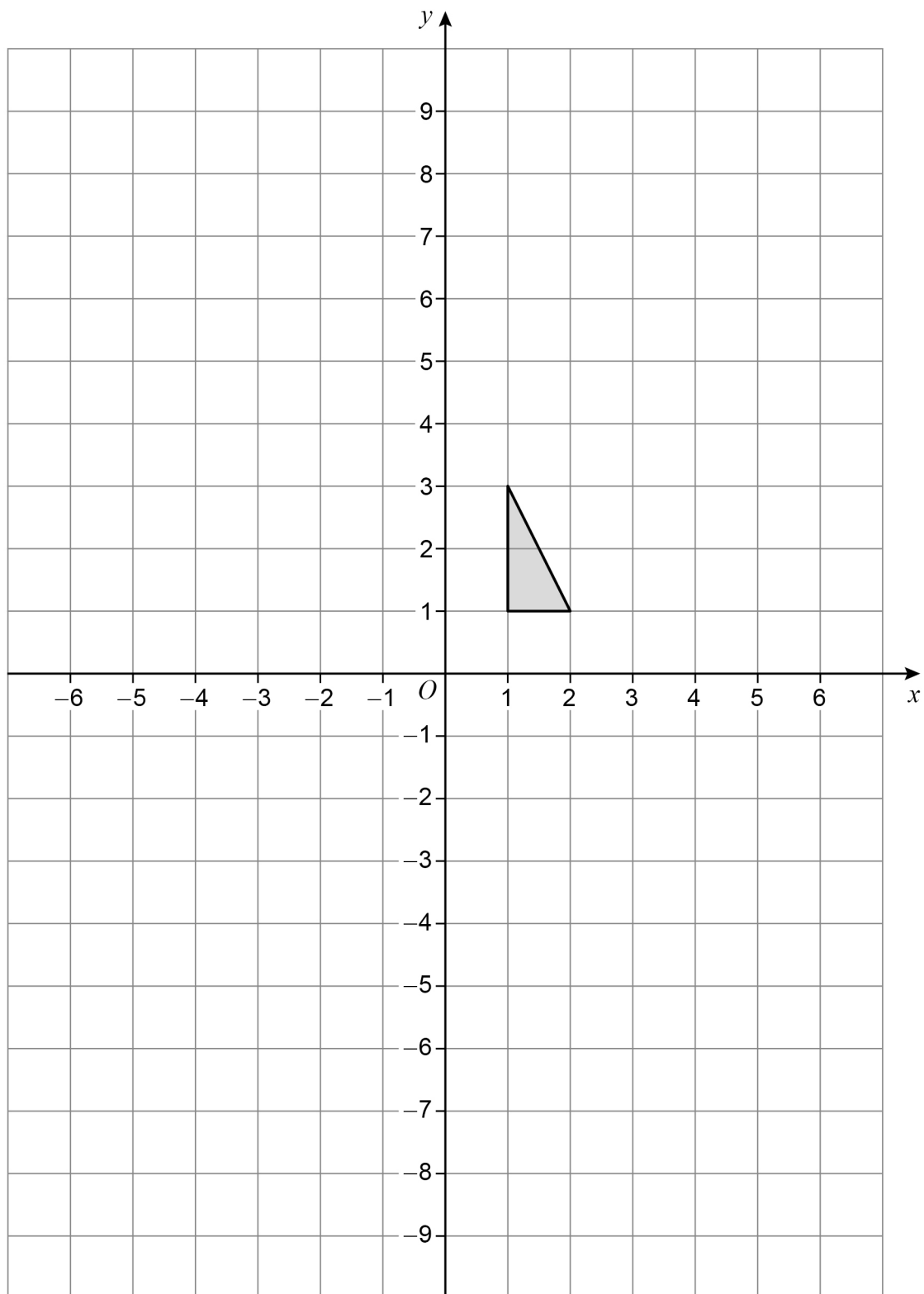
18 (b) Work out the value of y when $x = 625$

[2 marks]

$y =$ _____



19

Enlarge the triangle by scale factor -3 , centre O .**[2 marks]**

20 (a) Circle the expression equivalent to $(\sqrt{2a} \times \sqrt{8b})^{-1}$

[1 mark]

$4ab$

$\frac{1}{4ab}$

$4\sqrt{ab}$

$\frac{1}{4\sqrt{ab}}$

20 (b) Multiply out $(\sqrt{12} - \sqrt{18})^2$
Give your answer in the form $c + d\sqrt{6}$ where c and d are integers.
You **must** show your working.

[3 marks]

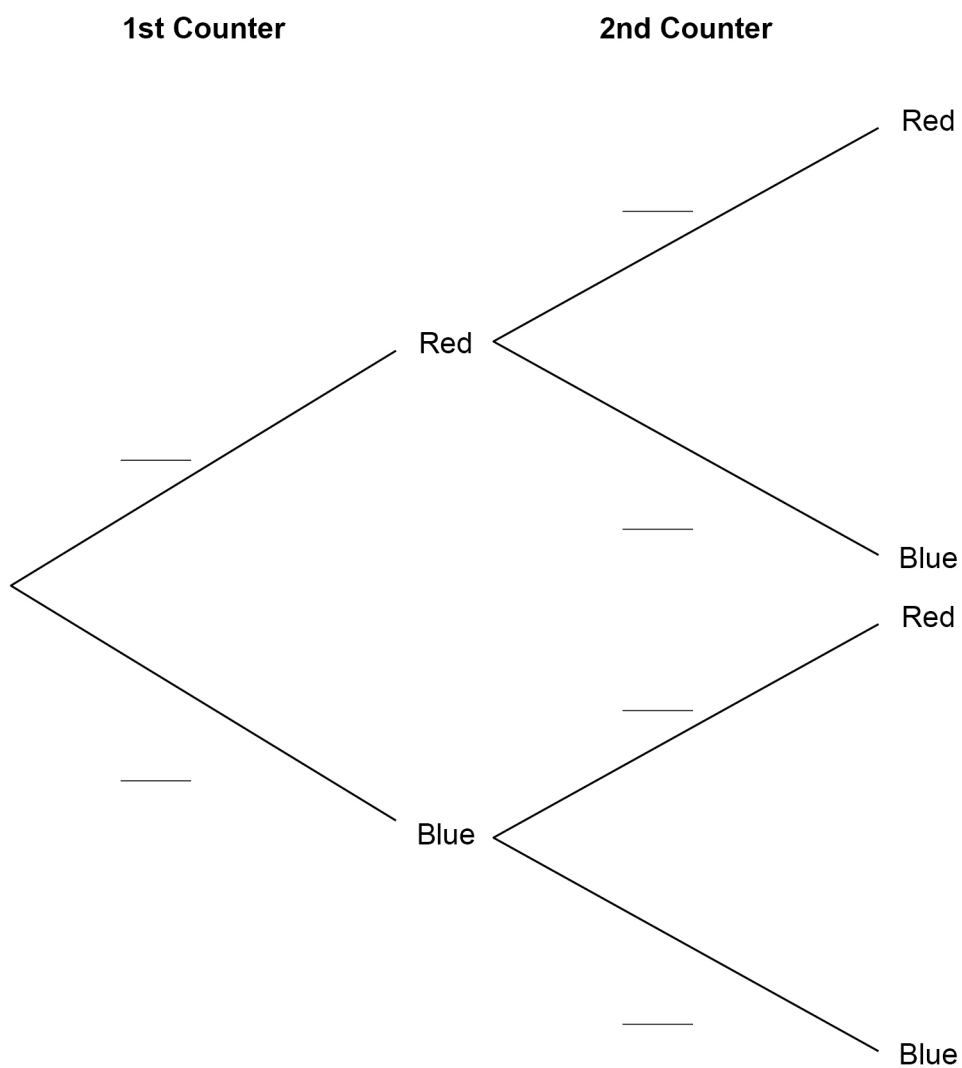
Answer _____



- 21** A bag contains 8 counters.
3 are red and 5 are blue.
A counter is chosen at random and **not** replaced.
A second counter is then chosen at random.

- 21 (a)** Complete the tree diagram.

[3 marks]



21 (b) Work out the probability that the two counters are the same colour.

[3 marks]

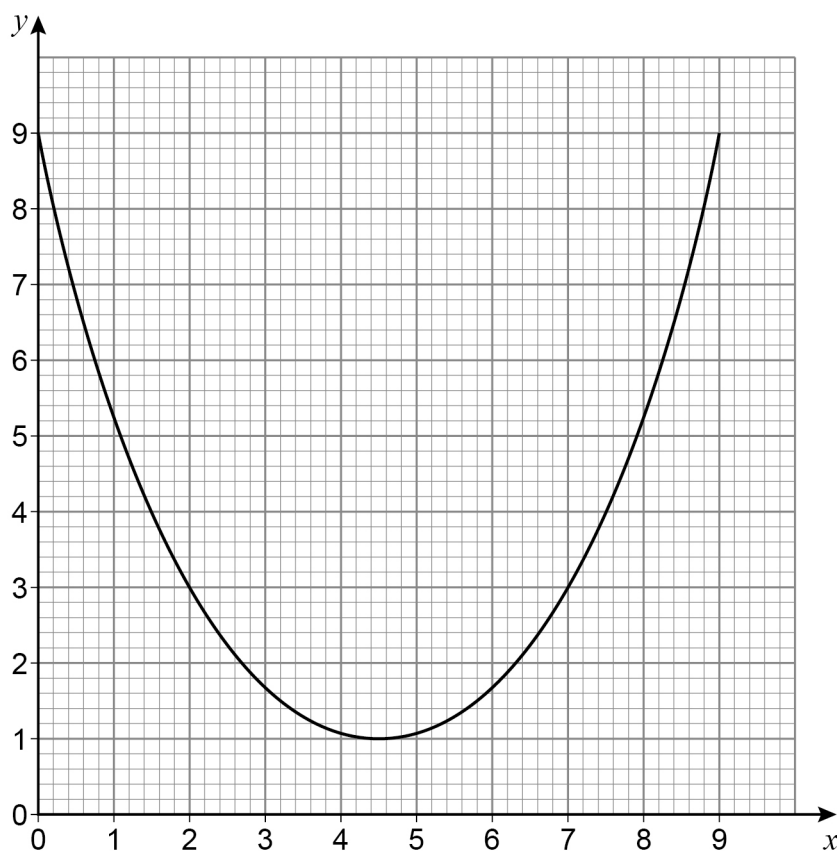
Answer _____

Turn over for the next question



23

Here is a curve.

Do not write
outside the
boxBy drawing a tangent, estimate the gradient of the curve at the point where x is 7**[2 marks]**

Answer _____

Turn over ►



24 $f(x) = 2x + 5$

$g(x) = x^2 - 14$

24 (a) Work out an expression for $f^{-1}(x)$ **[2 marks]**

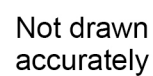
Answer _____

24 (b) Solve the equation $fg(x) = g(x)$ **[3 marks]**

Answer _____



The length of the longer diagonal is 26 cm



[4 marks]

[illegible]

Answer cm



The equation of a curve is $y = x^2 + px + r$ where p and r are integers.
(1, 2) and (5, 2) are points on the curve.

[5 marks]

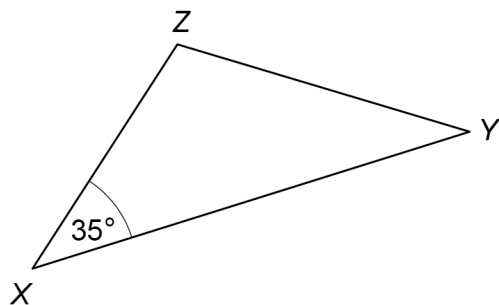
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$p =$ _____ $r =$ _____



27

Here is triangle XYZ.

Not drawn
accurately

XY is 7.2cm to the nearest mm

XZ is 3.8cm to the nearest mm

Angle YXZ is **exactly** 35° Work out the lower bound of the area, in cm^2 , of XYZ.You **must** show your working.**[3 marks]**

Answer _____ cm^2 **END OF QUESTIONS**

There are no questions printed on this page

*Do not write
outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



[illegible]

