AKADEMEIA
HIGH SCHOOL

Candidate name	
If you are placed in a specific maths set at your current school, please indicate the name or level of that set (for example: Express, Top, Middle, Core, etc.)	

Academic Potential Assessment Test

Mathematics Year 10

ENGLISH VERSION

January 2025

Time allowed: 75 minutes

Instructions:

- Use black/blue ink or ball-point pen.
- Answer the questions in the spaces provided – *there may be more space than you need*.
- Only answers are required to the questions in **Section A** (Q1-Q8)
- For questions in **Section B** (Q9-Q13), you should give full written solutions. Just stating an answer will not receive full marks.

- You are **NOT** allowed to use a calculator.

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Check your answers if you have time at the end.
- Try to answer every question, but you might not have enough time to solve all of them.

Good luck!

Why 10+10 = 11+11?
Because ten plus ten is twenty and eleven plus eleven is twenty too..

SECTION A

Only answers are required to the questions in Section A (Q1-Q8)

Q1. Only answers are required.

(a) Write these numbers in order of size.
Start with the smallest number.

$$\frac{1}{2} \quad 0.55 \quad 40\%$$

.....

(1)

(b) Work out

$$\left(4\frac{1}{5} - 2\frac{2}{3}\right) \div \frac{2}{3}$$

Give your answer as a mixed number.

.....

(1)

(c) Write 4.4347 correct to 2 decimal places.

.....

(1)

(d) Ali, Beth and Celia divide £280 in the ratio 2 : 5 : 3
Work out how much Ali gets.

.....

(1)

(e) Here is a list of ingredients for making 10 scones.

Ingredients for 10 scones	
75 g	butter
350 g	self-rising flour
40 g	sugar
150 ml	milk
2	eggs

Mia wants to make 25 scones.
Work out how much sugar she needs.

.....

(1)

(f) In a shop, a TV has a normal price of £500
The shop has a sale.

On Monday, the normal price of the TV is reduced by $\frac{1}{10}$ to give the sale price.

On Tuesday, the sale price of the TV is reduced further by 20%.

Work out the final price of the TV.

.....

(1)

Q2. Only answers are required.

(a) $k = 6x^2 - 5x$

Work out the value of *k* when $x = -2$

.....

(1)

(b) Expand and simplify $4(y + 3) - (4 - 2y)$

.....

(1)

(c) Expand and simplify $(2m + 7)(m - 3)$

.....

(1)

(d) Simplify fully

$$\frac{p^3 \times p^4}{p^2}$$

.....

(1)

(e) Solve $4x - 11 = 2(x + 3)$

.....

(1)

(f) Simplify $(2x^3)^5$

.....

(1)

Q3. Only answers are required.

(a) *EFG* is a triangle.
AB is parallel to *CD*.
Work out the size of the angle marked *p*.

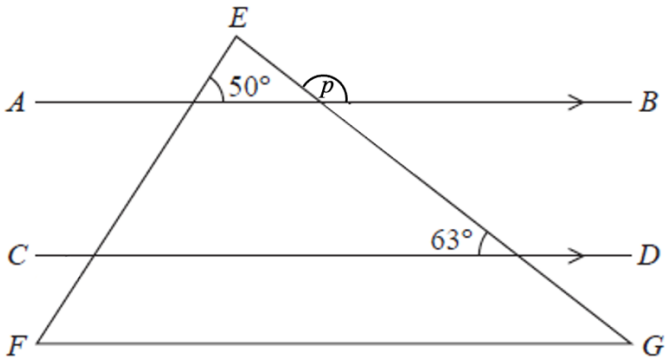


Diagram **NOT** accurately drawn

.....

(1)

(b) This shape is made from an equilateral triangle and 3 identical isosceles triangles.
Work out the size of the angle marked *y*.

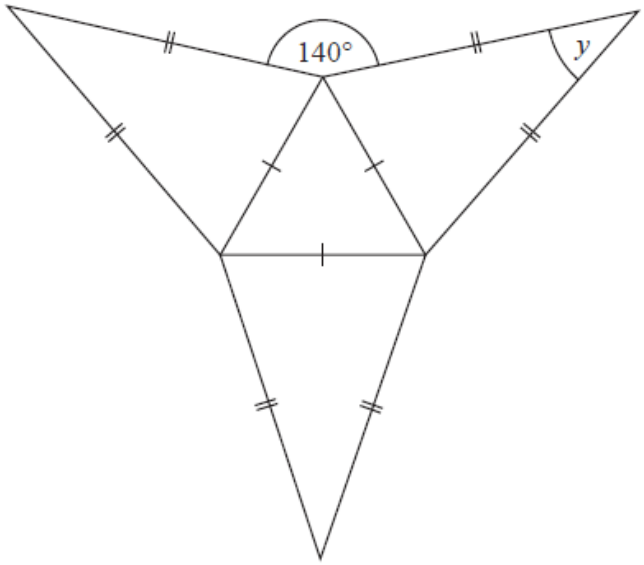


Diagram **NOT** accurately drawn

.....

(1)

(c) The length of side *AB* is $(3x - 5)$ cm.
The length of side *AC* is $(19 - x)$ cm.
The length of side *BC* is $2x$ cm.
Angle *ABC* = angle *BCA*.
Work out the value of x.

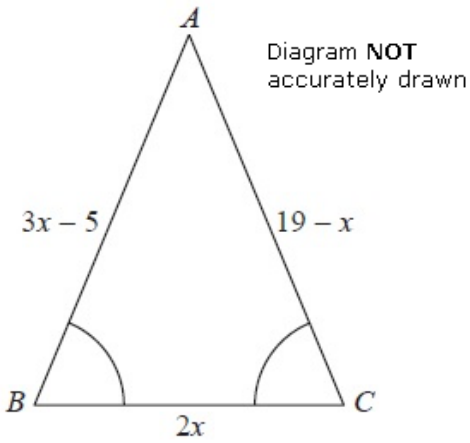


Diagram **NOT** accurately drawn

.....

(1)

(d) The diagram shows a triangular prism.
Calculate the volume of the prism. Write correct units in your answer.

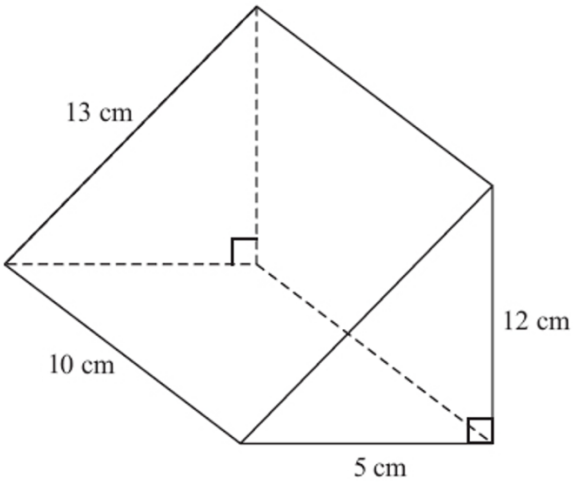
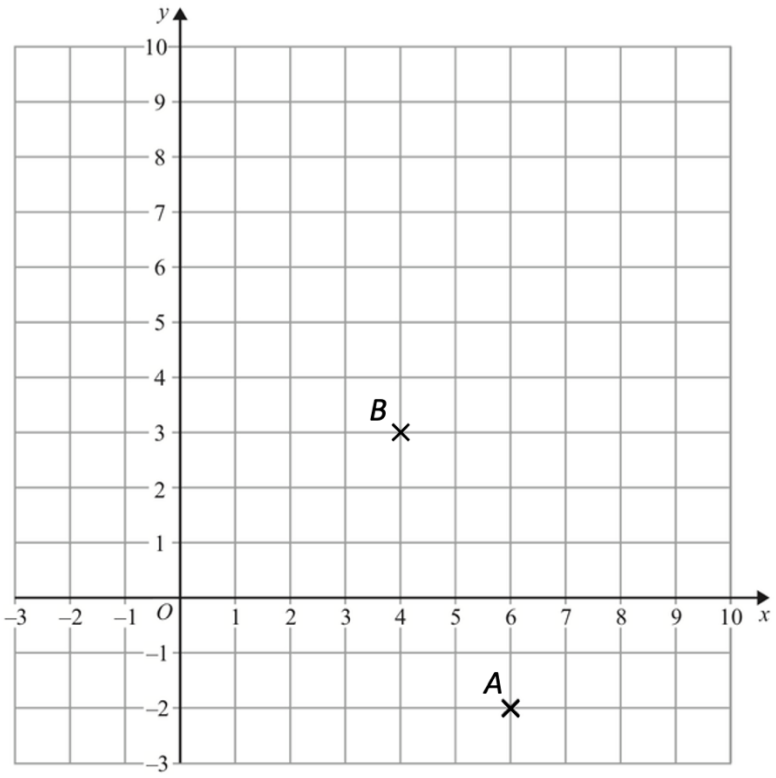


Diagram **NOT** accurately drawn

.....

(1)

(e) Two points, *A* and *B*, are plotted on a centimetre grid.



(i) Write down the coordinates of point *A*.

(..... , ...)

(1)

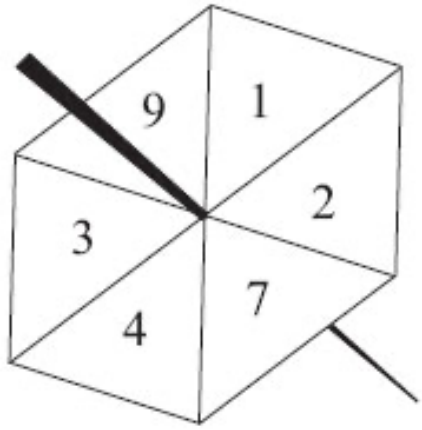
(ii) Point B is a midpoint of AC. Work out the coordinates of point C.

(..... , ...)

(1)

Q4. Only answers are required.

(a) Here is a fair 6-sided spinner. Jake is going to spin the spinner once.



(i) Write down the probability that the spinner will land on 4

.....

(1)

(ii) Write down the probability that the spinner will land on a number greater than 10

.....

(1)

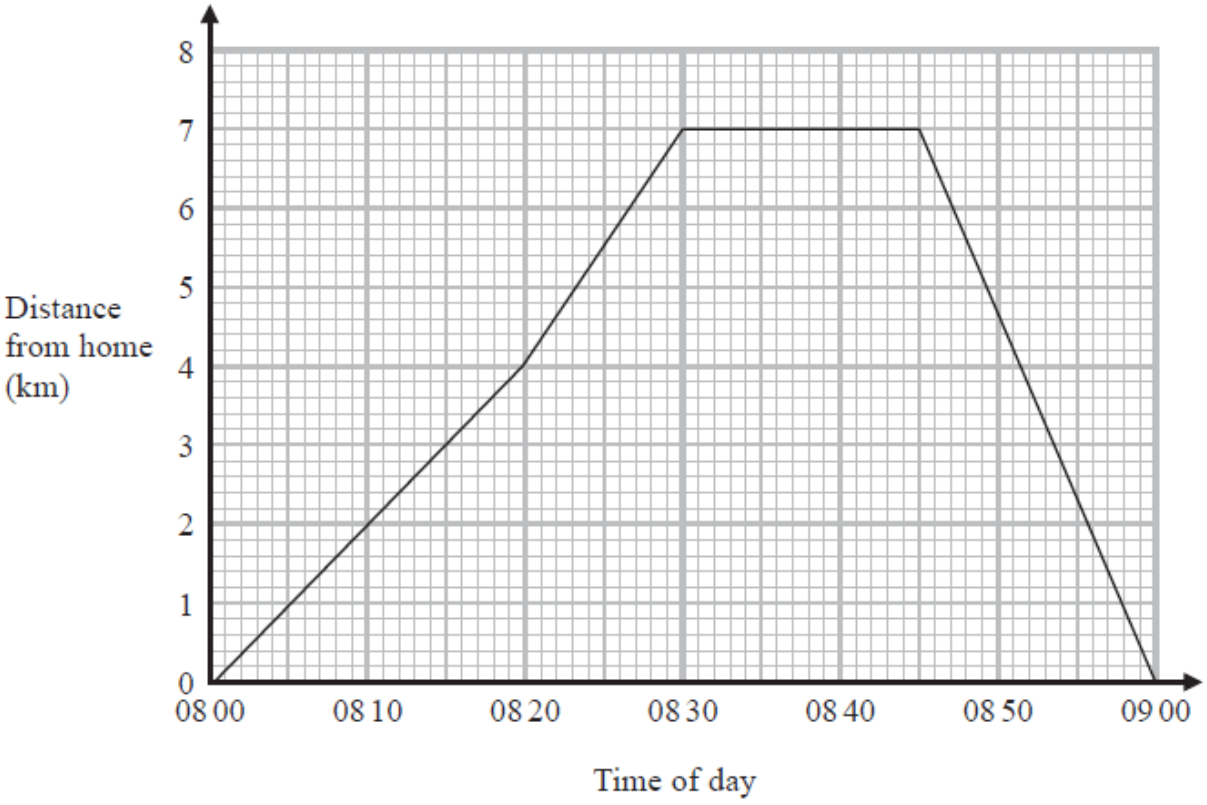
Liz is going to spin the spinner 120 times.

(iii) Work out an estimate for the number of times the spinner will land on an even number.

.....

(1)

(b) Carly cycles to her friend's house.
She stays at her friend's house for a number of minutes.
Then she cycles home.
Here is the travel graph for her journey.



(i) For how many minutes did Carly stay at her friend's house?

.....

(1)

(ii) How many kilometers did Carly cycle in total?

.....

(1)

(iii) Work out Carly's speed, in km/h, for the first 20 minutes of her journey.

.....

(1)

Q5. Only answers are required.

(a) Write down the value of $\sqrt[3]{0.064}$

.....

(1)

(b) A shop offers 20% off everything in a sale.

The sale price of a pair of designer shoes is £40.
Calculate the cost of the shoes before the sale.

.....

(1)

(c) Write these numbers in order of size.
Start with the smallest number.

6.72×10^5 67.2×10^{-4} 672×10^4 0.000 672

.....

(1)

(d) The time zone clock shows the times in four cities on Monday when it is 08:00 in London.

London	08:00
New York	04:00
Antananarivo	11:00
Tokyo	17:00

Richard goes by plane from London to New York.
The plane leaves when the time in London is 14:00
The plane takes 9 hours to get to New York.

What is the time in New York when the plane gets there?

.....

(1)

(e) Write 126 as a product of its prime factors.

.....

(1)

(f) Find the highest common factor (HCF) of 126 and 90

.....

(1)

Q6. Only answers are required.

(a) Make v the subject of the formula

$$E = \frac{mv^2}{2}$$

.....

(1)

(b) Kiaria is *x* years old.
Kiaria is 7 years older than Jay.
Martha is twice as old as Kiaria.

(i) Write down an expression, in terms of x, for:

Jay's age

.....

Martha's age

.....

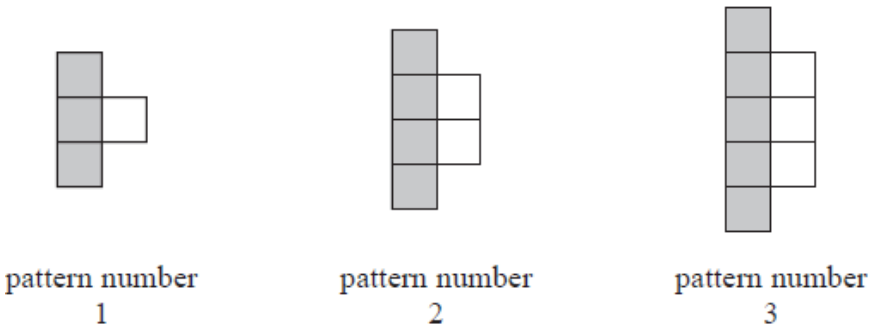
(1)

(ii) Knowing that the sum of their three ages is 77.
Work out Jay's age.

.....

(1)

(c) Here is a sequence of patterns made with grey square tiles and white square tiles.



pattern number 1 | pattern number 2 | pattern number 3

(i) Find the total number of tiles in pattern number *20*

.....

(1)

(ii) Write an expression, in terms of *n*, for the number of grey tiles in pattern number *n*

.....

(1)

(d) Solve

$$\frac{2x-1}{x+3}=\frac{6x}{3x-1}$$

.....

(1)

Q7. Only answers are required.

(a) Here is a right-angled triangle.

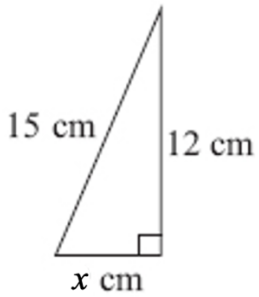


Diagram **NOT** accurately drawn

(i) Work out the value of x.

.....

(1)

The shape below is made from 4 of these triangles.

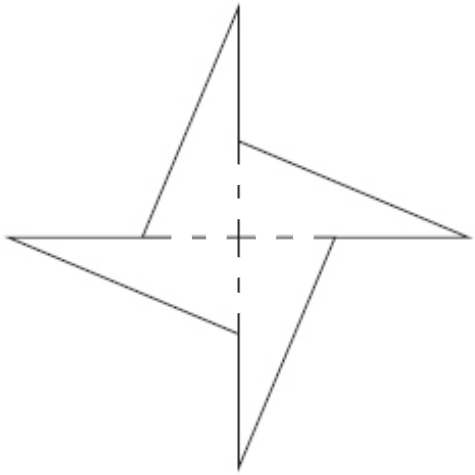


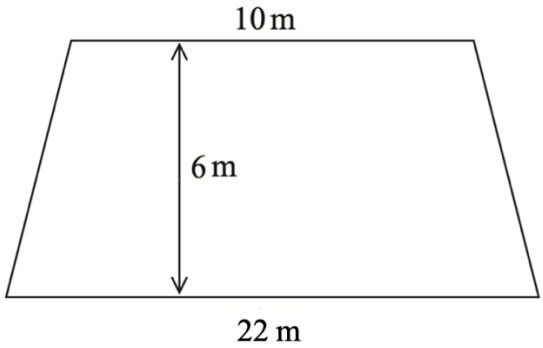
Diagram **NOT** accurately drawn

(ii) Work out the perimeter of the shape.

.....

(1)

(b) The diagram shows a floor in the shape of a trapezium.



£16.99

(i) Work out the area of the trapezium.

.....

(1)

(ii) John is going to paint the floor.
Each 5 litre tin of paint costs £16.99
1 litre of paint covers an area of $2\ m^2$
Work out how much John needs to spend on paint.

.....

(1)

(c) Amy has some toy bricks.
Each brick is a cube of side 1 cm.

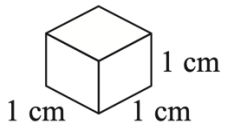
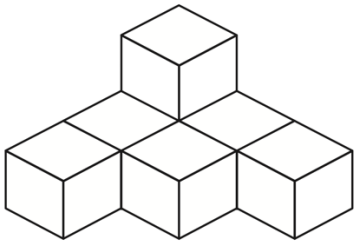


Diagram **NOT** accurately drawn

Amy uses some of the bricks to make this solid shape.



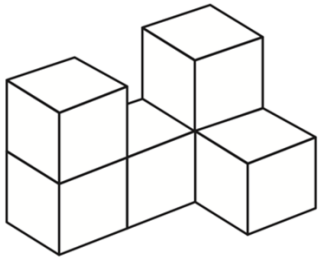
Amy adds some more of the bricks to this solid shape to make a cube of side 3 cm.

(i) How many bricks does Amy add?

.....

(1)

(ii) Naveed uses 6 of the bricks to make this solid shape.
Work out the total surface area of this solid shape.



.....

(1)

(d) The diagram shows a square with perimeter 16 cm.
Work out the area of the shaded region.

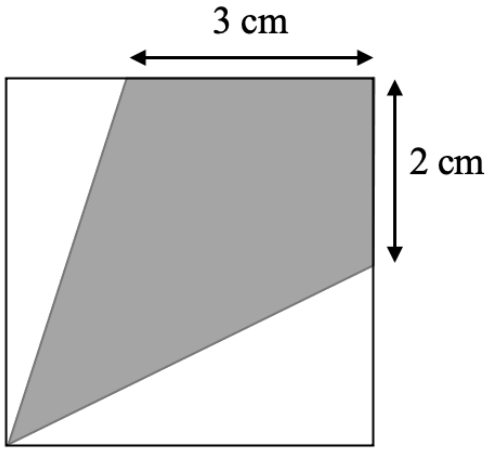


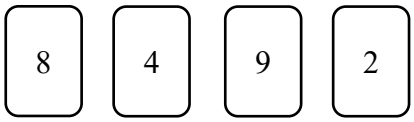
Diagram NOT
accurately drawn

.....

(1)

Q8. Only answers are required.

(a) Here are four cards.
Each card has a number on it.



Write all the three-digit numbers, less than 450, that can be made using these cards.
For one number, each card can be used only once.

.....

(1)

(b) Here are Ryan's scores in eight French tests.

4 6 4 7 8 6 7 6

(i) Work out the mean of Ryan's scores.

.....

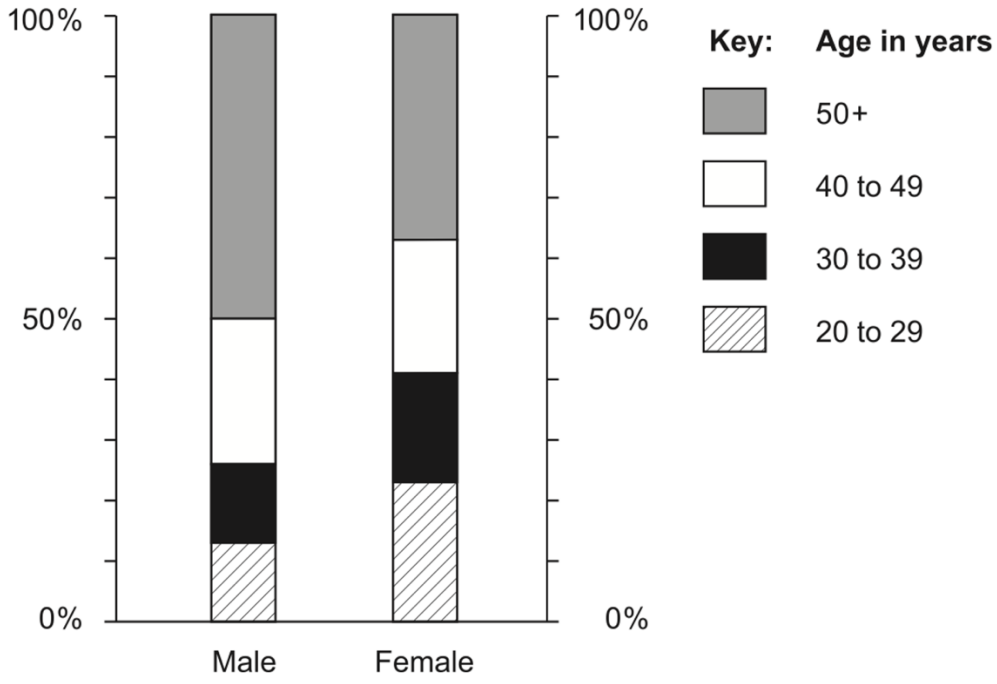
(1)

(ii) Ryan has to sit one more test. Ryan wants his mean mark for all nine tests to be at least 7. Work out the least mark that Ryan needs to get for the last test.

.....

(1)

(c) A newspaper predicts what the ages of secondary school teachers will be in six years' time. They print this chart.



The chart shows **24%** of male teachers will be aged 40 to 49.

(i) About what percentage of female teachers will be aged 40 to 49?

.....

(1)

(ii) The newspaper predicts there will be about 18 000 male teachers aged 40 to 49. Estimate the number of male teachers that will be aged 50+

.....

(1)

(iii) Use the information in the chart to decide if the statements below are **true** or **false** or if there is **not enough information** to tell.

Generally, female teachers will tend to be younger than male teachers.

☐ true ☐ false ☐ not enough information

In total, there will be more female teachers than male teachers.

☐ true ☐ false ☐ not enough information

(1)

SECTION B

For questions in Section B you should give full written solutions.
Just stating an answer will not receive full marks.

Q9.

Solve

$$\frac{5-x}{2}-\frac{2x+1}{3}=1$$

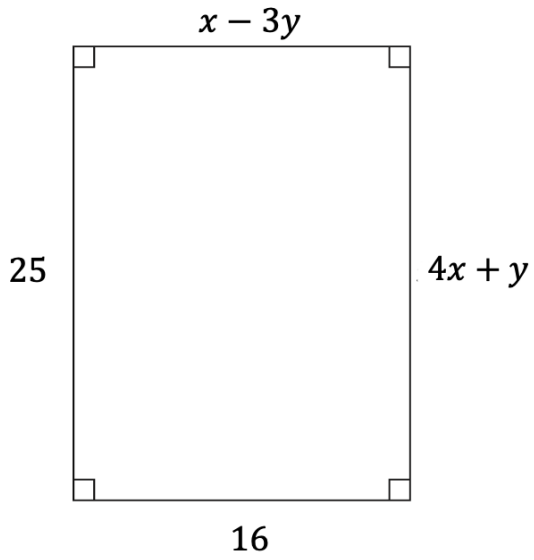
Show clear algebraic working.

.....

(2)

Q10.

The dimensions, in centimetres, of this rectangle are given in terms of x and y as shown.



Solve simultaneous equations to find the value of x and the value of y.
Show clear algebraic working.

x = ...

y = ...

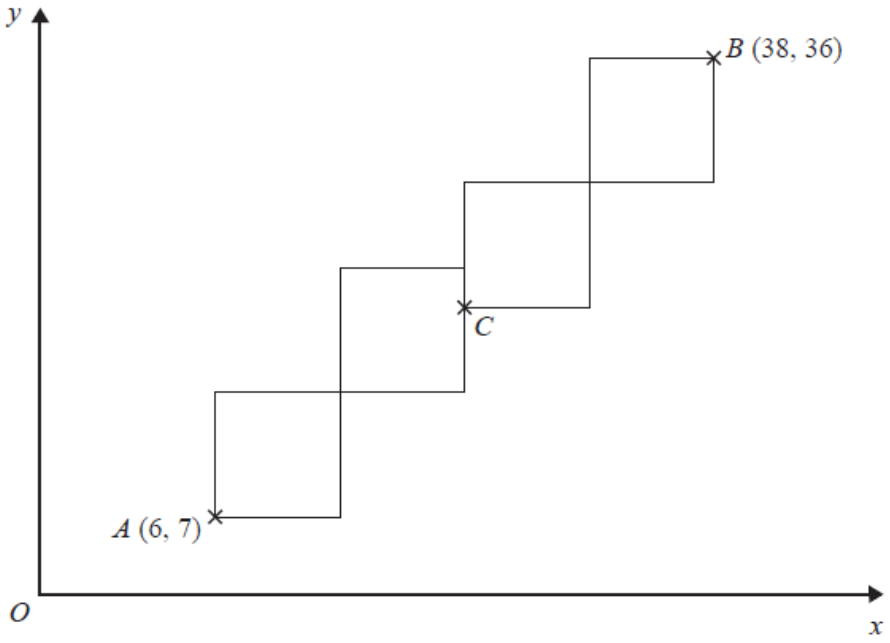
(3)

Q11.

A pattern is made from four identical squares.

The sides of the squares are parallel to the axes.

Point *A* has coordinates (6,7)
Point *B* has coordinates (38,36)
Point *C* is marked on the diagram.
Work out the coordinates of *C*.



.....

(3)

Q12.

Bill has some beads in a bag.
18 of the beads are red
42 of the beads are blue
The rest of the counters are yellow.

Bill takes at random one bead from the bag.

The probability that he takes a yellow bead is $\frac{2}{7}$

Work out how many yellow beads are in the bag before Bill takes a bead.

.....

(2)

Q13.

The example of a particular type of number chain is shown below.

97 → 63 → 18 → 8

The first number must be a positive integer. Each number after the first is the product of the digits of the previous number, so in this case 63 = 9 × 7; 18 = 6 × 3; 8 = 1 × 8.
The chain stops when a single-digit number is reached.

Another example can be found below.

53 → 15 → 5

Suppose that in such a chain the final number is **6**.
Find all possible two-digit numbers for which the final number in the chain is **6**.

.....

(2)