Write your name here:

| Surname: | Other Names: |
|---|---|
| | |

# Mathematics
# Practice Papers Set 2
# Paper 1 (Non Calculator)
# Higher Tier
# Time: 1 hour 30 minutes

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser

**Instructions**
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– there may be more space than you need.
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

**Information**
- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
– use this as a guide as to how much time to spend on each question.

**Advice**
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

**1** The diagram shows the floor of a village hall.

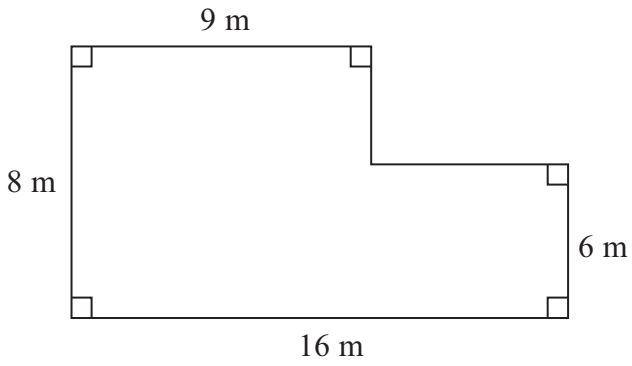


Diagram **NOT** accurately drawn

The caretaker needs to polish the floor.

One tin of polish normally costs £19
One tin of polish covers 12 $m^2$ of floor.

There is a discount of 30% off the cost of the polish.

The caretaker has £130

Has the caretaker got enough money to buy the polish for the floor?
You must show all your working.

**(Total for Question 1 is 5 marks)**

**2** Each day a company posts some small letters and some large letters.

The company posts all the letters by first class post.

The tables show information about the cost of sending a small letter by first class post and the cost of sending a large letter by first class post.

**Small Letter**

| Weight | First Class Post |
|---|---|
| 0–100 g | 60p |

**Large Letter**

| Weight | First Class Post |
|---|---|
| 0–100 g | £1.00 |
| 101–250 g | £1.50 |
| 251–500 g | £1.70 |
| 501–750 g | £2.50 |

One day the company wants to post 200 letters.

The ratio of the number of small letters to the number of large letters is 3 : 2

70% of the large letters weigh 0–100 g.

The rest of the large letters weigh 101–250 g.

Work out the total cost of posting the 200 letters by first class post.

£.....

**(Total for Question 2 is 5 marks)**

**3** Hertford Juniors is a basketball team.

At the end of 10 games, their mean score is 35 points per game.
At the end of 11 games, their mean score has gone down to 33 points per game.

How many points did the team score in the 11th game?

.....

**(Total for Question 3 is 3 marks)**

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**4** (a) Write down the exact value of sin (60)

.....

**(1)**

(b) Write down the exact value of tan (45)

.....

**(1)**

(c) Calculate $9 \times 10^4 \times 3 \times 10^3$
Give your answer in standard form.

.....

**(2)**

**(Total for Question 4 is 4 marks)**

**5** Solve the simultaneous equations

$$3x + 4y = 5$$
$$2x - 3y = 9$$

$x =$ .....

$y =$ .....

**(Total for Question 5 is 4 marks)**

**6** This is a list of ingredients for making chicken soup for 4 people.

Ingredients for **4** people

| | |
|---|---|
| 60 g | butter |
| 300 g | chicken |
| 150 m*l* | cream |
| 1 | onion |
| 640 m*l* | chicken stock |

Bill is going to make chicken soup for 6 people.

Work out the amount of each ingredient he needs.

..... g butter

..... g chicken

..... m*l* cream

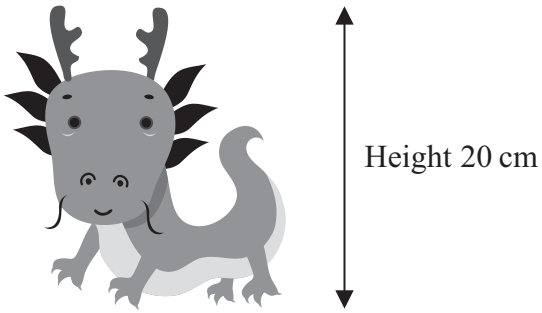
..... onion

..... m*l* chicken stock

**(Total for Question 6 is 3 marks)**

**7** A company makes monsters.

The company makes small monsters with a height of 20 cm.




A small monster has a surface area of 300 $cm^2$.

The company also makes large monsters with a height of 120 cm.

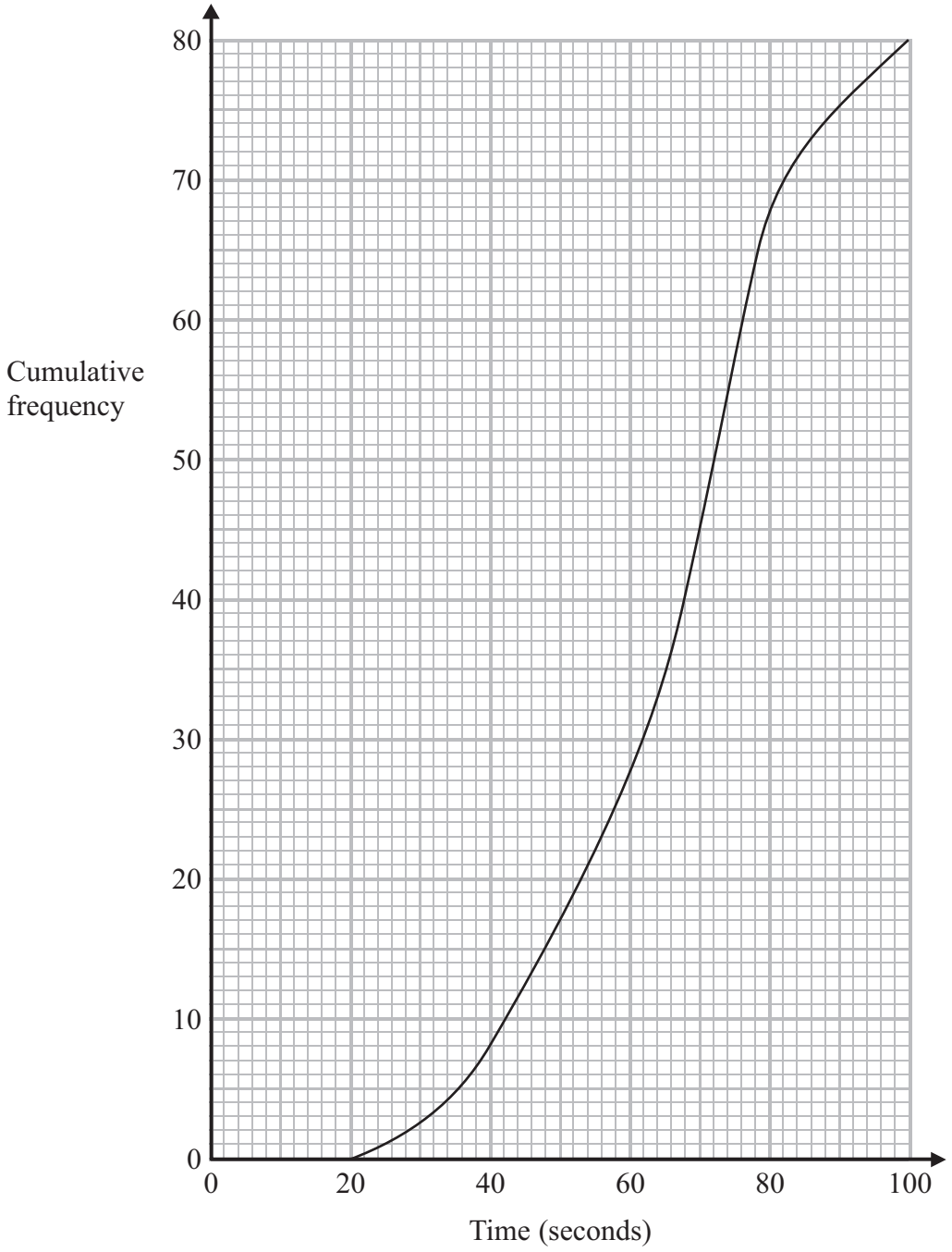
A small monster and a large monster are mathematically similar.

Work out the surface area of a large monster.

..... $cm^2$

**(Total for Question 7 is 3 marks)**

**8** The cumulative frequency graph shows information about the times 80 swimmers take to swim 50 metres.




(a) Use the graph to find an estimate for the median time.

..... seconds

**(1)**

A swimmer has to swim 50 metres in 60 seconds or less to qualify for the swimming team.

The team captain says,

"More than 25% of swimmers have qualified for the swimming team."

*(b) Is the team captain right?

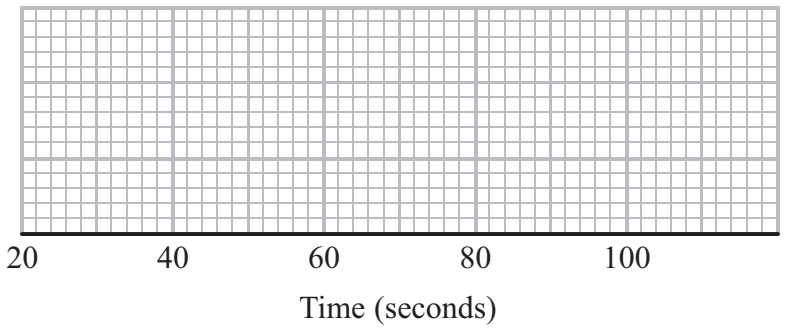
You must show how you got your answer.

**(3)**

For these 80 swimmers

the least time taken was 28 seconds
and the greatest time taken was 96 seconds.

(c) Use the cumulative frequency graph and the information above to draw a box plot for the times taken by the swimmers.




**(3)**

**(Total for Question 8 is 7 marks)**

**9** In a supermarket, the probability that John buys fruit is 0.7

In the same supermarket, the probability that John independently buys vegetables is 0.4

Work out the probability that John buys fruit or buys vegetables or buys both.

.....

**(Total for Question 9 is 3 marks)**

**10** $y$ is directly proportional to the square of $x$.

When $x = 3$, $y = 36$

Find the value of $y$ when $x = 5$

.....

**(Total for Question 10 is 4 marks)**

**11**

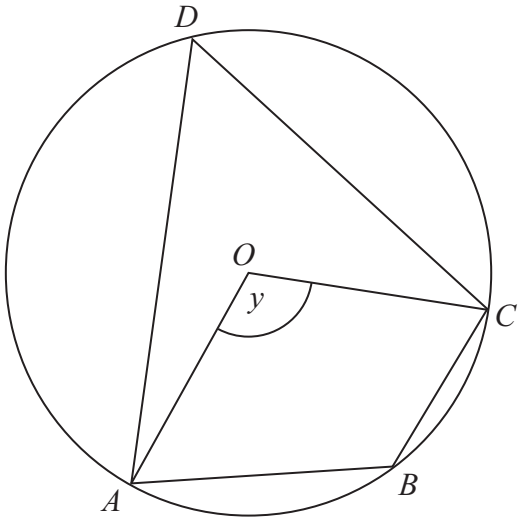



Diagram **NOT** accurately drawn

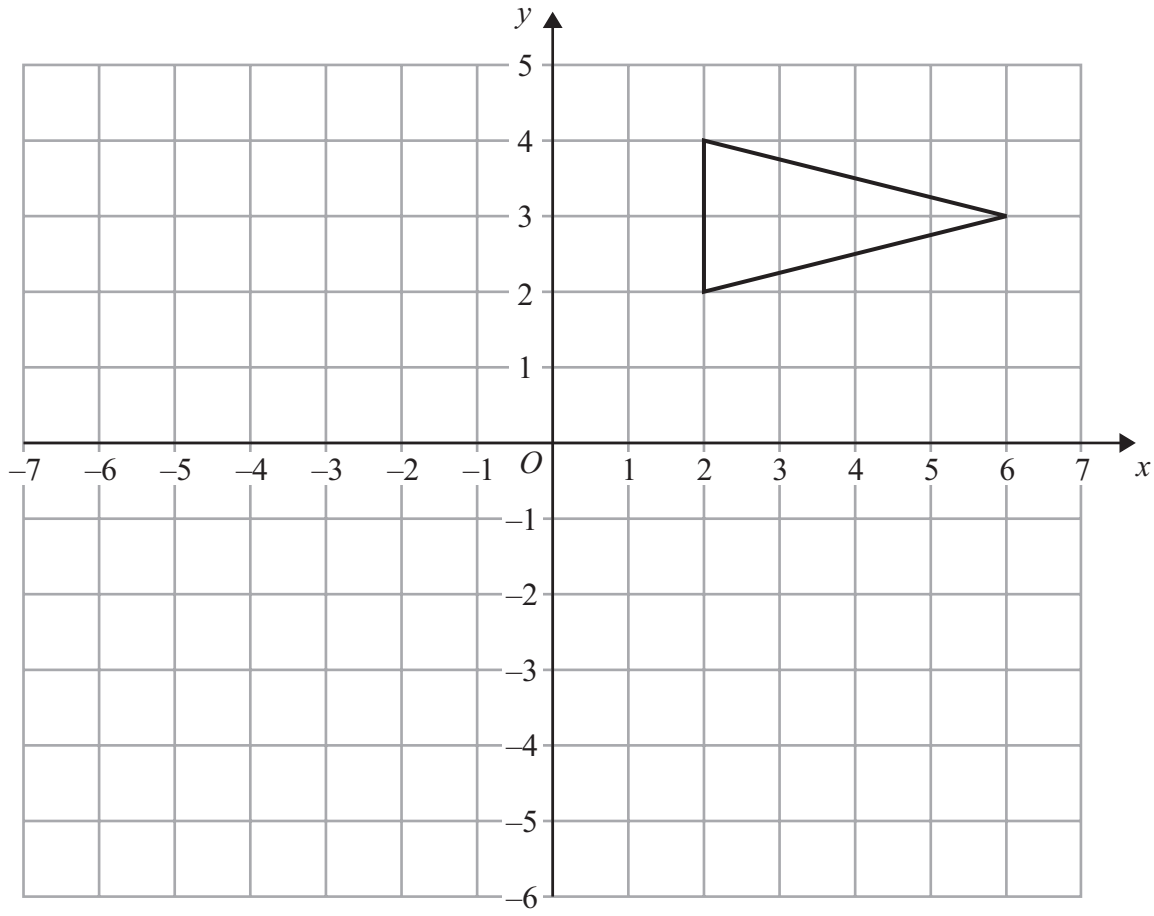
*A*, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.

Angle *AOC* = *y*.

Find the size of angle *ABC* in terms of *y*.
Give a reason for each stage of your working.

**(Total for Question 11 is 4 marks)**

**12**




On the grid, enlarge the triangle by scale factor $-\frac{1}{2}$, centre (0, –2).

**(Total for Question 12 is 2 marks)**

**13** *OACB* is a parallelogram.

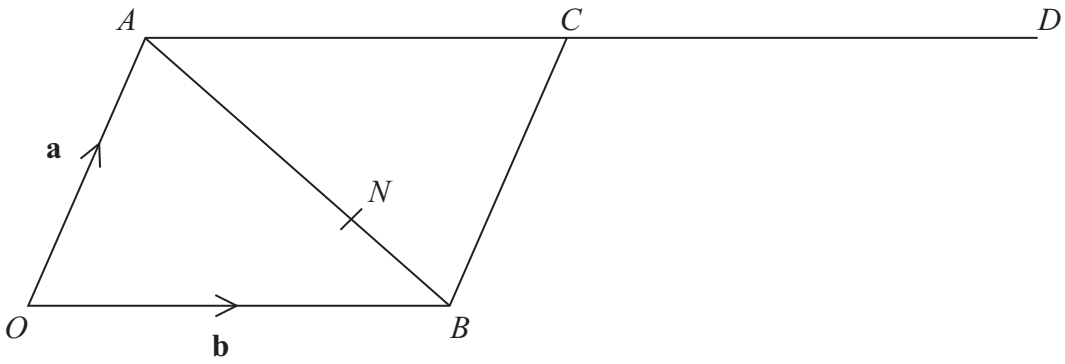



Diagram **NOT** accurately drawn

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$
$D$ is the point such that $\overrightarrow{AC} = \overrightarrow{CD}$
The point $N$ divides $AB$ in the ratio 2 : 1

(a) Write an expression for $\overrightarrow{ON}$ in terms of **a** and **b**.

.....

**(3)**

*(b) Prove that $OND$ is a straight line.

**(3)**

**(Total for Question 13 is 6 marks)**

**14** Use the quadratic formula to solve the equation $4x^2 - 6x + 1 = 0$

Give your answer in the form $\frac{p \pm \sqrt{q}}{r}$ where $p$, $q$ and $r$ are integers.

.....

**(Total for Question 14 is 3 marks)**

**15** (a) Solve $x^2 - x - 2 = 0$

.....

**(2)**

(b) Solve $3p^2 + p - 10 > 0$

.....

**(3)**

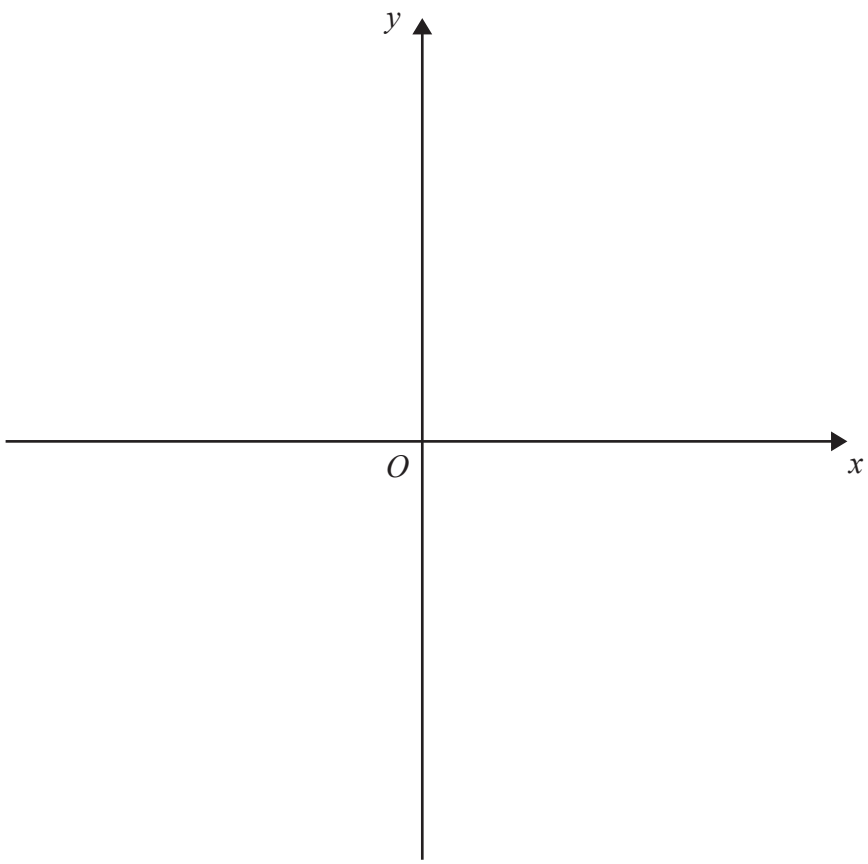
**(Total for Question 15 is 5 marks)**

**16** (a) Write the quadratic expression $x^2 + 3x + 1$ in the form $(x + c)^2 + d$ where $c$ and $d$ are constants.

.....

**(2)**

(b) Sketch the graph of $y = x^2 + 3x + 1$ showing the coordinates of any points at which the graph intersects the $y$-axis.




**(3)**

(c) State the coordinates of the turning point on the graph of $y = x^2 + 3x + 1$

.....

**(1)**

**(Total for Question 16 is 6 marks)**

**17** (a) Write $\sqrt{108}$ in the form $n\sqrt{3}$ where $n$ is an integer.

.....

**(1)**

(b) Simplify $(2 - \sqrt{3})(2 + \sqrt{3})$

.....

**(2)**

(c) Rationalise the denominator of $\dfrac{1}{2\sqrt{3}}$

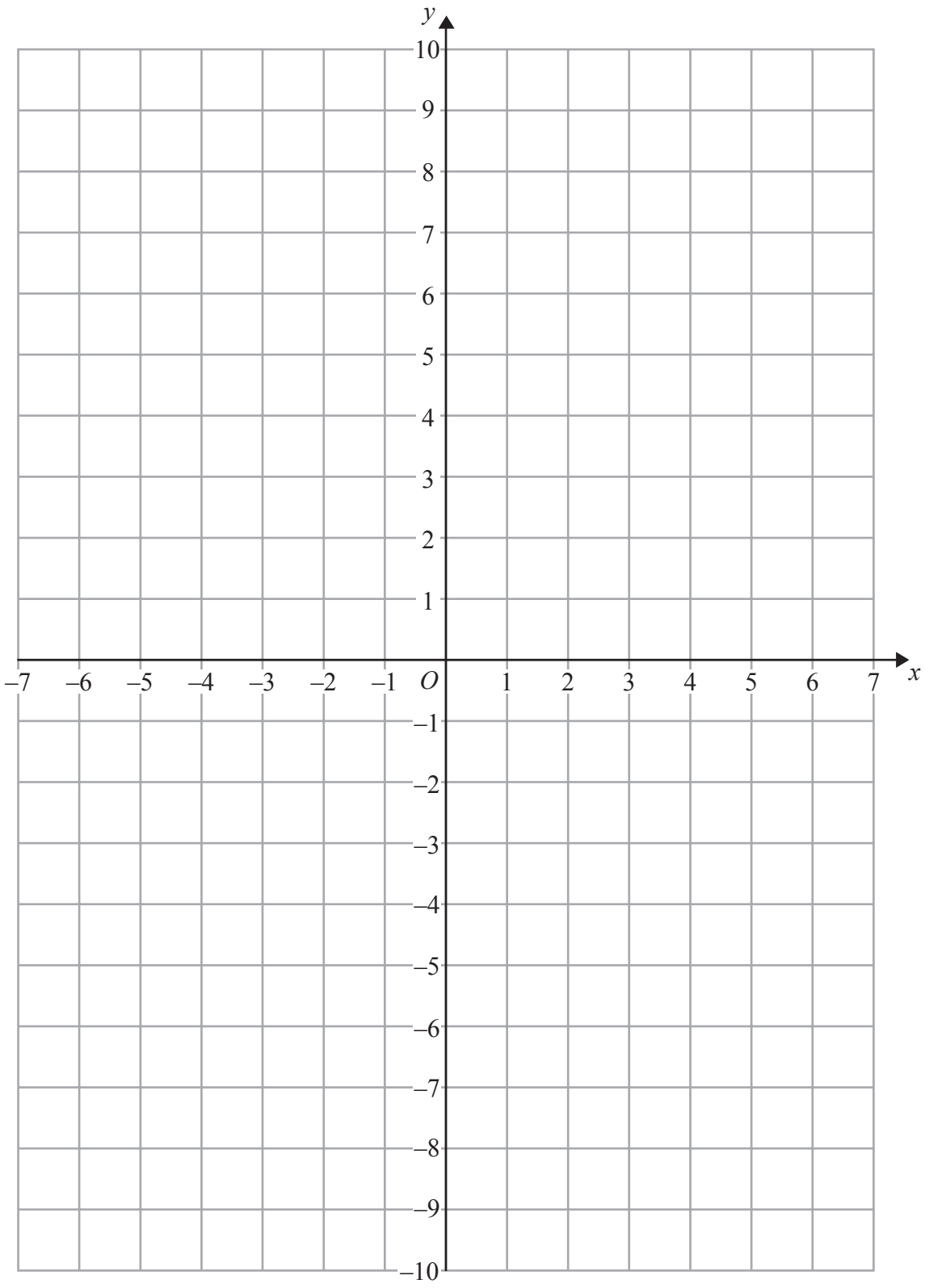
Give your answer in the form $\dfrac{\sqrt{a}}{b}$ where $a$ and $b$ are integers.

.....

**(2)**

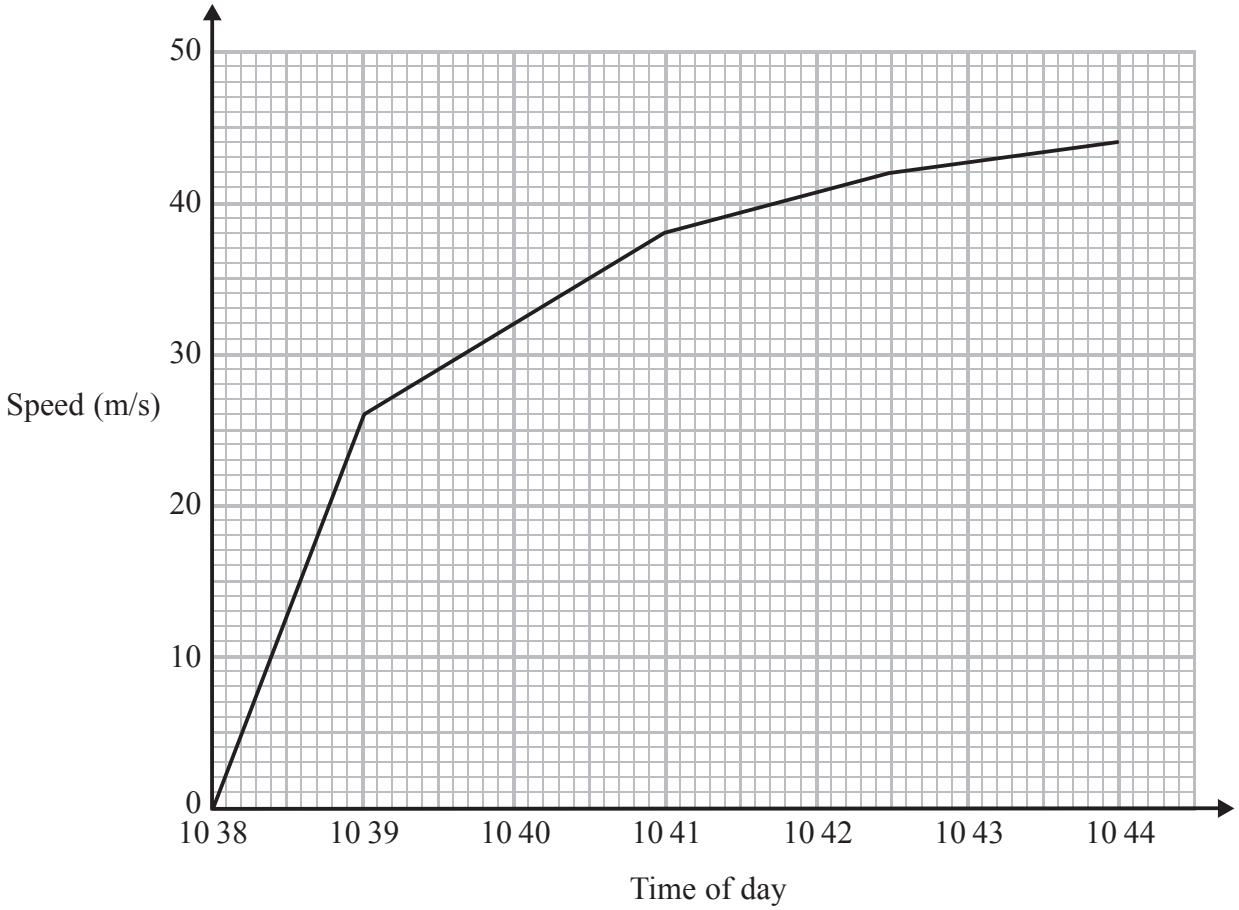
**(Total for Question 17 is 5 marks)**

**18** On the grid, construct the graph of $x^2 + y^2 - 36 = 0$




**(Total for Question 18 is 2 marks)**

**19** Here is a speed-time graph for the first 6 **minutes** of a train's journey.




(a) Between which two times does the train have its greatest acceleration?

.....

**(1)**

(b) Calculate the acceleration of the train between 10 39 and 10 41

Give your answer in $m/s^2$.

..... $m/s^2$

**(2)**

(c) Find the total distance, in metres, travelled by the train in the first 3 minutes of its journey.

..... m

**(3)**

**(Total for Question 19 is 6 marks)**