**GCSE**

**4352/02**

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W16-4352-02

**MATHEMATICS (UNITISED SCHEME)**
**UNIT 2: Non-Calculator Mathematics**
**HIGHER TIER**

A.M. WEDNESDAY, 13 January 2016

1 hour 15 minutes

CALCULATORS ARE
NOT TO BE USED
FOR THIS PAPER

**ADDITIONAL MATERIALS**

A ruler, a protractor and a pair of compasses may be required.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

Take $\pi$ as 3·14.

**INFORMATION FOR CANDIDATES**

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2**.

| For Examiner's use only | | |
|---|---|---|
| Question | Maximum Mark | Mark Awarded |
| 1. | 3 | |
| 2. | 7 | |
| 3. | 3 | |
| 4. | 5 | |
| 5. | 4 | |
| 6. | 2 | |
| 7. | 4 | |
| 8. | 5 | |
| 9. | 3 | |
| 10. | 3 | |
| 11. | 3 | |
| 12. | 4 | |
| 13. | 3 | |
| 14. | 6 | |
| 15. | 6 | |
| 16. | 4 | |
| **Total** | **65** | |

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**Formula List**

**Area of trapezium** $= \frac{1}{2}(a + b)h$
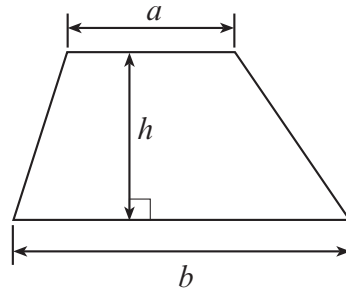
**Volume of prism** = area of cross-section × length
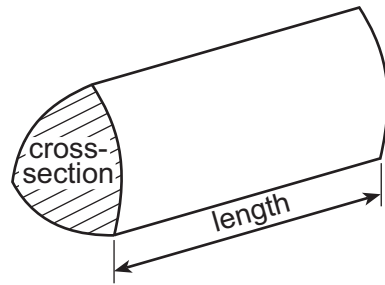
**Volume of sphere** $= \frac{4}{3}\pi r^3$

**Surface area of sphere** $= 4\pi r^2$
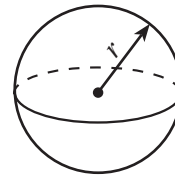
**Volume of cone** $= \frac{1}{3}\pi r^2 h$

**Curved surface area of cone** $= \pi r l$
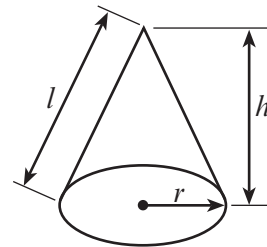
**In any triangle** $ABC$

**Sine rule** $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

**Cosine rule** $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** $= \dfrac{1}{2}ab \sin C$
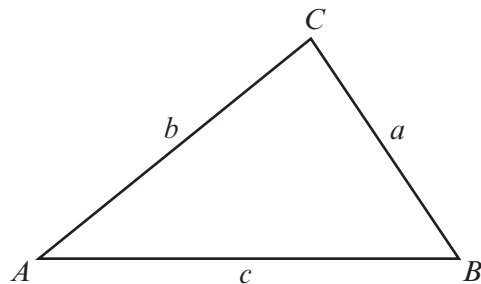
**The Quadratic Equation**

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

**1.** Solve the equation

$$2(2x - 3) = 1.$$ [3]

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**2.** *You will be assessed on the quality of your written communication in this question.*

Dewi makes candles to sell on a stall at the Saturday market.

One week, he makes 60 small candles and 20 large candles.
A small candle costs £2.50 to make and is sold for £6.
A large candle costs £5 to make and is sold for £11.

The market manager charges Dewi £40 for use of the stall at the market.

At the end of the day, Dewi has 12 small candles and 8 large candles left.

Calculate the overall profit that Dewi has made from making and selling candles that week.

You must show all your working. [7]

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**3.** Sarita's hair grows at an approximate rate of 12·5 mm per month.
Assuming her hair continues to grow at this rate, what length of hair will Sarita grow in 10 years?
Give your answer in metres. [3]

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**4.** All the angles in the diagram below are measured in degrees.
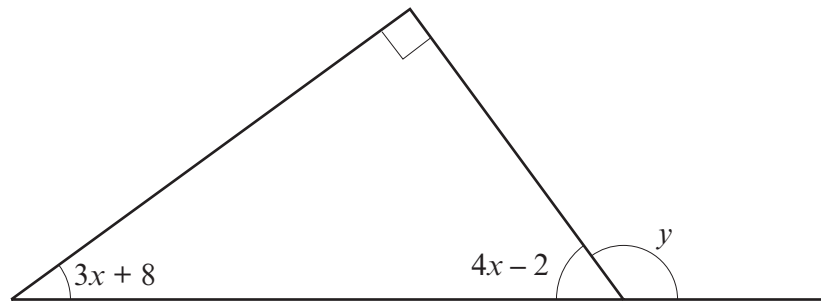


*Diagram not drawn to scale*

Find the value of $x$ and the size of angle $y$.
You must show all your working. [5]

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$x$ = ........................................................        $y$ = ........................................................

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**5.** Megan and Carys were running the 1500 m race in their school sports day.

Megan recorded a time of 5 minutes and 20 seconds.
Carys recorded a time of 6 minutes and 4 seconds.

Megan claimed that Carys took 15% longer than she did.

Was Megan correct?
You must show all your working.                                                    [4]

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**6.** Write down an expression for the $n$th term of the following sequence.

$$-9, -4, 1, 6, 11, 16, .....$$ [2]

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$n$th term ....................................................................

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**7.** Charlie's school is organising a Summer Fayre.

Charlie is making a spinner for his stall.
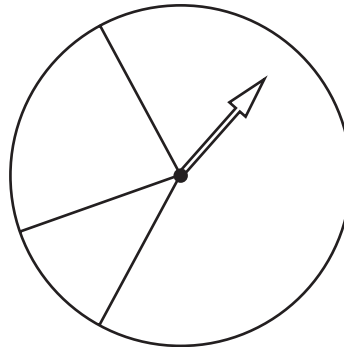A sketch of his spinner is shown below.



*Diagram not drawn to scale*

The spinner has three sectors, each to be painted a different colour: purple, orange or white.
The sectors are **not** of equal size.

- The angle made by the white sector at the centre of the circle is 234°.
- The probability that the spinner lands on the white sector is three times the probability that the spinner lands on the orange sector.

Calculate the probability that the spinner lands on the purple sector.
Express your answer as a fraction in its lowest terms. [4]

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**8.** *(a)* Express 350 as a product of its prime factors in index form. [3]

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*(b)* As a product of its prime factors, 12 800 can be expressed as $2^9 \times 5^2$.
How do you know that 12 800 is not a square number? [1]

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*(c)* Write the number 0·000 007 23 in standard form. [1]

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**9.** Enlarge the given triangle, using scale factor $-2$ and centre *C*. [3]

**Turn over.**
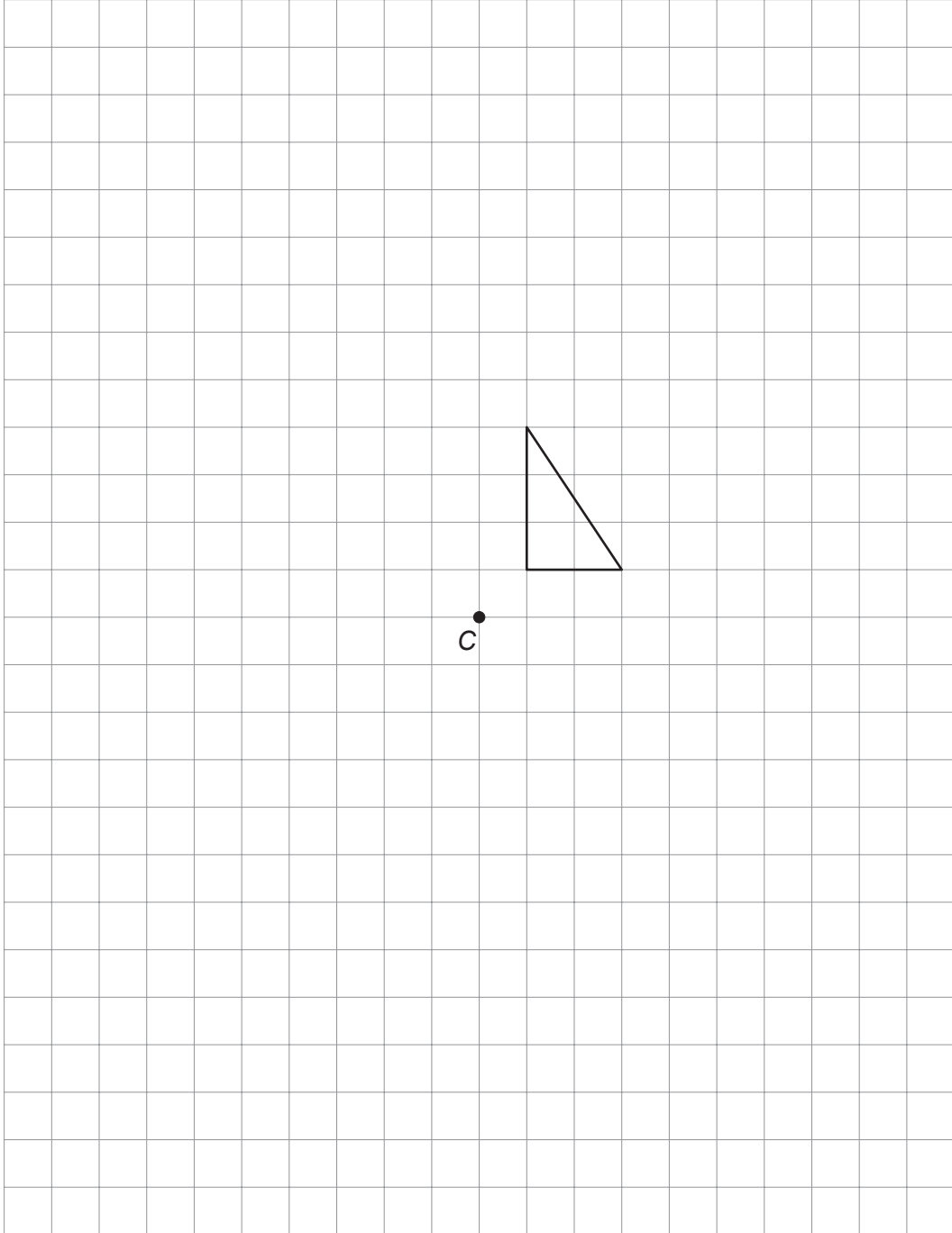
**10.** *(a)* Use the axes below to draw the line with equation $x + 3y = 6$ for values of $x$ from 0 to 6.

[2]

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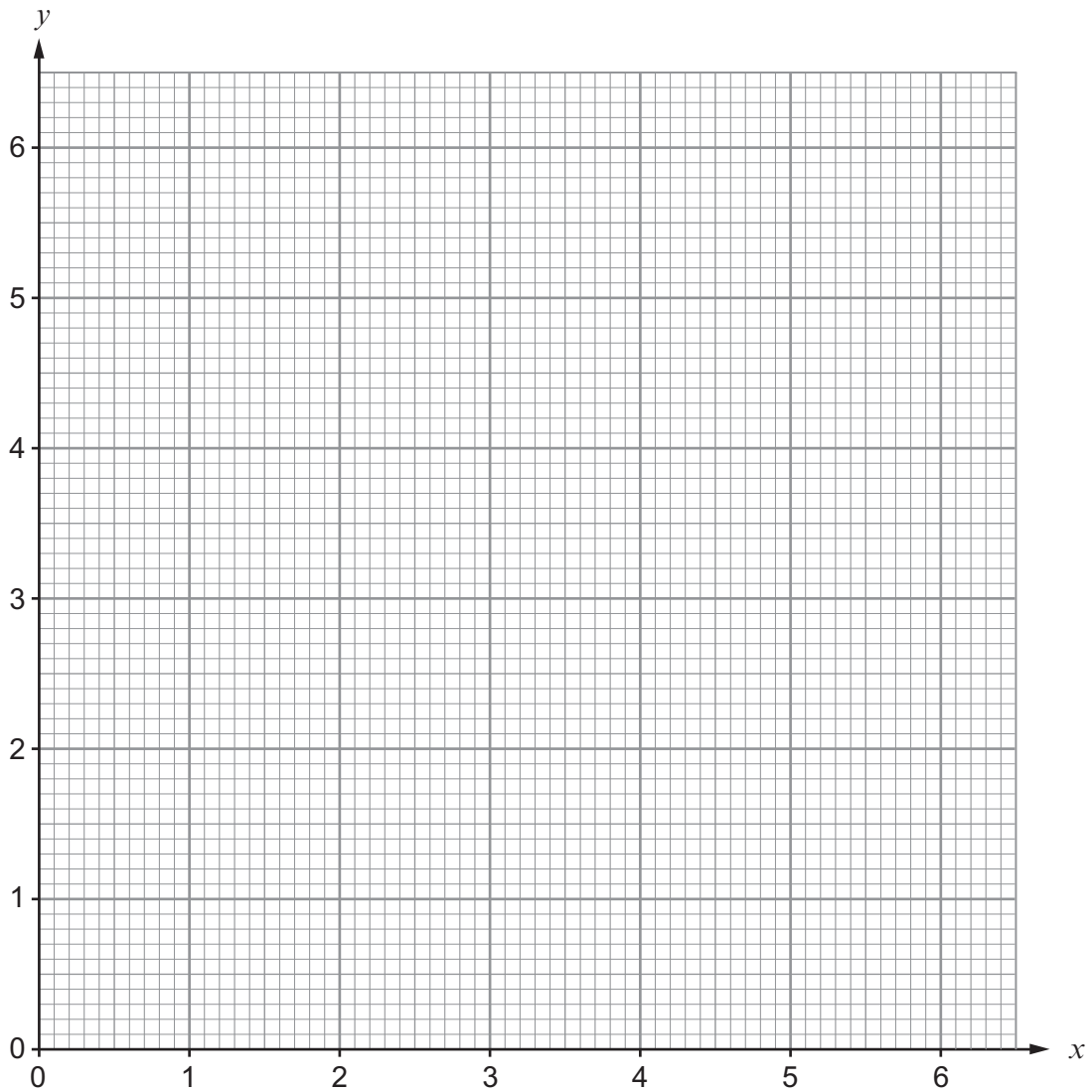


*(b)* Write down the equation of **another** line which is parallel to the line with equation $x + 3y = 6$.

[1]

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**11.** Make $w$ the subject of the following formula.

$$9w^2 + x^2 = 1$$

[3]

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**12.** Mathew is playing with toy cars and lorries.

He arranges 4 cars and 1 lorry in a straight line. The line is 35 cm long.
He then arranges 2 cars and 3 lorries in a straight line. This line is 40 cm long.

All the cars are the same length and all the lorries are the same length.

Find the length of each car and each lorry.
You must use an algebraic method.                                                                [4]

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Length of a toy car = ............................................ cm

Length of a toy lorry = ............................................ cm

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

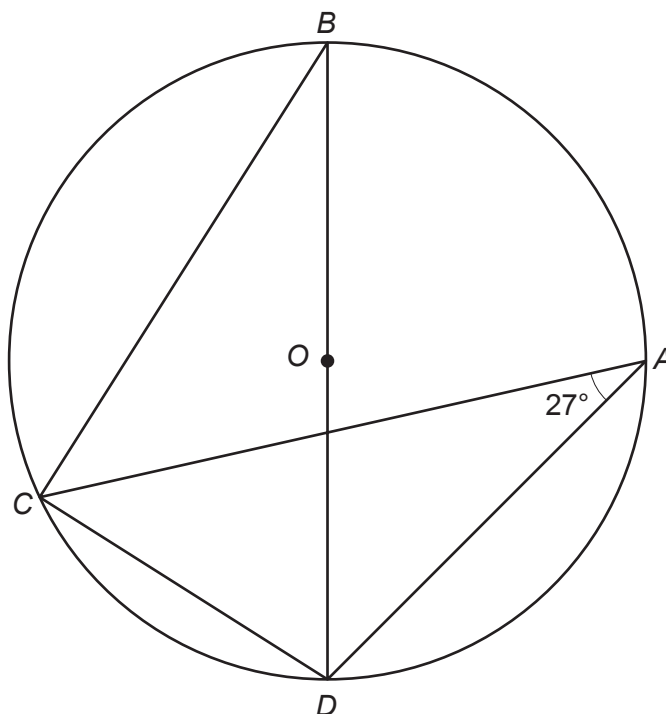*BD* is a diameter of the circle and $C\hat{A}D = 27°$.



*Diagram not drawn to scale*

Find the size of $B\hat{D}C$. [3]

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**14.** *(a)* Express 0·0̇6̇2̇ as a fraction. [2]

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*(b)* Simplify $\sqrt{5}\left(4+3\sqrt{5}\right)-\sqrt{5}\left(2+\sqrt{5}\right)$. [2]

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*(c)* Evaluate $\left(\dfrac{25}{9}\right)^{-\frac{1}{2}}$. [2]

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**15.** Each of the numbers 1, 2, 2, 3, 3, 3 is written on a card.

| 1 | 2 | 2 | 3 | 3 | 3 |
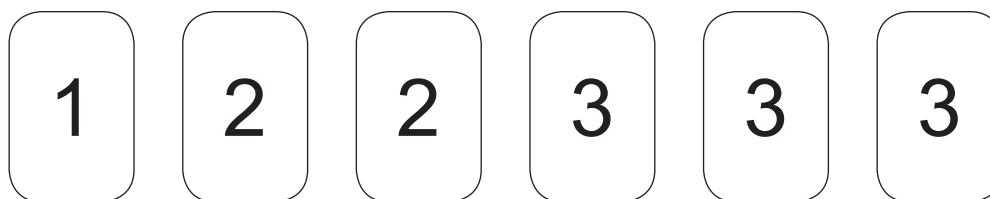
Two of the cards are selected at random, without being replaced.

*(a)* Find the probability that the product of the numbers selected is a square number. [3]

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*(b)* Find the probability that the sum of the numbers selected is 3. [3]
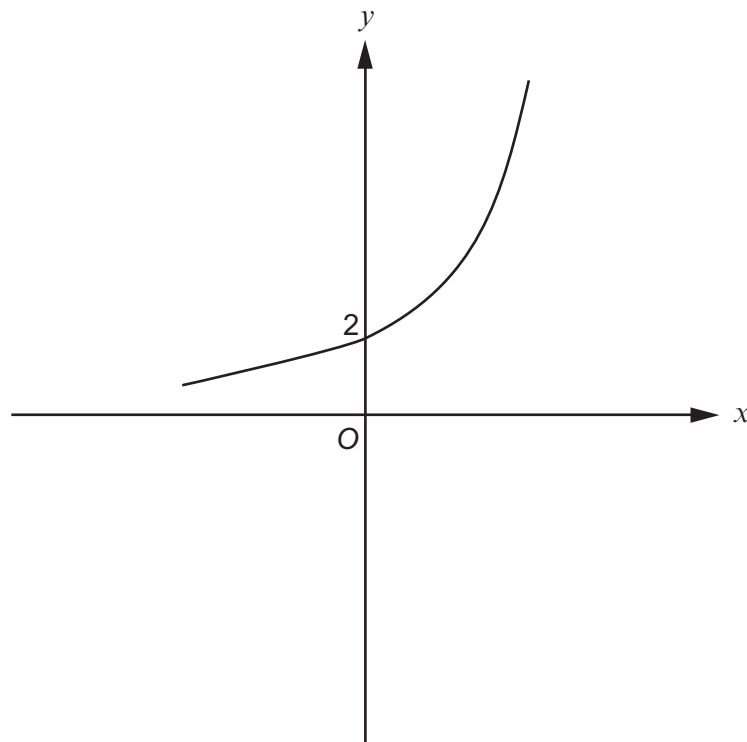
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**16.** *(a)* The diagram shows a sketch of $y = f(x)$.
On the same diagram, sketch the curve $y = f(x) - 6$.
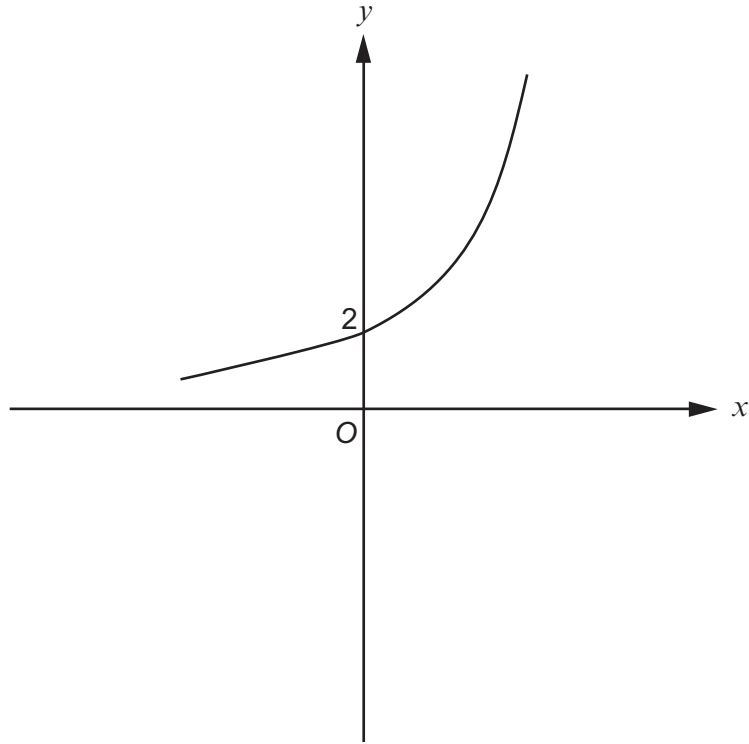Show clearly the value of $y$ at the point where this curve crosses the $y$-axis. [2]
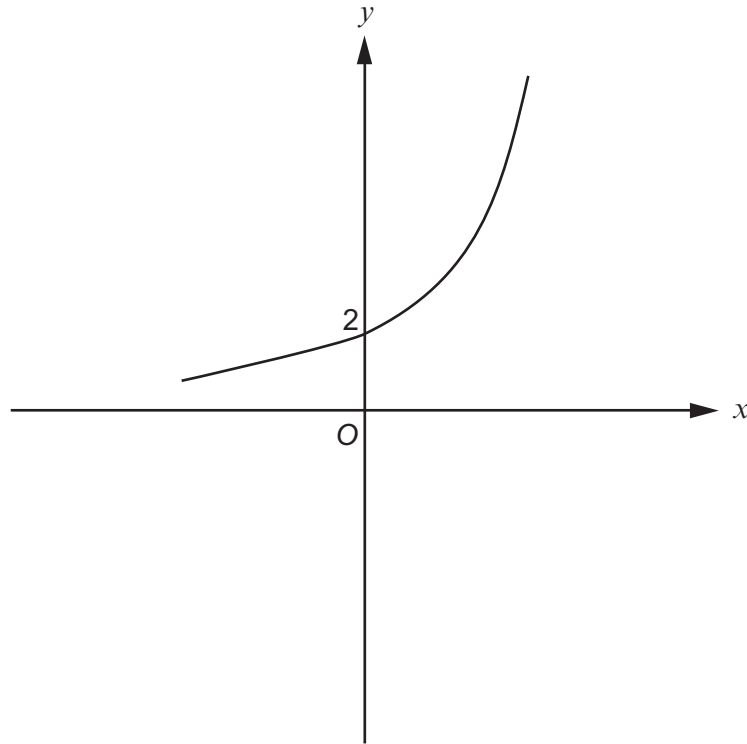


*(b)* This diagram again shows a sketch of $y = f(x)$.
On this same diagram, sketch the curve $y = -f(x)$. [1]

*(c)* This diagram again shows a sketch of $y = f(x)$.
On this same diagram, sketch the curve $y = f(-x)$. [1]



**END OF PAPER**

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