Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

3300U50-1

S24-3300U50-1

THURSDAY, 16 MAY 2024 – MORNING

MATHEMATICS
UNIT 1: NON-CALCULATOR
HIGHER TIER

1 hour 45 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

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.

If you run out of space use the additional page at the back of the booklet. Question numbers must be given for all work written on the additional page.

Take π 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.

In question **2**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**6**	
2.	**6**	
3.	**3**	
4.	**5**	
5.	**5**	
6.	**4**	
7.	**3**	
8.	**3**	
9.	**5**	
10.	**3**	
11.	**3**	
12.	**6**	
13.	**5**	
14.	**2**	
15.	**3**	
16.	**9**	
17.	**4**	
18.	**5**	
Total	**80**	

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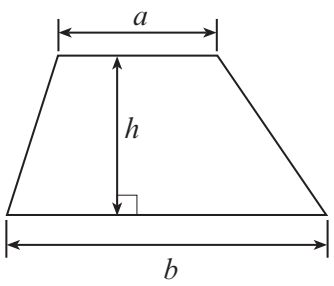
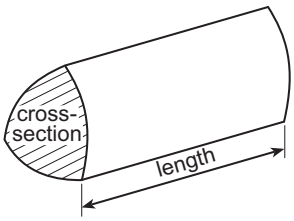
Formula List – Higher Tier

Area of trapezium = $\frac{1}{2}(a + b)h$

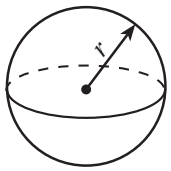


Volume of prism = area of cross-section × length



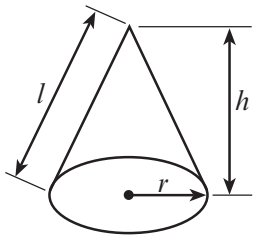
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

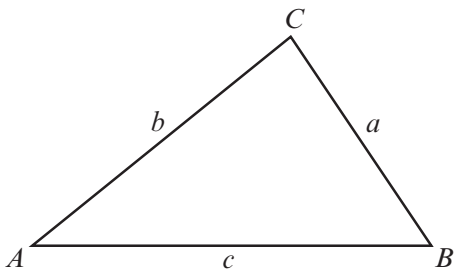


In any triangle ABC

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

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

Area of triangle = $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Annual Equivalent Rate (AER)

AER, as a decimal, is calculated using the formula $\left(1 + \frac{i}{n}\right)^n - 1$, where i is the nominal interest rate per annum as a decimal and n is the number of compounding periods per annum.

Examiner only

1. (a) Write the reciprocal of 4 as a decimal. [1]

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(b) Estimate the value of $\frac{79{\cdot}34}{40{\cdot}1 \times 0{\cdot}48}$.

You must show all your approximations in your working. [2]

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(c) Evaluate

$$1\frac{5}{7} + 2\frac{11}{14}.$$

Give your answer in its simplest form. [3]

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Examiner only

2. *In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

The right-angled triangle ABC is a cross-section of a prism, as shown below.

$AB = 9\,\text{cm}$, $BC = 10\,\text{cm}$ and $A\hat{B}C = 90°$.
The length of the prism is 20 cm.

Calculate the volume of the prism.
You must show all your working. [4 + 2 OCW]

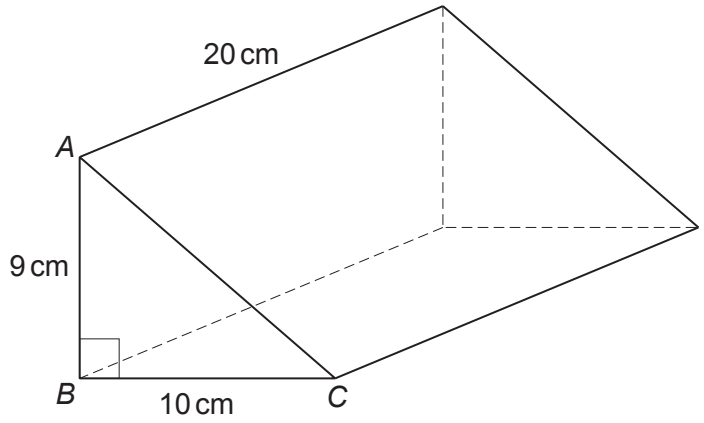


Diagram not drawn to scale

Examiner only

3. Point *P* lies on:

- the bisector of angle *ABC*
- the perpendicular bisector of line *BC*.

Using only a ruler and a pair of compasses, **construct** suitable lines and arcs to show the position of point *P*.

Construction arcs must be clearly shown. [3]

Examiner only

4. The diagram below shows a shape made by joining two rectangles together.
The area of the whole shape is 89 cm^2.

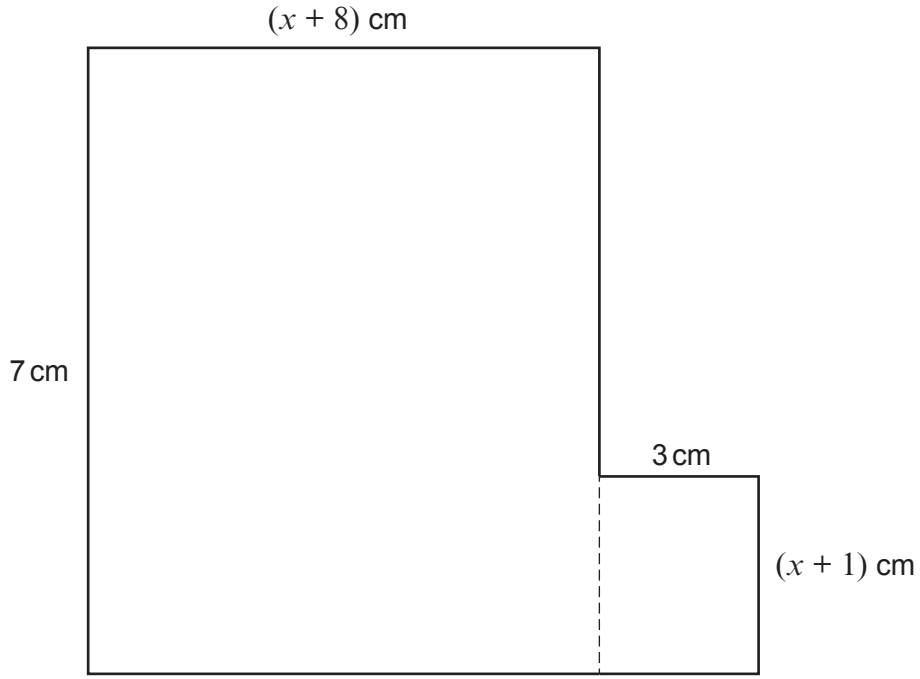


Diagram not drawn to scale

Form and solve an equation to find the value of x. [5]

Examiner only

5. | Lowest common multiple (LCM) of 10 and 18 | = n × | Highest common factor (HCF) of 30 and 72 |

Calculate the value of n.
You must show all your working. [5]

n = ...

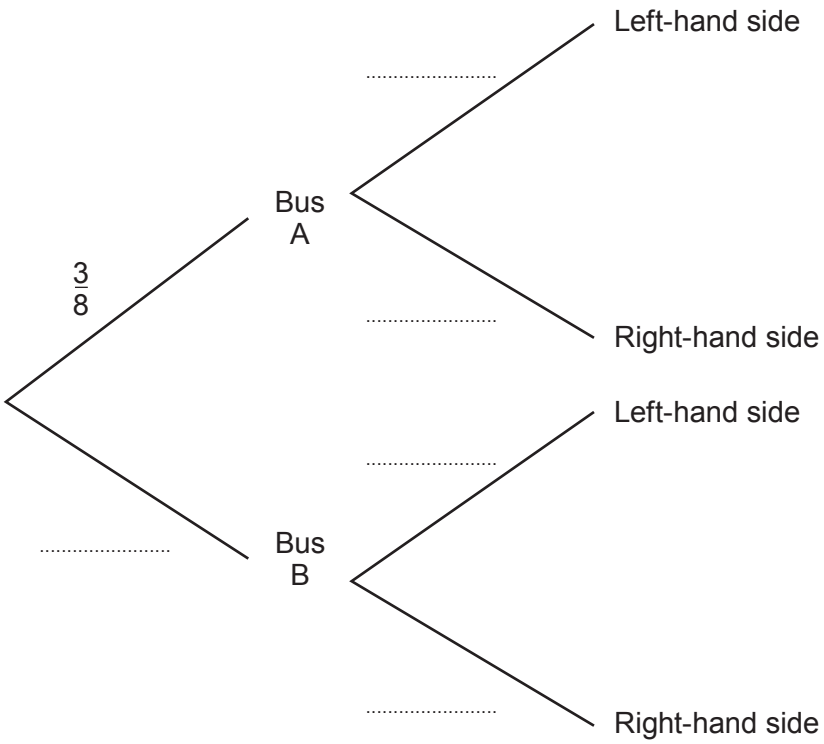
Examiner only

6. A group of people hired two buses, Bus A and Bus B, to take them home from a party.
Bus A left the party at 11:00 p.m.
Bus B left the party at midnight.

A person from the group is chosen at random.
The probability that this person left the party on Bus A is $\frac{3}{8}$.

The probability that this person sat on the left-hand side of the bus is equal to the probability that this person sat on the right-hand side.

(a) Complete the following tree diagram. [2]



(b) What is the probability that this person sat on the right-hand side of the bus that left at midnight? [2]

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Examiner only

7. (a) Express 0·0057 in standard form. [1]

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(b) Calculate the value of $\frac{2\times10^{4}}{5\times10^{-3}}$.

Give your answer in standard form. [2]

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8. A car travels a distance of x miles in 2 hours.
In the next hour, it travels a further distance of 36 miles.

Its average speed for the whole journey is 42 mph.

Calculate the value of x.
You must show all your working. [3]

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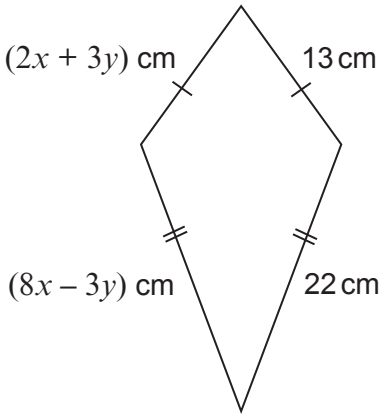
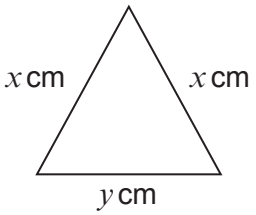
Examiner only

9. A kite and an isosceles triangle are shown below.
They are not drawn to the same scale.





Diagrams not drawn to scale

Using the information shown on the kite, calculate the perimeter of the isosceles triangle.
Do not use a trial and improvement method.
You must show all your working. [5]

Perimeter of the isosceles triangle = ... cm

Examiner only

10. The area of the shaded sector AOB shown below is $\frac{132\pi}{5}\text{cm}^2$.

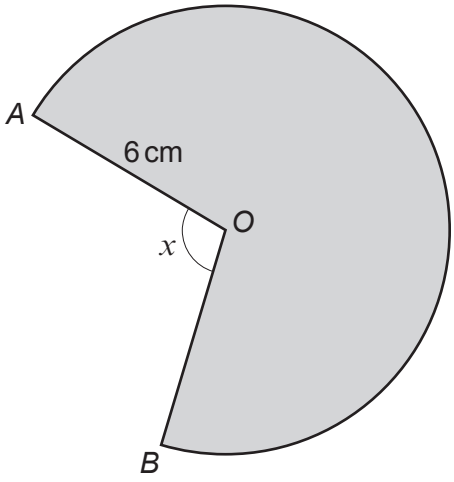
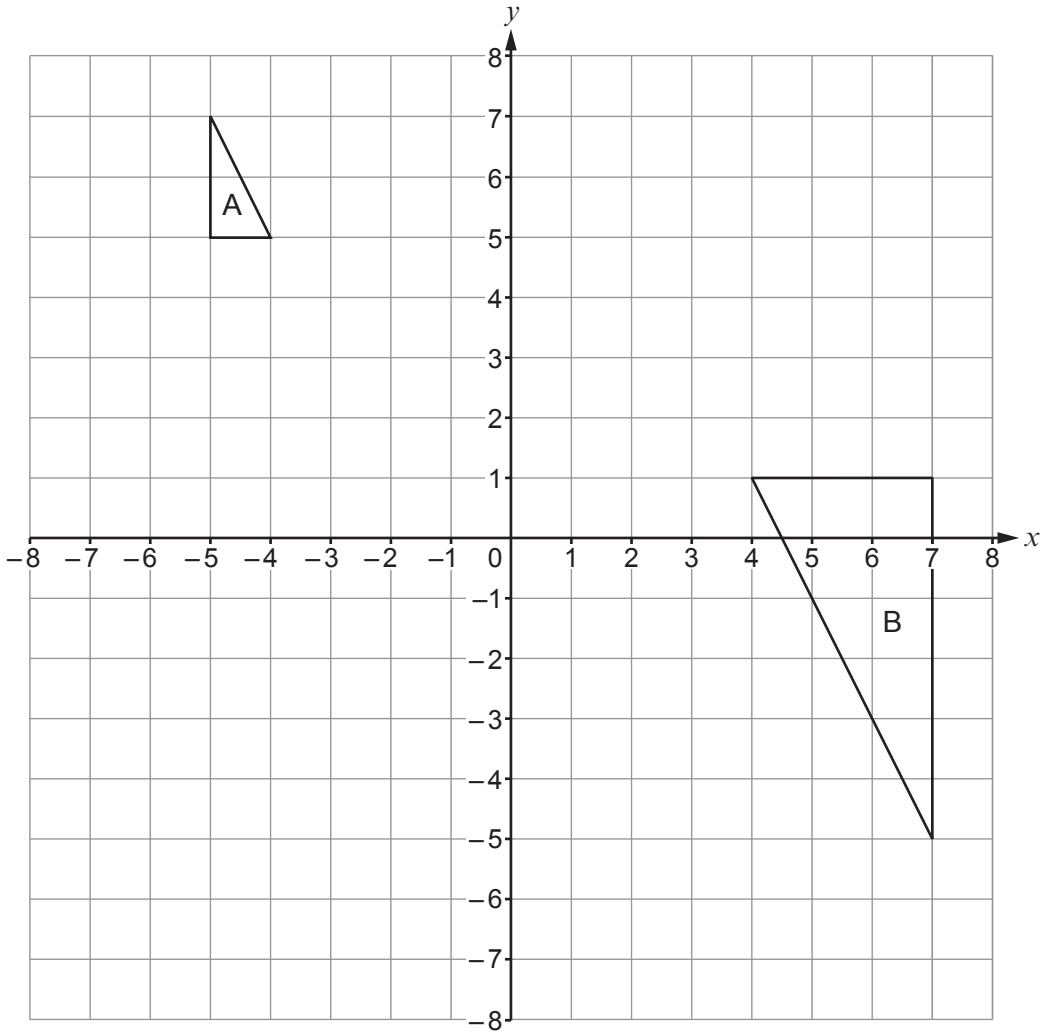


Diagram not drawn to scale

Find the size of angle x.
In your working, you should express any areas in terms of π. [3]

Examiner only

11. Describe fully the **single** transformation that transforms triangle A onto triangle B. [3]



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Examiner only

12. x is proportional to $\sqrt{w}$, and x = 24 when w = 36.

Also, y is inversely proportional to x, and y = 8 when x = 15.

Find the value of y when w = 25. [6]

Examiner only

13. Points *A*, *B*, *C*, *D* lie on a circle.
The line *FAE* is a tangent to the circle at *A*.

$B\hat{C}D = 114°$.

$D\hat{B}A = x°$.

$B\hat{A}E = 2x°$.

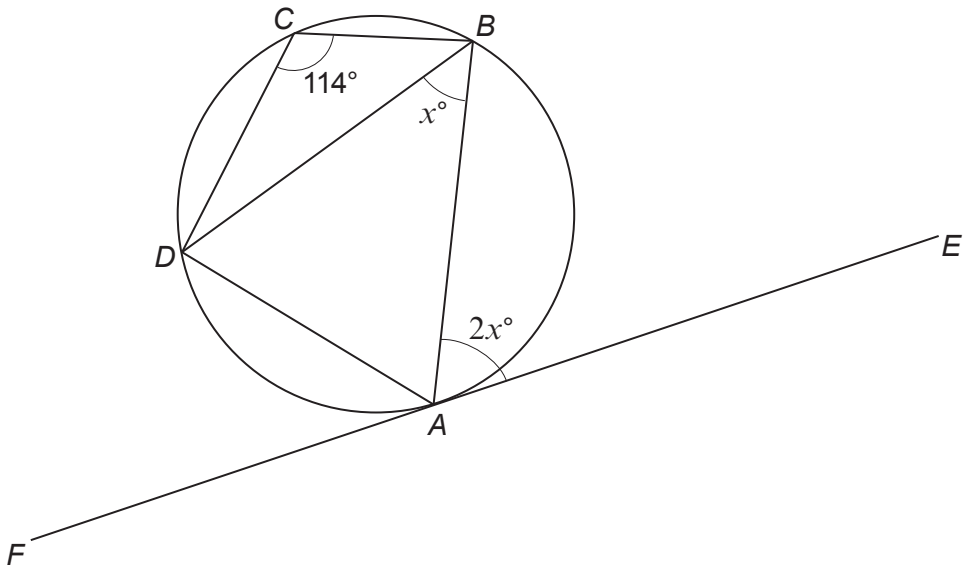

Diagram not drawn to scale

Calculate the value of x.
You must state any circle theorems that you use. [5]

Examiner only

14. Factorise $2x^2 - 17x + 30$. [2]

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15. (a) Circle the correct answer in each of the following questions:

(i) $\sqrt{20}$ is equal to [1]

$5\sqrt{2}$ $2\sqrt{5}$ 10 $5\sqrt{4}$ $4\sqrt{5}$

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(ii) $\sqrt{2} + \sqrt{50}$ is equal to [1]

$\sqrt{52}$ 10 $6\sqrt{2}$ 26 $26\sqrt{2}$

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(b) When $q = \sqrt{18}$, which **one** of the following produces a rational number? Circle your answer. [1]

$\sqrt{q}$ $\frac{q}{2}$ $q - 2$ q^4 $18q$

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Examiner only

16. (a) Simplify $\dfrac{4y^2 + 8xy}{y^2 - 4x^2}$. [4]

(b) Make f the subject of the following formula. [5]

$$\sqrt{hf^2 - m} = 3f$$

Examiner only

17. Eleven cards are placed in a box.
Seven of the cards are red and the rest are blue.

Gareth selects two cards at random and does not replace them.

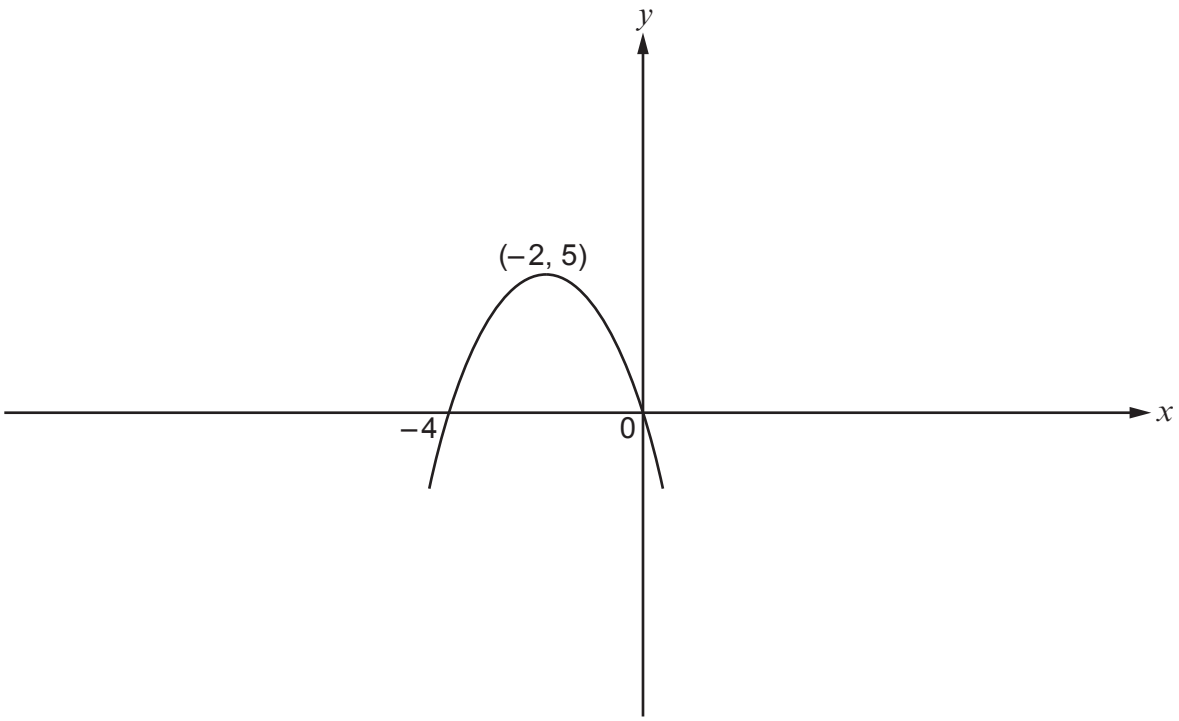
He claims that the probability of selecting two cards of the same colour is equal to the probability of selecting two cards of different colours.

Is Gareth correct?
You must show your working and justify your answer. [4]

Examiner only

18. (a) The highest point of a curve is called a maximum point.
The diagram below shows a sketch of the curve with equation $y = f(x)$.
The maximum point of this curve has coordinates (−2, 5).

(i) On the same diagram, sketch the curve $y = f(x - 6)$.
Mark clearly the coordinates of any point where the new curve crosses an axis.
[2]

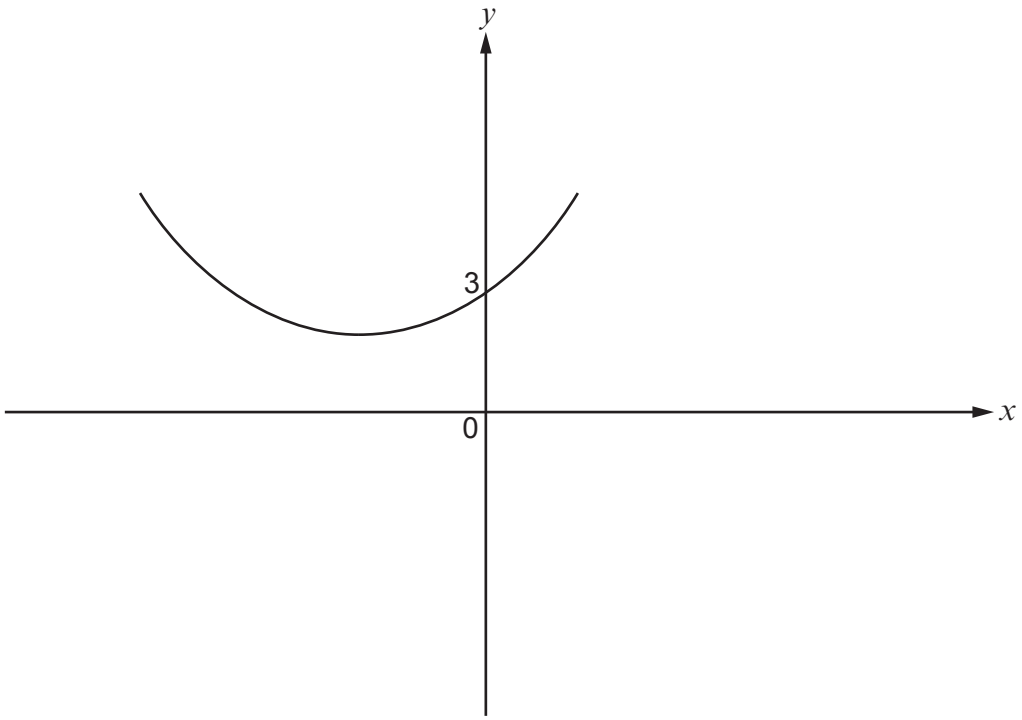


(ii) Complete the following sentence.

The maximum point of the curve $y = f(x - 6)$ has coordinates .....
[1]

Examiner only

(b) The diagram shows a sketch of $y = g(x)$.
On the same diagram, sketch the curve $y = -g(x)$.
Mark clearly the coordinates of any point where the new curve crosses an axis. [2]



END OF PAPER

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only