

Surname	Centre Number	Candidate Number
First name(s)		0

**GCSE**

3300U50-1



Z22-3300U50-1-R1

**TUESDAY, 24 MAY 2022 – MORNING**

**MATHEMATICS**  
**UNIT 1: NON-CALCULATOR**  
**HIGHER TIER**

1 hour 35 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  $\pi$  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.

In question 1, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

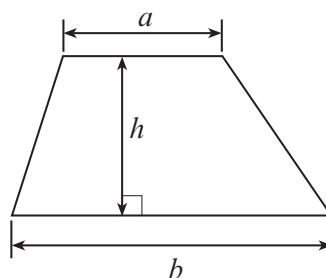
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	5	
3.	6	
4.	6	
5.	4	
6.	4	
7.	2	
8.	2	
9.	2	
10.	3	
11.	4	
12.	2	
13.	6	
14.	2	
15.	5	
16.	2	
17.	5	
18.	4	
<b>Total</b>	<b>70</b>	



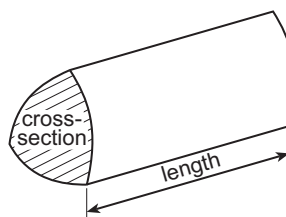
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## Formula List – Higher Tier

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

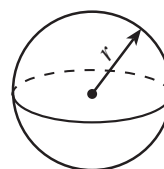


$$\text{Volume of prism} = \text{area of cross-section} \times \text{length}$$



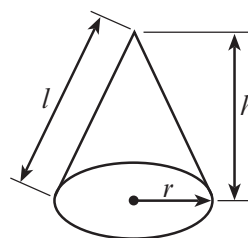
$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

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



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

$$\text{Curved surface area of cone} = \pi r l$$

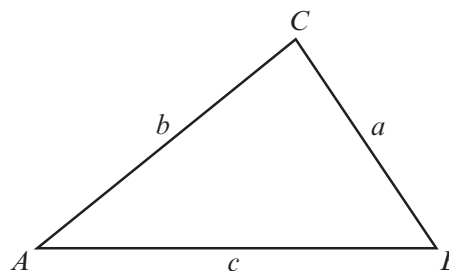


In any triangle  $ABC$

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

$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



### 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.





2. The table below shows some of the values of  $y = x^2 + x - 4$  for values of  $x$  from  $-3$  to  $3$ .

$x$	$-3$	$-2$	$-1$	$0$	$1$	$2$	$3$
$y = x^2 + x - 4$	$2$	$-2$		$-4$		$2$	$8$

- (a) Complete the table by finding the values of  $y$  for  $x = -1$  and for  $x = 1$ . [2]

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- (b) On the graph paper opposite, draw the graph of  $y = x^2 + x - 4$  for values of  $x$  from  $-3$  to  $3$ . [2]

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- (c) Use your graph to solve the equation  $x^2 + x - 4 = 0$ .  
Give your answers correct to 1 decimal place. [1]

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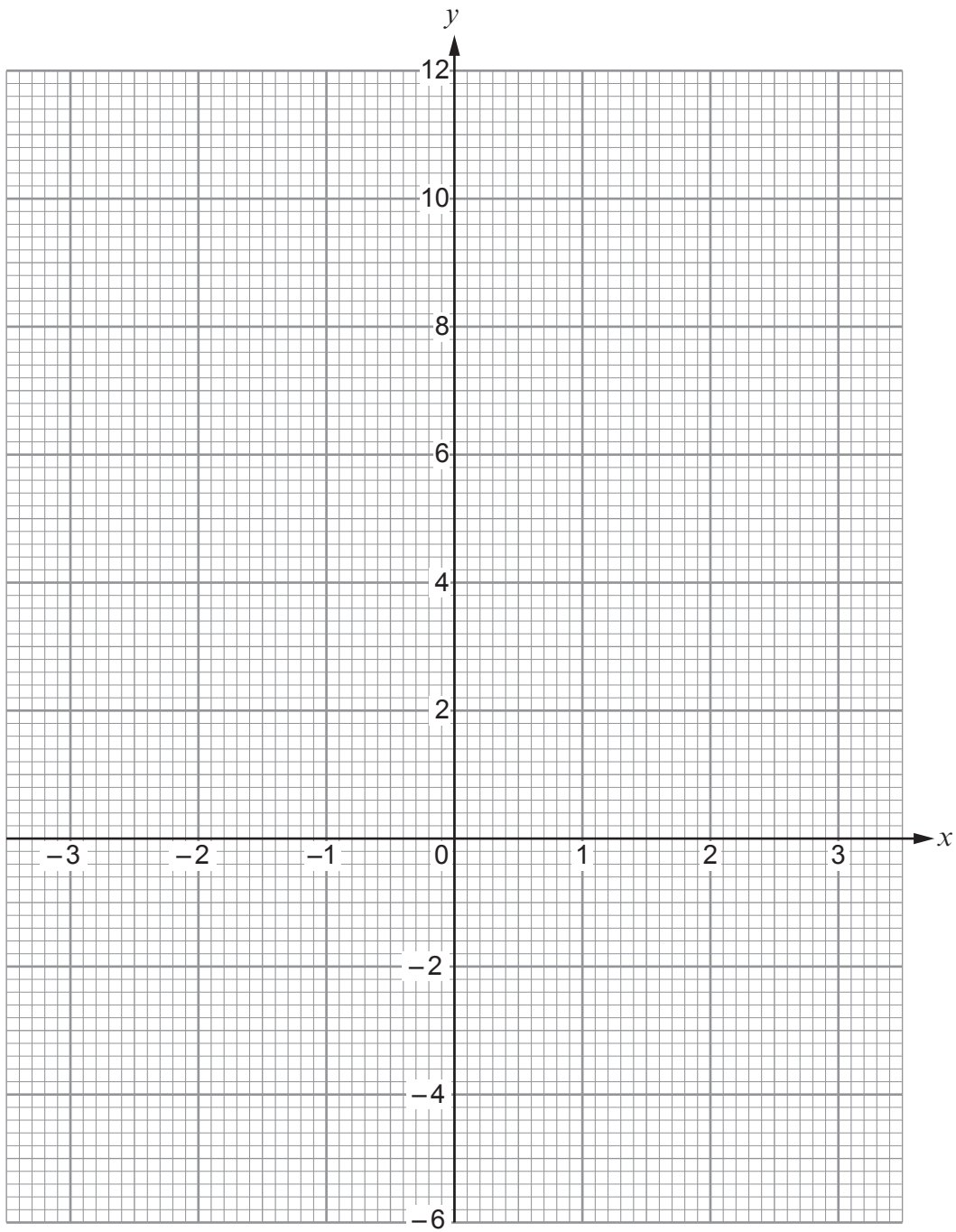
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$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots$$



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4. A and B are independent events.  
 The probability of event A occurring is 0.6.  
 The probability of event A **and** event B occurring is 0.48.

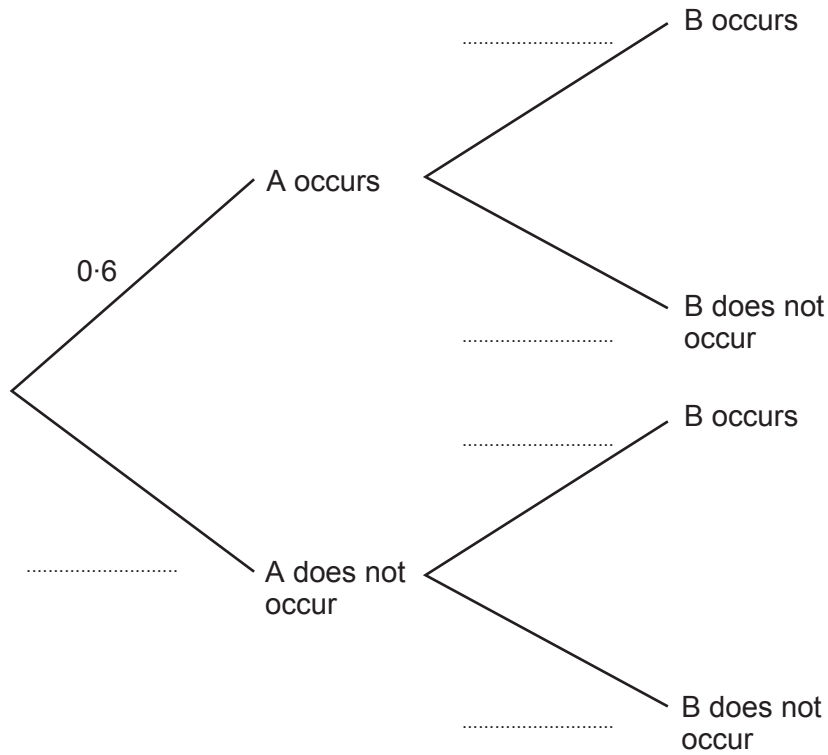
(a) Complete the tree diagram.

[4]

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(b) Calculate the probability of neither event A nor event B occurring.

[2]

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5. In the diagram:
- $AB$  and  $ED$  are parallel
  - triangles  $ABC$  and  $DEC$  are similar.

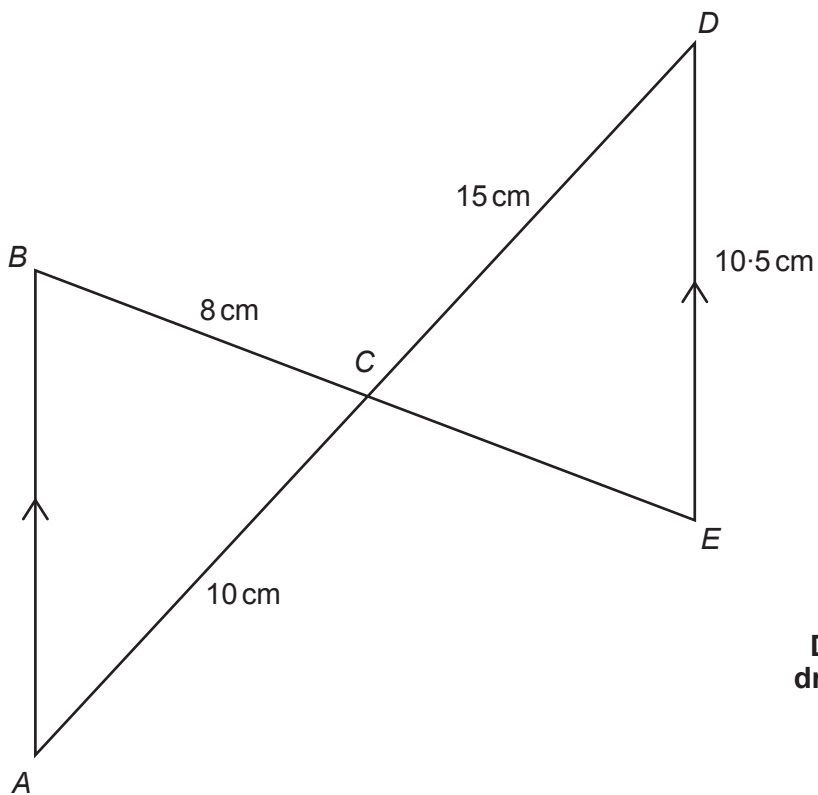


Diagram not drawn to scale

(a) Calculate the length of  $CE$ .

[2]

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(b) Calculate the length of  $AB$ .

[2]

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7. Circle the correct answer for each of the following statements.

(a)  $7.2\text{m}^3$  is equal to

[1]

$720\text{cm}^3$

$72000\text{cm}^3$

$7.2 \times 10^5\text{cm}^3$

$7.2 \times 10^3\text{cm}^3$

$7.2 \times 10^6\text{cm}^3$

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(b)  $36^{\frac{1}{2}}$  is equal to

[1]

18

6

$\frac{1}{18}$

$\frac{1}{6}$

$\frac{1}{36}$

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8. Find the value of  $\frac{30000}{1.5 \times 10^5}$ .

Write your answer as a decimal.

[2]

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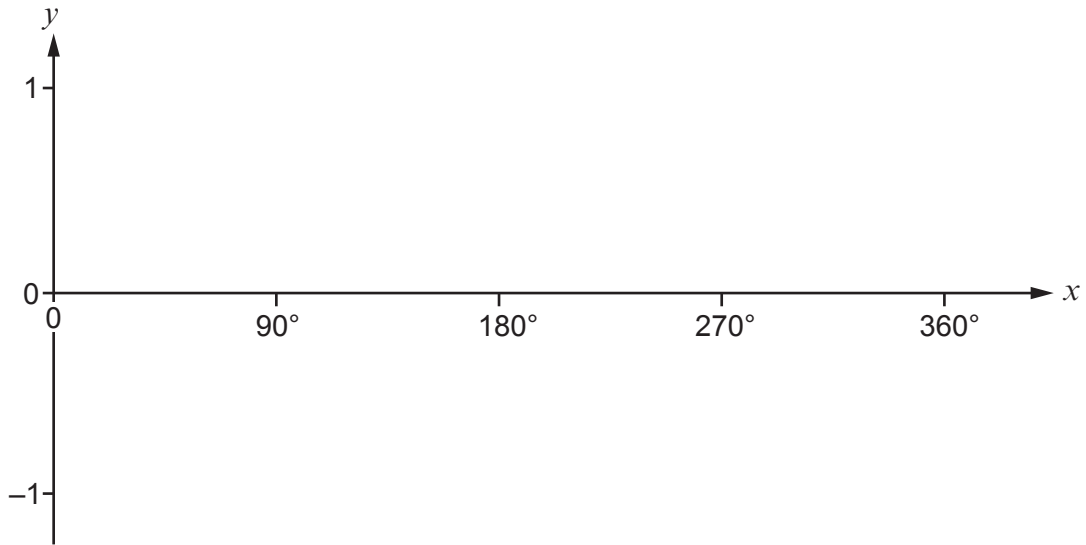
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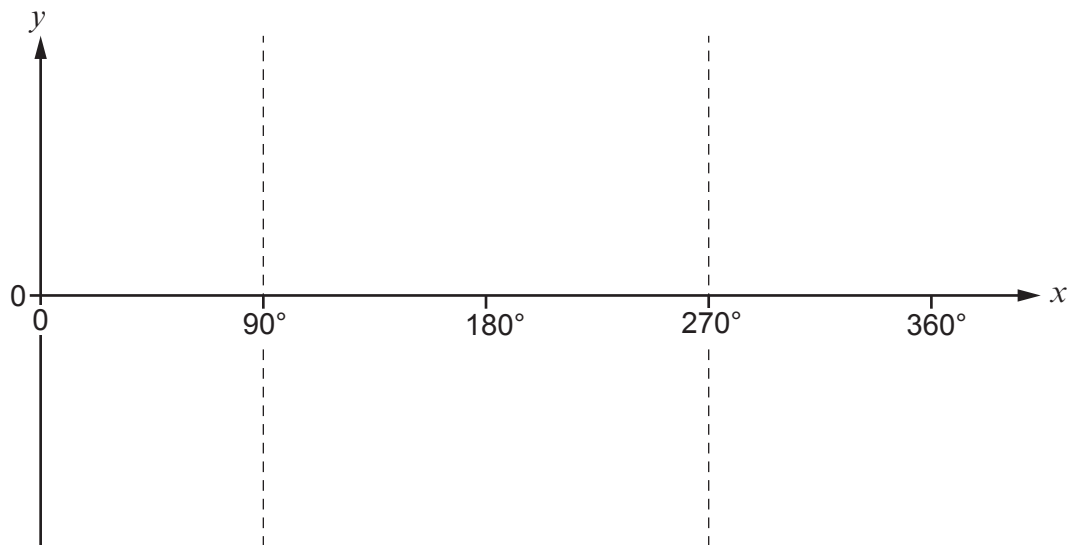
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9. (a) Sketch the curve  $y = \sin x$ , for values of  $x$  in the range  $x = 0^\circ$  to  $x = 360^\circ$ . [1]



- (b) Sketch the curve  $y = \tan x$ , for values of  $x$  in the range  $x = 0^\circ$  to  $x = 360^\circ$ . [1]



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10. Rearrange the following formula to make  $x$  the subject.

$$5x + 4 = t - yx$$

You must show all your working.

[3]

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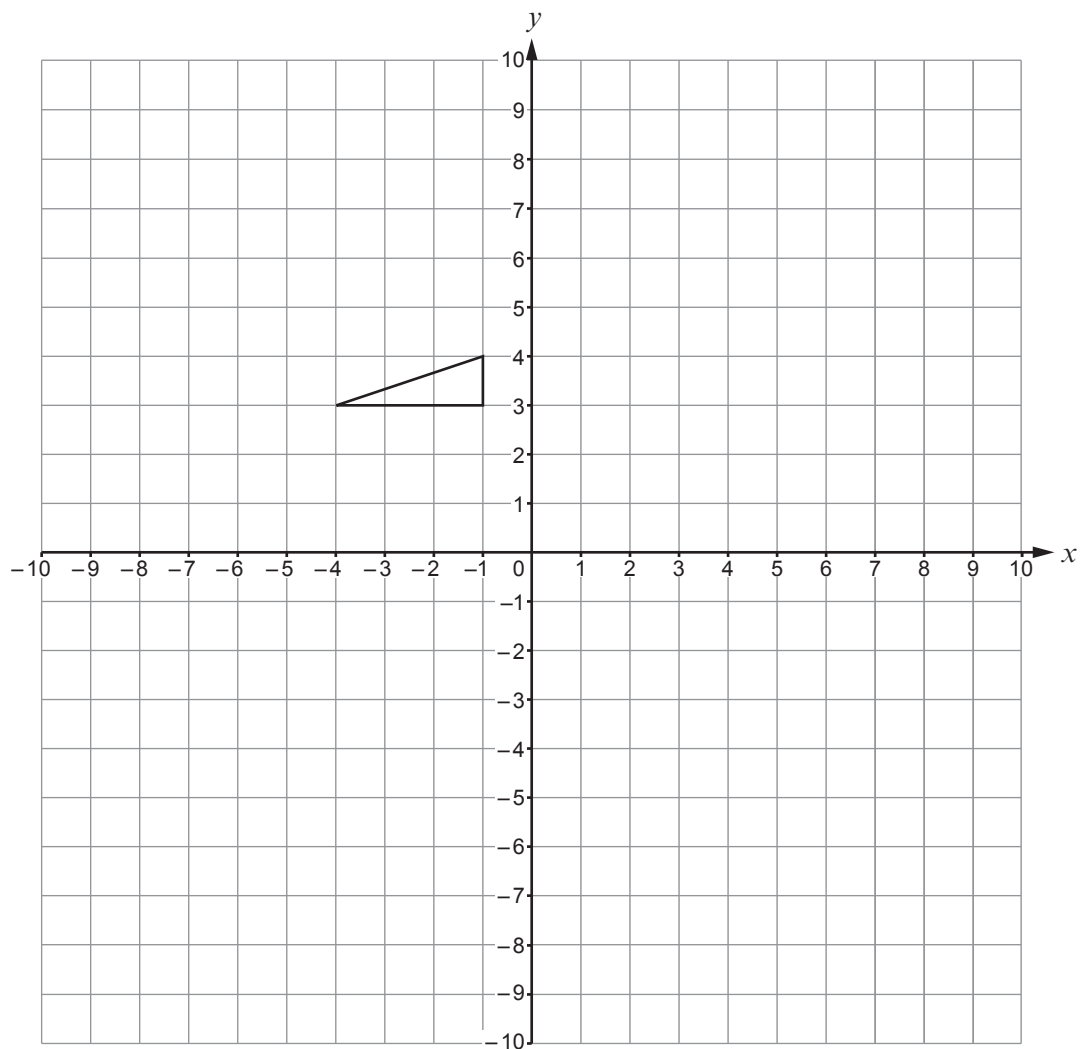
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12. Enlarge the triangle below by a scale factor of  $-2$ .  
Use the origin as the centre of enlargement.

[2]

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14. Find the value of  $125^{-\frac{1}{3}}$ .

Simplify your answer.

[2]

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15. Simplify the following.

$$\frac{\sqrt{800}}{(\sqrt{2})^3} + (3 - \sqrt{7})^2$$

State whether the answer is rational or irrational.

[5]

The answer is  
rational

The answer is  
irrational

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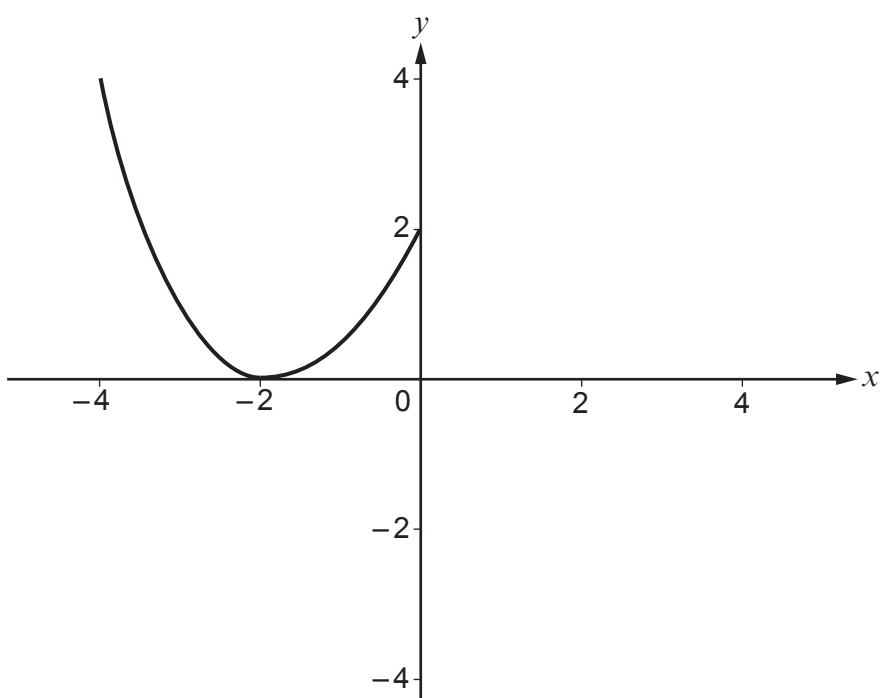
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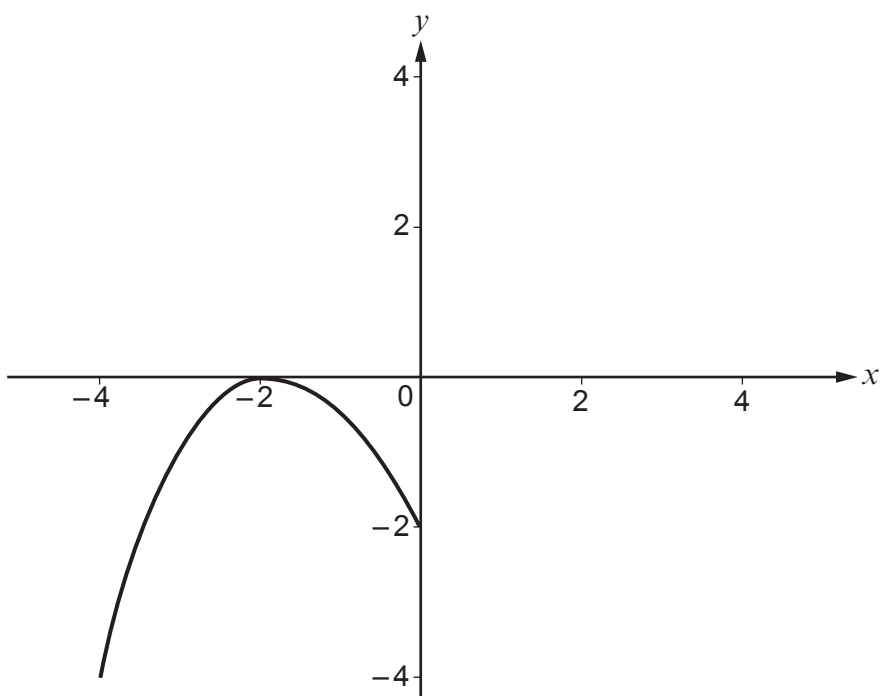


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16. (a) The following diagram shows a sketch of the curve  $y = f(x)$ .



The curve is transformed, as shown below.

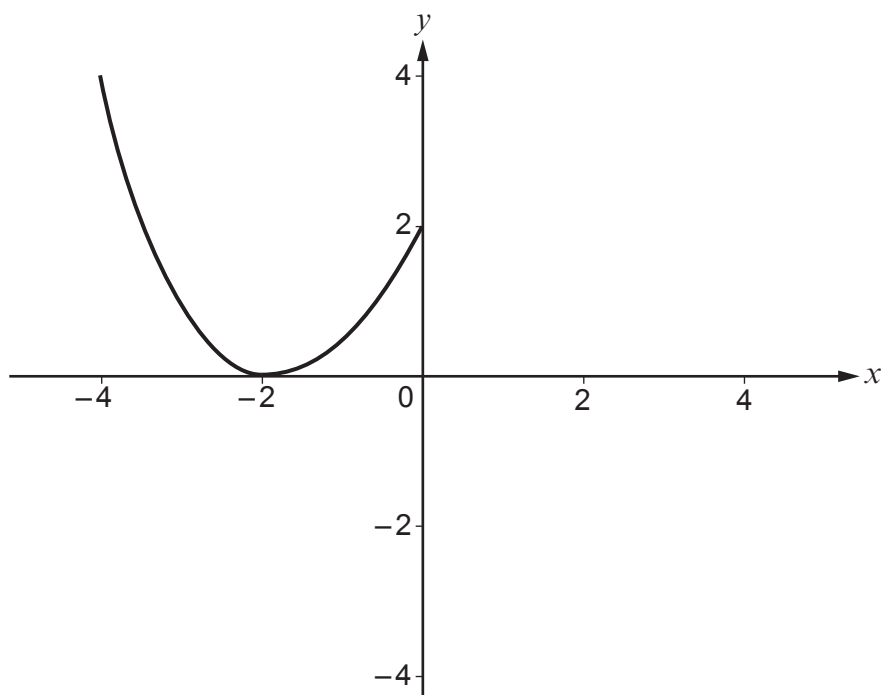


Using function notation, complete the equation of the transformed curve. [1]

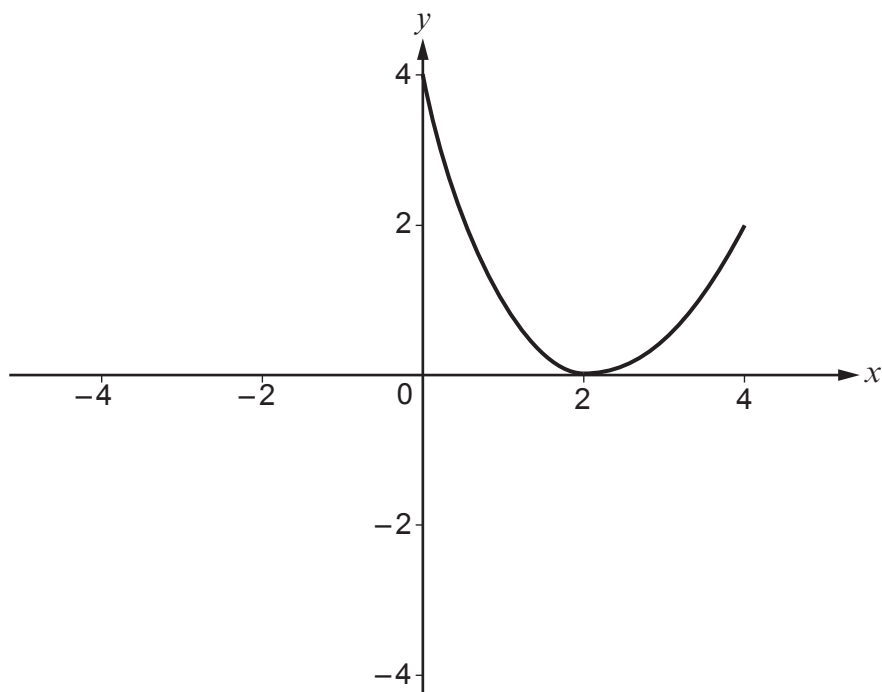
$y = \dots\dots\dots$



(b) The following diagram shows a sketch of the curve  $y = f(x)$ .



The curve is transformed, as shown below.



Using function notation, complete the equation of the transformed curve. [1]

$y = \dots\dots\dots$



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17. A bag contains 10 balls.  
5 of the balls are blue, 4 of the balls are red and 1 ball is green.  
Three balls are chosen at random, one at a time, without replacement.

- (a) Calculate the probability that the first ball is blue, the second ball is red and the third ball is green.  
You must show all your working. [2]

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- (b) Calculate the probability that at least one blue ball is chosen.  
You must show all your working. [3]

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18. Simplify  $\frac{6x-15}{4x^2-25}$ .

[4]

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