Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

S16-4352-02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: Non-calculator Mathematics

HIGHER TIER

A.M. THURSDAY, 9 June 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. Do not use gel pen or correction fluid.

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 continuation page at the back of the booklet, taking care to number the question(s) correctly.

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.

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.	**8**	
3.	**3**	
4.	**3**	
5.	**3**	
6.	**5**	
7.	**5**	
8.	**6**	
9.	**3**	
10.	**2**	
11.	**4**	
12.	**5**	
13.	**3**	
14.	**7**	
15.	**2**	
16.	**3**	
Total	**65**	

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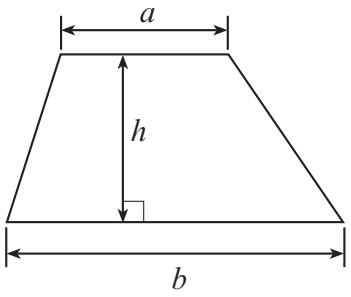
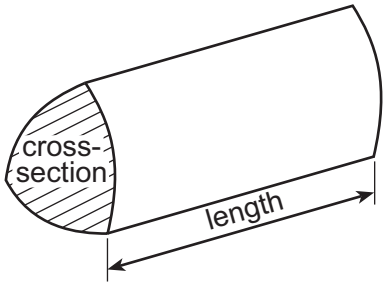
Formula List

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

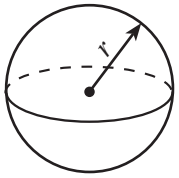


Volume of prism = area of cross-section × length



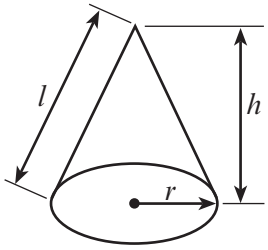
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

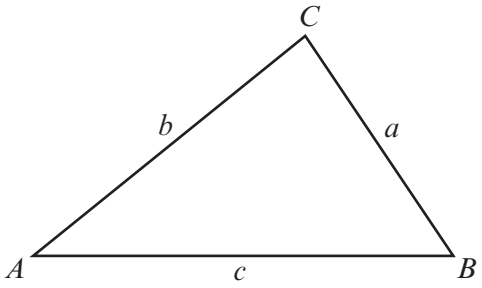


In any triangle ABC

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

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

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



The Quadratic Equation

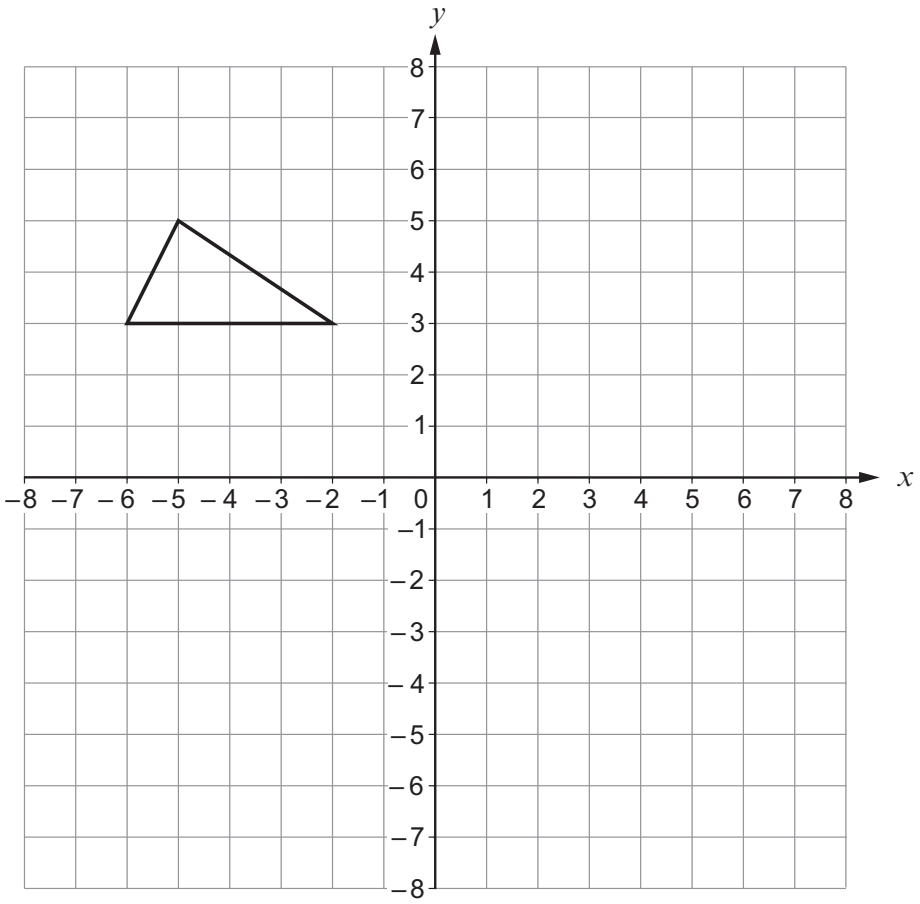
The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

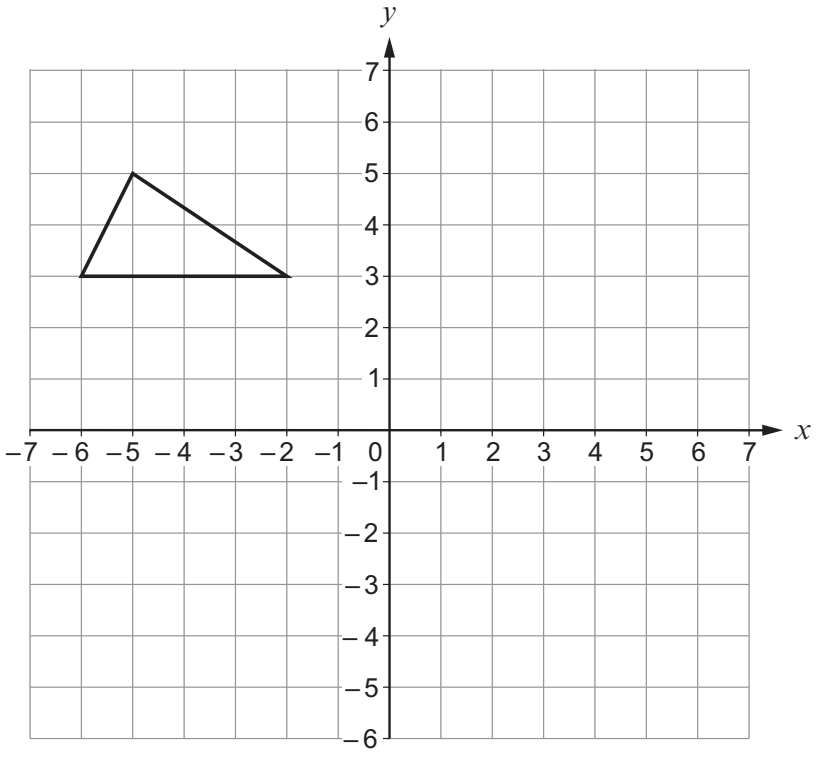
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Examiner only

1. *(a)* Rotate the triangle shown through 90° anticlockwise about the point (0, 2). [2]



(b) Translate the triangle shown 5 units to the right and 2 units down. [1]



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

Eddie wants to buy each of his **two** sisters an identical necklace.

The particular type of necklace he would like to buy is advertised as being for sale on two different websites. He would like to have the two necklaces delivered to his home.

Jewellery Boutique

Silver charm necklace
£36 + VAT at 20%

Postage and packing £6.95 for orders up to £100, otherwise no charge

Gems and Co

Silver charm necklace £55
BUY ONE, GET SECOND FOR HALF PRICE!

Free delivery

Which website is cheaper, and by how much?
You must show all your working. [8]

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Examiner only

Examiner only

3. In the following diagram, lines *DB* and *EA* are parallel and *CDF* is an isosceles triangle. Find the size of angle y. [3]

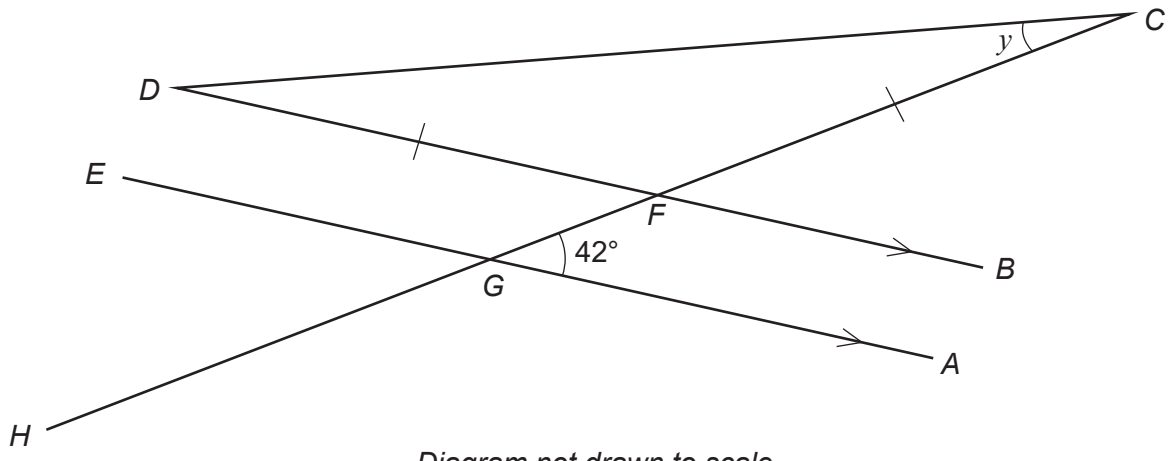

Diagram not drawn to scale

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y = ... °

Examiner only

4. Solve the following equation.

$$11x - 1 = 4(2x + 5)$$ [3]

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Examiner only

5. If n is an integer and $-5 < 2n \leqslant 2$, list the possible values of n. [3]

6. A box contains 400 beads of the same size and shape.

35% of the beads are green.

$\frac{2}{5}$ of the **remaining** beads are blue.

The only other colour of bead is white.

One bead is picked at random from the box.

Find the probability that a white bead is picked. [5]

Examiner only

7. *(a)* Write down an expression for the nth term of the following sequence.

8, 17, 26, 35, 44, ... [2]

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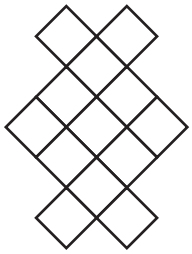
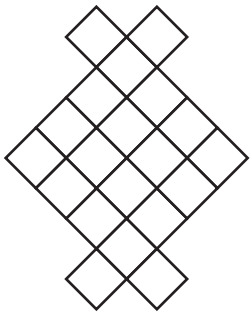
nth term .....

(b) The following patterns are made using small squares.

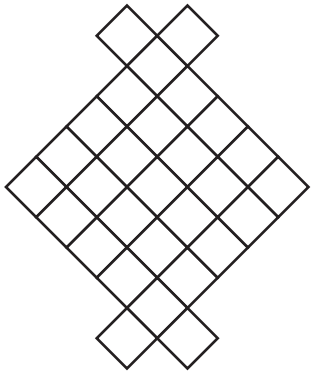
Pattern 1



Pattern 2



Pattern 3



Write an expression for the number of small squares in pattern n. [3]

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8. Katie is a netball player. She claims that, if she stands a distance of 2 metres from the goal post, there is a probability of at least 70% that she will score a goal with any throw.

Lloyd, her brother, challenges her to prove this by throwing 6 sets of 10 balls from this distance. Katie's results are given in the following table.

Number of throws	10	10	10	10	10	10
Number of goals	5	7	6	10	8	9

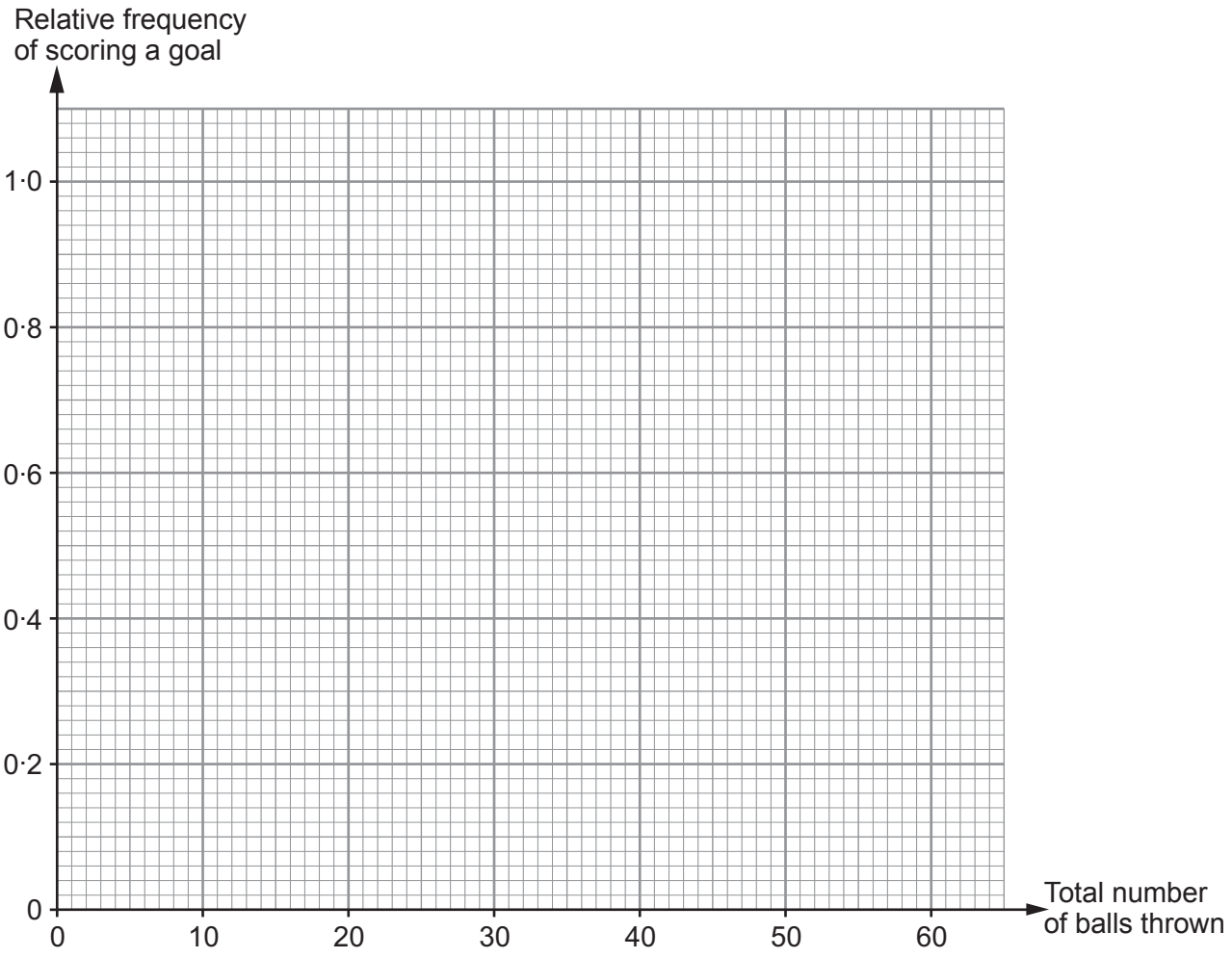
Lloyd then creates a table to show the cumulative number of goals and to calculate the relative frequencies.

Total number of throws	10	20	30	40	50	60
Total number of goals	5	12	18			
Relative frequency of scoring a goal	$\frac{5}{10}$	$\frac{12}{20}$	$\frac{18}{30}$			
	0·5	0·6	0·6			

(a) Complete the table above. [3]

Examiner only

(b) Draw a graph to show the relative frequency of scoring a goal. [2]



(c) Is Katie correct to claim that the probability that she scores a goal from this distance is at least 70%?
Explain your answer. [1]

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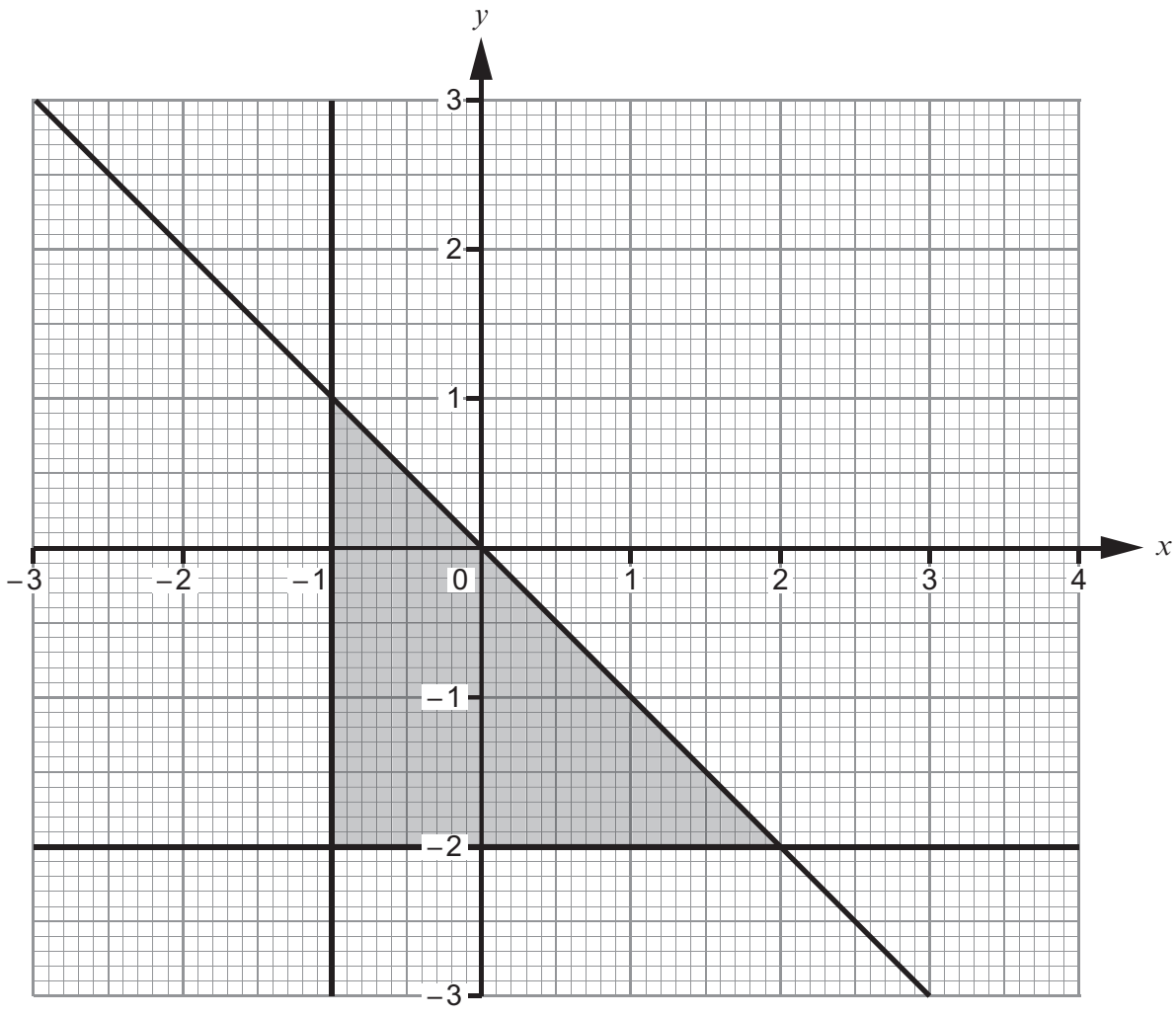
9.



Complete the following table to give the set of inequalities that describes the shaded region above. [3]

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$y \geqslant -2$

Examiner only

10. Write the following numbers in standard form.

(a) 0·000 000 053 [1]

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(b) 6 190 000 000 000 [1]

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11. Solve the following simultaneous equations using an algebraic (not graphical) method. You must show all your working. [4]

$$4x - 3y = 11$$

$$6x - 2y = 9$$

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Examiner only

12. The points *A*, *B* and *C* lie on the circumference of a circle, centre *O*.
AD is a tangent to the circle. *DCB* is a straight line.

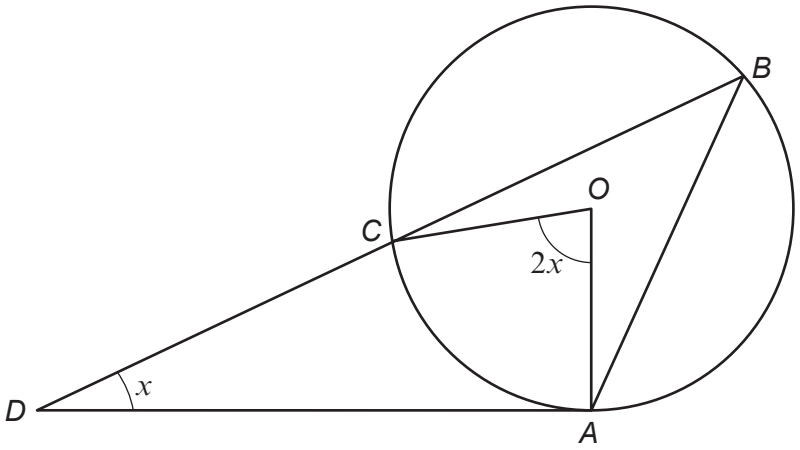


Diagram not drawn to scale

Find the size of each of the following angles, in terms of x.
Write your answers in their simplest form.

(a) $O\hat{C}D$, [2]

(b) $O\hat{A}B$. [3]

Examiner only

13. Rearrange the following formula to make c the subject.

$$4c - d = 2a + bc$$ [3]

Examiner only

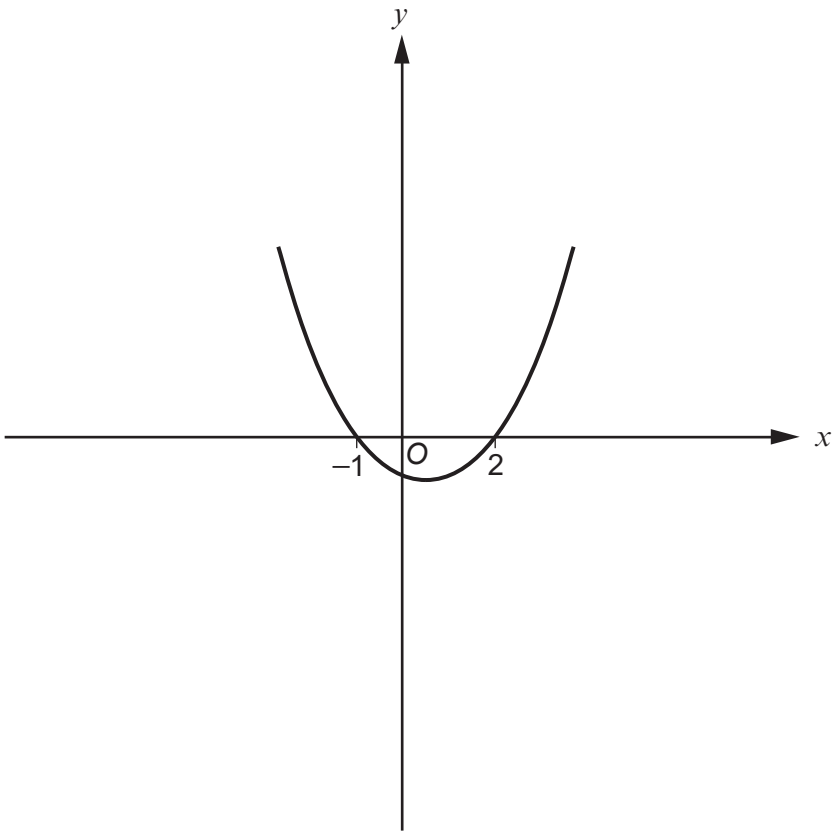
14. *(a)* Evaluate $\frac{1}{3} + 0\cdot\dot{0}\dot{4}$, expressing your answer as a fraction. [3]

(b) Evaluate $16^{-\frac{1}{2}}$. [2]

(c) Simplify $\left(3-\sqrt{5}\right)^2$. [2]

Examiner only

15. The graph below shows a sketch of the curve $y = f(x)$.
On the same diagram, sketch the curve $y = f(x + 4)$.
You must show clearly where the curve crosses the x-axis. [2]



Turn over.

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16. A box contains 5 red balls and 3 yellow balls.
Three balls are to be picked at random, without replacement.

Find the probability that the three balls are not all the same colour. [3]

END OF PAPER

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

Examiner only