GCSE Maths Higher Booklet 1

Name: .....

Set: .....

Probability

U1 June 2017

Examiner only

1. Ceri has a set of cards.
Each of her cards is labelled North, East, South or West.

The table below shows the probability distribution when a card is taken from the set of cards at random.

Label	North	East	South	West
Probability	0·4	0·25	0·2	0·15

(a) Ceri chooses one card at random from her set of cards.

What is the probability that the card is labelled East or South? [2]

.....

.....

(b) Sasha has an identical set of cards.
Ceri and Sasha each choose one card at random from their set of cards.

What is the probability that they both choose a card labelled North? [2]

.....

.....

U1 Nov 2016

Examiner only

1. A fair six-sided dice and a fair coin are thrown together once.

Circle the correct answer for each of the following statements.

(a) The number of possible outcomes is [1]

2 6 8 12 24.

(b) The probability of getting a **4** on the dice and a **tail** on the coin is [1]

$\frac{1}{8}$ $\frac{1}{12}$ $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{24}$.

(c) The probability of getting a **multiple of 3** on the dice and a **head** on the coin is [1]

$\frac{1}{8}$ $\frac{1}{12}$ $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{24}$.

Space for working:

3300U501
03

I+H Maths June 2018 U1

Examiner only

3. *(a)* Expand and simplify the following expression. [4]

$$x(5x - 2) - 3(x^2 - 2x + 7)$$

(b) Solve $\frac{22 - f}{3} = 6$. [3]

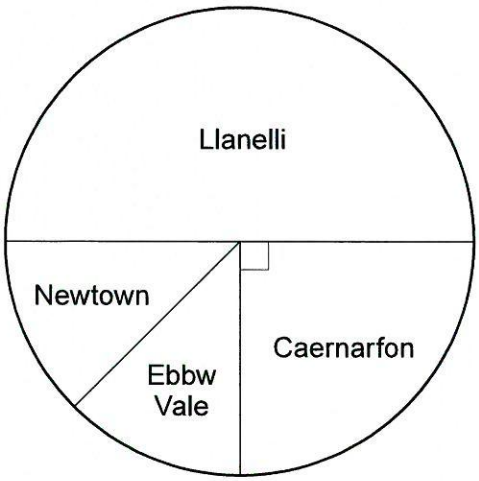
4. *(a)* A fair, six-sided dice is thrown twice.
What is the probability that a 3 is thrown on both occasions? [2]

I+H Maths June 2018 U1

Examiner only

(b) A company has offices in Llanelli, Caernarfon, Newtown and Ebbw Vale.
Its national committee is made up of workers from these four offices.

The pie chart below shows what fraction of the committee members come from each office.



There is an equal number of members from Newtown and Ebbw Vale.

A member is chosen at random from this committee to be its chairperson.

(i) The probability that the chosen member works at the Llanelli office is shown in the table below.

Complete the table. [2]

Office	Llanelli	Caernarfon	Newtown	Ebbw Vale
Probability	$\frac{1}{2}$			

.....

.....

.....

(ii) What is the probability that the member chosen as chairperson works at either the Llanelli or the Ebbw Vale office?
You must show all your working. [2]

.....

.....

.....

.....

.....

3300U501
07

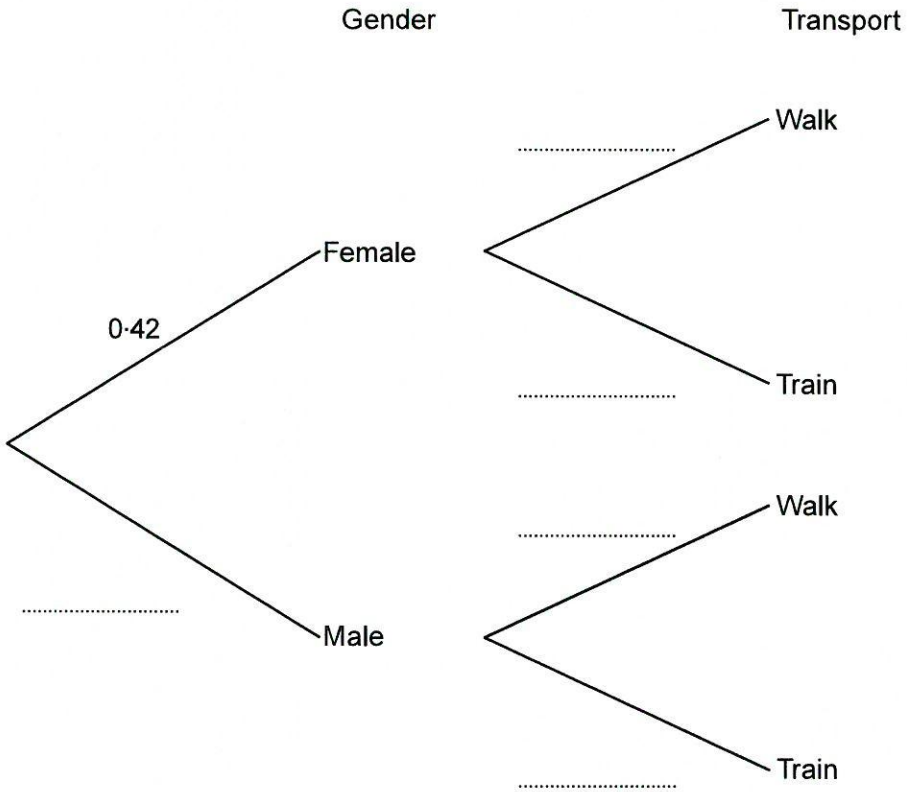
I+H maths June 2018 42

Examiner only

6. Visitors to the top of Snowdon can either walk up the mountain or take the mountain railway from Llanberis.
On a particular day, a visitor to the top of Snowdon is chosen at random.
The probability that this person is female is 0·42.
The probability that this person took the train is 0·35.

The decision to walk or take the train is independent of gender.

(a) Complete the tree diagram shown below. [3]



(b) The person chosen at random receives a gift voucher.
What is the probability that this person is female and travelled up the mountain by train? [2]

.....

.....

.....

.....

.....

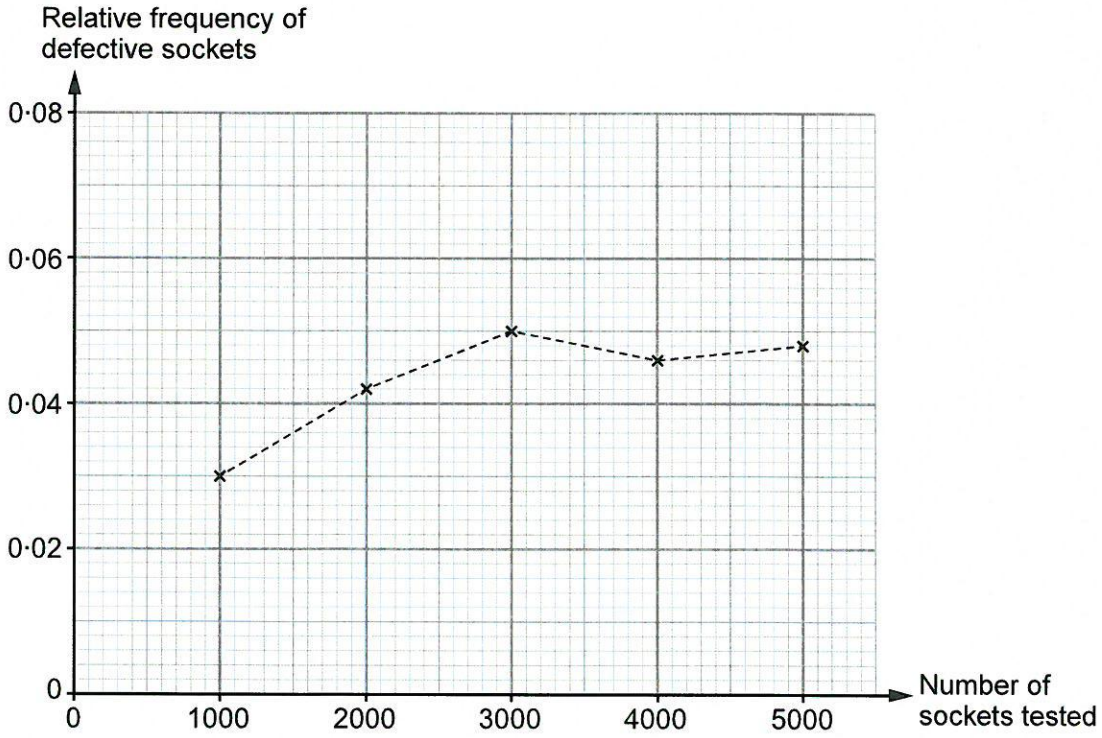
3300U601
07

U2 Nov 2016

Examiner only

7. A factory uses a machine to produce electrical sockets.
The manager carries out a survey to investigate the probability of the machine producing a socket that does not work (defective).

The relative frequency of defective sockets produced was calculated after testing a total of 1000, 2000, 3000, 4000 and 5000 sockets.
The results are plotted on the graph below.



(a) How many of the first 3000 sockets tested were defective? [2]

.....

.....

(b) Write down the best estimate for the probability that one socket, selected at random, will be defective.
You must give a reason for your choice. [2]

Probability: .....

Reason: .....

.....

3300U601
09

Turn over.

Examiner only

7. Alwyn often drives from Bangor to Cardiff.
He always chooses one of two routes for these journeys.
He either travels through Rhayader or through Hereford.
The probability that he travels through Rhayader is 0·7.

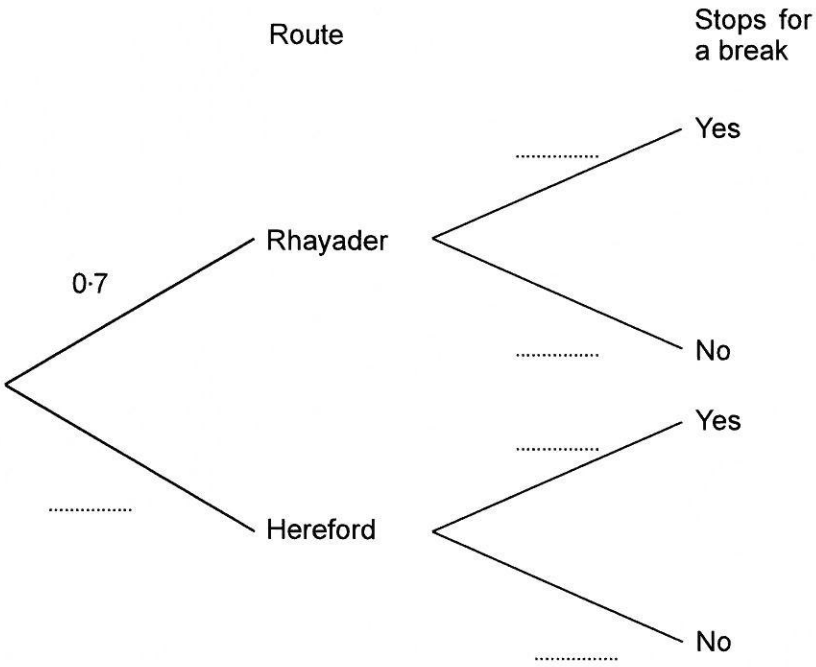
Sometimes he decides to stop for a break during his journey.
His decision is independent of the route he takes.

The probability that he travels through Rhayader **and** stops for a break is 0·42.

(a) Complete the following tree diagram. [4]

.....

.....



(b) Calculate the probability that Alwyn travels through Hereford but **does not** stop for a break. [2]

.....

.....

.....

3300U501
09

Examiner only

7. 100 boxes each contain 10 balls.

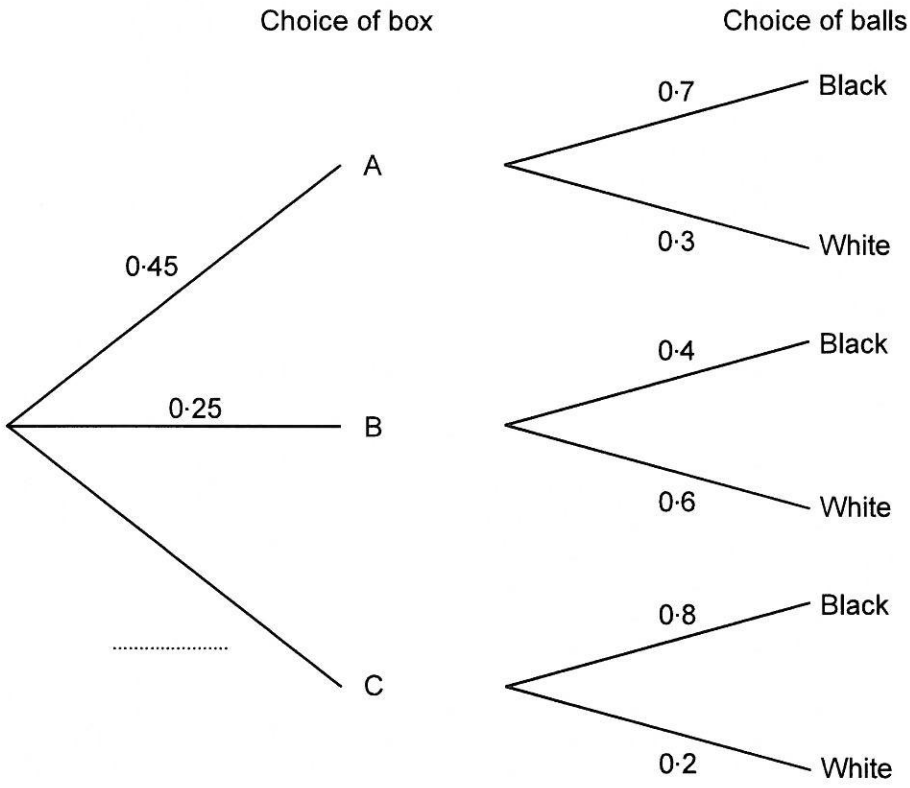
45 of the boxes are labelled A.
They each contain 7 black balls and 3 white balls.

25 of the boxes are labelled B.
They each contain 4 black balls and 6 white balls.

The rest of the boxes are labelled C.
They each contain 8 black balls and 2 white balls.

In a game, a player chooses a box at random, and then chooses a ball at random from that box.

(a) Complete the tree diagram shown below. [1]



(b) What is the probability that a player will select a black ball? [3]

.....

.....

.....

.....

.....

.....

Examiner only

(c) If a large number of people played the game, approximately what fraction of them would you expect to choose a white ball?
Circle your answer. [1]

$\frac{1}{10}$ $\frac{1}{5}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$

8. (a) Factorise $x^3 - 5x$. [1]

(b) Expand and simplify $(2x - 3)(x + 4)$. [2]

(c) Factorise $x^2 - 3x - 28$. [2]

I+H maths Nov 2017 4H

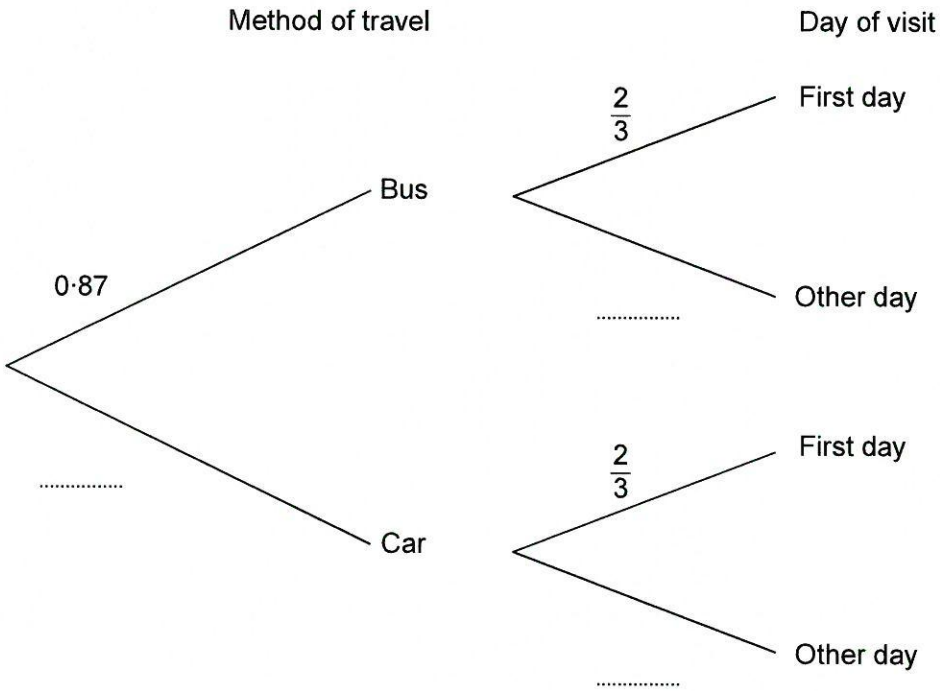
Examiner only

8. All the members of a farming club visited the Royal Welsh Agricultural Show.
They all travelled to the show either by bus or by car.
None of them visited the show on more than one day.
The decision to travel by car or by bus was independent of the day of the visit.

A member of the club was selected at random.
The probability that this member travelled by bus was 0·87.

The probability that this member visited the show on the first day was $\frac{2}{3}$.

(a) Complete the tree diagram shown below. [2]



(b) What is the probability that a member, chosen at random, was **not** one of those who travelled by bus on the first day of the show? [3]

.....

.....

.....

.....

.....

.....

.....

Turn over.

Examiner only

12. The area of a rectangle is 137 cm^2, correct to the nearest cm^2.
Its width is 11 cm, correct to the nearest cm.

Calculate the greatest possible length of the rectangle.
Give your answer correct to 3 significant figures. [2]

13. A bag contains 5 red counters and 5 blue counters.
Three counters are drawn at random from the bag at the same time.
Calculate the probability that the three counters will be the same colour. [3]

Examiner only

16. The table below shows the three-day rain forecast for Monday, Tuesday and Wednesday in Eglwyswrw.

Day	Probability of rain
Monday	80%
Tuesday	80%
Wednesday	80%

For these three days,

(a) calculate the probability that it will rain on all three days. [2]

(b) calculate the probability that it will rain on exactly 2 consecutive days. [3]

Examiner only

16. A bag contains 200 beads.
Some of the beads are red.
A bead is selected at random.
Its colour is recorded and then the bead is **replaced**.
A second bead is selected at random and its colour is also recorded.

The probability that two red beads are selected is 0·1369.
Calculate the number of red beads in the bag. [4]

Examiner only

17. A bag contains 6 red blocks, 4 green blocks and 2 yellow blocks.
Three blocks are taken from the bag, at random, **without replacement**.

(a) What is the probability that the first block removed is red, the second is green and the third is yellow? [2]

(b) Calculate the probability that all three blocks will be the same colour. [3]

(c) Write down the probability that the three blocks will **not** be the same colour. [1]

Examiner only

17. At a children's party, the children play a number of games.
The winner of each game chooses a ticket for a prize, at random, from a box.
The ticket is not returned to the box.
At the start of the party, there are 12 prizes available: 1 book, 3 key-rings and 8 pencils.

(a) Find the probability that the winners of the first two games choose the same type of prize. [3]

(b) After the winners of the first **three** games have chosen their prizes, find the probability that the ticket for the book is still in the box. [2]

Examiner only

18. A game played at a children's party involves throwing a ball into a bucket.
Each child tries to get the ball into the bucket in the least number of throws.
On each attempt, the probability that Sofia gets the ball into the bucket is 0·8.
Each attempt is independent of any previous attempt.

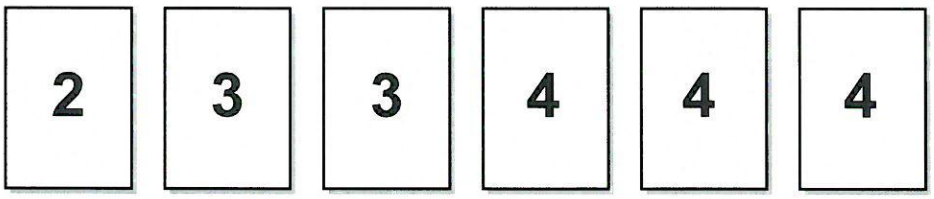
Show that she is 5 times more likely to get the ball into the bucket on her first attempt than to have her first successful throw on her second attempt.

You must show all your working. [3]

END OF PAPER

Examiner only

19.



Two of the cards shown above are selected at random, without being replaced.

Find the probability that

(a) the product of the two numbers selected is 12, [3]

(b) the **sum** of the two numbers selected is **even**. [4]

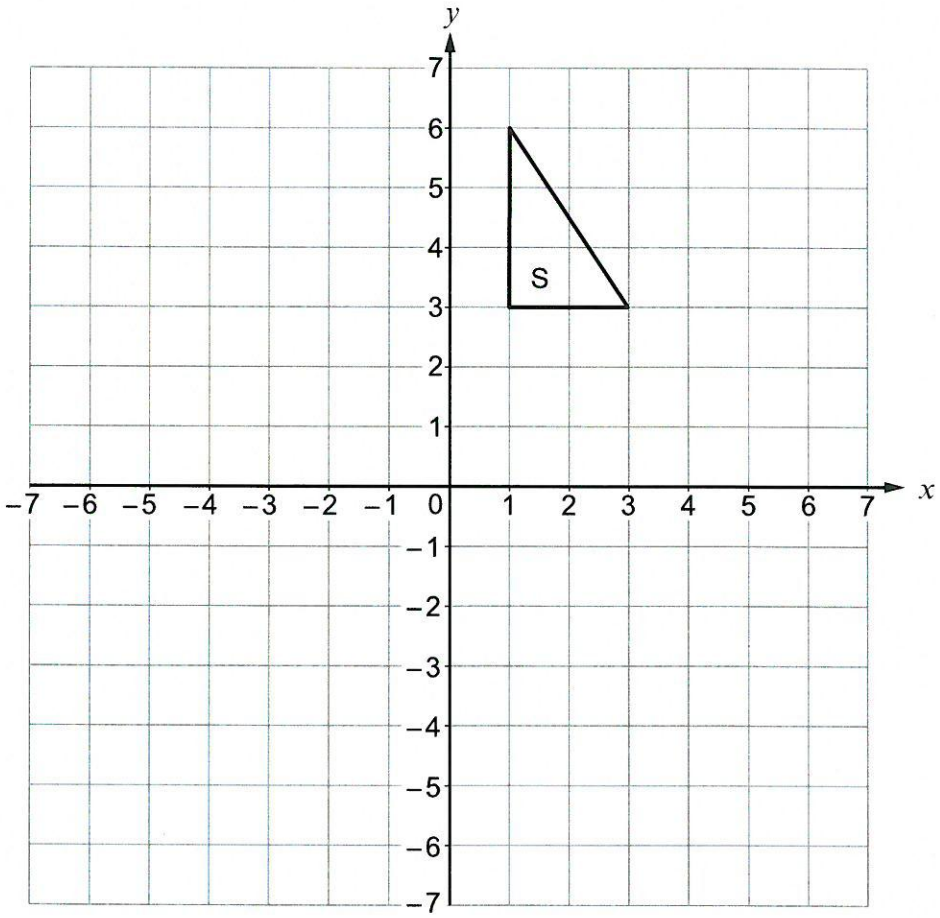
END OF PAPER

Transformations

U2 Nov 2016

Examiner only

(b) (i) Translate the triangle S using the column vector $\begin{pmatrix} -5 \\ -4 \end{pmatrix}$. [1]



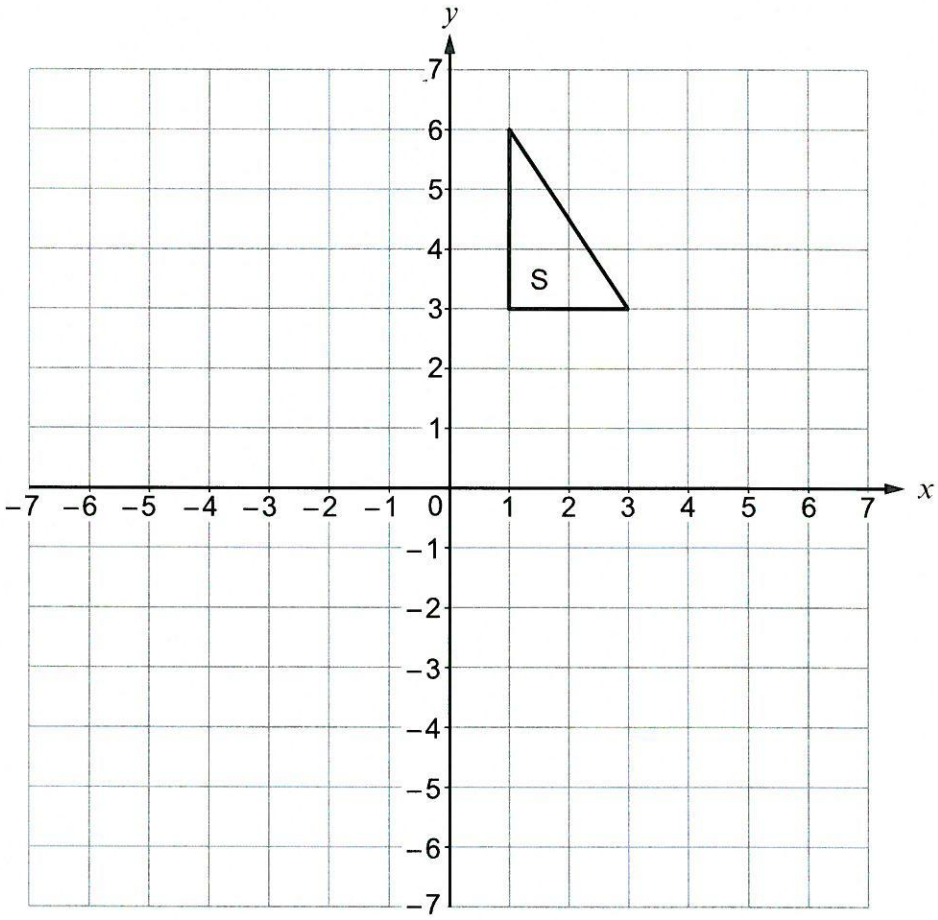
(ii) Write down the column vector that will reverse the translation in part (i). [1]

.....

U2 Nov 2016

Examiner only

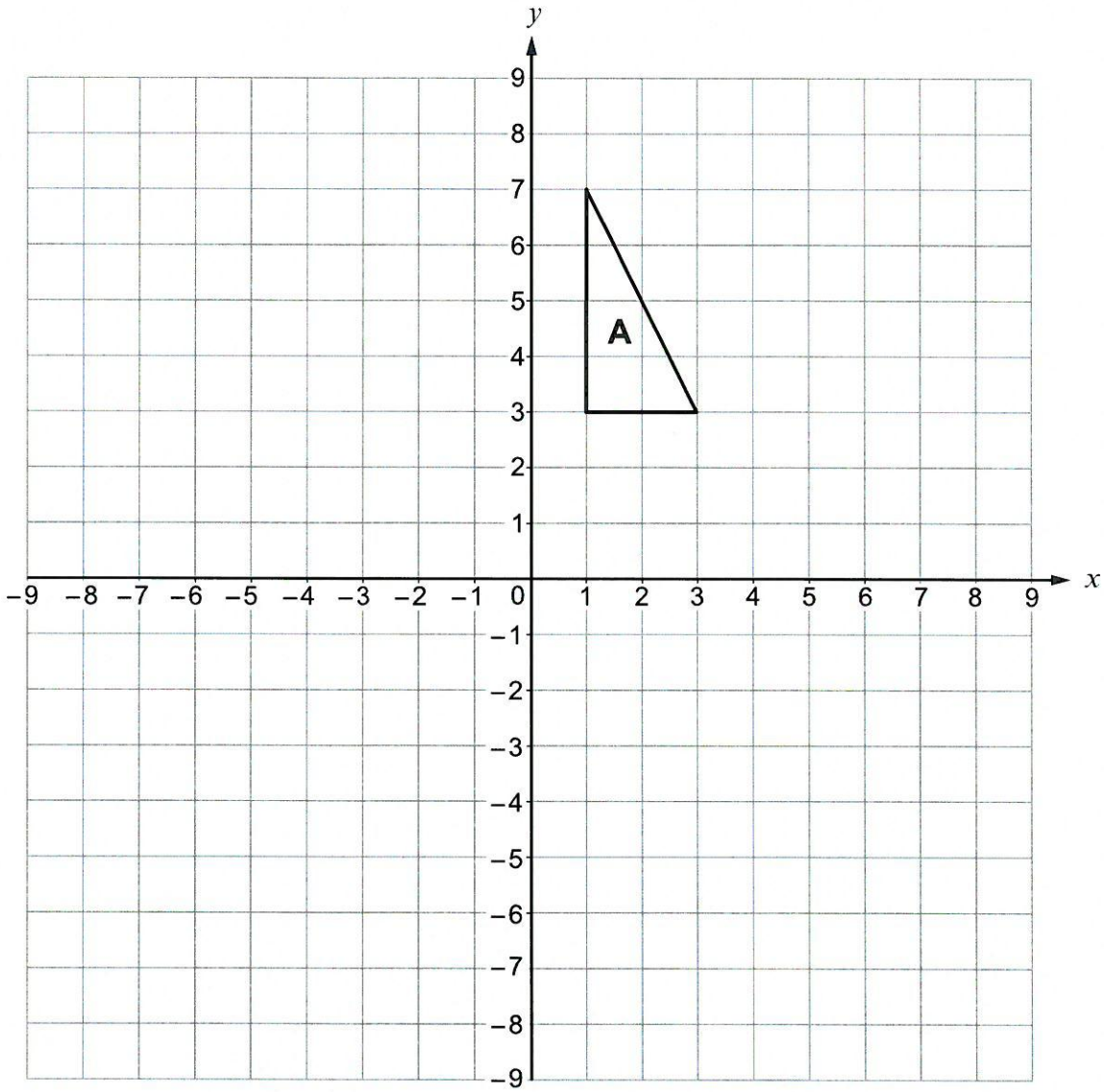
1. *(a)* Reflect the triangle S in the line $y = x$. [2]



Turn over.

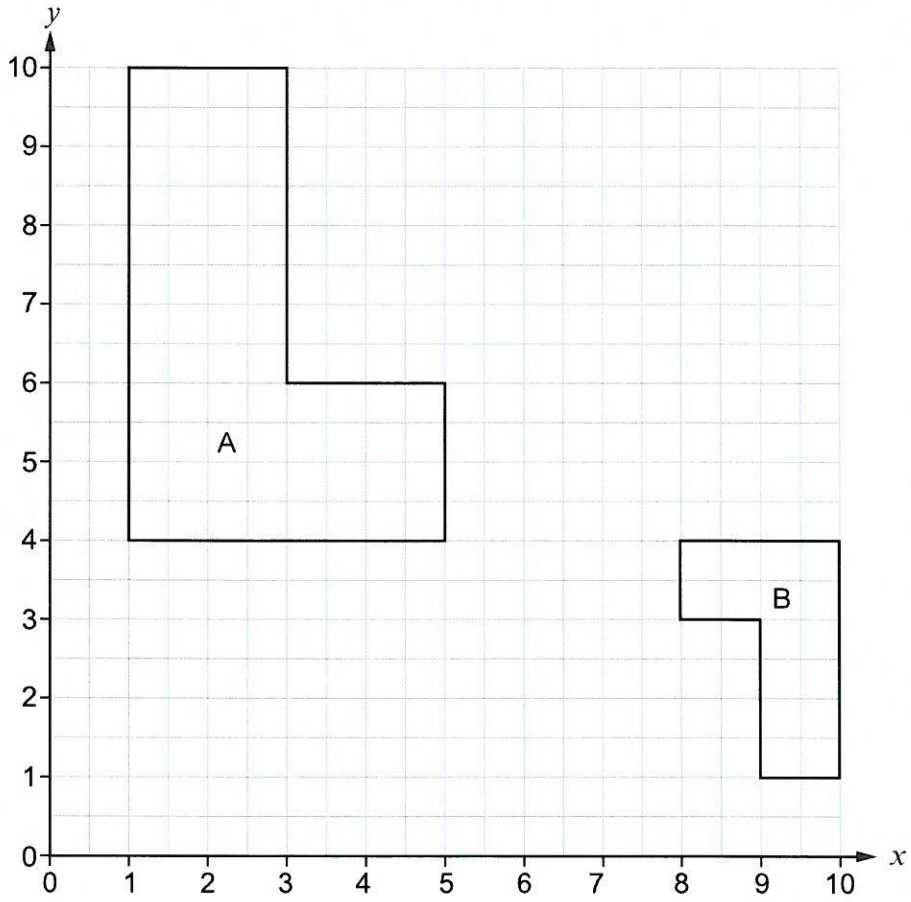
Examiner only

3. *(a)* Rotate triangle A through 90° anticlockwise, about the point (–2, 3). [2]



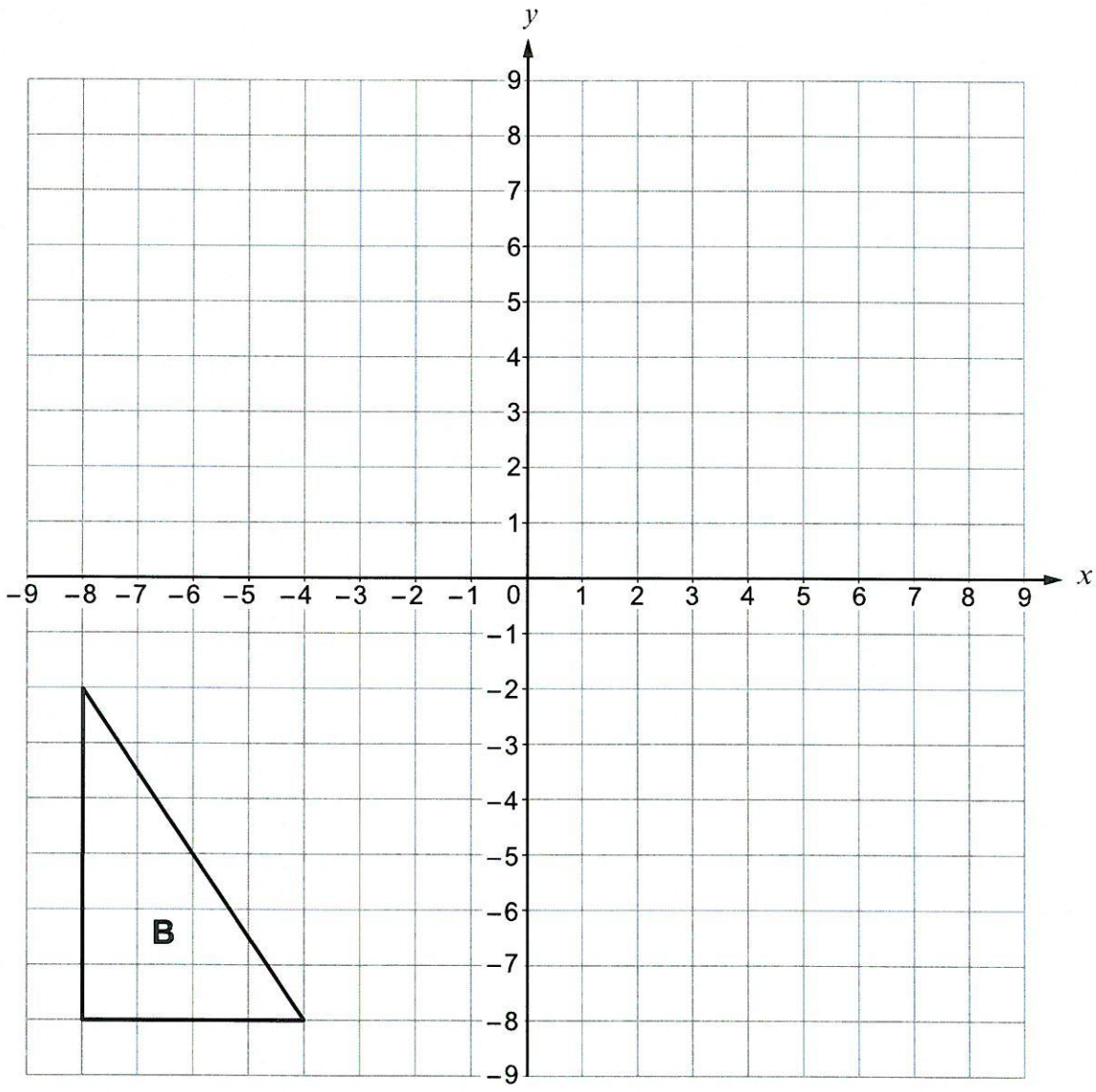
Examiner only

15. Describe fully a **single** transformation that transforms shape A onto shape B. [3]



Examiner only

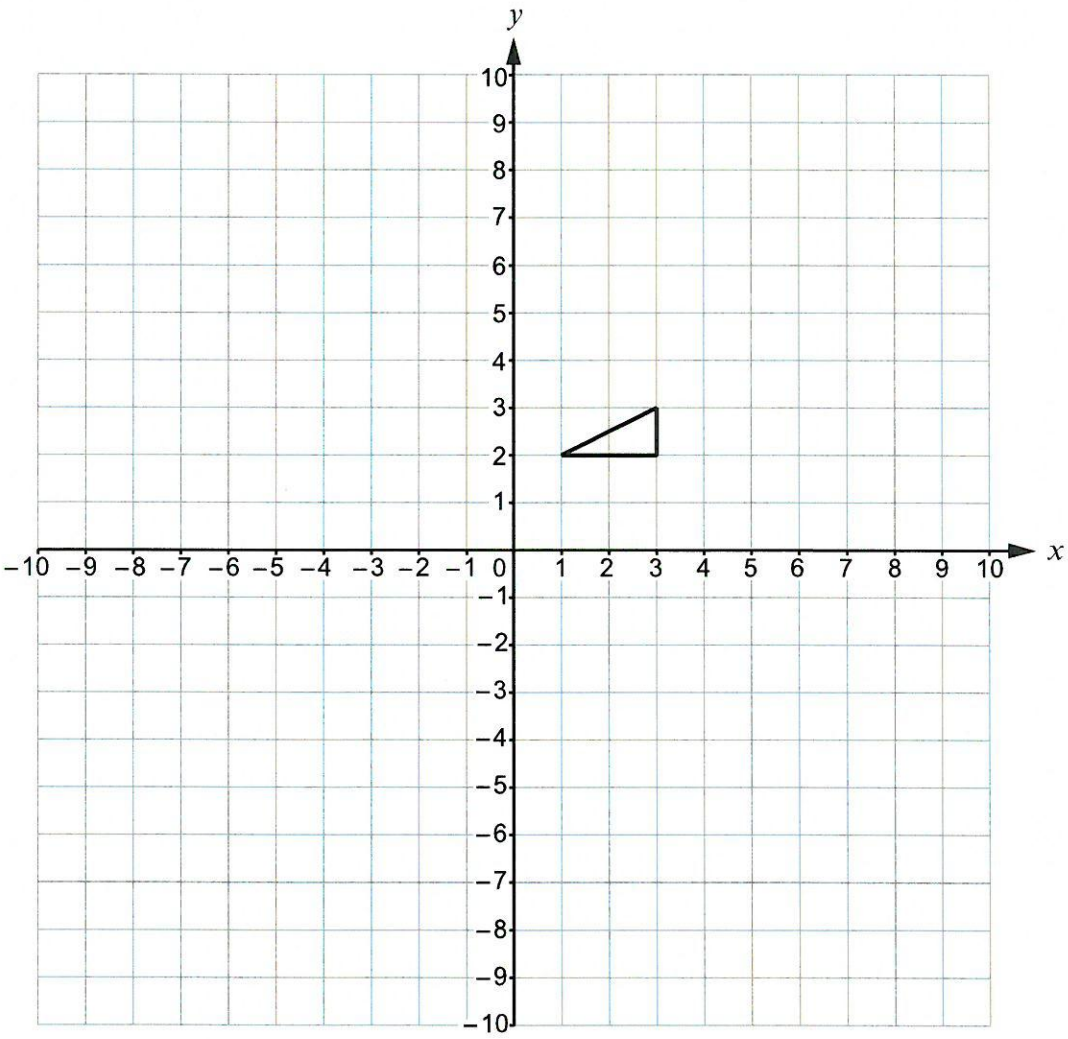
(b) Enlarge triangle B by a scale factor of $\frac{1}{2}$, using (0, 0) as the centre of enlargement. [2]



3300U501
07

Examiner only

10. Enlarge the triangle below by a scale factor of –2. Use the origin as the centre of enlargement. [2]



Transformations

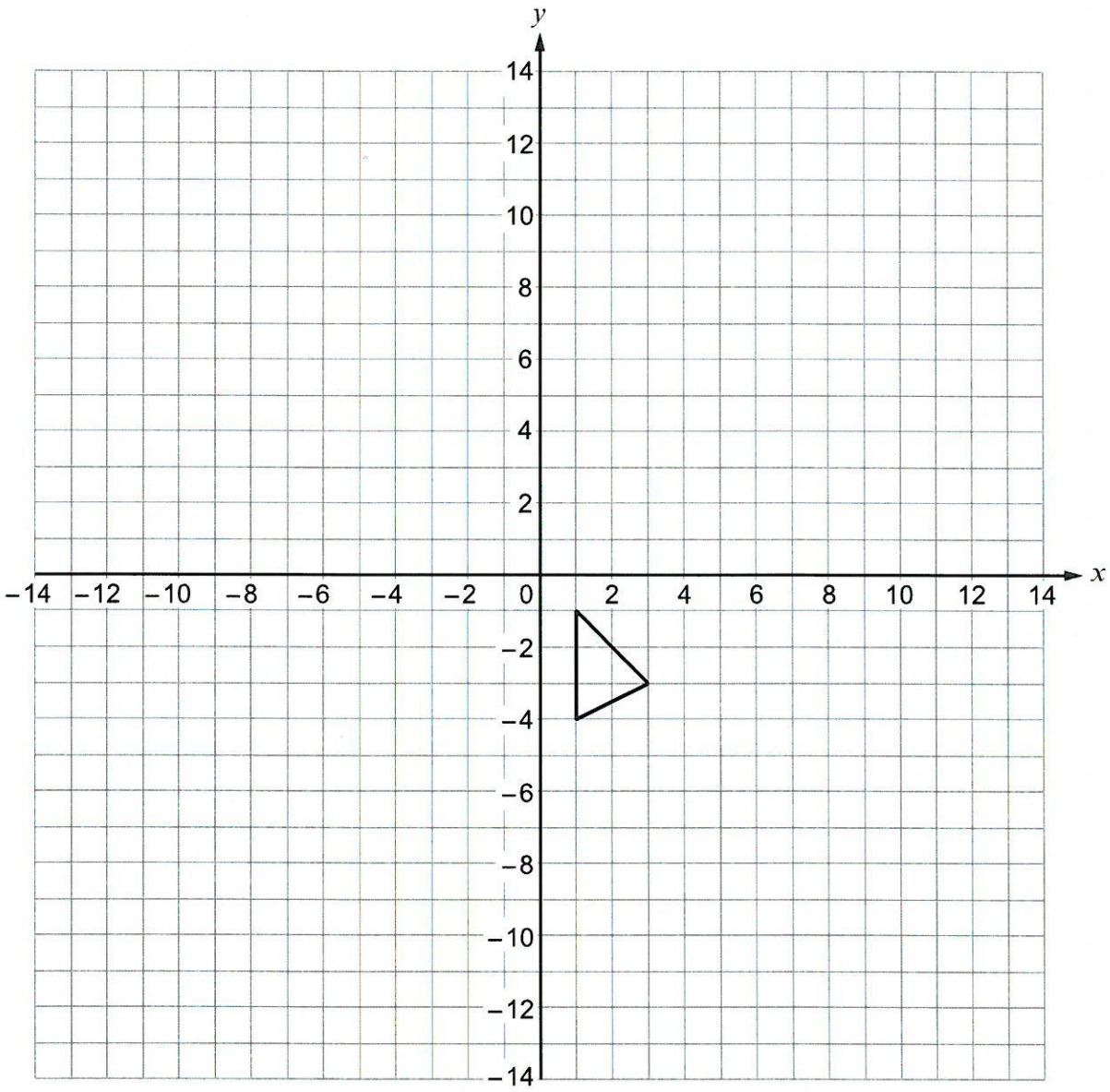
U2 Nov 2016

Examiner only

10. Draw the enlargement of the given triangle, using

- a scale factor of -2,
- $(-2, 1)$ as the centre of enlargement.

[3]

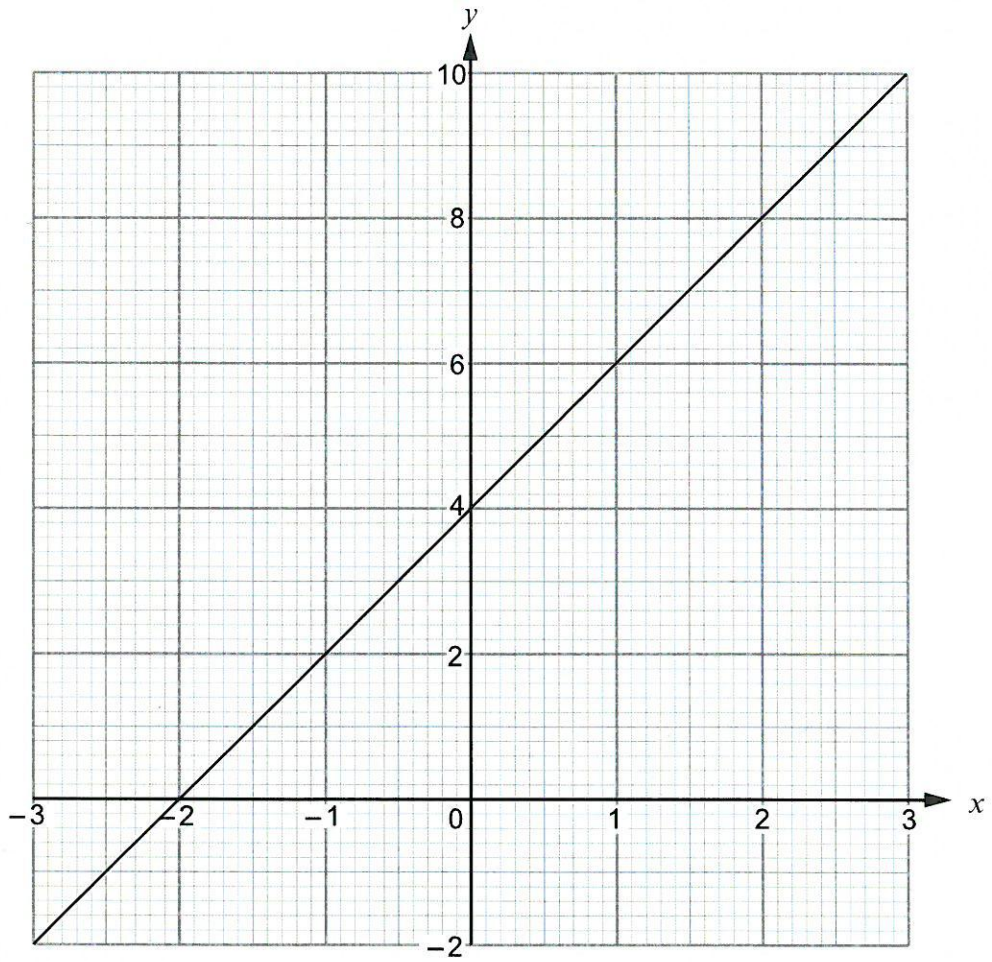


Graphs

U2 Nov 2016

Examiner only

6. *(a)* The diagram below shows the graph of a straight line for values of x from −3 to 3.



(i) Write down the gradient of the above line. [1]

.....

(ii) Write down the equation of the line in the form $y = mx + c$, where m and c are whole numbers. [2]

.....

(b) Without drawing, show that the line $2y = 5x - 3$ is parallel to the line $4y = 10x + 7$. You must show working to support your answer. [2]

.....

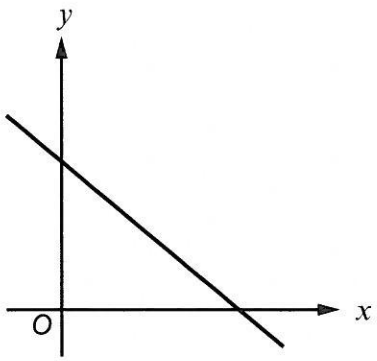
.....

.....

.....

Examiner only

4. *(a)*



Which **one** of the following equations could represent the line shown in the graph above?
Circle your answer. [1]

$y = -x - 2$ $y = -x + 2$ $y = x + 2$ $y = x - 2$ $y = -x.$

(b) Which **one** of the following points lies on the line $2y = 3x + 4$?
Circle your answer. [1]

(2, –5) (5, 2) (–2, 5) (2, 5) (–2, –5)

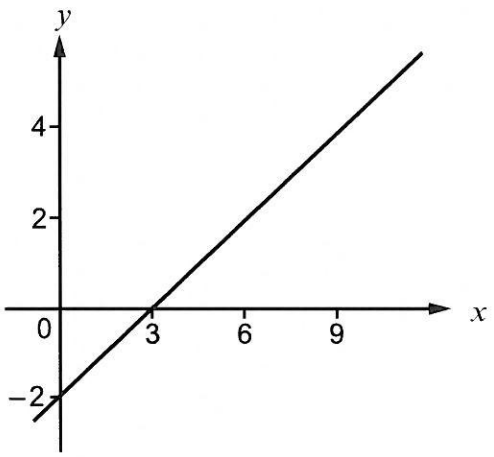
.....

.....

.....

.....

(c)



What is the gradient of the line shown in the graph above?
Circle your answer. [1]

$\frac{3}{2}$ $-\frac{3}{2}$ $\frac{2}{3}$ $-\frac{2}{3}$ -6

Examiner only

9. *(a)* Circle the equation of a straight line that is parallel to the line $3y = 2x + 6$. [1]

$3y = 2x + 7$ $\quad 2y = 3x + 6$ $\quad 3y = -2x + 6$ $\quad -3y = 2x + 6$ $\quad 2y = -3x + 6$

.....

.....

(b) Circle the equation of a straight line that is perpendicular to the line $y = 5x - 3$. [1]

$y = \frac{x}{5} + 3$ $\quad y = 5x + 3$ $\quad y = 5x + \frac{1}{3}$ $\quad y = -5x + 3$ $\quad y = \frac{-x}{5} + 3$

.....

U1 June 2017

Examiner only

2. The table below shows some of the values of $y = x^2 - 5x + 2$, for values of x from -1 to 5.

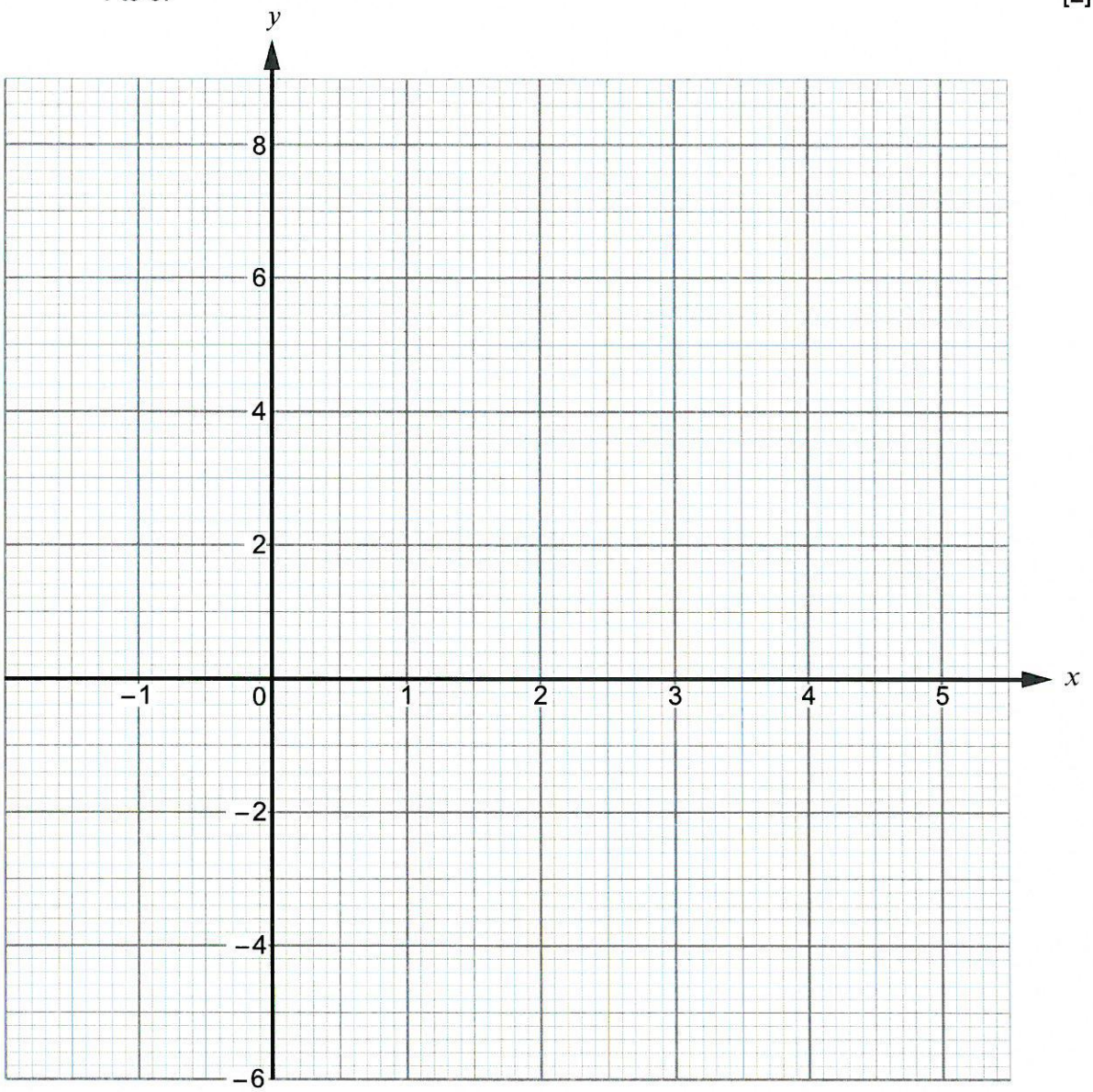
x	-1	0	1	2	3	4	5
$y = x^2 - 5x + 2$	8	2	-2	-4		-2	2

(a) Complete the table above. [1]

.....

.....

(b) On the graph paper below, draw the graph of $y = x^2 - 5x + 2$ for values of x from -1 to 5. [2]



Examiner only

(c) Draw the line $y = -3$ on the graph paper.

Write down the values of x where the line $y = -3$ cuts the curve $y = x^2 - 5x + 2$.
Give your answers correct to 1 decimal place. [2]

Values of x are ..... and .....

3. (a) Express 700 as a product of its prime factors in index form. [3]

(b) The number 33 554 432 is equal to 2^{25}.

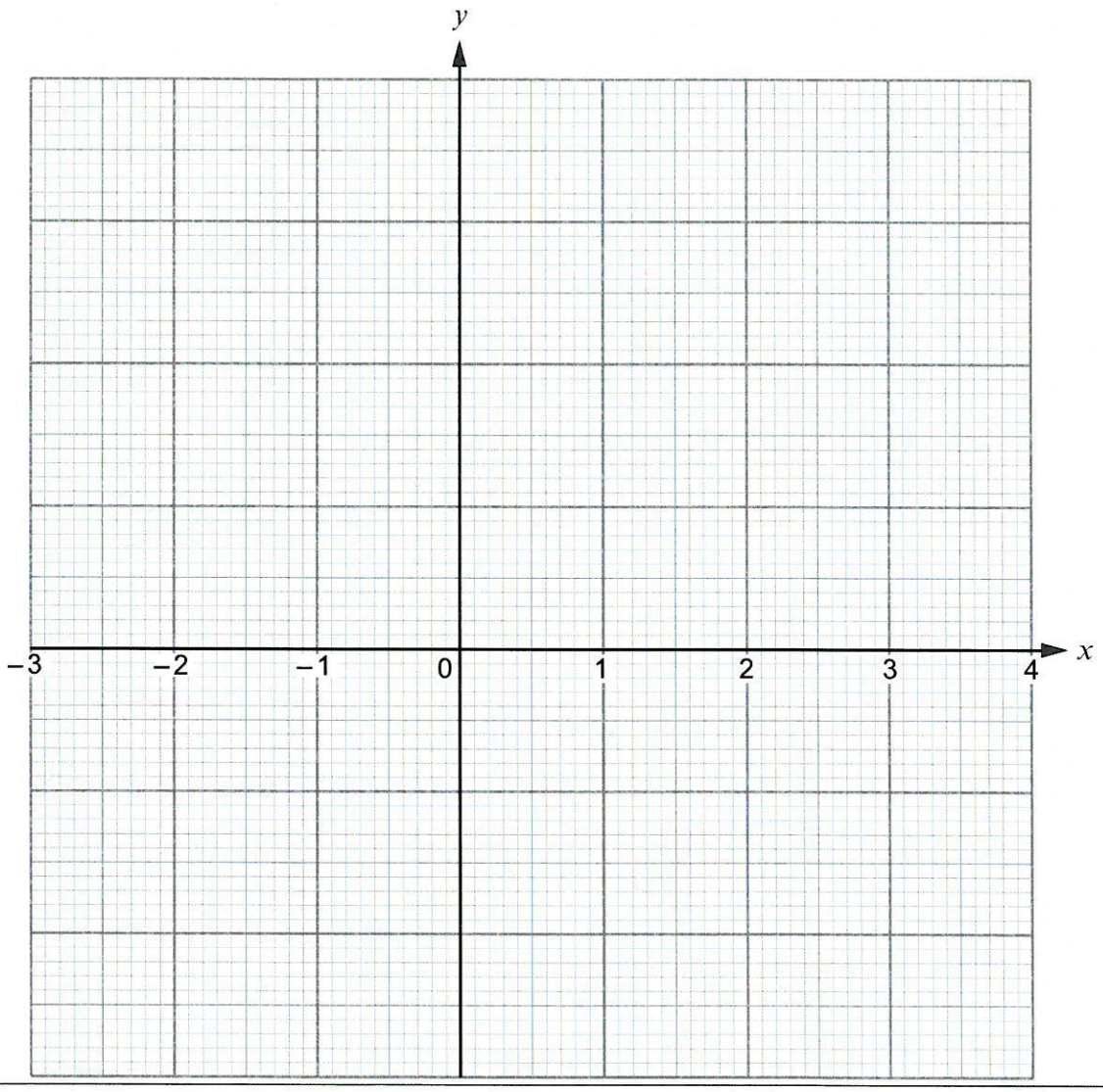
Explain how this tells you that 33 554 432 is not a square number. [1]

I+H Maths Nov 2017 U1

Examiner only

2. *(a)* Complete the table below.
Draw the graph of $y = 2x^2 - 5$ for values of x between –2 and 3.
Use the graph paper below.
Choose a suitable scale for the y-axis. [4]

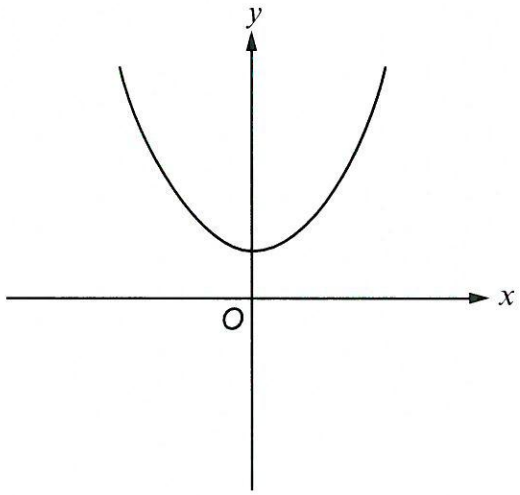
x	–2	–1	0	1	2	3
$y = 2x^2 - 5$	3		–5	–3	3	13



I+H Maths Nov 2017 U1

Examiner only

(b)



The sketch above can represent only one of the equations given below.
Circle this equation. [1]

$y = x^2$ $y = x^2 - 3$ $y = -x^2$ $y = x^2 + 3$ $y = 3x$

3300U501
05

Turn over.

U1 Nov 2016

Examiner only

2. *(a)* The table below shows some of the values of $y = 2x^2 - 5x - 1$ for values of x from –2 to 4.

Complete the table by finding the value of y for $x = -1$ and for $x = 2$. [2]

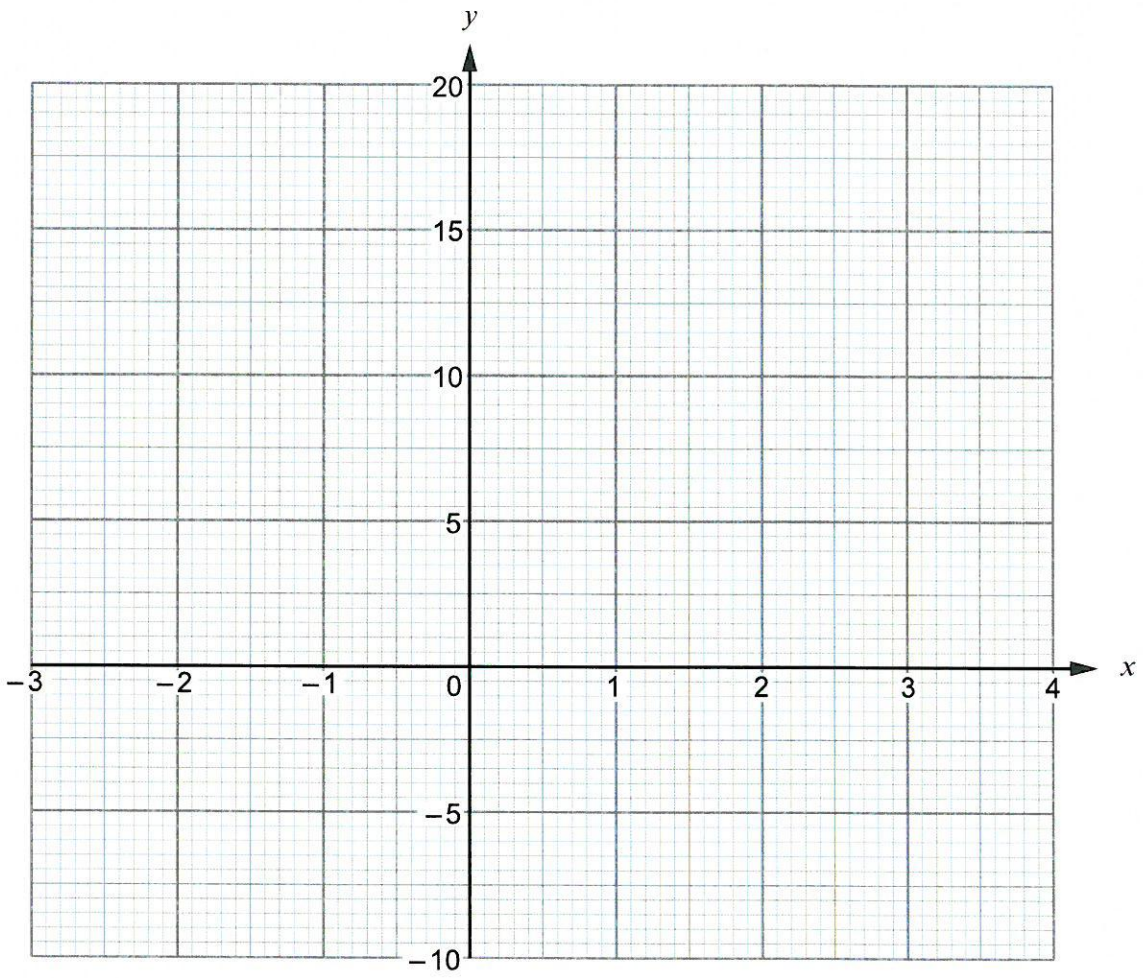
x	–2	–1	0	1	2	3	4
$y = 2x^2 - 5x - 1$	17		–1	–4		2	11

.....

.....

.....

(b) Draw the graph of $y = 2x^2 - 5x - 1$ for values of x from –2 to 4.
Use the graph paper below. [2]



U1 Nov 2016

Examiner only

(c) Draw the line $y = 5$ on the graph paper.

Write down the values of x where the line $y = 5$ cuts the curve $y = 2x^2 - 5x - 1$.
Give your answers correct to 1 decimal place. [2]

Values of x are ..... and .....

(d) Circle the equation below whose solutions are the values you have given in *(c)*. [1]

$2x^2 - 5x - 1 = 0$ $\quad$ $2x^2 - 5x - 6 = 0$ $\quad$ $2x^2 - 5x - 5 = 0$

$2x^2 - x - 1 = 0$ $\quad$ $2x^2 - 5x + 4 = 0$

.....

.....

.....

3300U501
05

H Maths June 2015 U2

Examiner only

12. Five quadratic equations are listed below.
Draw a line connecting each equation to its solution.
One has been completed for you. [4]

Equation	Solution
$x^2 - 4 = 0$	$x = 1, x = -\frac{3}{2}$
	$x = 2, x = -2$
	$x = 1, x = \frac{3}{2}$
$x(2x + 3) = 0$	$x = \frac{4}{9}$
	$x = -1, x = -\frac{2}{3}$
	$x = -\frac{2}{3}, x = \frac{2}{3}$
	$x = \frac{3}{2}, x = -\frac{3}{2}$
$(x - 1)(2x - 3) = 0$	$x = 1, x = -\frac{2}{3}$
	$x = -\frac{9}{4}$
	$x = 0, x = \frac{2}{3}$
$(2x - 3)(2x + 3) = 0$	$x = \frac{81}{16}$
	$x = 0, x = -\frac{3}{2}$
	$x = \frac{3}{2}$
$(4x + 9)^2 = 0$	$x = -\frac{9}{4}, x = 0$

.....

.....

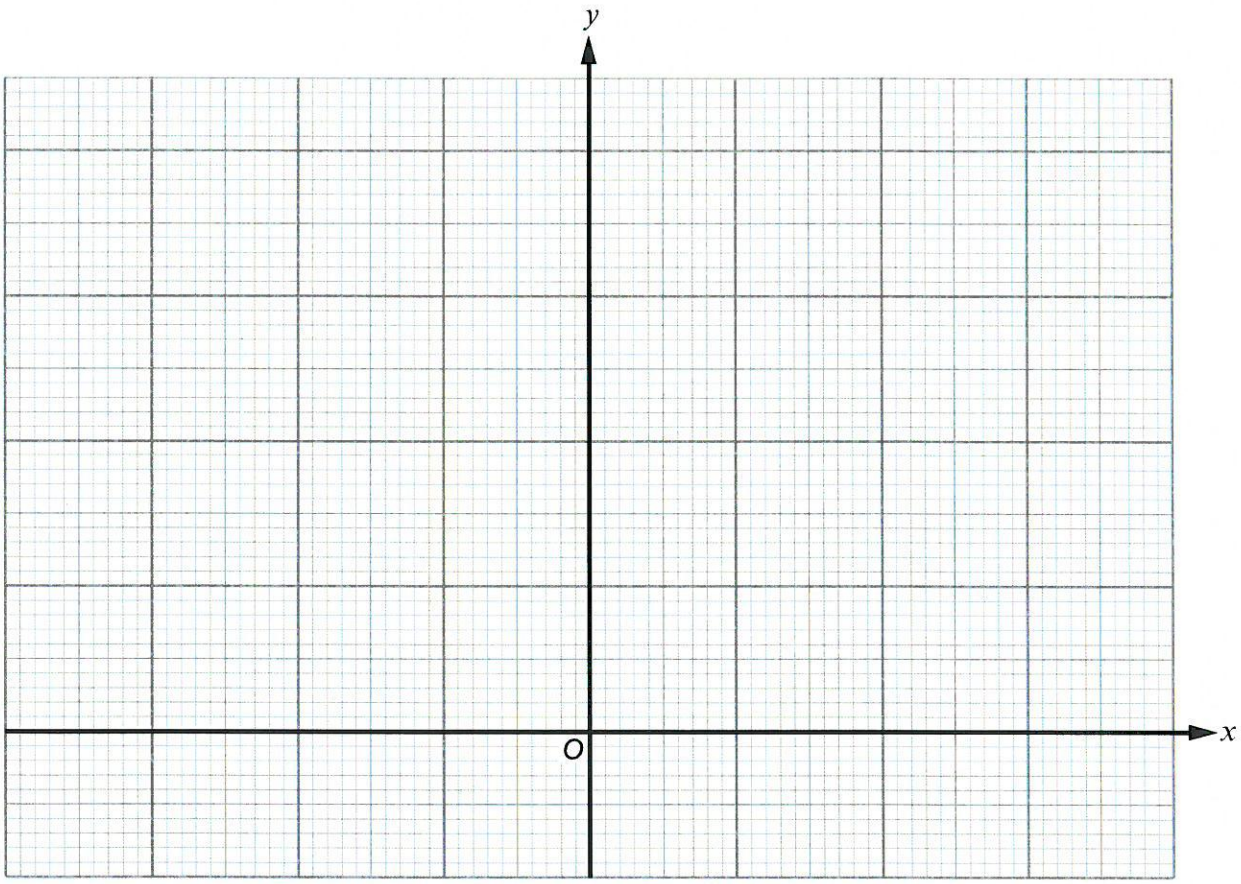
.....

.....

.....

Examiner only

16. *(a)* Draw the graph of the curve $y = 2^x$ for values of x from –2 to 2.
Use the graph paper below. [3]



(b) Use your graph to find the value of $2^{1\cdot4}$. [1]

(c) Use your graph to solve the equation $2^x = 1\cdot4$. [1]

Circle Theorems

I+H maths Nov 8 2017 U1

Examiner only

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

PQ and PR are tangents to a circle with centre O.
$\hat{RPQ} = 30°$.

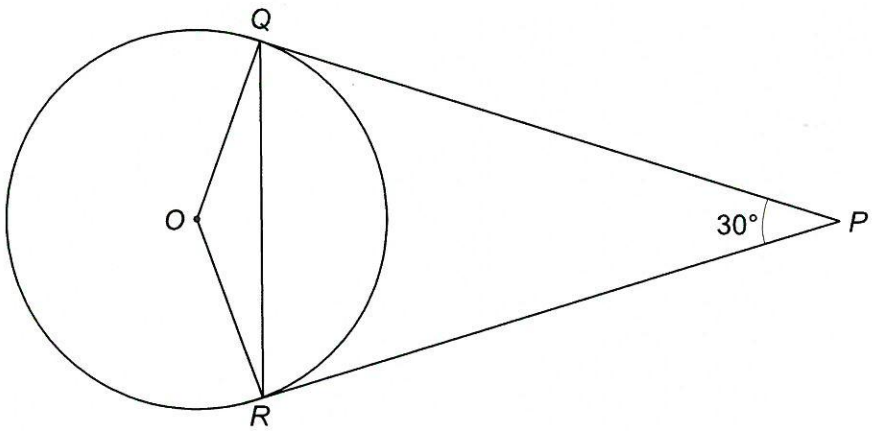


Diagram not drawn to scale

Find the size of $\hat{OQR}$.

You must indicate any angles you calculate.
You must give a reason for each stage of your working. [5 + 2 OCW]

$\hat{OQR}$ = ... °

Examiner only

7. Calculate the size of angle x in the diagram below. [3]

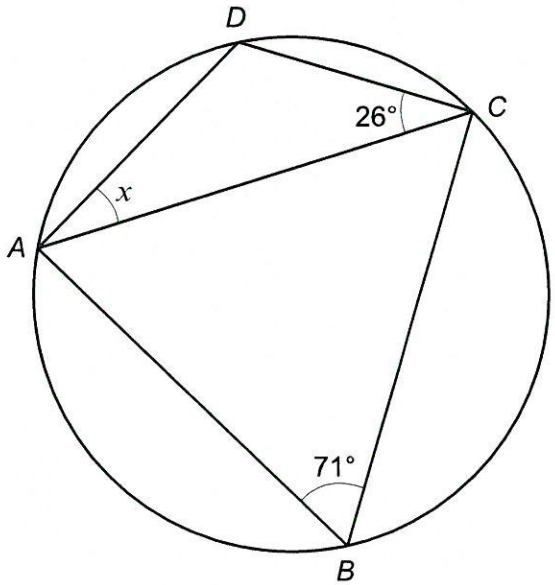


Diagram not drawn to scale

U2 Nov 2016

Examiner only

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

Points *A*, *B*, *C* and *D* lie on the circumference of a circle, centre *O*.
BD is a diameter of the circle.
The straight line *BC* = 4·7 cm and $B\hat{A}C = 28°$.

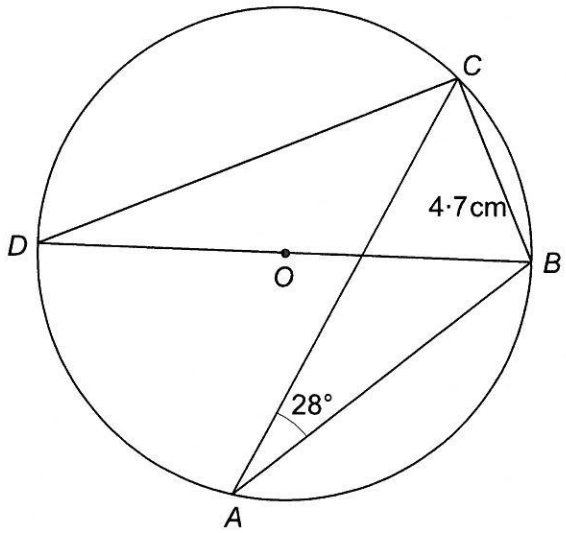


Diagram not drawn to scale

Write down the size of $B\hat{D}C$.
Hence, calculate the length *BD*.
You must show all your working. [5 + 2 OCW]

U2 June 2017

Examiner only

10. Points A, B and C lie on the circumference of a circle, centre O.
$A\hat{C}B = 37°$.

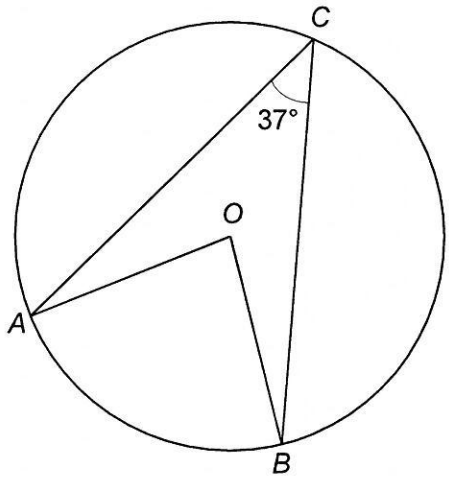


Diagram not drawn to scale

Calculate the size of the **reflex** angle $A\hat{O}B$. [2]

.....

.....

.....

3300U601
11

Examiner only

10. The line GH is a tangent to the circle at point Y.
The line EF is parallel to the line GH.
The vertices of triangle EFY lie on the circle.
$E\hat{Y}G = 60°$.

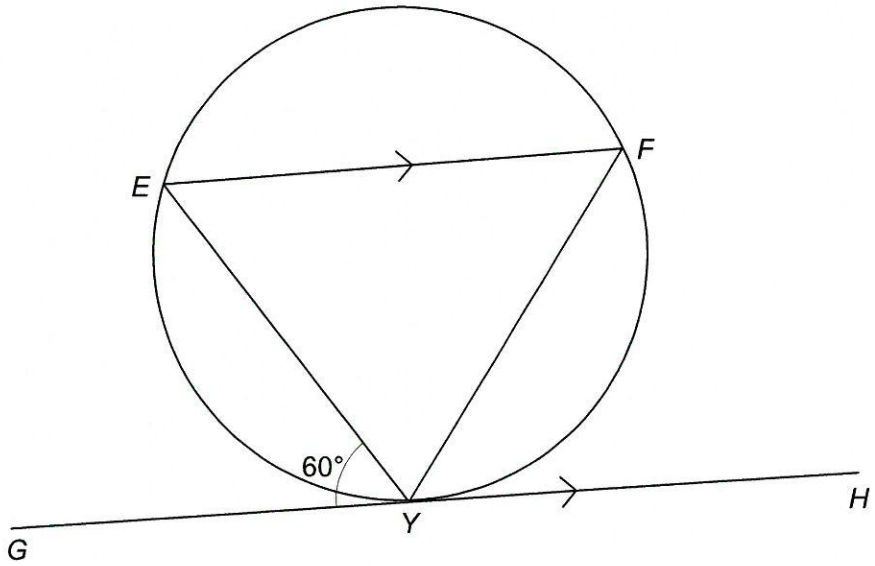


Diagram not drawn to scale

Prove that EFY is an equilateral triangle.
Give a reason for each step to justify your proof. [3]

Examiner only

12. *A*, *B* and *C* are points on the circumference of a circle.
XY is a tangent to the circle at the point *A*.

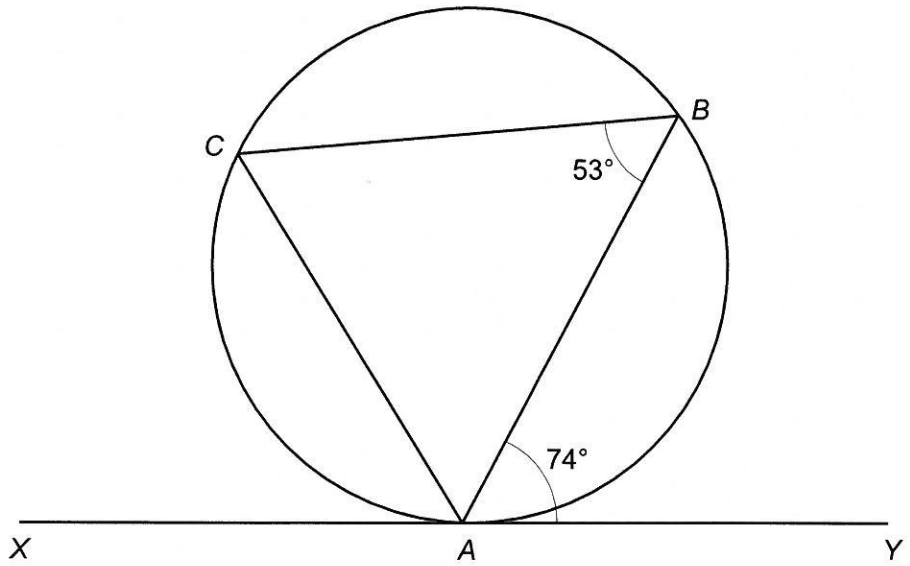


Diagram not drawn to scale

$B\hat{A}Y = 74°$ and $A\hat{B}C = 53°$.
Prove that triangle *ABC* is an isosceles triangle.
You must give a reason for any statement that you make or any calculation that you carry out.
[5]

U1 Nov 2016

Examiner only

13. The points *P*, *Q* and *R* lie on the circumference of a circle, centre *O*.
PQ is a diameter of the circle.
The straight line *ARB* is a tangent to the circle.

$\hat{QRB} = x$, where x is measured in degrees.

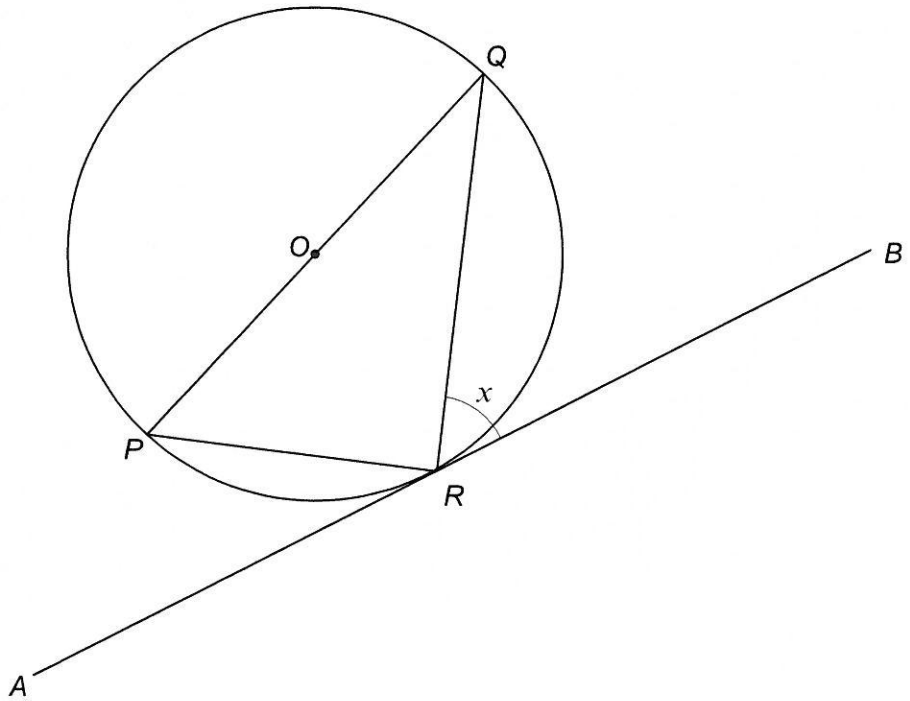


Diagram not drawn to scale

Calculate the size of $\hat{PQR}$ in terms of x.
You must give a reason for each step of your solution. [4]

H Maths June 2018 U2

Examiner only

19. BC is the tangent to the circle at point E, as shown below.

$EC = 8$ cm, $AC = 11$ cm and $D\hat{C}E = 31°$.

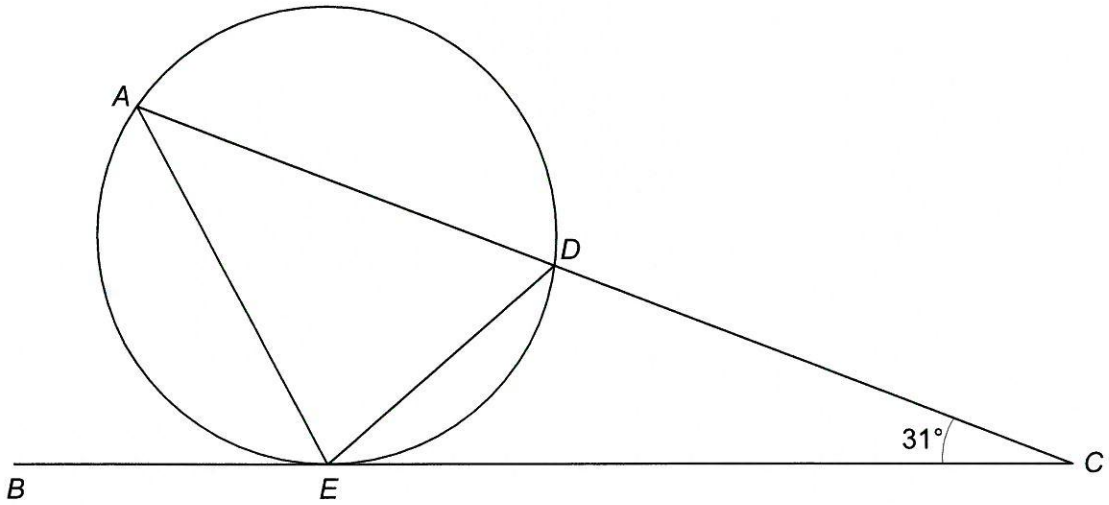


Diagram not drawn to scale

(a) Calculate the length of AE. [3]

H maths June 2015 U2

Examiner only

(b) Calculate the size of $C\hat{E}D$. [4]

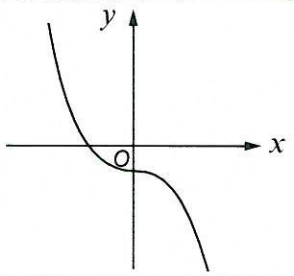
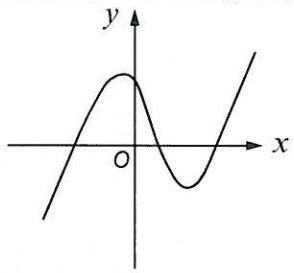
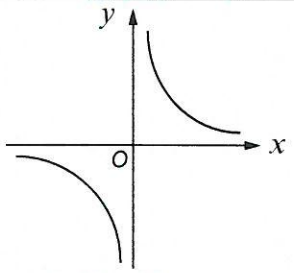
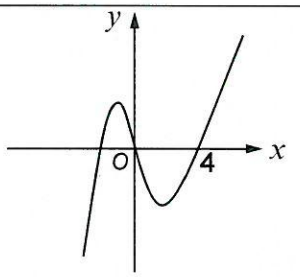
END OF PAPER

Transformation of Graphs

U2 Nov 2016

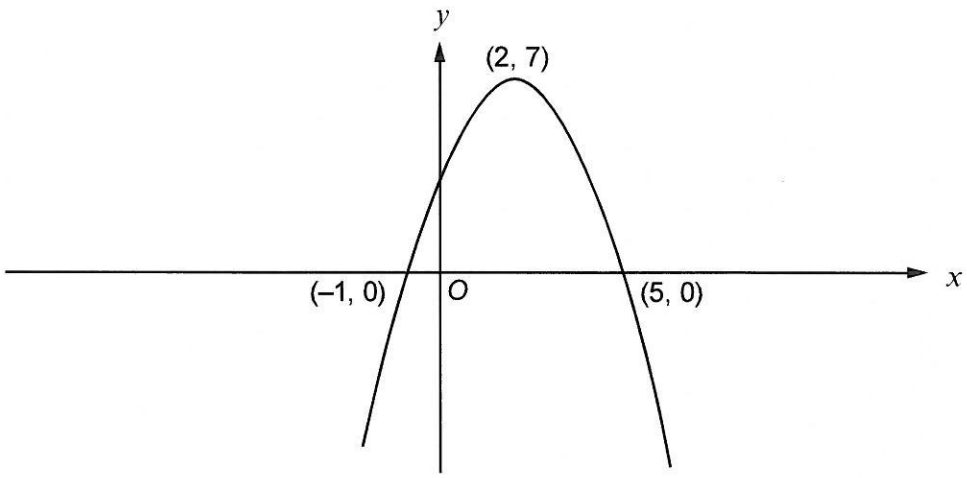
Examiner only

15. Circle either TRUE or FALSE for each statement given below. [2]

GRAPH	STATEMENT		
	The equation of this graph could be $y = -x^3 - 2$.	TRUE	FALSE
	The equation of this graph could be $y = x^3 - 9x$.	TRUE	FALSE
	The equation of this graph could be $y = x^{-1}$.	TRUE	FALSE
	The equation of this graph could be $y = x^3 + 4$.	TRUE	FALSE

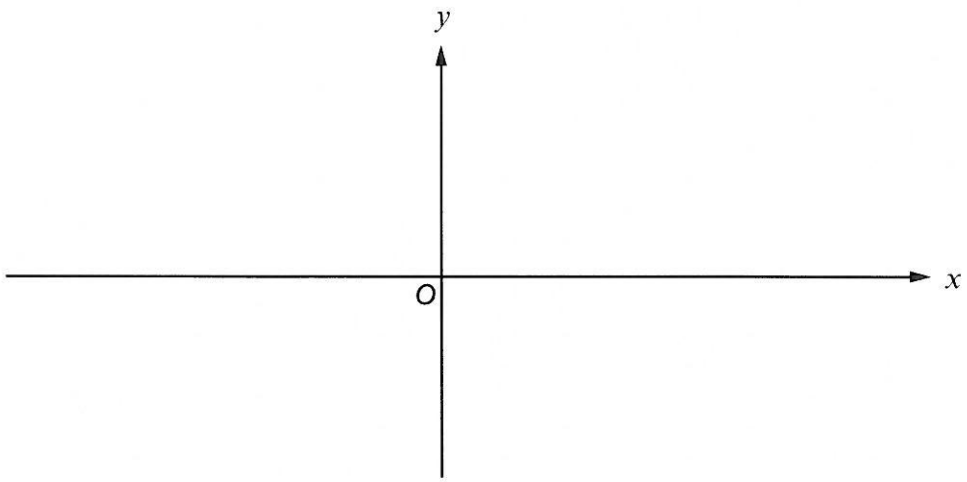
Examiner only

15. *(a)* The diagram shows a sketch of the graph $y = f(x)$.
The graph passes through the points (–1, 0) and (5, 0) and its highest point is at (2, 7).



Sketch the graph of $y = f(x - 3)$ on the axes below.
You must indicate

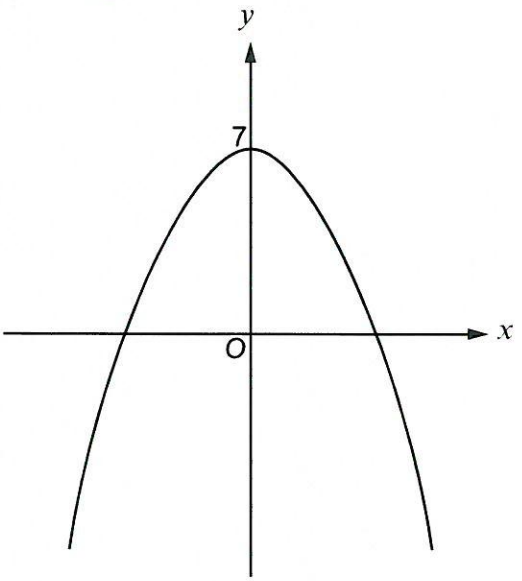
- the coordinates of the points of intersection of the graph with the x-axis
- the coordinates of the highest or lowest point. [3]



Examiner only

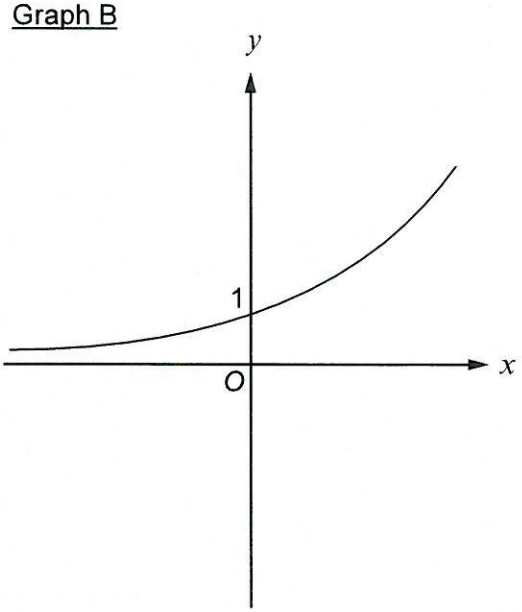
16. Each of the two graphs below is described by **one** of the equations on the right.
Put a **tick** in the box next to the equation which correctly describes each graph. [2]

Graph A



	Equation describing graph A
$y = 7x^2$	
$y = -(x + 7)^2$	
$y = (x - 7)^2$	
$y = 7 - x^2$	
$y = x^2 + 7$	

Graph B



	Equation describing graph B
$y = x^2 + 1$	
$y = 2^x$	
$y + 1 = x^2$	
$y = \frac{1}{x}$	
$y = x^0$	

.....

.....

.....

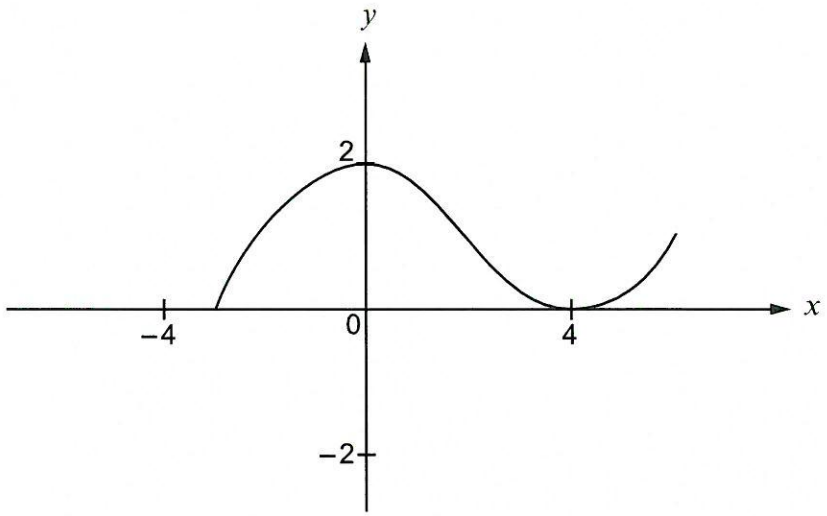
.....

.....

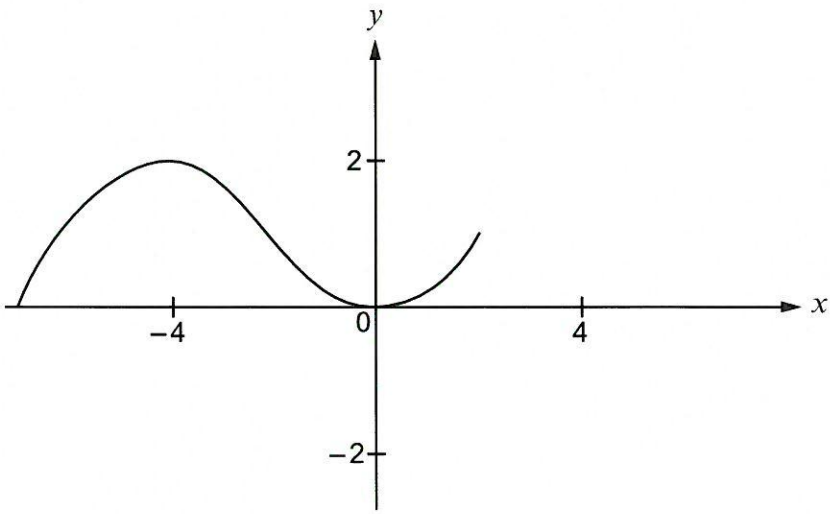
.....

Examiner only

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



The curve is transformed, as shown below.



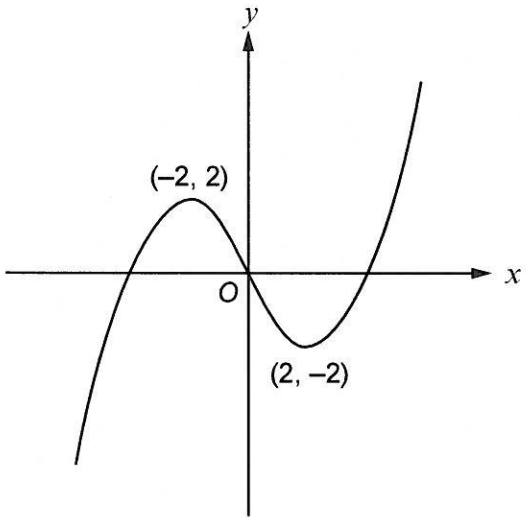
Using function notation, complete the following to give the equation of the transformed curve. [1]

The equation of the transformed curve is

$y =$ .....

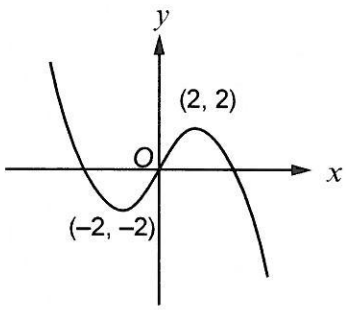
Examiner only

20. A sketch of the graph $y = f(x)$ is shown below.
Two specific points are shown on the graph. They are called a maximum point and a minimum point.
The maximum point shown is (–2, 2) and the minimum point shown is (2, –2).



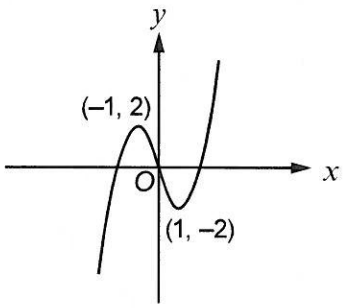
The graphs on the opposite page are transformations of $y = f(x)$.
Draw a line connecting each graph to the equation describing the transformation.
One has been done for you. [4]

Examiner only

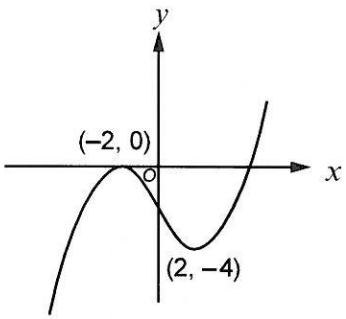


$y = f(x) - 2$

$y = f(x + 2)$

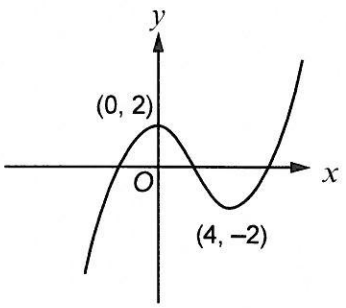


$y = -f(x)$

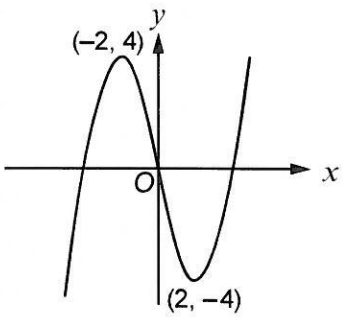


$y = 2f(x)$

$y = f(2x)$



$y = f(x) + 2$



$y = \frac{1}{2} f(x)$

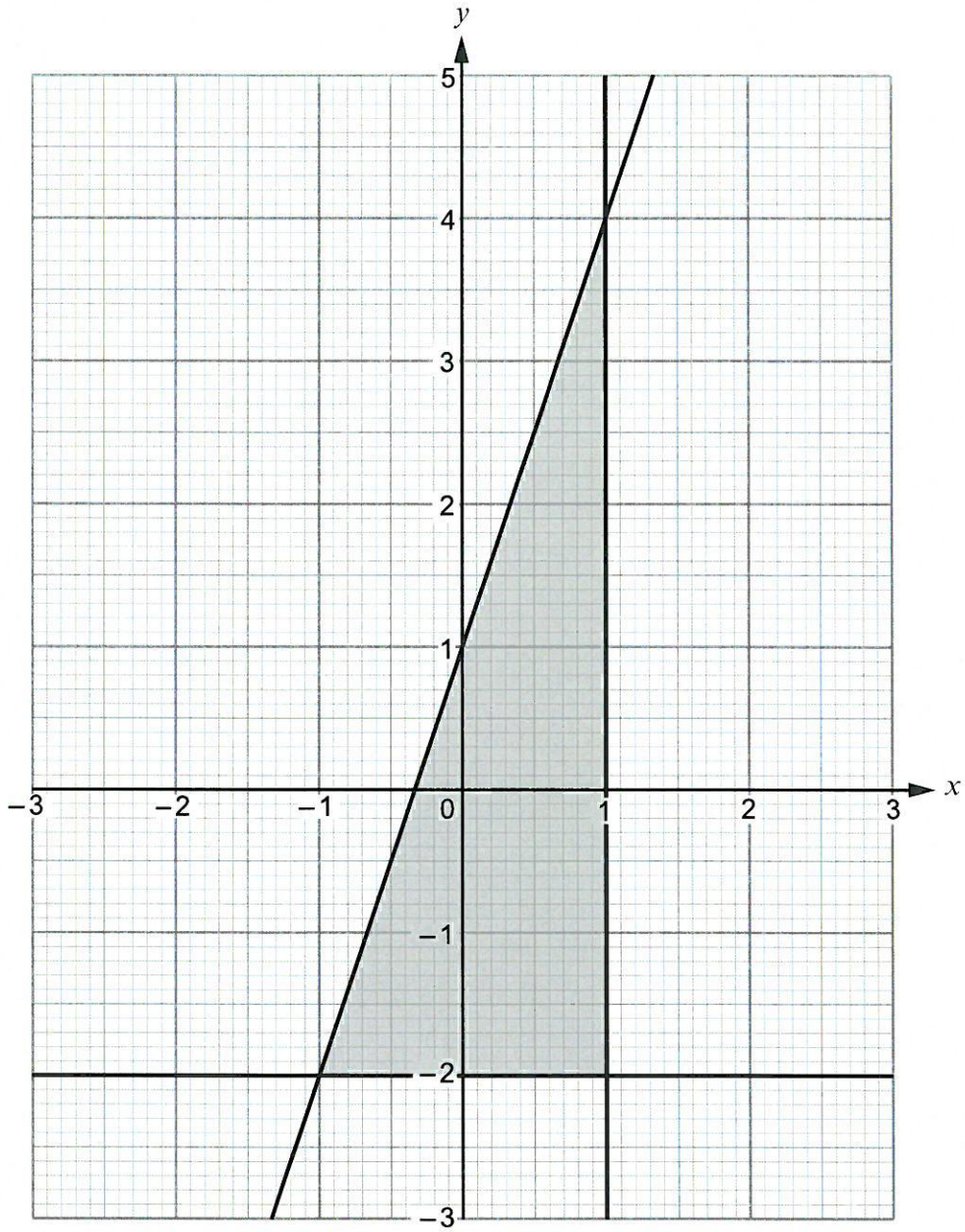
$y = f(x - 2)$

Inequalities - Shading Regions

H Maths Nov 2017 U1

Examiner only

11.



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

.....

.....

$x \leqslant 1$

Examiner only

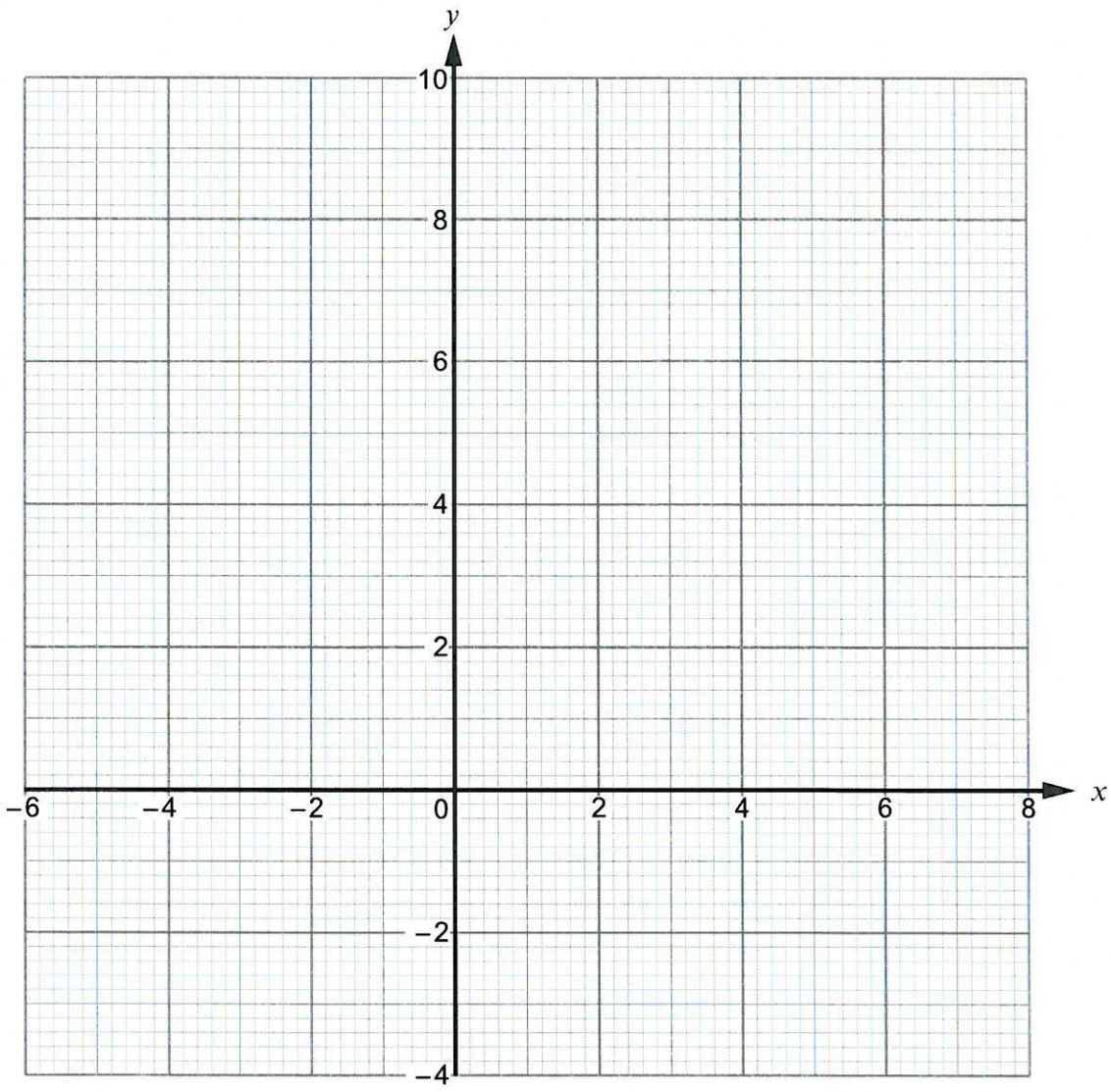
13. *(a)* On the graph paper below, draw the region which satisfies all of the following inequalities.

$$x + y \leqslant 6$$

$$y \geqslant \frac{x}{2} + 3$$

$$x \geqslant -2.$$

Clearly indicate the region that represents your answer. [3]



Examiner only

(b) (i) What is the greatest possible value of x such that all three conditions are met? [1]

x = ...

(ii) What is the greatest possible value of y such that all three conditions are met? [1]

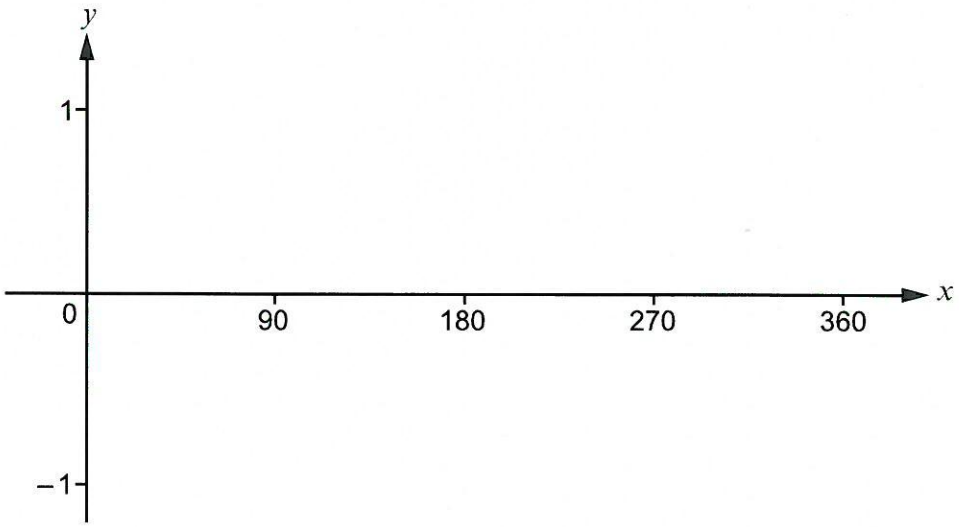
y = ...

Trigonometric Graphs

H Maths Nov 2017 U2

Examiner only

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



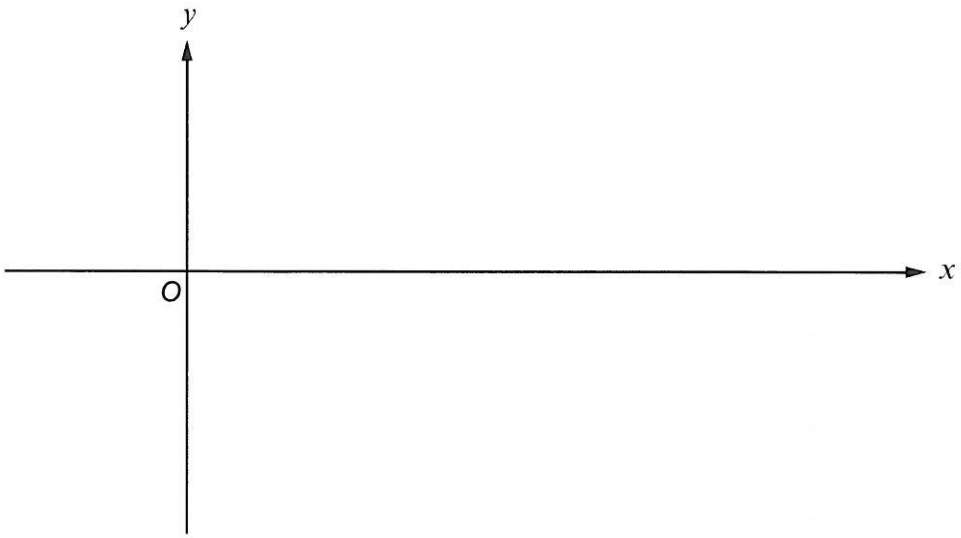
(b) Solve each of the following equations.
Give all answers in the range $x = 0°$ to $x = 360°$.

(i) $\sin x = 0{\cdot}3$ [2]

(ii) $\sin x + 1 = 0$ [1]

Examiner only

(b) Using the axes below, **sketch** the graph of $y = \cos x + 1$ for values of x from 0° to 360°. [2]



Examiner only

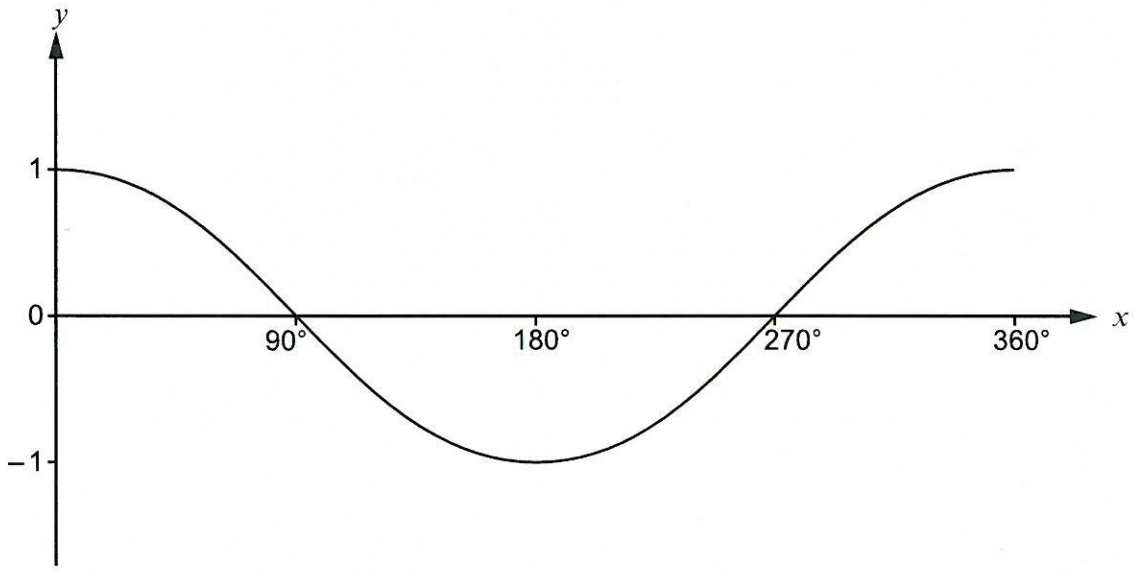
15. *(a)* Using the axes below, **sketch** the graph of $y = \sin x$ for values of x from 0° to 360°. You must label any important values on both axes. [2]

(b) Circle the value that is equal to sin 200°. [1]

sin 20° sin 100° sin 160° sin 220° sin 340°

Examiner only

18. The following diagram shows a sketch of $y = \cos x$ for values of x from 0° to 360°.



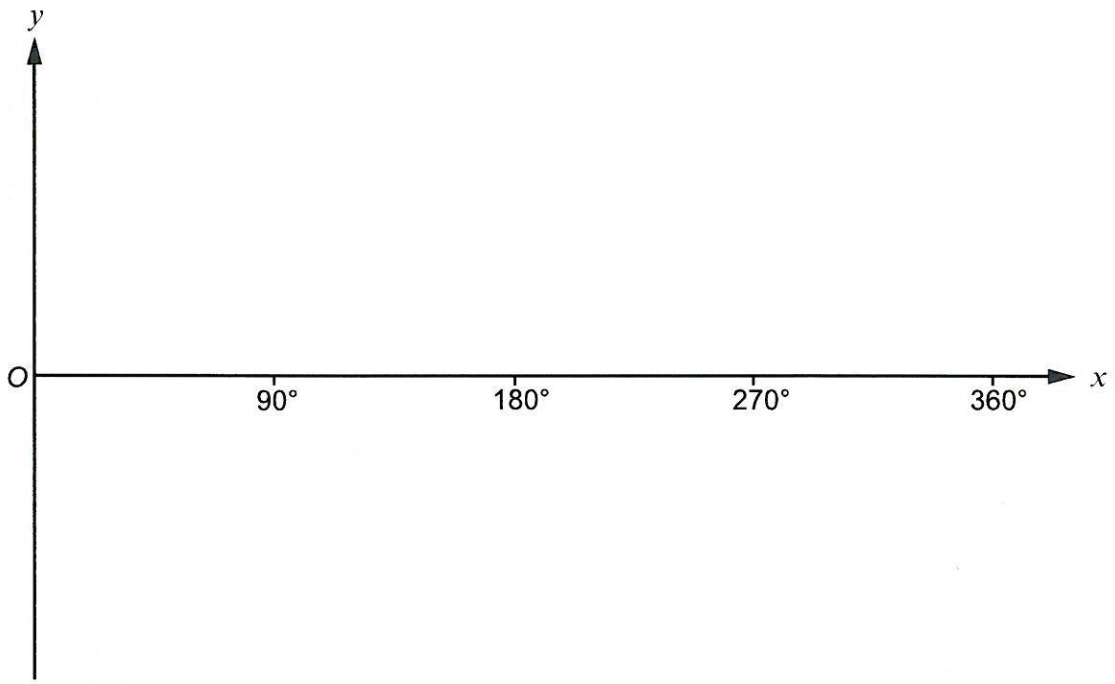
(a) Given that $\cos 21° = 0{\cdot}9336$, correct to 4 decimal places, write down all the solutions of the equation

$$\cos x = -0{\cdot}9336$$

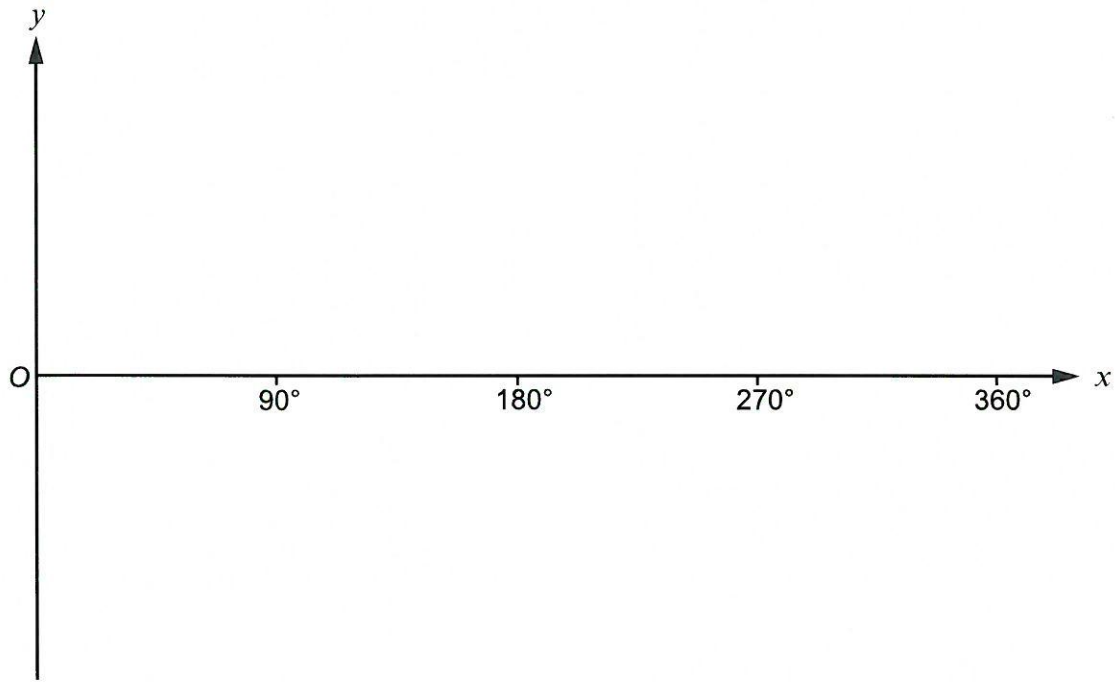
for values of x from 0° to 360°. [2]

Examiner only

(b) (i) Use the following axes to sketch the graph of $y = 2\cos x$ for values of x from 0° to 360°.
You must indicate any important points on both axes. [2]



(ii) Use the following axes to sketch the graph of $y = \cos x - 1$ for values of x from 0° to 360°.
You must indicate any important points on both axes. [2]



END OF PAPER

Construction and Loci

U1 Nov 2016

Examiner only

3. A regular polygon has exterior angles of 45°.

(a) How many sides does this polygon have? [2]

.....

.....

.....

(b) Each side of this regular polygon is 7 cm.
A sketch of two sides of the polygon is shown below.
The two sides are *AB* and *BC*.

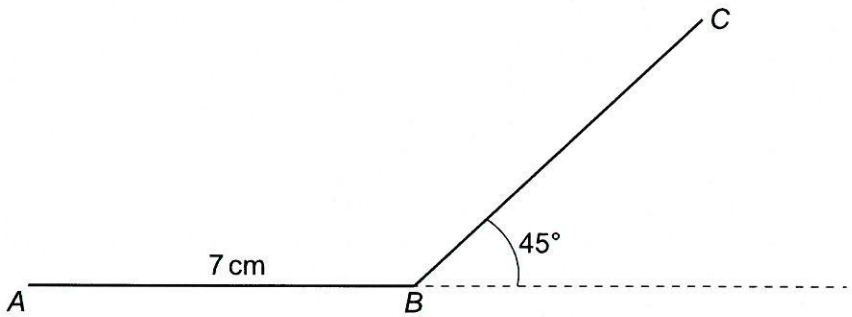


Diagram not drawn to scale

Construct an accurate drawing that shows these **two sides** of the polygon.
Use only a ruler and a pair of compasses.
The point *A* has been given.
You must show your construction arcs. [4]

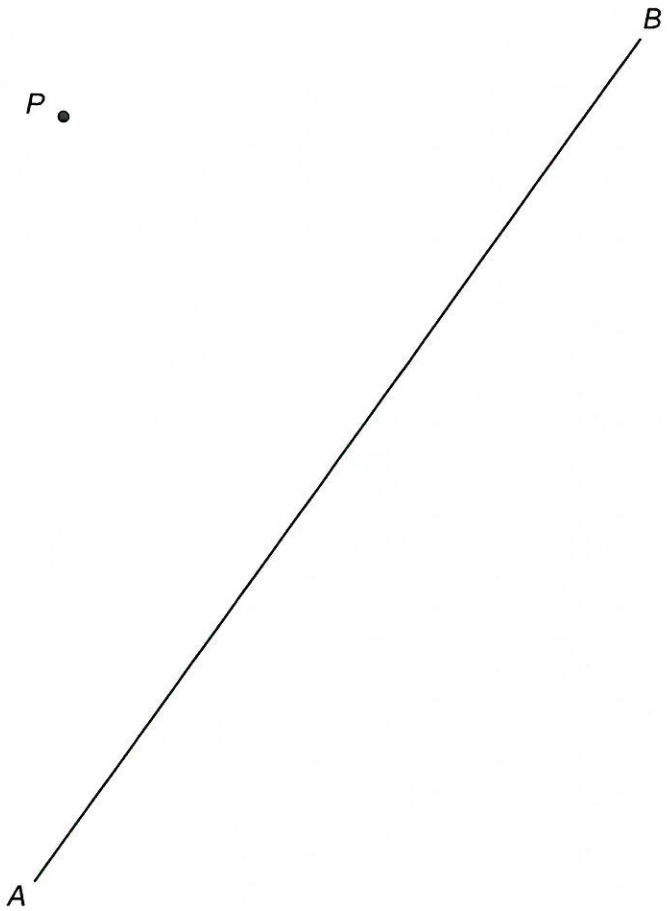
A •

Examiner only

5. Construct an accurate drawing of triangle ABC, where $AB = 7$ cm, $A\hat{B}C = 90°$ and $B\hat{A}C = 60°$.
Use only a ruler and a pair of compasses.
The side AB has been drawn for you.
You must show your construction arcs. [3]

Examiner only

6. Using only a ruler and a pair of compasses, construct a perpendicular line from the point *P* to the line *AB*. [3]



I+H maths June 2018 U1

Examiner only

8. The line AB is drawn below.
The point P lies **above** the line AB.

The region in which P is located is such that

- P is nearer to point A than to point B,
- $B\hat{A}P \leqslant 60°$,
- $AP \geqslant 6\,\text{cm}$.

Using a ruler and a pair of compasses, **construct** suitable lines and arcs to represent these conditions.
Construction arcs must be clearly shown.

Shade the region in which the point P is located. [5]

Indices and Surds

I+H Maths Nov 2017 U2

Examiner only

1. Simplify each of the following and circle the correct answer in each case.

(a) $6p^6 \times 3p^3$ [1]

$9p^9$ $9p^{18}$ $18p^{18}$ $18p^2$ $18p^9$

(b) $3{\cdot}4g^8 \div 13{\cdot}6g^2$ [1]

$\frac{g^4}{4}$ $\frac{g^6}{4}$ $4g^4$ $4g^6$ $0{\cdot}4g^6$

(c) $\frac{m^3 \times m^6}{m^9}$ [1]

1 m m^2 m^4 4

3300U601
03

Turn over.

Examiner only

11. *(a)* Evaluate $49^{-\frac{1}{2}}$. [1]

(b) Express $0\cdot3\dot{7}\dot{2}$ as a fraction. [2]

(c) Find the value of $\left(\sqrt{63}-\sqrt{7}\right)^2$. [3]

Examiner only

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

(a) $9^{\frac{3}{2}}$ is equal to [1]

6 $\frac{21}{2}$ $\frac{27}{2}$ 27 $\frac{729}{2}$

.....

.....

.....

(b) $10000^{-\frac{1}{4}}$ is equal to [1]

-10000 -2500 $\frac{1}{2500}$ $\frac{1}{100}$ $\frac{1}{10}$

.....

.....

.....

Examiner only

15. *(a)* Express $0\dot{2}4\dot{5}$ as a fraction. [2]

(b) Expand and simplify $(8-3\sqrt{7})(5+\sqrt{7})$. [2]

H maths Nov 2017 U1

Examiner only

15. *(a)* Express $0\cdot6\dot{4}\dot{2}$ as a fraction. [2]

(b) Evaluate $\left(\frac{1}{36}\right)^{-\frac{1}{2}}$. [2]

Examiner only

16. You are given that $p = \sqrt{40}$ and $q = \sqrt{10}$.
Circle the correct answer in each of the following:

(a) p is equal to [1]

$10\sqrt{4}$ $4\sqrt{10}$ $10\sqrt{2}$ $2\sqrt{10}$ 20

(b) pq is equal to [1]

$10\sqrt{40}$ $40\sqrt{10}$ 400 200 20

(c) q^5 is equal to [1]

$100\sqrt{10}$ $5\sqrt{10}$ $\sqrt{50}$ 625 $10\sqrt{100}$

U1 Nov 2016

Examiner only

17. Simplify

$$\frac{\left(5\sqrt{3}\right)^2 - \frac{2\sqrt{18}}{\sqrt{2}}}{\sqrt{32} \times \sqrt{2}}$$

and state whether your answer is rational or irrational. [5]

Examiner only

17. Circle the expression that is equivalent to $w^{-\frac{3}{5}}$. [1]

$-\left(\sqrt[3]{w}\right)^5$ $\quad -\frac{3}{5}w$ $\quad -\left(\sqrt[5]{w}\right)^3$ $\quad \frac{1}{\left(\sqrt[5]{w}\right)^3}$ $\quad \frac{1}{\left(\sqrt[3]{w}\right)^5}$

18. Solve the equation $x = \frac{7}{5x-3}$.

Give your answers correct to 2 decimal places. [5]

Examiner only

19. *(a)* Give one example to show that the square of an irrational number is **not** always rational. [1]

Number = ... Square of the number = ...

(b) Find two **different** irrational numbers to make the answer to the calculation below rational. Complete the calculation by filling in the three boxes. [1]

$$\square \times \square = \square$$

Venn Diagrams

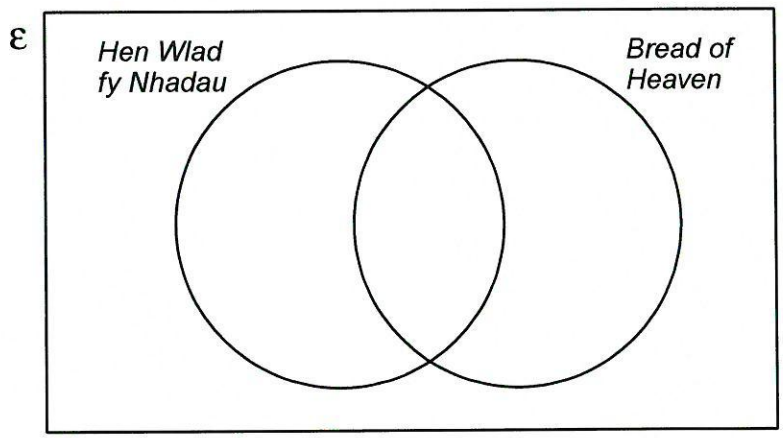
I+H June 2018 maths U1

Examiner only

2. 30 rugby supporters travel to Cardiff on a coach.
They decide to investigate how many of them can sing one, or both, of the songs *'Hen Wlad fy Nhadau'* and *'Bread of Heaven'*.

- 12 say they can sing both songs.
- 18 say they can sing *'Bread of Heaven'*.
- 5 say they cannot sing either of the songs.

(a) Complete the Venn diagram below to show this information.
The universal set, ε, contains all of the 30 supporters on the coach. [3]



(b) One of these supporters is chosen at random.
What is the probability that this person can sing *'Hen Wlad fy Nhadau'*? [2]

Turn over.

U2 Nov 2016

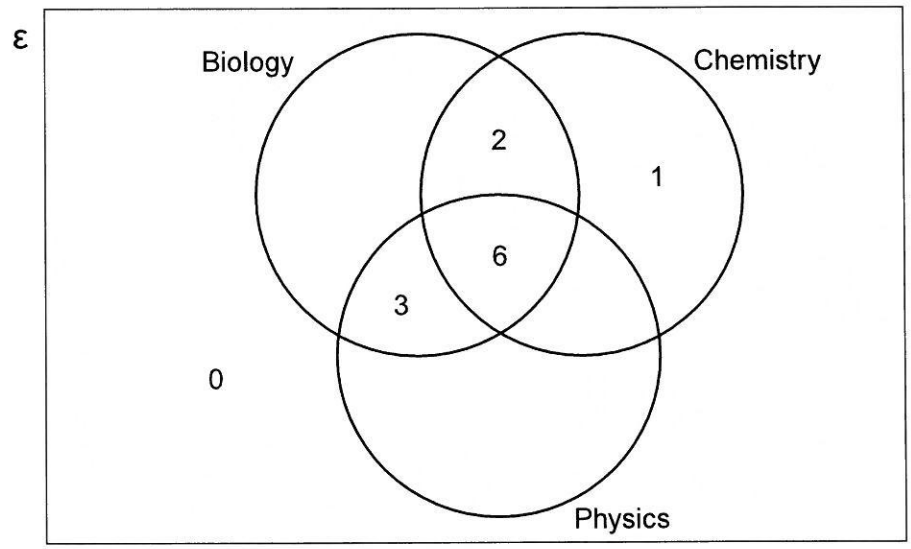
Examiner only

5. At a college, a total of 28 students study one or more of the science subjects: Biology, Chemistry and Physics.
The 28 students form the universal set, ε.
Some parts of the Venn diagram below have already been completed.

It is also known that:

- 5 students study only Biology
- 13 students study Chemistry

(a) Complete the Venn diagram. [3]



(b) How many students study Biology and Chemistry but not Physics? [1]

(c) One of the students is chosen at random.
What is the probability that this student studies Biology? [2]

Turn over.

I+H maths Nov 2017 U1

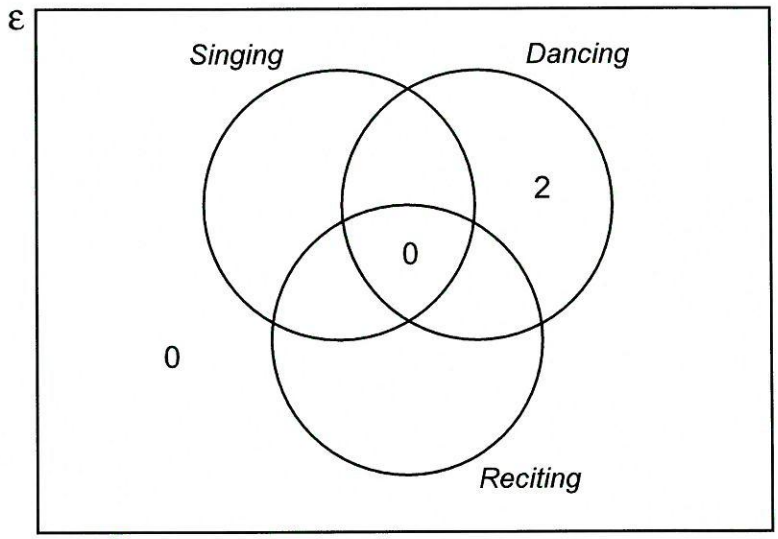
Examiner only

7. A group of pupils from a school took part in The Urdd National Eisteddfod.
All of them competed in at least one of the following competitions: *Singing*, *Dancing* or *Reciting*.

- 2 of them only took part in a *Dancing* competition.
- 5 only took part in a *Reciting* competition.
- No one took part in both a *Reciting* and a *Dancing* competition.
- 3 took part in both a *Singing* and a *Dancing* competition.
- 9 took part in a *Reciting* competition.
- 22 took part in a *Singing* competition.

The Venn diagram below shows some of the above information.
The universal set, ε, contains all of the pupils in the group.

One of the pupils in the group is chosen at random.
What is the probability that this person **only** took part in a *Singing* competition? [5]



3300U501
11

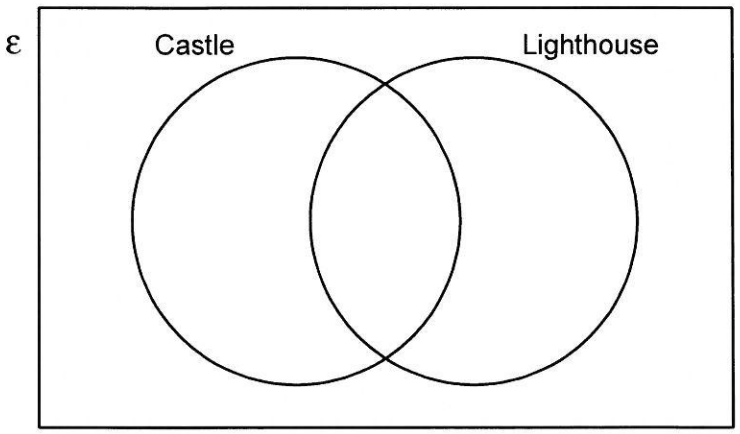
11 June 2017

Examiner only

7. A group of 20 people visited Anglesey for a weekend break.

- 10 of the group visited Beaumaris Castle.
- 13 of the group visited South Stack Lighthouse.
- 4 of the group did not visit either of these places.

(a) Complete the Venn diagram below to show this information.
The universal set, ε, contains all of the 20 people in the group. [3]



(b) One person is chosen at random from the group.
What is the probability that this person visited only one of the two places? [2]