"Full Coverage": Curved Graphs

This worksheet is designed to cover one question of each type seen in past papers, for each GCSE Higher Tier topic. This worksheet was automatically generated by the DrFrostMaths Homework Platform: students can practice this set of questions interactively by going to www.drfrostmaths.com/homework, logging on, *Practise → Past Papers/Worksheets* (or *Library → Past/Past Papers* for teachers), and using the 'Revision' tab.

Question 1

Categorisation: Complete a table of values for a cubic or quadratic equation (for subsequent plotting)

[Edexcel IGCSE Nov2009-4H Q14a]

Complete the table of values for $y = x^3 - 3x^2 + 12$

x	-2	-1	0	1	2	3
y	.....	8	.....	.....	.....	.....

Question 2

Categorisation: Complete a table of values for a reciprocal equation.

[Edexcel GCSE Nov2012-2H Q18a]

Complete the table of values for $y = \frac{6}{x}$.

x	0.5	1	2	3	4	5	6
y	.....	6	3	.....	1.5	.....	1

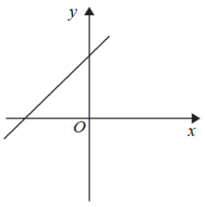
Question 3

Categorisation: Match curved graphs (including linear, quadratic, exponential and reciprocal) to their corresponding equation.

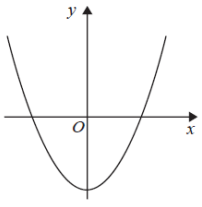
[Edexcel GCSE(9-1) Mock Set 3 Autumn 2017 3F Q27]

Here are four graphs.

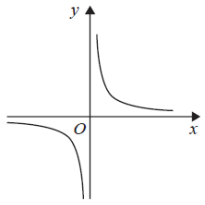
Graph A



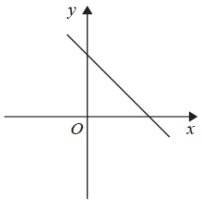
Graph B



Graph C



Graph D



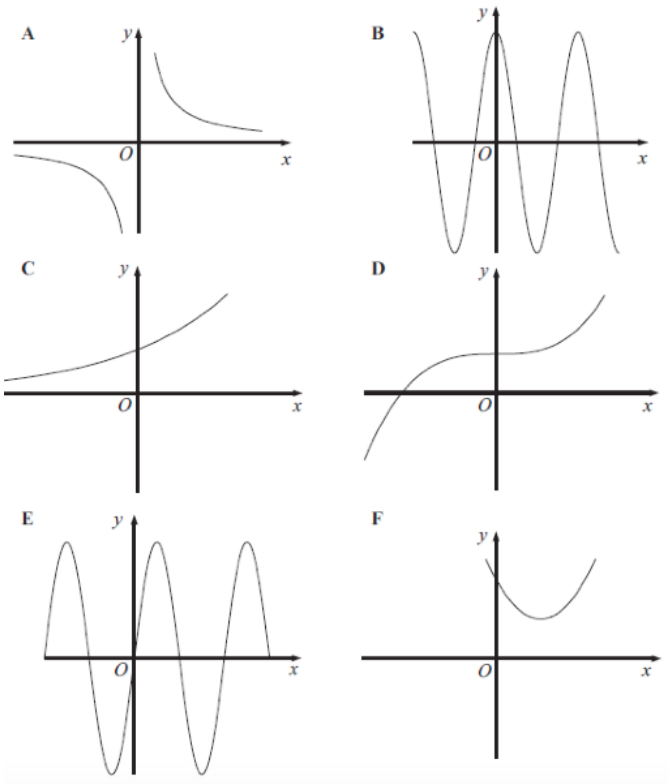
Each of the equations in the table is the equation of one of the graphs.
Complete the table.

Equation	Letter of graph
$y = x^2 - 7$	.....
$y = 3 - 2x$	.....
$y = 2x + 3$	.....
$y = \frac{1}{x}$	.....

Question 4

Categorisation: As above.

[Edexcel GCSE March2012-3H Q20]



Each equation in the table represents one of the graphs **A** to **F**.
Write the letter of each graph in the correct place in the table.

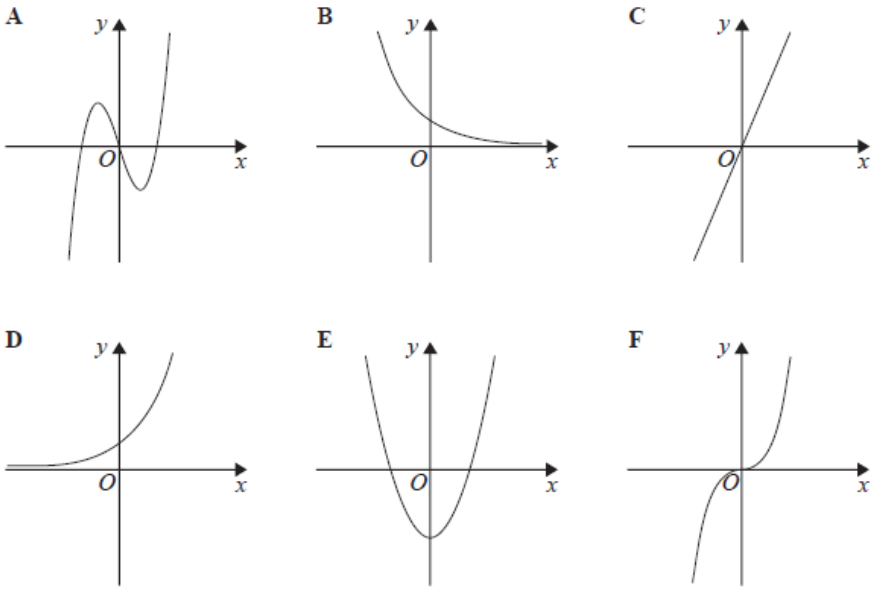
Equation	Graph
$y = 4\ sin\ x^\circ$	.....
$y = 4\ cos\ x^\circ$	.....
$y = x^2 - 4x + 5$	.....
$y = 4 \times 2^x$	.....
$y = x^3 + 4$	.....
$y = \frac{4}{x}$	.....

Question 5

Categorisation: As above.

[Edexcel GCSE(9-1) Mock Set 1 Autumn 2016 3H Q9ii]

Here are six graphs.



(ii) Write down the letter of the graph that could have the equation $y = x^3 - 3x$

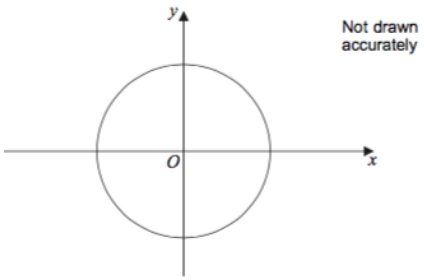
.....

Question 6

Categorisation: Recognise that the graph with equation $x^2 + y^2 = r^2$ is a circle with centre (0,0) and radius r.

[AQA IGCSE FM June2012-P2 Q1]

Here is a sketch of the circle $x^2 + y^2 = 36$



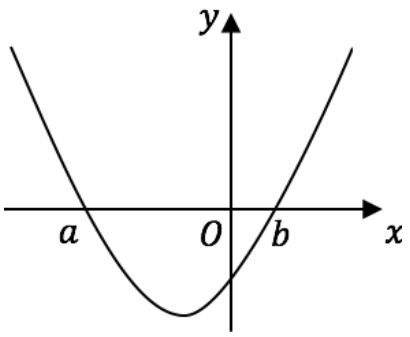
Work out the circumference of the circle, giving your answer to 1 decimal place.

..... cm

Question 7

Categorisation: Sketch a quadratic equation, identifying intercepts with the axes.

Below is a sketch of the graph with equation $y = x^2 + 4x - 12$.
Work out the values of a and b .



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Question 8

Categorisation: Identify the turning point of a quadratic by completing the square.

[Edexcel GCSE(9-1) Mock Set 2 Spring 2017 2H Q19]
By completing the square, find the coordinates of the turning point of the curve with equation $y = x^2 + 10x + 18$ You must show all your working.

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Question 9

Categorisation: As above, but where the coefficient of x^2 is not 1.

[Edexcel Specimen Papers Set 2, Paper 3H Q23b]
$2x^2 + 16x + 35$ can be expressed in the form $2(x + 4)^2 + 3$
Hence or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

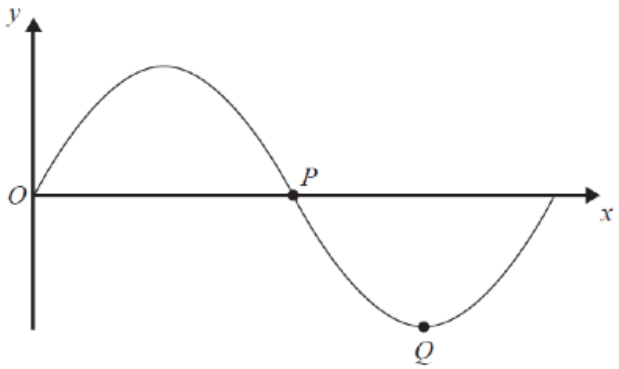
.....

Question 10

Categorisation: Recognise the graphs of $y = sin\ x$ and $y = cos\ x$ and identify the coordinates of points on these graphs.

[Edexcel GCSE June2014-1H Q26b]

The diagram shows part of a sketch of the curve $y = \sin x°$



Write down the coordinates of the point Q.

.....

Question 11

Categorisation: Use known coordinates to determine the constants p and q in the exponential equation $y = pq^x$.

[Edexcel GCSE Nov2005-6H Q15]

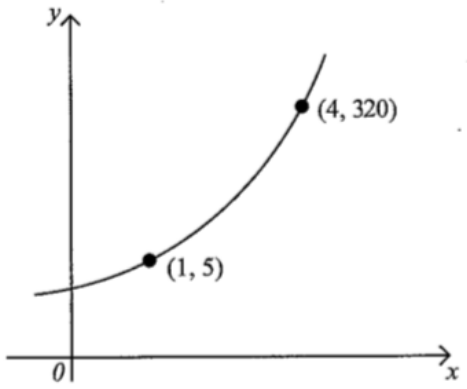


Diagram **NOT** accurately drawn

The sketch graph shows a curve with equation $y = pq^x$

The curve passes through the points $(1,5)$ and $(4,320)$.

Calculate the value of p and the value of q.

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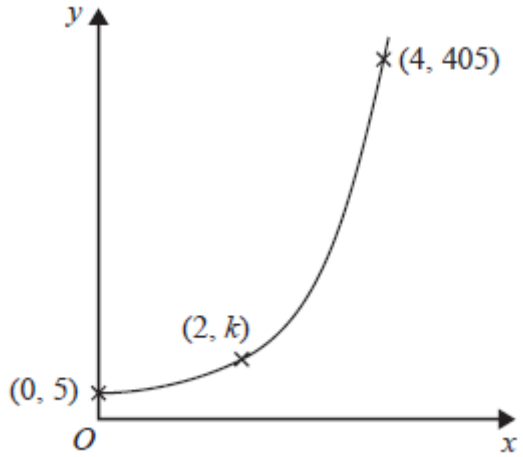
Question 12

Categorisation: As above.

[Edexcel GCSE(9-1) Mock Set 1 Autumn 2016 - 2H Q20]

Here is a sketch of part of the graph of $y = pq^x$ where $q > 0$



The points $(0,5)$, $(2,k)$ and $(4,405)$ are all on the graph of $y = pq^x$

Find the value of k

.....

Question 13

Categorisation: Understand and form exponential equations in context.

[Edexcel New SAMs Paper 3H Q17b]

Louis and Robert are investigating the growth in the population of a type of bacteria.

They have two flasks A and B. At the start of day 1, there are 1000 bacteria in flask A.

The population of bacteria grows exponentially at the rate of 50% per day.

The population of bacteria in flask A at the start of the 10th day is k times the population of bacteria in flask A at the start of the 6th day.

Find the value of k

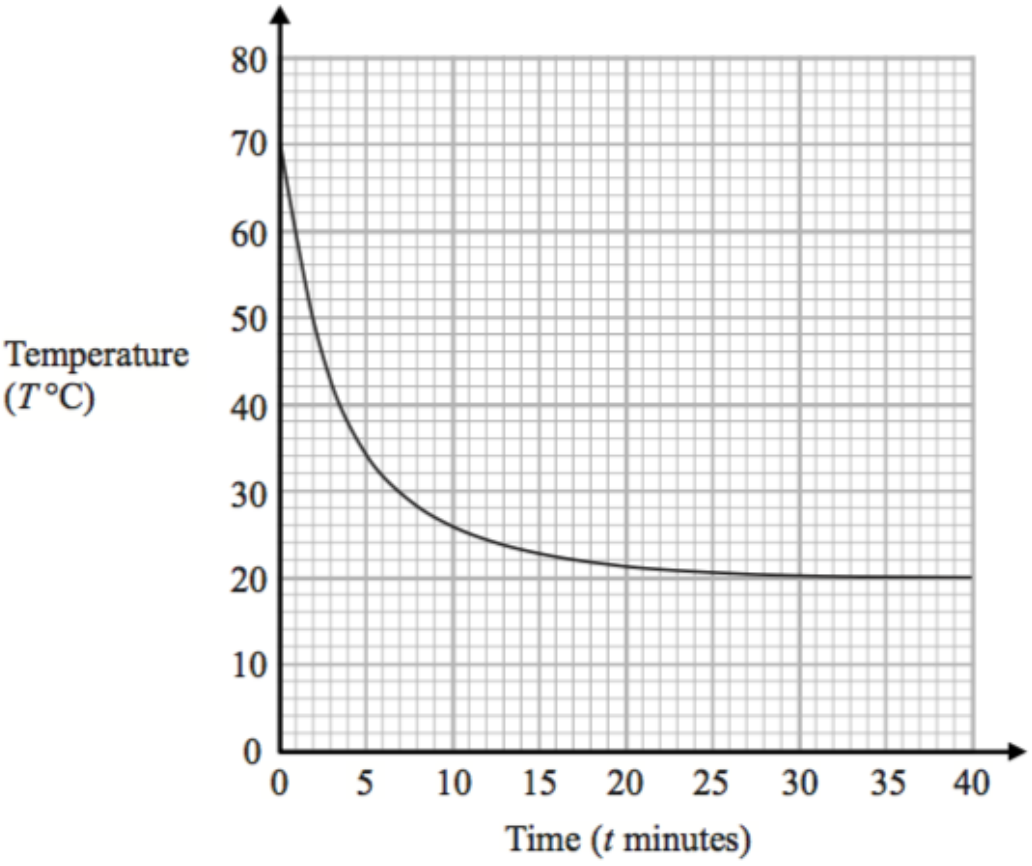
$k =$ .....

Question 14

Categorisation: Estimate the gradient of a graph by drawing the tangent.

[Edexcel GCSE(9-1) Mock Set 3 Autumn 2017 1H Q13b Edited]

The graph shows the temperature, T °C, of the coffee in a cup at a time t minutes.



Explain what the gradient of the graph at time 5 minutes represents.

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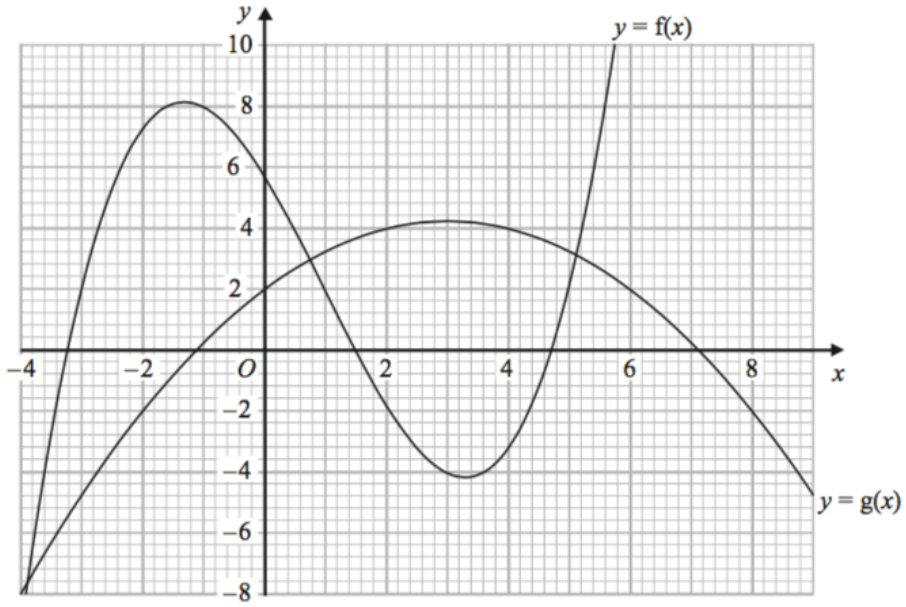
Question 15

Categorisation: As above.

[Edexcel IGCSE May2015(R)-3H Q20c]

The diagram shows parts of the graphs of $y = f(x)$ and $y = g(x)$.



Calculate an estimate for the gradient of the curve $y = f(x)$ at the point on the curve where $x = 3$

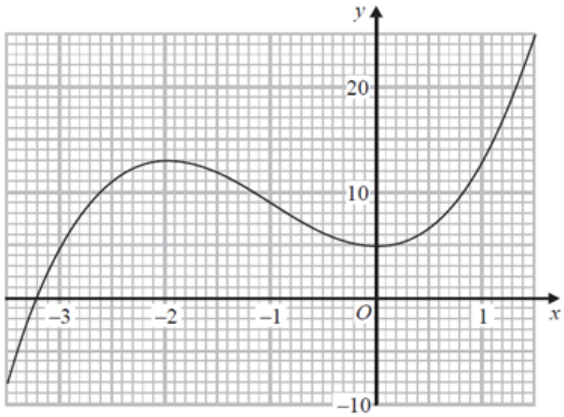
.....

Question 16

Categorisation: As above.

[Edexcel IGCSE Jan2016-3H Q15c]

The diagram shows the graph of $y = f(x)$ for $-3.5 \leq x \leq 1.5$



Find an estimate for the gradient of the curve at the point where $x = -2.5$

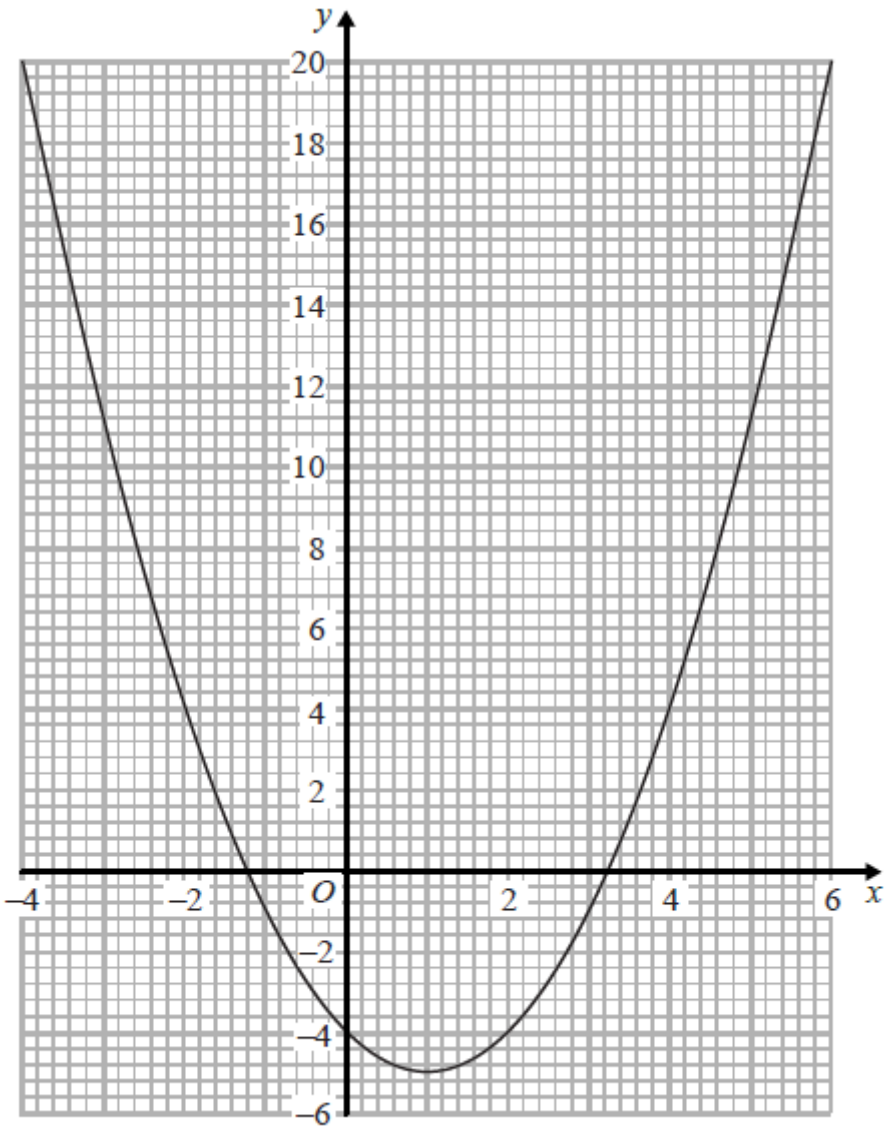
.....

Question 17

Categorisation: Estimate the roots of an equation using a graph.

[Edexcel GCSE(9-1) Mock Set 2 Spring 2017 2F Q25a, 2H Q4a]

Here is the graph of $y = x^2 - 2x - 4$



(a) Write down estimates for the roots of $x^2 - 2x - 4 = 0$

$x =$ .....

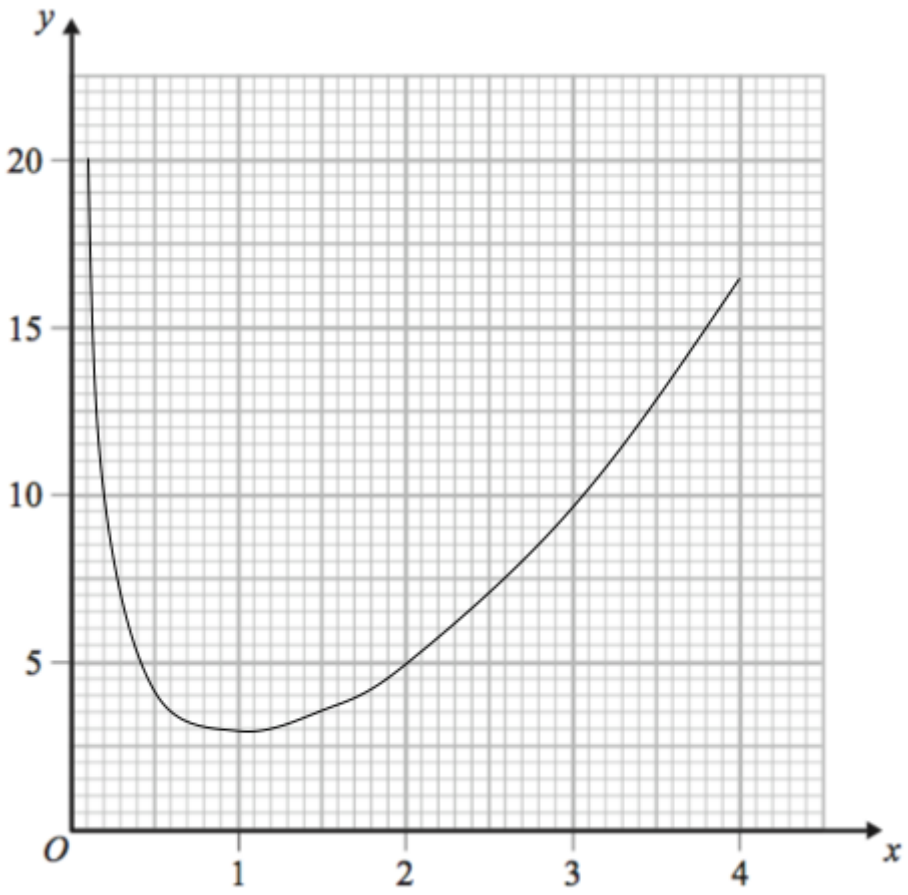
$x =$ .....

Question 18

Categorisation: Use a graph to estimate the solution of an equation when the y value is fixed.

[Edexcel IGCSE May2013(R)-4H Q20c Edited]

The graph of $y = x^2 + \frac{2}{x}$ is drawn below.



Use the graph to find estimates for the solutions of $x^2 + \frac{2}{x} = 14$ in the interval $0.1 \leq x \leq 4$

Give your estimates correct to 1 decimal place.

$x =$ .....

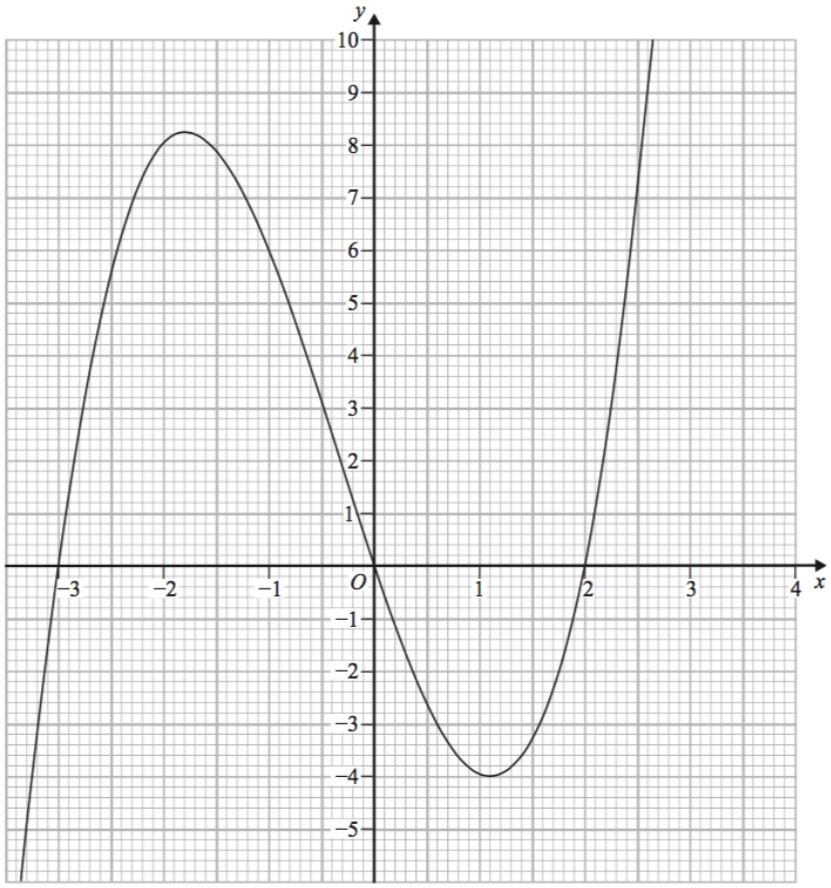
$x =$ .....

Question 19

Categorisation: Use a graph to reason about the number of solutions of an equation.

[Edexcel IGCSE Jan2017-4H Q19c]

Here is the graph of $y = h(x)$



The equation $h(x) = k$ has 3 different solutions for $a < k < b$

Use the graph to find an estimate for the value of a and the value of b .

$a =$ .....

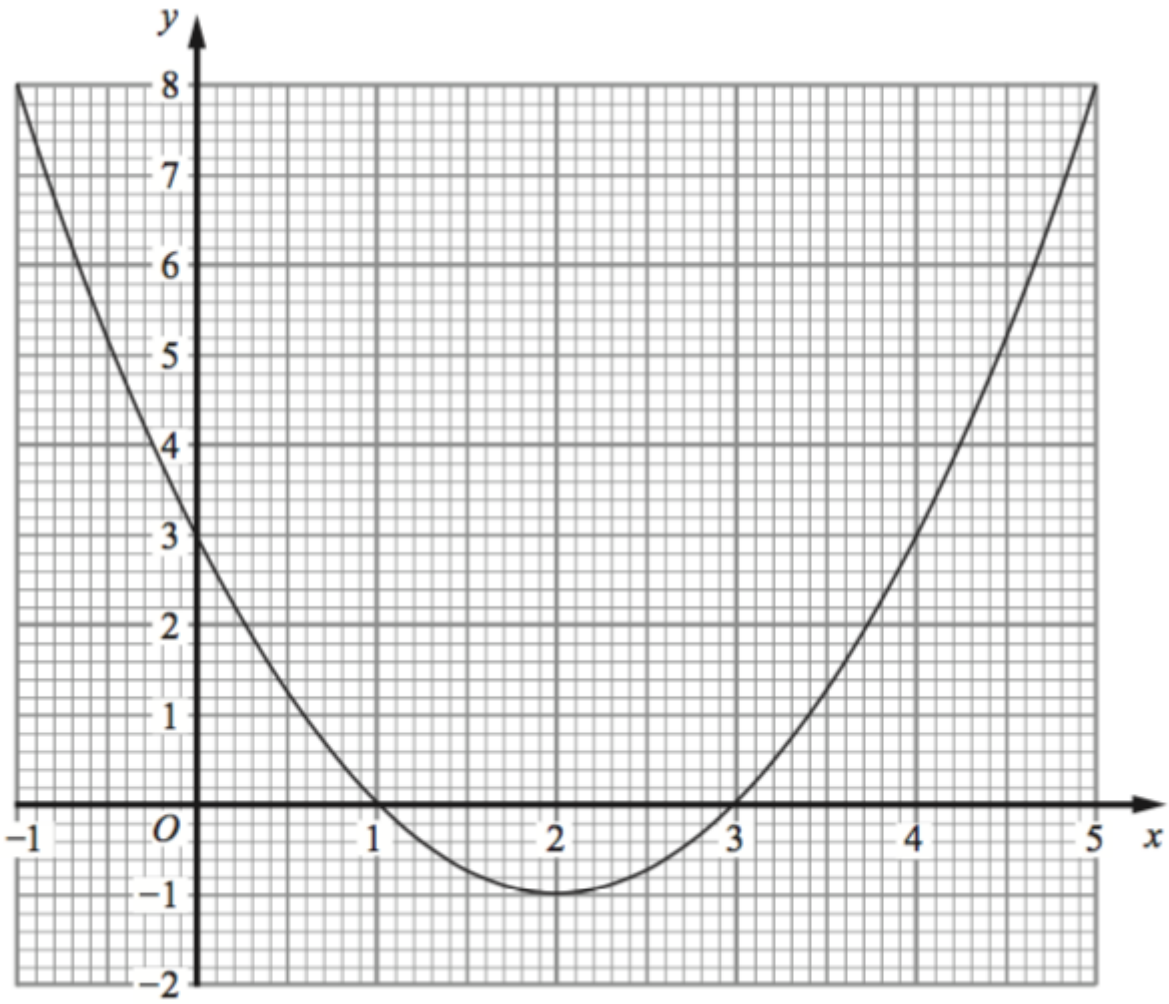
$b =$ .....

Question 20

Categorisation: Determine the solution to an equation by drawing an additional graph.

[Edexcel IGCSE Nov2010-3H Q14b]

The diagram shows the graph of $y = x^2 - 4x + 3$ for $-1 \leq x \leq 5$



By drawing a suitable straight line on the diagram, solve the equation $x^2 - 4x + 3 = x + 1$

$x =$ .....

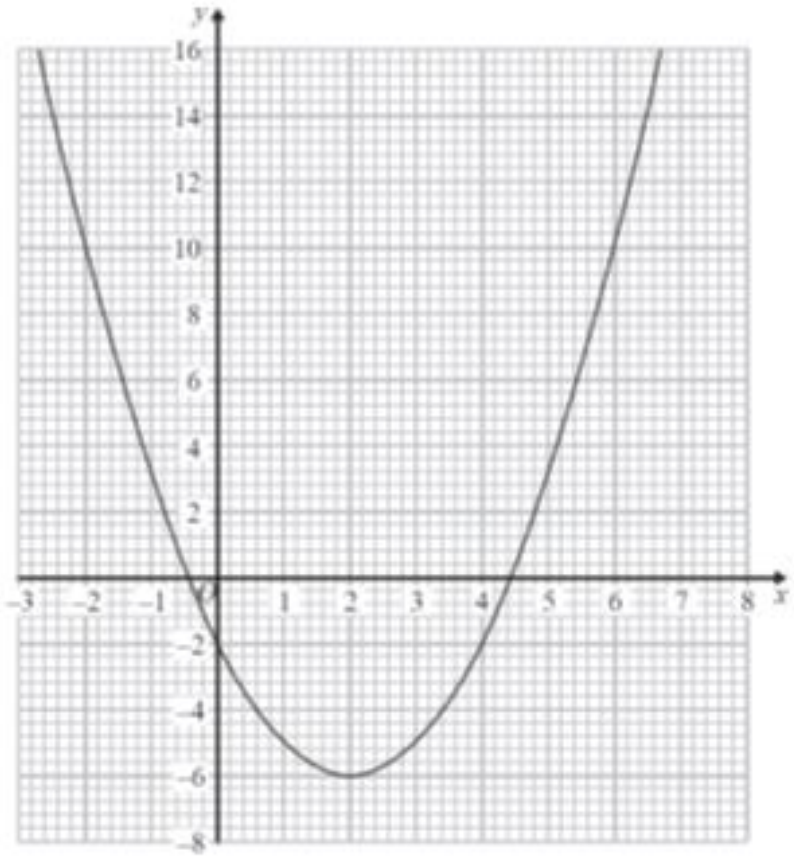
$x =$ .....

Question 21

Categorisation: As above, but where the original function is not explicit in the new equation to solve.

[Edexcel GCSE Jun2016-1H Q19aii]

The diagram shows the graph of $y = x^2 - 4x - 2$



Use the graph to find estimates for the solutions of $x^2 - 4x - 6 = 0$

$x =$ .....

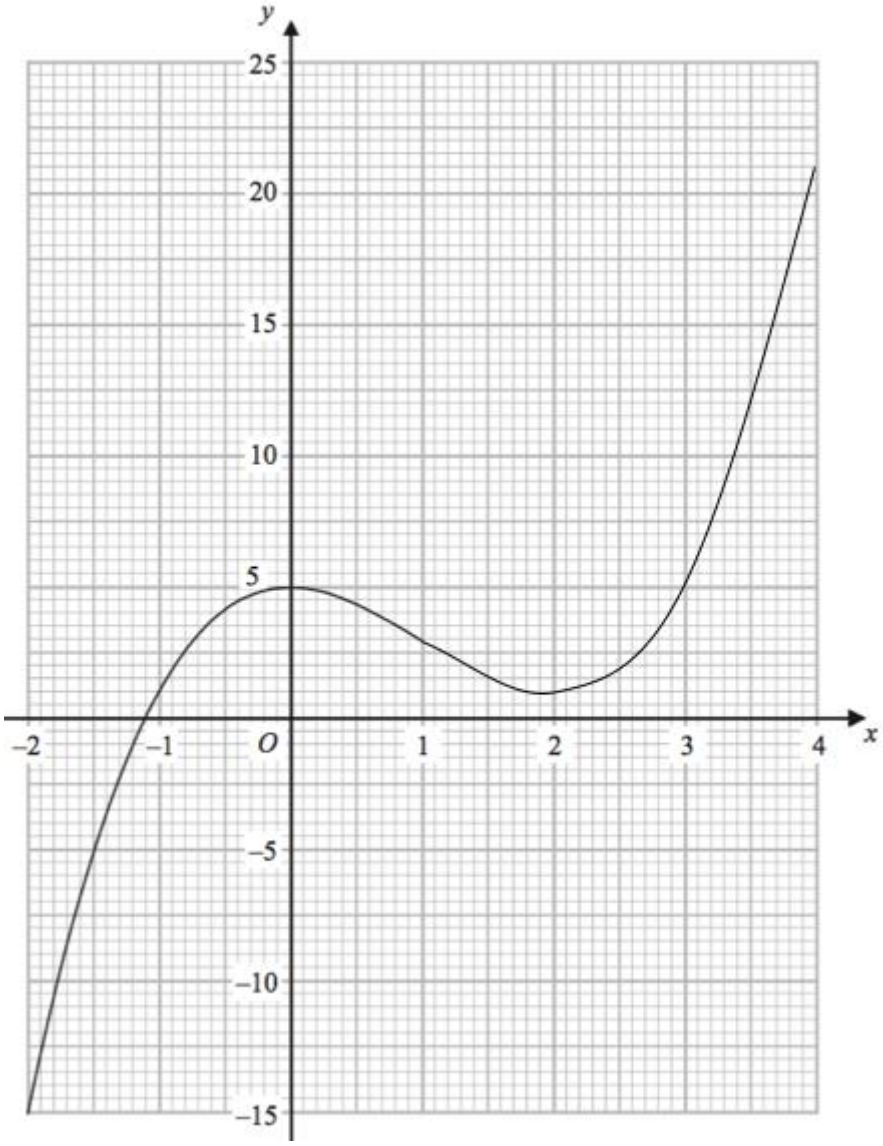
$x =$ .....

Question 22

Categorisation: As above, but where the additional graph to draw is a general straight line.

[Edexcel IGCSE May2015(R)-4H Q15d Edited]

The graph of $y = x^3 - 3x^2 + 5$ is drawn below.



By drawing a suitable straight line on the grid, find an estimate for the solution of the equation $x^3 - 3x^2 + 2x + 4 = 0$

$x =$ .....

Answers

Question 1

-8, 12, 10, 8, 12

Question 2

12, 2, 1.2

Question 3

B, D, A, C

Question 4

E, B, F, C, D, A

Question 5

"A"

Question 6

37.7 cm

Question 7

$a = -6$, $b = 2$

Question 8

$(-5, -7)$

Question 9

$(-4,3)$

Question 10

$(270, -1)$

Question 11

$p = 1.25$, $q = 4$

Question 12

$k = 45$

Question 13

$k = \frac{81}{16}$

Question 14

"rate of change OR rate of cooling"

Question 15

any value in the range
-1.4 to -0.7

Question 16

any value in the range 7 to 8

Question 17

$x = -1.2$ and $x = 3.2$ (awrt)

Question 18

any value in the range
$x =$ 0.1 to $x =$ 0.2 and
any value in the range
$x =$ 3.6 to $x =$ 3.7

Question 19

$a =$ -4 and any value in the range $b =$ 8.2 to $b =$ 8.3

Question 20

any value in the range
$x =$ 0.4 to $x =$ 0.5 and
any value in the range
$x =$ 4.5 to $x =$ 4.6

Question 21

any value in the range
$x =$ -1.2 to $x =$ -1.0
and any value in the range
$x =$ 5.0 to $x =$ 5.2

Question 22

any value in the range
$x =$ -0.9 to $x =$ -0.7