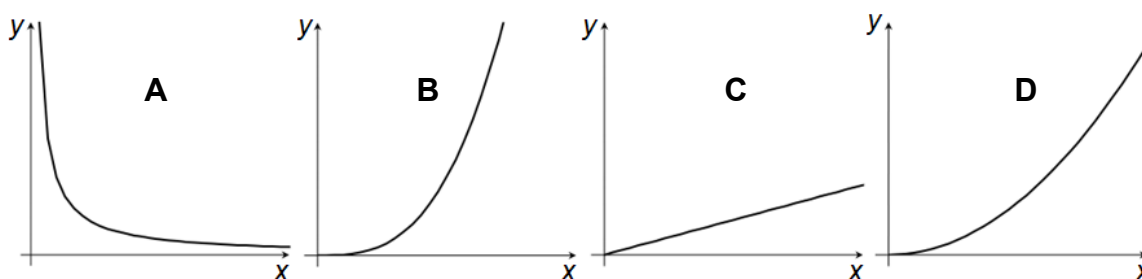


## Foundation Check In - 7.01 Graphs of equations and functions

1. Complete the table of values for  $3x + 2y = 1$  and then plot the graph on suitable axes.

x	-3	-2	-1	0	1	2	3
y							

2. Which of the graphs sketched below is the statement “as the value of  $x$  increases,  $y$  increases” **not** true for? Write down a possible equation for this graph.



3. Find the coordinates where  $y = x^2 - 3x - 10$  intercepts the  $x$ -axis.

4. Complete the table of values for  $y = \frac{1}{x^2}$  and then plot the graph on suitable axes.

x	-4	-2	-1	-0.5	0.5	1	2	4
y								

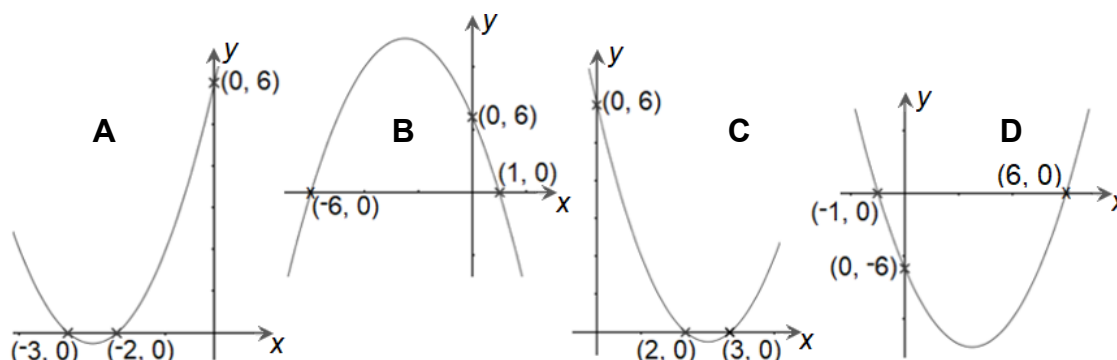
5. Match the following equations with the correct sketch.

$$y = x^2 - 5x + 6$$

$$y = 6 + 5x + x^2$$

$$y = x^2 - 5x - 6$$

$$y = 6 - 5x - x^2$$



# GCSE (9–1) MATHEMATICS

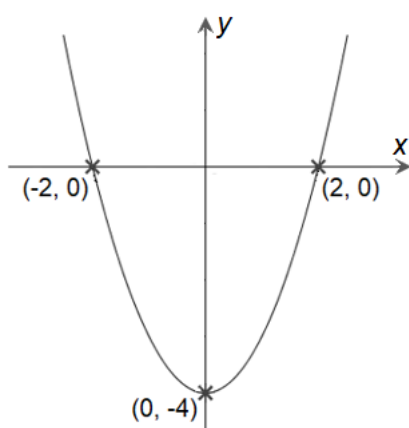
6. Explain why the following results table for the equation  $y = x^2 - x$  is not correct.

x	-3	-2	-1	0	1	2	3
y	6	2	0	0	0	2	6

7. Explain why the turning point of  $y = x^2 - 4x + 3$  occurs at  $x = 2$ .

8. Explain how the graph of  $y = x^2 + x - 6$  can be used to solve the equation  $x^2 + x - 10 = 0$ .

9. Find the equation of the graph shown below.



10. Complete the table of values for  $y = x - x^3$ .

Write down two more  $x$  values that will help you find the shape of the graph.  
Calculate  $y$  for your  $x$  values, then draw the graph.

x	-2	-1	0	1	2		
y							

## Extension

(a) Draw the graph of  $y = x^2 + 2x - 3$ .

(b) Write down the solutions to  $x^2 + 2x - 3 = 0$ .

(c) On the same axes draw the line  $y = 2x + 1$ .

(d) Use your graph to solve  $x^2 + 2x - 3 = 2x + 1$ .

(e) The solution to  $x^2 + 2x - 3 = 2x + 1$  is the same solution as \_\_\_\_\_ = 0.  
Write down the correct quadratic equation.

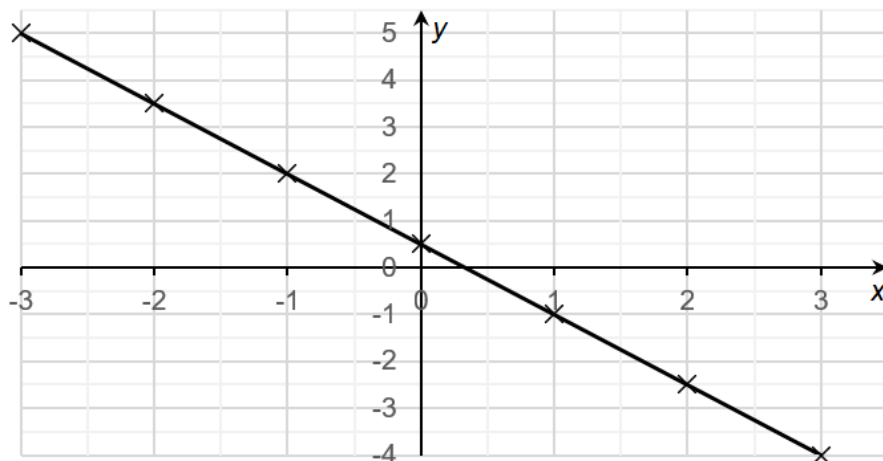
(f) Write two other equations that could be solved using the graph  $y = x^2 + 2x - 3$ .

# GCSE (9–1) MATHEMATICS

## Answers

1.

x	-3	-2	-1	0	1	2	3
y	5	3.5	2	0.5	-1	-2.5	-4



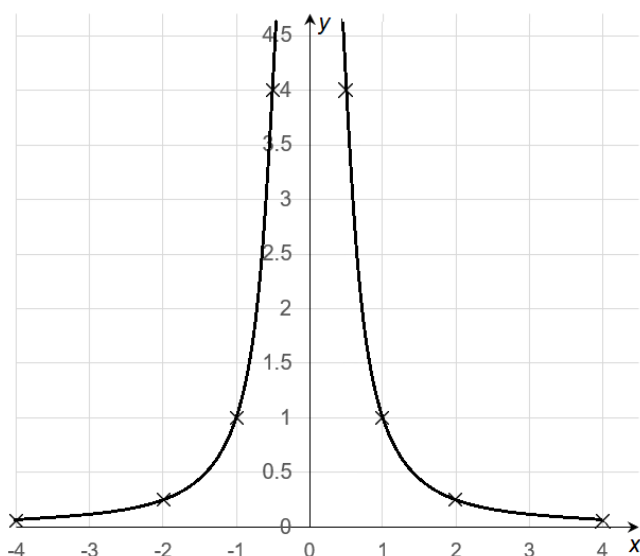
2. Graph **A**, with equation  $y = \frac{1}{x}$  or other valid equation.

3. When factorised, the equation is  $(x - 5)(x + 2) = 0$ .

$x = 5$  or  $x = -2$ , so the x-axis intercepts are  $(5, 0)$  and  $(-2, 0)$ .

4.

x	-4	-2	-1	-0.5	0.5	1	2	4
y	0.06	0.25	1	4	4	1	0.25	0.06



5.

A	B	C	D
$y = 6 + 5x + x^2$	$y = 6 - 5x - x^2$	$y = x^2 - 5x + 6$	$y = x^2 - 5x - 6$

# GCSE (9–1) MATHEMATICS

6. For the negative values of  $x$ , mistakes have been made in subtracting a negative.

$x = -3$	$x = -2$	$x = -1$
$y = (-3)^2 - (-3)$	$y = (-2)^2 - (-2)$	$y = (-1)^2 - (-1)$
$y = 9 + 3$	$y = 4 + 2$	$y = 1 + 1$
$y = 12$	$y = 6$	$y = 2$

7. Quadratic graphs are symmetrical with the line of symmetry passing through the turning point. The line of symmetry will be halfway between the roots of the equation.

$$x^2 - 4x + 3 = 0$$

$$(x - 1)(x - 3) = 0$$

The roots of the equation are at  $(1, 0)$  and  $(3, 0)$ , so the turning point is halfway between the roots at  $x = 2$ .

8. The equation  $x^2 + x - 10 = 0$  can be written as  $x^2 + x - 6 = 4$ .

The solutions of the equation  $x^2 + x - 10 = 0$  is where the graph of  $y = x^2 + x - 6$  and the line  $y = 4$  intersect.

9. Using the  $x$ -intercepts  $(-2, 0)$  and  $(2, 0)$

$$y = (x + 2)(x - 2)$$

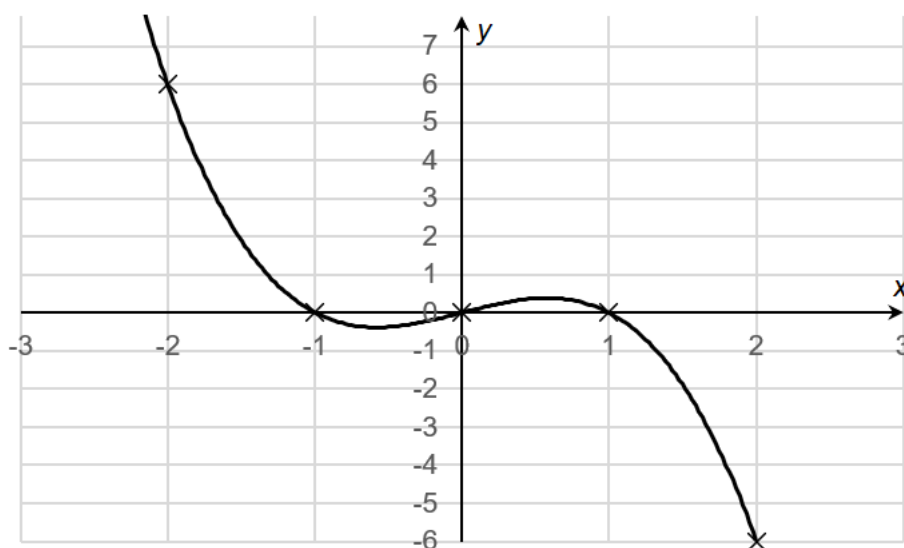
$$y = x^2 - 4$$

Then substitute  $x = 0$  to check that the  $y$ -intercept is  $(0, -4)$ .

The equation of the graph is  $y = x^2 - 4$ .

10. Additional  $x$  values between  $-1$  and  $0$  and between  $0$  and  $1$  are recommended.

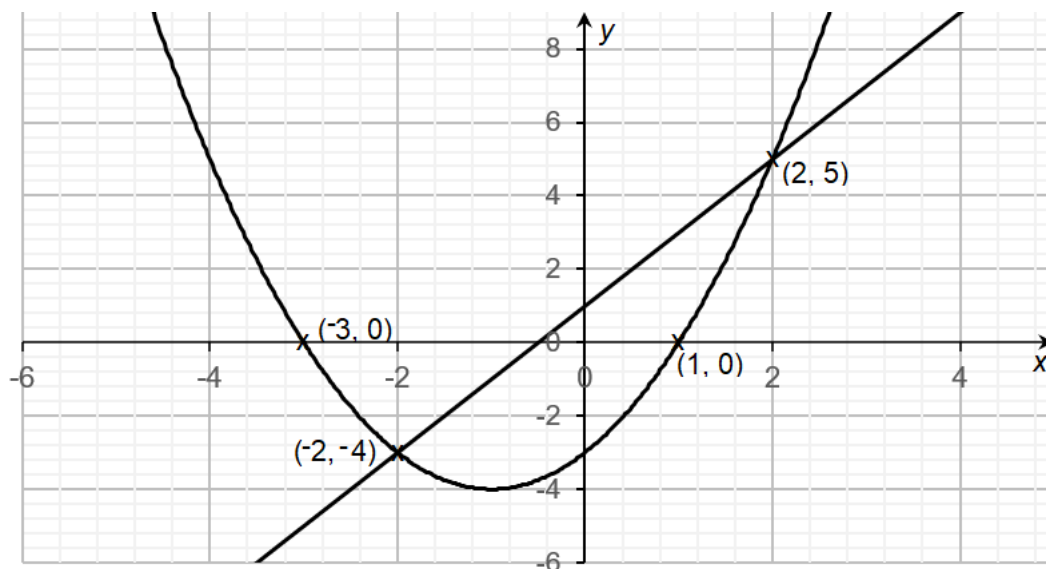
$x$	-2	-1	0	1	2	-0.5	0.5
$y$	6	0	0	0	-6	-0.375	0.375



# GCSE (9–1) MATHEMATICS

## Extension

(a) & (c)



(b)  $(-3, 0)$  and  $(1, 0)$

(c) See graph above

(d)  $x = -2$  and  $x = 2$

(e)  $y = x^2 - 4$

(f) Below are some possible examples, but there are too many to list here.

$y = x^2 + 2x - 3$	$y = x^2 + 2x - 3$	$y = x^2 + 2x - 3$	$y = x^2 + 2x - 3$
$y = 2x + 5$	$y = 5x + 2$	$y = 8$	$y = 2x - 5$
$\rightarrow 0 = x^2 - 8$	$\rightarrow 0 = x^2 - 3x - 5$	$\rightarrow 0 = x^2 + 2x - 11$	$\rightarrow 0 = x^2 + 2$

# GCSE (9–1)

# **MATHEMATICS**

We'd like to know your view on the resources we produce. Click '[Like](#)' or '[Dislike](#)' to send us an auto generated email about this resource. Add comments if you want to. Let us know how we can improve this resource or what else you need. Your email will not be used or shared for any marketing purposes.

Looking for another resource? There is now a quick and easy search [tool to help find free resources](#) for your qualification.

### **Resources: *the small print***

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up to date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please [contact us](#).

© OCR 2020 - You can copy and distribute this resource freely if you keep the OCR logo and this small print intact and you acknowledge OCR as the originator of the resource.

OCR acknowledges the use of the following content: N/A

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our [Expression of Interest form](#).

Please [get in touch](#) if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use a table of values to plot a linear graph			
AO1	2	Recognise a graph from a description			
AO1	3	Find the $x$ -axis intercepts of a quadratic equation			
AO1	4	Use a table of values to plot a reciprocal graph			
AO1	5	Identify intercepts of quadratic functions			
AO2	6	Interpret a table of values			
AO2	7	Using symmetry, identify the turning point of a quadratic function			
AO2	8	Identify the point of intersection of a line and a curve			
AO3	9	Identify intercepts and the turning point of a graph to determine its equation			
AO3	10	Recognise the shape of a cubic graph			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use a table of values to plot a linear graph			
AO1	2	Recognise a graph from a description			
AO1	3	Find the $x$ -axis intercepts of a quadratic equation			
AO1	4	Use a table of values to plot a reciprocal graph			
AO1	5	Identify intercepts of quadratic functions			
AO2	6	Interpret a table of values			
AO2	7	Using symmetry, identify the turning point of a quadratic function			
AO2	8	Identify the point of intersection of a line and a curve			
AO3	9	Identify intercepts and the turning point of a graph to determine its equation			
AO3	10	Recognise the shape of a cubic graph			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use a table of values to plot a linear graph			
AO1	2	Recognise a graph from a description			
AO1	3	Find the $x$ -axis intercepts of a quadratic equation			
AO1	4	Use a table of values to plot a reciprocal graph			
AO1	5	Identify intercepts of quadratic functions			
AO2	6	Interpret a table of values			
AO2	7	Using symmetry, identify the turning point of a quadratic function			
AO2	8	Identify the point of intersection of a line and a curve			
AO3	9	Identify intercepts and the turning point of a graph to determine its equation			
AO3	10	Recognise the shape of a cubic graph			

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use a table of values to plot a linear graph			
AO1	2	Recognise a graph from a description			
AO1	3	Find the $x$ -axis intercepts of a quadratic equation			
AO1	4	Use a table of values to plot a reciprocal graph			
AO1	5	Identify intercepts of quadratic functions			
AO2	6	Interpret a table of values			
AO2	7	Using symmetry, identify the turning point of a quadratic function			
AO2	8	Identify the point of intersection of a line and a curve			
AO3	9	Identify intercepts and the turning point of a graph to determine its equation			
AO3	10	Recognise the shape of a cubic graph			