



ACHIEVE ACADEMY

GCSE Maths — Foundation Tier

Quadratic, Cubic & Reciprocal Graphs · Practice Booklet

NAME: _____

CLASS: _____

DATE: _____

☐ Developing

☒ Secure

☐ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

Quadratic, Cubic & Reciprocal Graphs

Total marks available: 105

● Quadratic, Cubic & Reciprocal Graphs

✓ (a) $(0, -2)$; (b) $y = 6$

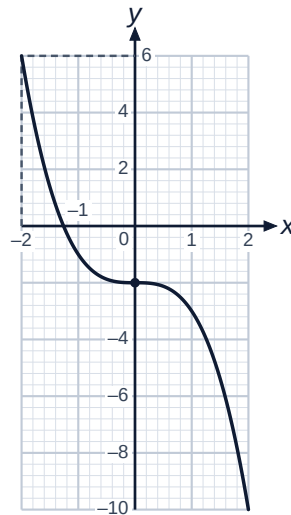
Q1 · ● Developing · 2 marks

METHOD

(a) The curve crosses the y -axis where $x = 0$: at $(0, -2)$

(b) Go up/down from $x = -2$ to the curve, then across to the y -axis: $y = 6$

B1 for each part



✓ Correct curve drawn (see below)

Q2 · ● Developing · 2 marks

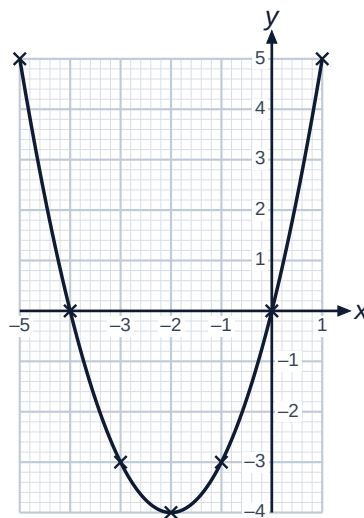
METHOD

Plot the points $(-5, 5)$, $(-4, 0)$, $(-3, -3)$... from the table ($\pm \frac{1}{2}$ small square).

Join them with a smooth curve – not ruled line segments.

B1 all points plotted correctly · B1 smooth curve

x	-5	-4	-3	-2	-1	0	1
y	5	0	-3	-4	-3	0	5



✓ Correct curve drawn (see below)

Q3 · ● Developing · 2 marks

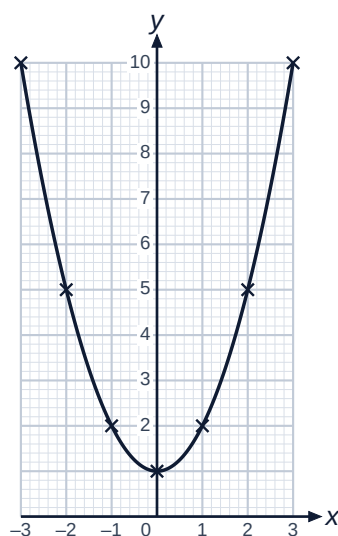
METHOD

Plot the points $(-3, 10)$, $(-2, 5)$, $(-1, 2)$... from the table ($\pm \frac{1}{2}$ small square).

Join them with a smooth curve – not ruled line segments.

B1 all points plotted correctly · B1 smooth curve

x	-3	-2	-1	0	1	2	3
y	10	5	2	1	2	5	10



✓ Correct curve drawn (see below)

Q4 · ● Developing · 2 marks

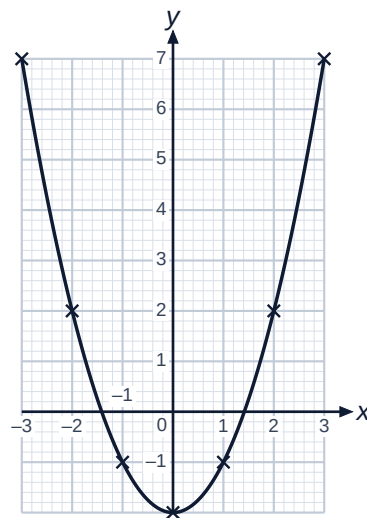
METHOD

Plot the points $(-3, 7)$, $(-2, 2)$, $(-1, -1)$... from the table ($\pm \frac{1}{2}$ small square).

Join them with a smooth curve – not ruled line segments.

B1 all points plotted correctly · B1 smooth curve

x	-3	-2	-1	0	1	2	3
y	7	2	-1	-2	-1	2	7



✓ (a) -5, 4; (b) curve drawn (see below)

Q5 · ● Developing · 4 marks

METHOD

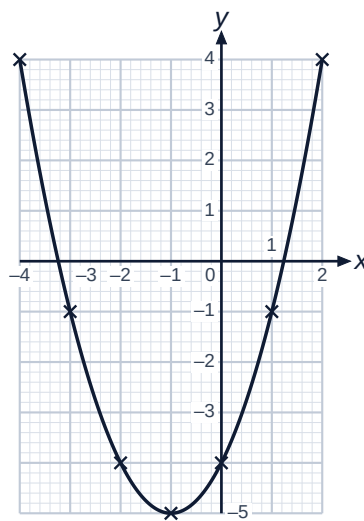
Substitute each x-value: $x = -4$: $y = 4$; $x = 2$: $y = 4$

B2 all missing values correct (B1 for at least one)

Plot all 7 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	-4	-3	-2	-1	0	1	2
y	4	-1	-4	-5	-4	-1	4



✓ (a) $-2, 7$; (b) curve drawn (see below)

Q6 · ● Developing · 4 marks

METHOD

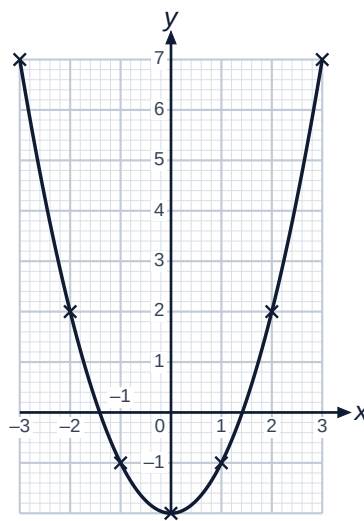
Substitute each x-value: $x = 0$: $y = -2$; $x = 3$: $y = 7$

B2 all missing values correct (B1 for at least one)

Plot all 7 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	-3	-2	-1	0	1	2	3
y	7	2	-1	-2	-1	2	7



✓ (a) $(0, -2)$; (b) $y = 2$

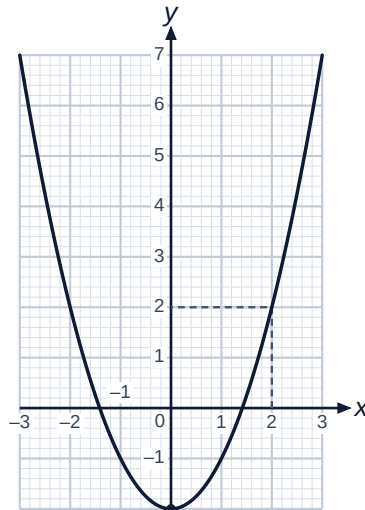
Q7 · ● Developing · 2 marks

METHOD

(a) The curve crosses the y -axis where $x = 0$ at $(0, -2)$

(b) Go up/down from $x = 2$ to the curve, then across to the y -axis: $y = 2$

B1 for each part



✓ (a) $(0, 1)$; (b) $y = -3$

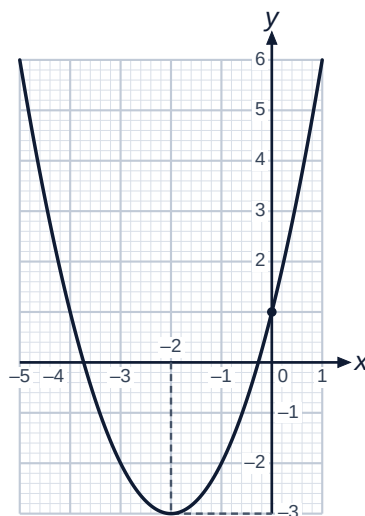
Q8 · ● Developing · 2 marks

METHOD

(a) The curve crosses the y -axis where $x = 0$ at $(0, 1)$

(b) Go up/down from $x = -2$ to the curve, then across to the y -axis: $y = -3$

B1 for each part



✓ (a) 10, 1, 5; (b) curve drawn (see below)

Q9 · ● Developing · 4 marks

METHOD

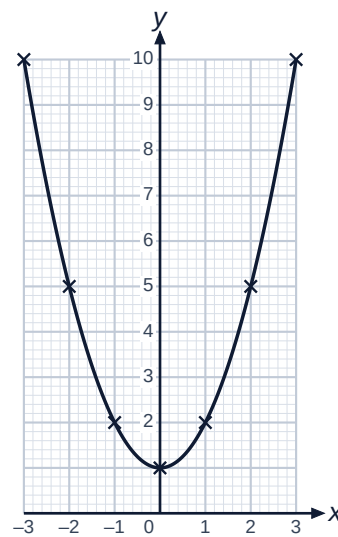
Substitute each x-value: $x = -3: y = 10$; $x = 0: y = 1$; $x = 2: y = 5$

B2 all missing values correct (B1 for at least one)

Plot all 7 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	-3	-2	-1	0	1	2	3
y	10	5	2	1	2	5	10



✓ Correct curve drawn (see below)

Q10 · ● Developing · 2 marks

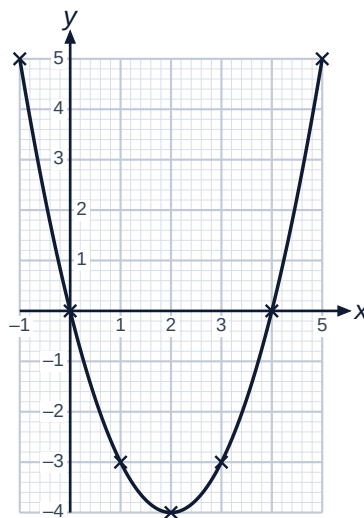
METHOD

Plot the points $(-1, 5)$, $(0, 0)$, $(1, -3)$... from the table ($\pm \frac{1}{2}$ small square).

Join them with a smooth curve – not ruled line segments.

B1 all points plotted correctly · B1 smooth curve

x	-1	0	1	2	3	4	5
y	5	0	-3	-4	-3	0	5



✓ (a) 0, -7; (b) curve drawn (see below)

Q11 · ● Secure · 4 marks

METHOD

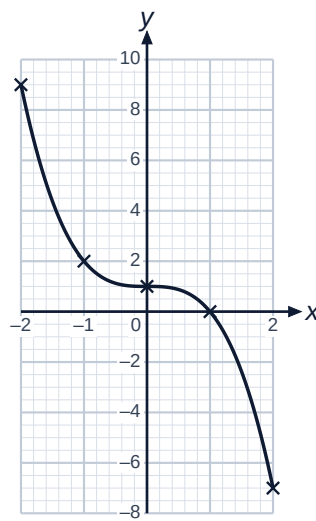
Substitute each x-value: $x = 1: y = 0$; $x = 2: y = -7$

B2 all missing values correct (B1 for at least one)

Plot all 5 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	-2	-1	0	1	2
y	9	2	1	0	-7



✓ (a) 12, 6; (b) curve drawn (see below)

Q12 · ● Secure · 4 marks

METHOD

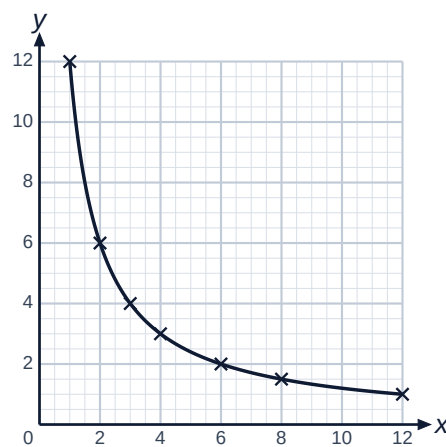
Substitute each x-value: $x = 1: y = 12$; $x = 2: y = 6$

B2 all missing values correct (B1 for at least one)

Plot all 7 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	1	2	3	4	6	8	12
y	12	6	4	3	2	1.5	1



✓ (a) 3, 1.5; (b) curve drawn (see below)

Q13 · ● Secure · 4 marks

METHOD

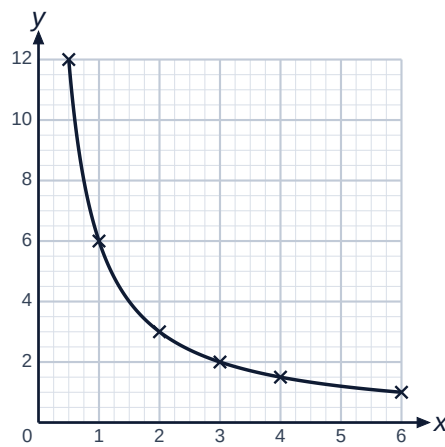
Substitute each x-value: $x = 2$: $y = 3$; $x = 4$: $y = 1.5$

B2 all missing values correct (B1 for at least one)

Plot all 6 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	0.5	1	2	3	4	6
y	12	6	3	2	1.5	1



✓ (a) $x = -1$ and $x = 1$; (b) $(0, 1)$

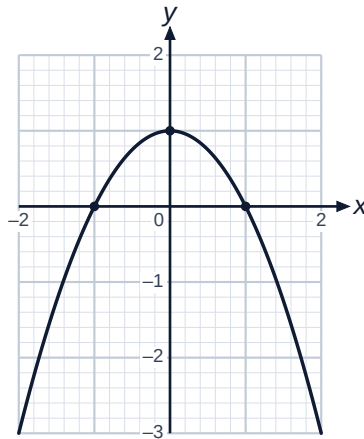
Q14 · ● Secure · 3 marks

METHOD

(a) The roots are where the curve crosses the x-axis ($y = 0$): $x = -1$ and $x = 1$

(b) The turning point is the maximum point of the curve: $(0, 1)$

B1 B1 roots · B1 turning point



✓ (a) $x = -4$ and $x = -2$; (b) $(-3, -1)$

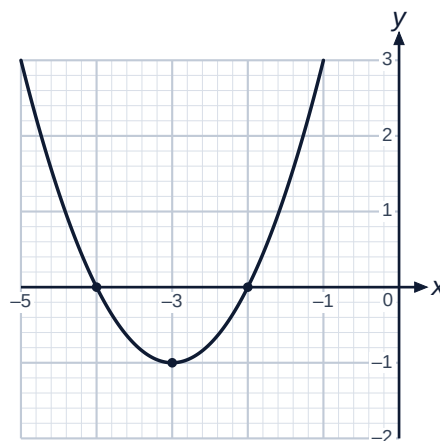
Q15 · ● Secure · 3 marks

METHOD

(a) The roots are where the curve crosses the x-axis ($y = 0$): $x = -4$ and $x = -2$

(b) The turning point is the minimum point of the curve: $(-3, -1)$

B1 B1 roots · B1 turning point



✓ (a) $x = -3$ and $x = -1$; (b) $(-2, -1)$

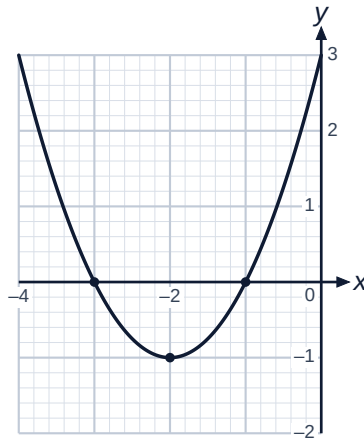
Q16 · ● Secure · 3 marks

METHOD

(a) The roots are where the curve crosses the x-axis ($y = 0$): $x = -3$ and $x = -1$

(b) The turning point is the minimum point of the curve: $(-2, -1)$

B1 B1 roots · B1 turning point



✓ (a) 0, 8; (b) curve drawn (see below)

Q17 · ● Secure · 4 marks

METHOD

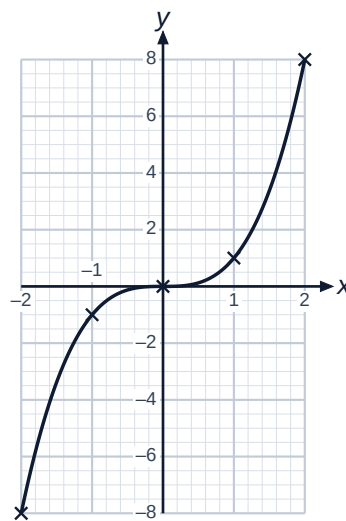
Substitute each x-value: $x = 0$: $y = 0$; $x = 2$: $y = 8$

B2 all missing values correct (B1 for at least one)

Plot all 5 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	-2	-1	0	1	2
y	-8	-1	0	1	8



✓ (a) 16, 4; (b) curve drawn (see below)

Q18 · ● Secure · 4 marks

METHOD

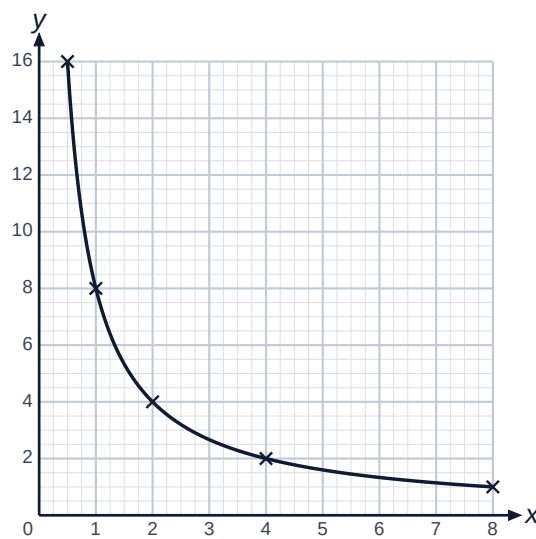
Substitute each x-value: $x = 0.5$: $y = 16$; $x = 2$: $y = 4$

B2 all missing values correct (B1 for at least one)

Plot all 5 points ($\pm 1/2$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	0.5	1	2	4	8
y	16	8	4	2	1



✓ (a) -1, 7; (b) curve drawn (see below)

Q19 · ● Secure · 4 marks

METHOD

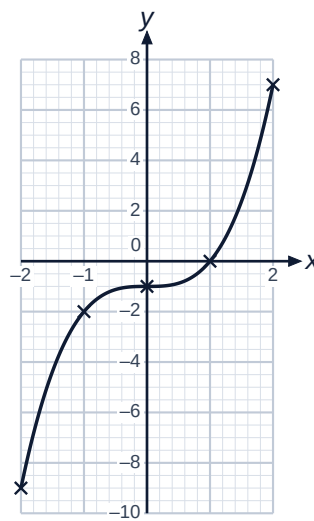
Substitute each x-value: $x = 0: y = -1$; $x = 2: y = 7$

B2 all missing values correct (B1 for at least one)

Plot all 5 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

x	-2	-1	0	1	2
y	-9	-2	-1	0	7



✓ (a) $x = -1$ and $x = 1$; (b) $(0, -1)$

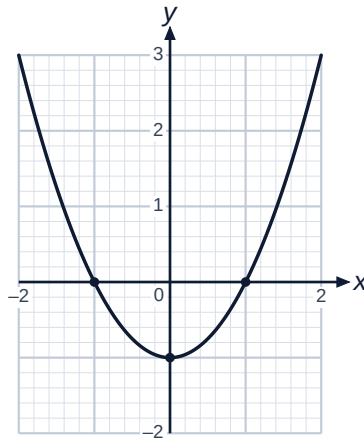
Q20 · ● Secure · 3 marks

METHOD

(a) The roots are where the curve crosses the x-axis ($y = 0$): $x = -1$ and $x = 1$

(b) The turning point is the minimum point of the curve: $(0, -1)$

B1 B1 roots · B1 turning point



✓ A: 4 · B: 3 · C: 2 · D: 1

Q21 · ● Greater Depth · 3 marks

METHOD

A: cubic S-shape $\rightarrow y = x^3 + 2$

B: two separate branches (reciprocal) $\rightarrow y = \frac{4}{x}$

C: parabola (quadratic) $\rightarrow y = x^2 + 2$

D: straight line $\rightarrow y = x - 2$

B3 all four correct (B2 two correct, B1 one correct)

✓ (a) $x = -3.2$ and $x = 1.2$; (b) $x = -2.7$ and $x = 0.7$

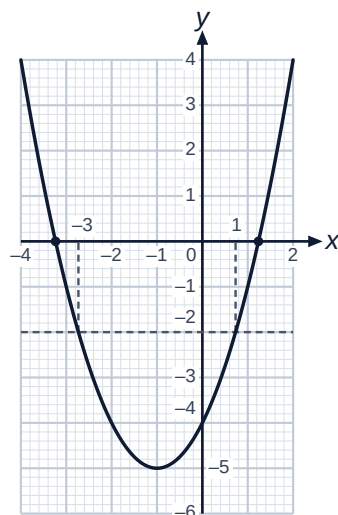
Q22 · ● Greater Depth · 4 marks

METHOD

(a) Read where the curve crosses the x-axis: $x = -3.2$ (accept -3.3 to -3.1) and $x = 1.2$ (accept 1.1 to 1.3)

(b) Draw the line $y = -2$ across the grid and read the x-values where it meets the curve: $x = -2.7$ (accept -2.8 to -2.6) and $x = 0.7$ (accept 0.6 to 0.8)

B1 B1 part (a) · M1 line $y = -2$ · A1 both values



✓ (a) $x = -2.7$ and $x = 0.7$; (b) $x = -2.4$ and $x = 0.4$

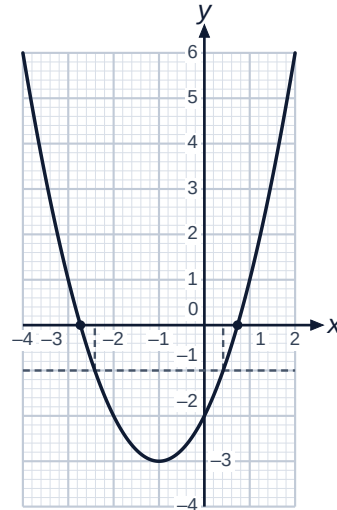
Q23 · ● Greater Depth · 4 marks

METHOD

(a) Read where the curve crosses the x -axis: $x = -2.7$ (accept -2.8 to -2.6) and $x = 0.7$ (accept 0.6 to 0.8)

(b) Draw the line $y = -1$ across the grid and read the x -values where it meets the curve: $x = -2.4$ (accept -2.5 to -2.3) and $x = 0.4$ (accept 0.3 to 0.5)

B1 B1 part (a) · M1 line $y = -1$ · A1 both values



✓ (a) -1, -5, -4; (b) curve drawn (see below); (c) $x = -2.2$ and $x = 2.2$

Q24 · ● Greater Depth · 6 marks

METHOD

Substitute each x-value: $x = -2$: $y = -1$; $x = 0$: $y = -5$; $x = 1$: $y = -4$

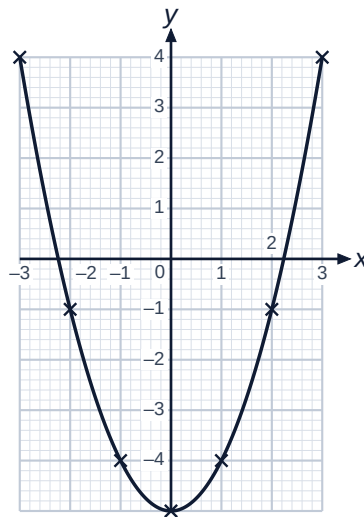
B2 all missing values correct (B1 for at least one)

Plot all 7 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

(c) Read where the curve crosses the x-axis: $x = -2.2$ (accept -2.3 to -2.1) and $x = 2.2$ (accept 2.1 to 2.3) · B1 B1 (follow through from their graph)

x	-3	-2	-1	0	1	2	3
y	4	-1	-4	-5	-4	-1	4



✓ (a) -2, -6, -5; (b) curve drawn (see below); (c) $x = -1.4$ and $x = 3.4$

Q25 · ● Greater Depth · 6 marks

METHOD

Substitute each x-value: $x = -1$: $y = -2$; $x = 1$: $y = -6$; $x = 2$: $y = -5$

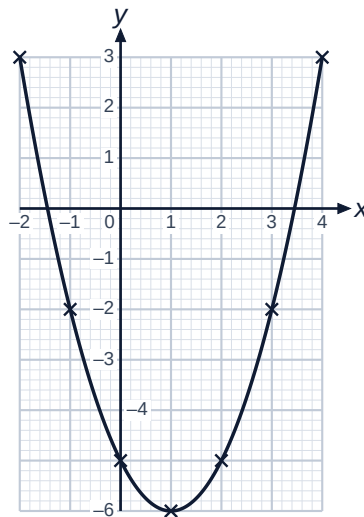
B2 all missing values correct (B1 for at least one)

Plot all 7 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

(c) Read where the curve crosses the x-axis: $x = -1.4$ (accept -1.5 to -1.3) and $x = 3.4$ (accept 3.3 to 3.5) · B1 B1 (follow through from their graph)

x	-2	-1	0	1	2	3	4
y	3	-2	-5	-6	-5	-2	3



- ✓ (a) 4, 4; (b) curve drawn (see below);
(c) $x = -3.2$ and $x = 1.2$

Q26 · ● Greater Depth · 6 marks

METHOD

Substitute each x-value: $x = -4$: $y = 4$; $x = 2$: $y = 4$

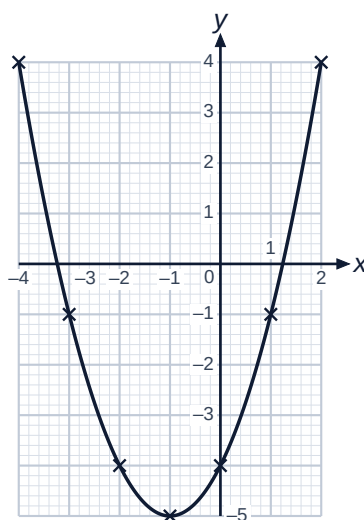
B2 all missing values correct (B1 for at least one)

Plot all 7 points ($\pm \frac{1}{2}$ small square) and join them with a smooth curve – not ruled line segments.

B1 points plotted · B1 smooth curve

(c) Read where the curve crosses the x-axis: $x = -3.2$ (accept -3.3 to -3.1) and $x = 1.2$ (accept 1.1 to 1.3) · B1 B1 (follow through from their graph)

x	-4	-3	-2	-1	0	1	2
y	4	-1	-4	-5	-4	-1	4



✓ (a) $x = -0.7$ and $x = 2.7$; (b) $x = -1.2$ and $x = 3.2$

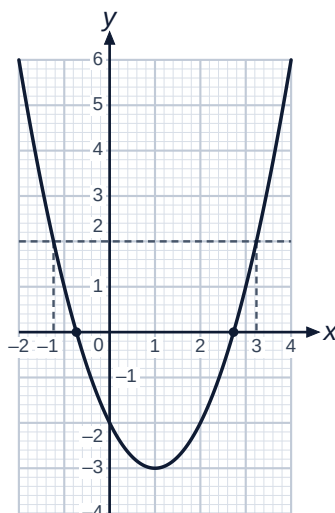
Q27 • ● Greater Depth • 4 marks

METHOD

(a) Read where the curve crosses the x-axis: $x = -0.7$ (accept -0.8 to -0.6) and $x = 2.7$ (accept 2.6 to 2.8)

(b) Draw the line $y = 2$ across the grid and read the x-values where it meets the curve: $x = -1.2$ (accept -1.3 to -1.1) and $x = 3.2$ (accept 3.1 to 3.3)

B1 B1 part (a) • M1 line $y = 2$ • A1 both values



✓ A: 2 • B: 3 • C: 1 • D: 4

Q28 • ● Greater Depth • 3 marks

METHOD

A: two separate branches (reciprocal) $\rightarrow y = \frac{4}{x}$

B: straight line $\rightarrow y = -x + 2$

C: parabola (quadratic) $\rightarrow y = -x^2 + 4$

D: cubic S-shape $\rightarrow y = x^3$

B3 all four correct (B2 two correct, B1 one correct)

✓ A: 4 · B: 1 · C: 3 · D: 2

Q29 · ● Greater Depth · 3 marks

METHOD

A: two separate branches (reciprocal) $\rightarrow y = \frac{2}{x}$

B: straight line $\rightarrow y = -x + 2$

C: parabola (quadratic) $\rightarrow y = x^2$

D: cubic S-shape $\rightarrow y = x^3$

B3 all four correct (B2 two correct, B1 one correct)

✓ (a) $x = -2.7$ and $x = 0.7$; (b) $x = -3.6$ and $x = 1.6$

Q30 · ● Greater Depth · 4 marks

METHOD

(a) Read where the curve crosses the x-axis: $x = -2.7$ (accept -2.8 to -2.6) and $x = 0.7$ (accept 0.6 to 0.8)

(b) Draw the line $y = 4$ across the grid and read the x-values where it meets the curve: $x = -3.6$ (accept -3.7 to -3.5) and $x = 1.6$ (accept 1.5 to 1.7)

B1 B1 part (a) · M1 line $y = 4$ · A1 both values

