Graphing parabolas

6 questions | 21 marks

Award the shown method marks for equivalent correct working.

1. For $y = x^2 - 4$, calculate y for $x = -3, -2, -1, 0, 1, 2, 3$. Write the ordered pairs. [3 marks]

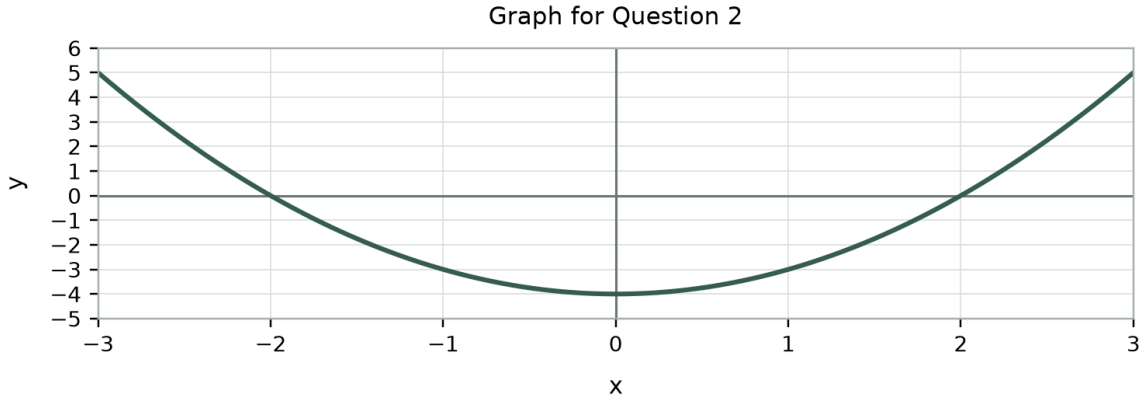
Correct values for negative inputs: $5, 0, -3$ [1].

Correct value for zero: -4 [1].

Correct values for positive inputs: $-3, 0, 5$ and ordered pairs in (x, y) order [1].

Answer: $(-3, 5), (-2, 0), (-1, -3), (0, -4), (1, -3), (2, 0), (3, 5)$.

2. Use the graph of $y = x^2 - 4$ supplied with this worksheet. [4 marks]



(a) State the turning point.

Turning point $(0, -4)$ [1].

Answer: $(0, -4)$.

(b) State the x-intercepts.

Give the x-intercept $(-2, 0)$ [1] and $(2, 0)$ [1].

Answer: $(-2, 0)$ and $(2, 0)$.

(c) Write the axis of symmetry.

Axis $x = 0$ [1].

Answer: $x = 0$.

3. For $y = (x-2)^2 - 9$: [4 marks]

(a) State the turning point and whether the graph opens up or down.

Turning point $(2, -9)$ [1]; opens up [1].

Answer: $(2, -9)$; opens up.

(b) Find the roots.

Use $(x-2)^2 = 9$, so $x - 2 = \pm 3$ [1]; both roots $-1, 5$ [1].

Answer: $x = -1$ or $x = 5$.

4. For $y = -x^2 + 9$: [4 marks]

(a) State the highest point.

Highest point $(0, 9)$ [1].

Answer: $(0, 9)$.

(b) Find both roots.

Give the root -3 [1] and 3 [1].

Answer: -3 and 3.

(c) State whether its turning point is a maximum or minimum.

Maximum [1].

Answer: A maximum.

5. Compare $y = x^2$ and $y = 2x^2$. [3 marks]

(a) Find the y value on each graph when $x = 1$.

$y = 1$ for $y = x^2$ [1]; $y = 2$ for $y = 2x^2$ [1].

Answer: 1 and 2.

(b) Which graph is narrower?

$y = 2x^2$ is narrower [1].

Answer: $y = 2x^2$.

6. Compare $y = x^2 + 3$ and $y = x^2 - 2$. [3 marks]

(a) How far above the second graph is the first graph?

Find $3 - (-2) = 5$ units [1].

Answer: 5 units.

(b) Do they have the same axis of symmetry? Give its equation.

State they share an axis [1] and give $x = 0$ [1].

Answer: Yes; $x = 0$.