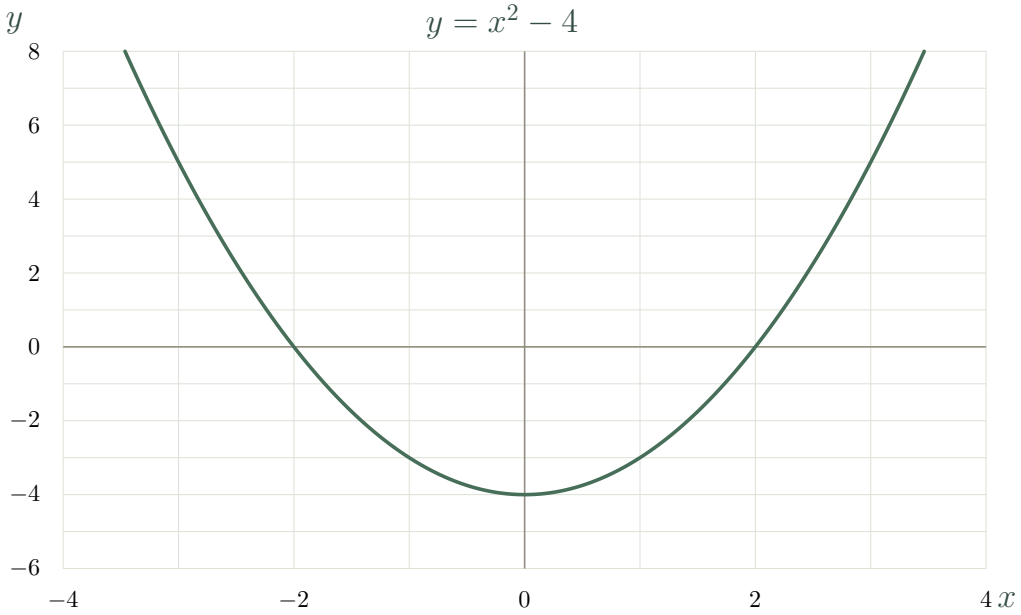
Sketching by hand and with graphing tools

6 questions | 17 marks

Equivalent correct methods earn the corresponding marks.

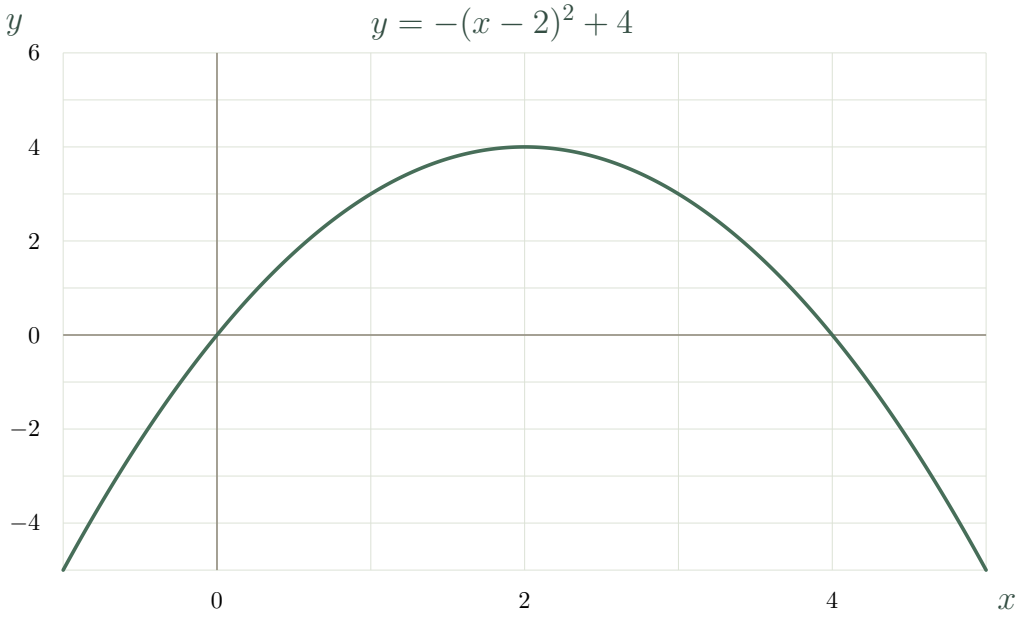
1. Sketch $y = x^2 - 4$. Label the vertex and all intercepts. [3 marks]



$x^2 = 4$ gives the roots; the y-intercept equals the vertex.

Answer: Vertex $(0, -4)$; roots $-2, 2$; upward opening.

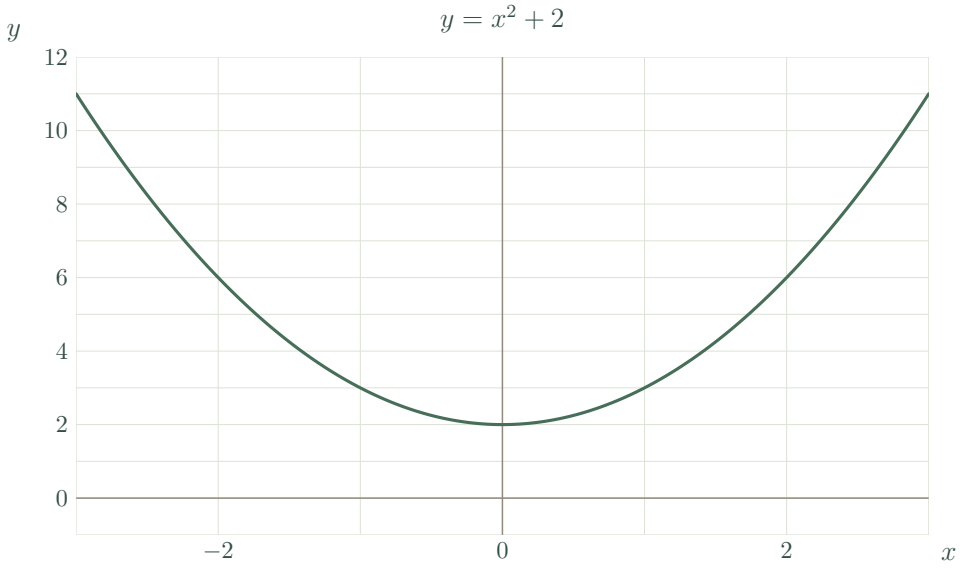
2. Sketch $y = -(x-2)^2 + 4$. Label the vertex and all intercepts. [3 marks]



Set $(x-2)^2 = 4$ for the roots.

Answer: Vertex $(2, 4)$; roots $0, 4$; y-intercept $(0, 0)$; downward opening.

3. Sketch $y = x^2 + 2$. Explain why there are no x-intercepts. [3 marks]



A real square cannot be negative, so $x^2 + 2$ cannot equal zero.

Answer: Vertex $(0, 2)$, upward opening; $x^2 + 2 \geq 2$.

4. Describe how to obtain $y = -x^2 + 3$ from $y = x^2$, then state the vertex. [2 marks]

The negative sign reverses y-values; adding 3 shifts them upward.

Answer: Reflect in the x-axis and move up 3; vertex $(0, 3)$.

5. The table is intended for $y = x^2 - 2x - 3$. Identify the incorrect entry and correct it. [3 marks]

One y-value is incorrect.

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

Substitute $x = 2$: $4 - 4 - 3 = -3$.

The correct table is symmetric about $x = 1$.

Answer: At $x = 2$, $y = -3$, not -1.

6. A tool uses $-5 \le x \le 5$ to graph $y = x^2 - 10x + 16$ and shows only one root. Find both roots and suggest a better horizontal window. [3 marks]

$(x - 2)(x - 8) = 0$.

The second root is outside the original horizontal window; the axis is $x = 5$.

Answer: Roots $2, 8$; for example $0 \le x \le 10$.