Quadratics and Parabolas - Practice 1

16 questions | 44 marks | 60 minutes

Balanced expansion, factorisation, equations and graph features.

Equivalent correct methods earn the corresponding marks.

1. Expand $(x+2)(x+6)$. [2 marks]

$x^2+6x+2x+12=x^2+8x+12.$

Answer: $x^2+8x+12$

2. Expand $(x-4)^2$. [2 marks]

$(x-4)(x-4)=x^2-4x-4x+16.$

Answer: $x^2-8x+16$

3. Use a difference of squares to calculate 19×21. [2 marks]

$(20-1)(20+1)=20^2-1^2=399.$

Answer: 399

4. Factorise $x^2+9x+20$. [2 marks]

$4+5=9$ and $4\times5=20.$

Answer: $(x+4)(x+5)$

5. Factorise x^2-x-12. [2 marks]

$-4+3=-1$ and $(-4)(3)=-12.$

Answer: $(x-4)(x+3)$

6. Solve $x^2-5x+6=0$. [2 marks]

$(x-2)(x-3)=0.$

Answer: $x=2,3$

7. Solve $x^2=4x$. [2 marks]

$x^2-4x=x(x-4)=0.$

Answer: $x=0,4$

8. Complete a table for $y = x^2 - 2x - 3$ at $x = -1, 0, 1, 2, 3$. [3 marks]

Complete the outputs

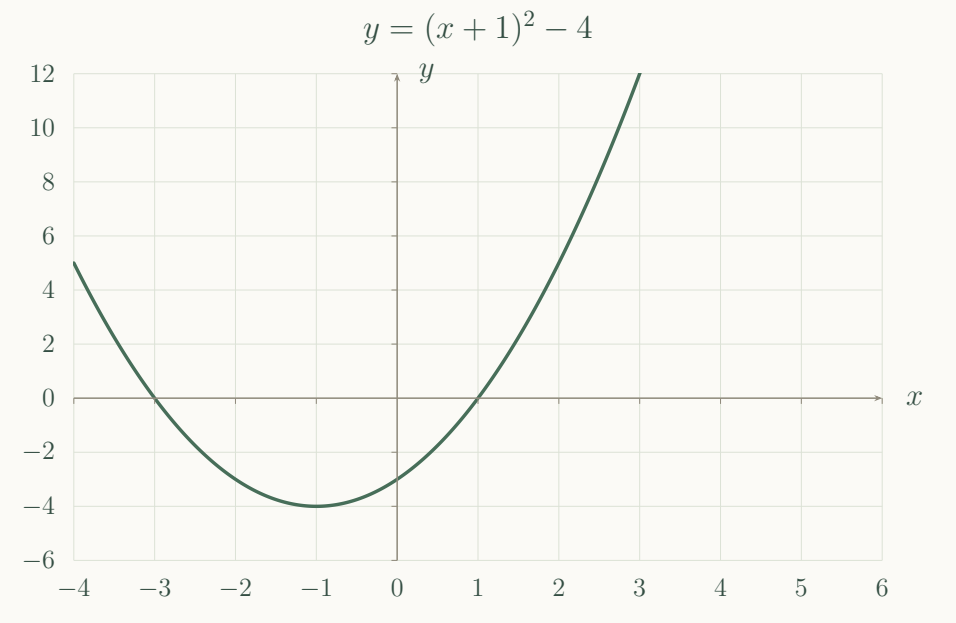
x	-1	0	1	2	3
y	?	?	?	?	?

At $x = -1$, $1 + 2 - 3 = 0$.

The remaining substitutions give -3, -4, $-3, 0$.

Answer: $0, -3, -4, -3, 0$

9. The supplied curve is $y = (x+1)^2 - 4$. [4 marks]



(a) State both x-intercepts. [2 marks]

The curve crosses the x-axis at -3 and 1.

Answer: $(-3, 0), (1, 0)$

(b) State the turning point and axis. [2 marks]

The minimum is halfway between the roots.

Answer: $(-1, -4)$; axis $x = -1$.

10. Give the turning point and minimum of $y = (x+2)^2 - 1$. [3 marks]

The square is zero at $x = -2$ and cannot be negative.

Answer: $(-2, -1)$; minimum -1.

11. For $y = -x^2 + 16$, state the maximum and both roots. [3 marks]

The maximum is at $x = 0$.

$x^2 = 16$ gives $x = \pm 4$.

Answer: Maximum 16; roots $-4, 4$.

12. Lee says $(x+5)^2 = x^2 + 25$. Explain the missing term. [3 marks]

The two cross-products are $5x$ and $5x$.

The correct expansion is $x^2 + 10x + 25$.

Answer: The missing term is $10x$.

13. Write a monic quadratic rule with roots -4 and 2, then expand it. [3 marks]

Use a bracket zero at each root.

Expand and combine $-2x + 4x$.

Answer: $y = (x+4)(x-2) = x^2 + 2x - 8$

14. A rectangle is x cm wide and $x+2$ cm long. Its area is $63\ \text{cm}^2$. Find its dimensions. [4 marks]

$x^2 + 2x - 63 = (x+9)(x-7) = 0$.

Reject $x = -9$; $x = 7$.

$7 \times 9 = 63$.

Answer: $7\ \text{cm}$ by $9\ \text{cm}$

15. Estimate both solutions of $x^2 = 10$ to two decimal places. [3 marks]

$\sqrt{10} \approx 3.16227766$.

Both signs have the same square.

Answer: $x \approx -3.16, 3.16$

16. Revenue is $R = n(14 - n)$ dollars. Find whole-number counts giving $R = 40$ and check both. [4 marks]

$n^2 - 14n + 40 = (n-4)(n-10) = 0$.

$4(10) = 40$ and $10(4) = 40$; both prices are positive.

Answer: $n = 4, 10$