

Quadratic Functions and Equations: math test solutions, Grade 11 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Vertex form

/ 3 pts

(a) $f(x) = (x^2 - 8x + 16) - 16 + 11 = (x - 4)^2 - 5$. (2 pts)

(b) The vertex is $(4, -5)$, the axis is $x = 4$ and the y-intercept is 11. (1 pt)

2 Factoring

/ 4 pts

(a) Numbers with product -30 and sum -7 : -10 and 3 .

$2x^2 - 10x + 3x - 15 = (2x + 3)(x - 5)$. (2 pts)

(b) $4x^2 - 81 = (2x - 9)(2x + 9)$. (1 pt)

(c) $x = -\frac{3}{2}$ or $x = 5$. (1 pt)

3 Quadratic formula (calculator allowed)

/ 4 pts

$a = 2, b = 3, c = -7: \Delta = 9 + 56 = 65.$ (1 pt)

$$x = \frac{-3 \pm \sqrt{65}}{4}. \text{ (2 pts)}$$

$x \approx 1.27$ or $x \approx -2.77.$ (1 pt)

4 The discriminant

/ 3 pts

(a) $\Delta = 36 - 36 = 0$: one real solution ($x = 3$). (1 pt)

(b) $\Delta = 4 - 48 = -44 < 0$: the solutions are complex, not real. (1 pt)

(c) $\Delta = 25 - 8k = 0$, so $k = \frac{25}{8}.$ (1 pt)

5 Inequalities

/ 3 pts

(a) $(x - 4)(x + 2) \leq 0$, so $-2 \leq x \leq 4$, that is $[-2, 4].$ (1.5 pts)

(b) $x^2 + 3x - 10 > 0$, so $(x + 5)(x - 2) > 0$, which gives $x < -5$ or $x > 2.$ (1.5 pts)

6 A water jet (calculator allowed)

/ 3 pts

(a) The vertex is at $x = -\frac{2}{2 \cdot (-0.25)} = 4$, and $h(4) = -4 + 8 + 1.75 = 5.75.$ The maximum height is 5.75 feet. (1 pt)

(b) $-0.25x^2 + 2x + 1.75 = 4.75$ gives $x^2 - 8x + 12 = 0$, so $(x - 2)(x - 6) = 0$: at $x = 2$ ft and $x = 6$ ft. (1 pt)

(c) $h(x) = 0$ gives $x^2 - 8x - 7 = 0$, so $x = 4 + \sqrt{23} \approx 8.8$ feet (the negative root is rejected). (1 pt)



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