

6L / Classroom answers

Teacher copy. Accept equivalent exact forms and valid alternative reasoning.

1. Evaluate a quadratic

$$y = 0.$$

- $y = -2(-2)^2 + 8 = -2(4) + 8 = 0.$

2. Opening and width

It opens upward and is wider.

- The coefficient is positive. Its magnitude, $\frac{1}{4}$, is less than 1, making a wider curve on the same axes.

3. Vertex and symmetry

Vertex $(2, -1)$; symmetry line $x = 2$.

- The lowest point is $(2, -1)$, and the matching halves lie on either side of the vertical line $x = 2$.

4. Reflected points

Matching point $(4, 3)$; distance 4 m.

- A is 2 m left of $x = 2$. Its matching point is 2 m right, at $(4, 3)$.
- The horizontal separation is $4 - 0 = 4$ m.

5. Intercepts and span

Crossings $(-4, 0)$ and $(4, 0)$; width 8 m.

- At ground level, $0 = -\frac{1}{2}x^2 + 8$, so $x^2 = 16$ and $x = \pm 4$.
- The width is $4 - (-4) = 8$ m.

6. Clearance with parabolas

Yes. The smallest gap above its roof is exactly 0.5 m.

- The arch is lowest over the vehicle at its outer edges: $y = -\frac{1}{2}(2)^2 + 8 = 6$ m.
- The available gap is $6 - 5.5 = 0.5$ m, so the whole roof meets the requirement.

6L / Homework answers

Teacher copy. Accept equivalent exact forms and valid alternative reasoning.

1. Evaluate a quadratic

$$y = 9.$$

- $y = -3(-1)^2 + 12 = -3 + 12 = 9.$

2. Opening and width

It opens downward and is narrower.

- The coefficient is negative, so the curve is reflected downward. Its magnitude is $2 > 1$, making it narrower on the same axes.
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3. Vertex and symmetry

Vertex $(-1, -4)$; symmetry line $x = -1$.

- The lowest point is $(-1, -4)$, so the matching halves are separated by the vertical line $x = -1$.
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4. Reflected points

Matching point $(2, 5)$; distance 6 m.

- B is 3 m left of $x = -1$. Its partner is 3 m right, at $(2, 5)$.
 - The separation is $2 - (-4) = 6$ m.
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5. Intercepts and span

Crossings $(-4, 0)$ and $(8, 0)$; width 12 m.

- $0 = -\frac{1}{4}(x - 2)^2 + 9$ gives $(x - 2)^2 = 36$, so $x - 2 = \pm 6$.
 - Thus $x = -4$ or $x = 8$, and the width is $8 - (-4) = 12$ m.
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6. Clearance with parabolas

No. At the right edge, the roof touches the arch, leaving no safety gap.

- The arch is lowest over this lane at $x = 6$: $y = -\frac{1}{4}(6 - 2)^2 + 9 = 5$ m.
 - The gap is $5 - 5 = 0$ m, less than the required 0.5 m.
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