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Chapter 6 Review

6.1 Minima and Maxima

1. Rewrite each relation in the form $y = a(x - h)^2 + k$ by completing the square.
a) $y = x^2 + 6x + 3$
d) $y = x^2 + 10x - 5$

2. Find the vertex of each quadratic relation. Sketch a graph of the relation, labelling the vertex, the axis of symmetry, and two other points.
a) $y = x^2 + 14x - 7$
d) $y = -x^2 + 16x + 3$

4. The path of a basketball can be modelled by the equation $h = -0.06d^2 + 0.6d + 3$, where h represents the height, in metres, of the ball above the ground and d represents the horizontal distance, in metres, that the ball travels.
a) What is the maximum height reached by the ball?
b) What horizontal distance has the ball travelled when it reaches this maximum height?

6.2 Solve Quadratic Equations

5. Solve by factoring. Check your solutions.
a) $x^2 + 2x - 15 = 0$
d) $15c^2 - 8c - 12 = 0$

6. Solve.
a) $y^2 + 2y = 8$
b) $5x^2 = -8x - 3$
c) $4z^2 = 1$
d) $10m^2 - 40m = 0$
e) $8x^2 - 40 = 22x$
f) $-18x^2 + 39x = -15$

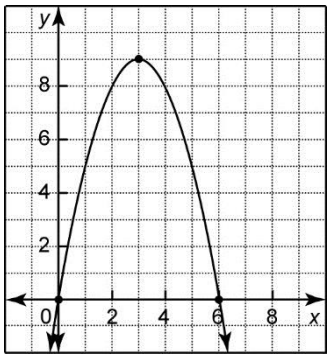
7. Write a quadratic equation in the form $ax^2 + bx + c = 0$, where a, b, and c are integers, given the following roots.
b) $-\frac{1}{3}$ and $\frac{2}{5}$

6.3 Graph Quadratics Using the *x*-Intercepts

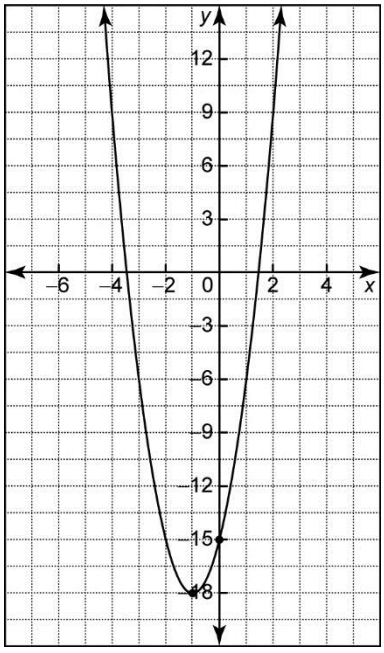
8. Find the x-intercepts and the vertex of each quadratic relation. Sketch each graph.
a) $y = x^2 + 6x + 9$
b) $y = 25x^2 - 9$
f) $y = 20x^2 - 5$

9. Write an equation in the form $y = ax^2 + bx + c$ to represent each parabola.

a)



b)



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10. A parabola has a vertex (–3, 4) and one x-intercept is –1. Find the other x-intercept and the y-intercept.

6.4 The Quadratic Formula

11. Use the quadratic formula to solve each equation. Express your answers as exact results.

a) $x^2 + 5x + 2 = 0$

h) $0 = -3x^2 + 3x + 1$

12. For each quadratic relation, state the coordinates of the vertex and the direction of opening and determine the number of x-intercepts.

a) $y = 3(x + 1)^2 + 1$

b) $y = -\frac{1}{2}(x + 2)^2 + 3$

c) $y = \frac{2}{3}(x - 3)^2$

d) $y = -3(x + 4)^2 - 2$

13. A toy rocket is launched from a platform that is 2 m off the ground at an initial velocity of 17.4 m/s. The height, h, in metres, of the rocket t seconds after it is launched is given by the equation $h = -4.9t^2 + 17.4t + 2$.

a) How long will it take the toy rocket to reach a height of 9 m, to the nearest tenth of a second?

b) When will the toy rocket fall back to the height of 9 m, to the nearest tenth of a second?

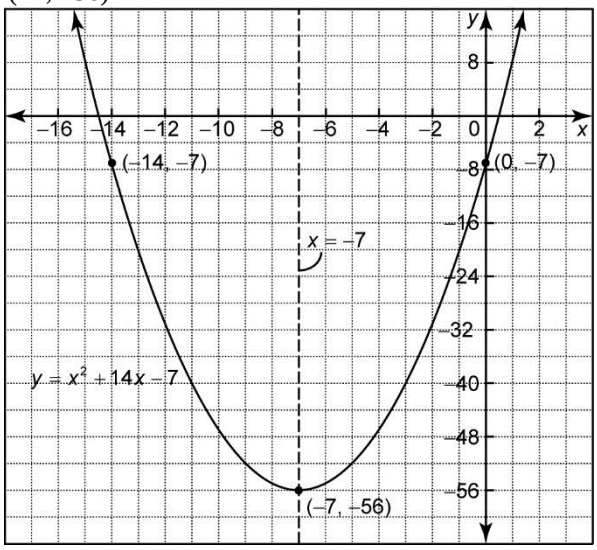
c) Using your answers from parts a) and b), find the time when the rocket will reach its maximum height and determine this maximum height. Round to the nearest tenth.

ANSWERS FOR **Chapter 6 Review**

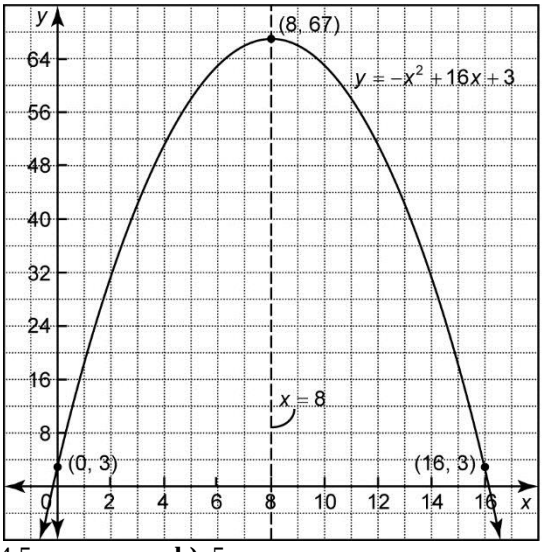
1. a) $y = (x + 3)^2 - 6$ **d)** $y = (x + 5)^2 - 30$

2. Labelled points may vary. Examples are shown on the graphs.

a) (–7, –56)



d) (8, 67)



4. a) 4.5 m **b)** 5 m

5. a) –5, 3 **d)** $-\frac{2}{3}, \frac{6}{5}$

6. a) –4, 2 **b)** $-\frac{3}{5}, -1$ **c)** $-\frac{1}{2}, \frac{1}{2}$

d) 0, 4 **e)** $-\frac{5}{4}, 4$ **f)** $-\frac{1}{3}, \frac{5}{2}$

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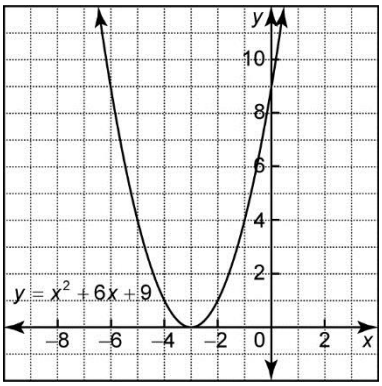
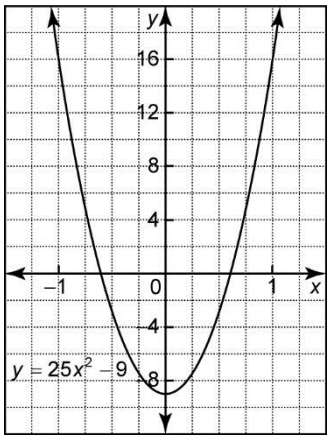
7. Answers may vary. For example:
b) $15x^2 - x - 2 = 0$

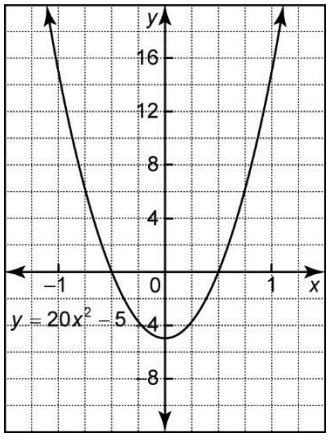
8. **a)** -3; $(-3, 0)$



b) $\frac{3}{5}$, $-\frac{3}{5}$; $(0, -9)$



f) $-\frac{1}{2}$, $\frac{1}{2}$; $(0, -5)$



9. **a)** $y = -x^2 + 6x$ **b)** $y = 3x^2 + 6x - 15$

10. -5; -5

11. **a)** $\frac{-5 \pm \sqrt{17}}{2}$ **h)** $\frac{3 \pm \sqrt{21}}{6}$

12. **a)** $(-1, 1)$, upward, none **b)** $(-2, 3)$, downward, two
c) $(-3, 0)$, upward, one **d)** $(-4, -2)$, downward, none

13. **a)** 0.5 s **b)** 3.1 s **c)** 1.8 s, 17.4 m