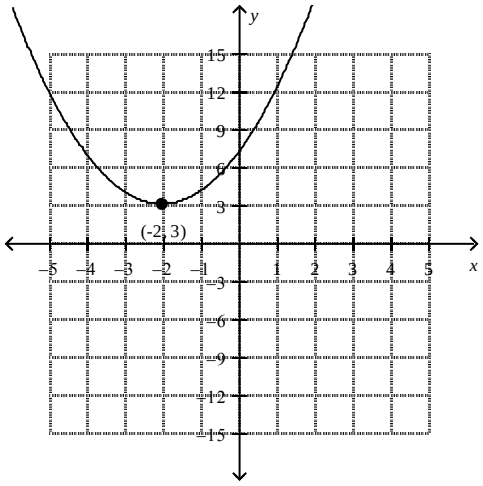
# REVIEW – Chapter 4

1. What information does the equation for the quadratic function $f(x) = (x - 3)(x + 8)$ provide about the function?

2. The flight of a disc is modelled by the function $h(t) = -5(t - 1.5)^2 + 15$, where $h(t)$ is the height in metres and $t$ is the time in seconds. What is the maximum height the disc reaches?

3. Write the equation for the function shown in the graph below in vertex form.




4. Write the equation of the quadratic function in vertex and standard form whose vertex is at (–1, 6) and that passes through (2, 24).

5. The path of a model rocket is modelled by the quadratic function $h(t) = -5(t - 4)^2 + 75$, where the height, $h(t)$, is in metres and the time, $t$, is in seconds. When will the rocket reach a height of 35 metres?

6. What number must you add to $x^2 - 7x$ to create a perfect square?

7. Complete the square on $y = x^2 - 16x - 10$.

8. Complete the square on $y = 4x^2 + 24x - 13$.

9. Complete the square to write the function $f(x) = -2x^2 + 5x - 16$ in vertex form. State the vertex.

10. Identify the values of $a$, $b$, and $c$ you would substitute into the quadratic formula to solve $(3x + 1)(-2x - 3) = -x + 7$.

11. Use the quadratic formula to solve $-8x^2 - 5x + 3 = 0$. Round your answer to two decimal places. If there is no real solution, say so.

12. Use the quadratic formula to solve $12x^2 + 4x + 13 = 0$. Round your answer to two decimal places. If there is no real solution, say so.

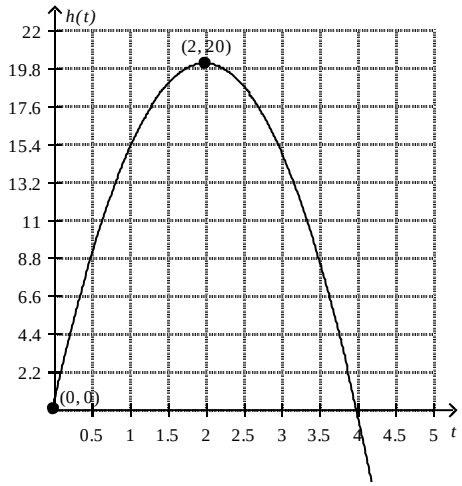
13. Write the discriminant of $3x^2 + 5 = (x - 9)(2x + 3)$. Do not evaluate.

14. Determine the number of real solutions of the quadratic equation $-3x^2 - 4x + 8 = 0$. Do not solve.

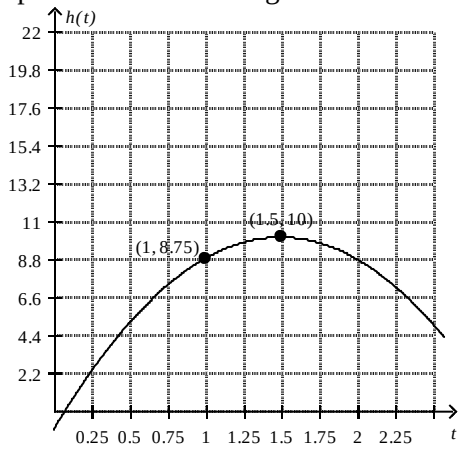
15. Determine whether the quadratic function $h(x) = 4(x + 6)^2$ intersects the *x*-axis at one point, two points, or not at all. Do not draw the graph.

18. For what value(s) of $k$ does the function $2x^2 + kx + 8 = 0$ have two distinct solutions? one solution? no solution?

19. The graph shows the height of a football that is kicked for a field goal, where time, $t$, is in seconds and height, $h(t)$, is in metres. Use the graph to determine an algebraic model.




20. The graph shows the flight of a paper airplane, where time, $t$, is in seconds and height, $h(t)$, is in metres. Use the graph to determine an algebraic model. Use the model to determine when the plane will hit the ground.



21. The flight of a volleyball served over the net travels through the coordinates (0.4, 3) and (0.6, 2.55), where (0.4, 3) is the vertex of the graph of the function. Determine the algebraic model of the function.

22. The profit of a company is modelled by the quadratic function $P(x) = -25x^2 + 402x + 5000$, where the profit, $P(x)$, is in $x$ dollars. What is the maximum profit?

24. For the quadratic function $h(x) = -3x^2 + 18x - 8$:
a) Write the equation in vertex form.

b) Write the equation of the axis of symmetry.

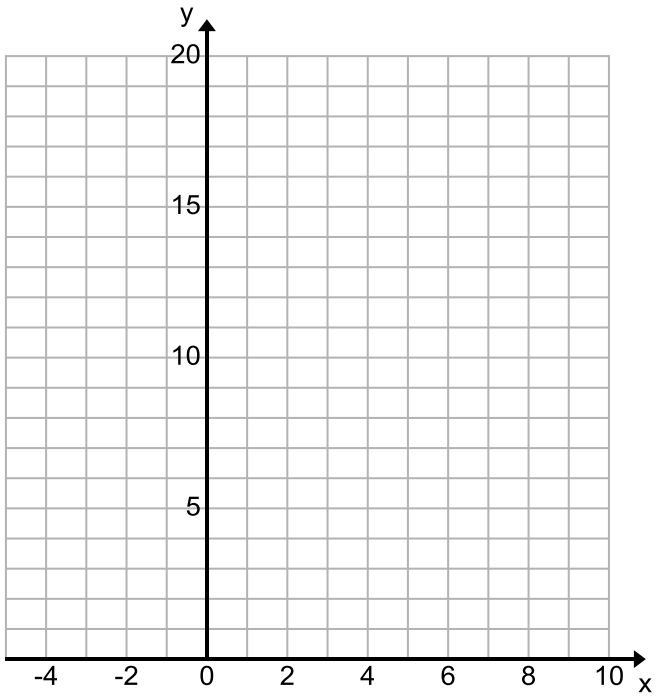
c) Write the coordinates of the vertex.

d) Determine the maximum or minimum value of $h(x)$. State a reason for your choice.

e) Determine the domain of $h(x)$.

f) Determine the range of $h(x)$.

g) Graph the function.




31. The profit of a company is modelled by $P(x) = -0.25(x - 80)^2 + 275$, where $x$ is the number of the products the company manufactures, in thousands, and $P(x)$ is the profit, in thousands of dollars.
a)According to the model, what is the maximum profit the company can earn?

b) What will the profit be when the company manufactures 75 000 products?

c) How many products will the company have to produce before they earn a profit?

32. The height of a baseball hit into the air is given by the quadratic equation $h(t) = -5(t - 2.6)^2 + 35$, where time, $t$, is in seconds and height, $h(t)$, is in metres.
a) What was the height of the ball when it was hit?

b) What is the maximum height of the ball?

c) Is the ball still in the air after 4 s? Explain.

d) When is the ball at a height of 24 m?

33. The height of a train going over a parabolic shaped bridge is given by the quadratic equation $h(t) = -0.01(t - 300)^2 + 800$, where time, $t$, is in seconds and height, $h(t)$, is in metres.
a) What is the maximum height of the train?

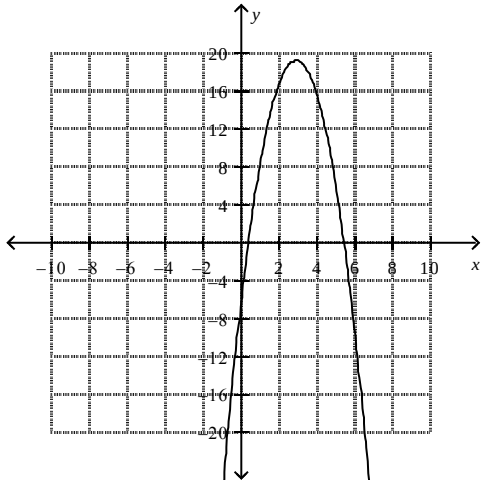
b) Is the train still on the bridge after 5.5 minutes? Explain.

c) When is the train at a height of 450 m?

# *Chapter 4 REVIEW - Solutions*

1. The zeros are at $x = 3$ and $x = -8$ and the parabola opens up.
2. 15 m
3. $f(x) = (x+2)^2 + 3$
4. Vertex form: $f(x) = 2(x+1)^2 + 6$; Standard form: $f(x) = 2x^2 + 4x + 8$
5. about 1.17 s and 6.83 s
6. $\frac{49}{4}$
7. $y = (x-8)^2 - 74$
8. $y = 4(x+3)^2 - 49$
9. $f(x) = -2\left(x - \frac{5}{4}\right)^2 - \frac{103}{8}$; $(\frac{5}{4}, -\frac{103}{8})$
10. $a = -6$; $b = -10$; $c = -10$
11. –1 and 0.38
12. no real solution
13. $(15)^2 - 4(1)(32)$
14. two
15. one
18. Two distinct solutions: $k < -8$ and $k > 8$
    One solution: $k = 8$
    No solution: $-8 < k < 8$
19. $h(t) = -5(t-2)^2 + 20$
20. $h(t) = -5(t-1.5)^2 + 10$; about 2.9 s
21. $f(x) = -11.25(x-0.4)^2 + 3$
22. \$6616.04
24. a) $h(x) = -3(x-3)^2 + 19$
    b) $x = 3$
    c) (3, 19)
    d) The maximum value is at $y = 19$ because $a < 0$. The parabola opens downward.
    e) domain: $\{x \in \mathbf{R}\}$
    f) range: $\{h(x) \in \mathbf{R} \mid h(x) \leq 19\}$

g)




30. $(-m)^2 - 4(1)(m+3) < 0$

$m^2 - 4m - 12 < 0$

$(m-6)(m+2) < 0$

$-2 < m < 6$

31. a) \$275 000
    b) \$268 750
    c) 114
32. a) 1.2 m
    b) 35 m
    c) Yes, the ball will hit the ground after 5.2 seconds.
    d) 1.1 s and 4.1 s
33. a) 800 m
    b) Yes the train is on the bridge for a total of 600 seconds which is 6 minutes.
    c) 113 s and 487 s