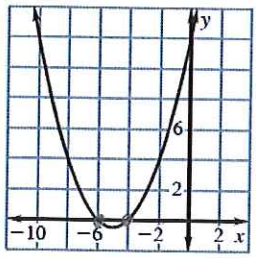
Chapter 8 Review

Multiple Choice

Identify the choice that best completes the statement or answers the question.

Anytime you solve x = you are finding the x-intercepts, zeros or roots.



C 1. What are the roots (x-intercepts) of the function whose graph is shown?

a. 4 and 6
b. 4 and – 6
c. –4 and – 6
d. –4 and 6

A 2. Solve $x^2 = 9$. Find x-intercepts.

a. $x = \pm 3$ $\sqrt{x^2} = \sqrt{9}$ $x = \pm 3$
b. $x = \pm 81$

B 3. Solve $4x^2 = 14x + 8$. (Find x-intercepts)

a. $x = -2$ or $x = 1$
b. $x = -\frac{1}{2}$ or $x = 4$
c. $x = -\frac{1}{4}$ or $x = 8$
d. $x = 0$ or $x = -\frac{7}{4}$

$4x^2 - 14x - 8 = 0$

$x = \frac{14 \pm \sqrt{14^2 - 4(4)(-8)}}{2(4)}$

$x = \frac{14 \pm \sqrt{324}}{8}$ $x = \frac{14+18}{8}$ $x = \frac{14-18}{8}$

___ 4. Solve $36x^2 + 169 = 0$. Put in quad. Formula See no real solutions

a. $\pm\frac{6}{13}i$
b. $\pm\frac{6}{13}$
c. $\pm\frac{13}{6}i$
d. $\pm\frac{13}{6}$

B 5. Solve $r^2 - 4r = 12$ by completing the square.

a. 3 and –2
b. 6 and –2
c. 3 and 0
d. 6 and 3

$r^2 - 4r + 4 = 12 + 4$

$r^2 - 4r + 4 = 16$

$\frac{-4}{2} = -2$ $(-2)^2 = 4$ $\sqrt{(x-2)^2} = \sqrt{16}$

$x - 2 = 4$ $x - 2 = -4$

$+2 \quad +2$ $+2 \quad +2$

A 6. A gardener wants to create a rectangular vegetable garden in a backyard. She wants it to have a total area of 120 square feet, and it should be 12 feet longer than it is wide. The width is x. What dimensions should she use for the vegetable garden? Round to the nearest hundredth of a foot.

a. 6.49 feet by 18.49 feet
b. 4.95 feet by 16.95 feet
c. 12.49 feet by 24.49 feet
d. 10.95 feet by 22.95 feet

$6.49 + 12 = 18.49$

$120\,ft^2$ $x = w$

$l = x + 12$

C 7. Solve $8x = x^2 - 9$ using the Quadratic Formula. (Find x-intercepts)

a. $x = 18$ or $x = -2$
b. $x = 54$ or $x = -46$
c. $x = 9$ or $x = -1$
d. $x = 1$ or $x = -9$

$0 = x^2 - 8x - 9$ $x = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(-9)}}{2(1)}$

$x = \frac{8 \pm \sqrt{100}}{2}$ $x = \frac{8+10}{2}$ $x = \frac{8-10}{2}$

$x = 9$ $x = -1$

$x(x+12) = 120$

$x^2 + 12x = 120$

$\frac{12}{2} = 6$ $6^2 = 36$ $+36$

$x^2 + 12x + 36 = 156$

$\sqrt{(x+6)^2} = \sqrt{156}$

$x + 6 = \sqrt{156}$ $x + 6 = -\sqrt{156}$

$-6 \quad -6$

$x = 6.49$

$\frac{10}{2} = 5$ $5^2 = 25$ $x^2 + 10x = 39 + 25$ $x^2 + 10x + 25 = 64$ $\sqrt{(x+5)^2} = \sqrt{64}$ $x + 5 = \pm 8$ $x + 5 = 8$ $x = 3$ $x + 5 = -8$ $x = -13$

C 8. Solve $x^2 + 10x = 39$ by completing the square. Find x-intercepts.

a. $x = -5 \pm \sqrt{14}$
b. $x = -3$ or 13
c. $x = 3$ or -13
d. $x = 5 \pm \sqrt{14}$

B 9. Henry throws a tennis ball over his house. The ball is 6 feet above the ground when he lets it go. The quadratic function that models the height, in feet, of the ball after t seconds is $p(x) = -16t^2 + 46t + 6$. How long does it take for the ball to hit the ground?

a. 2 seconds
b. 3 seconds
c. 4.5 seconds
d. 6 seconds

$y = 0$ $0 = -16t^2 + 46t + 6$ $x = \frac{-46 \pm \sqrt{46^2 - 4(-16)(6)}}{2(-16)}$ $x = \frac{-46 \pm \sqrt{2500}}{-32}$ $x = \frac{-46 + 50}{-32}$ $x = \frac{-46 - 50}{-32}$ $x = 3$ or $-\frac{1}{8}$

___ 10. A farmer has 120 yards of fencing to build around a rectangular orchard. Let w be the width of the orchard. Write an equation giving the area of the orchard. Find the dimensions of the orchard when the area is 900 square yards.

a. $120w - w^2$; The width is 58 yd, and the length is 62 yd.
b. $60w - w^2$; The width is 50 yd, and the length is 18 yd.
c. $60w - w^2$; The width is 30 yd, and the length is 30 yd.
d. $w^2 - 60w$; The width is 72 yd, and the length is 48 yd.

B 11. Find the zeros(x-intercepts) of the function $h(x) = x^2 + 23x + 60$ by factoring.

a. $x = 4$ or $x = 15$
b. $x = -20$ or $x = -3$
c. $x = -4$ or $x = -15$
d. $x = 20$ or $x = 3$

60, 20, 3, 23 $(x+20)(x+3) = 0$ $x + 20 = 0$ $x = -20$ $x + 3 = 0$ $x = -3$

C 12. Complete the square for $x^2 - 14x + \boxed{49}$. Then write the resulting expression as a binomial squared.

a. 49; $(x + 7)^2$
b. -49; $(x + 7)^2$
c. 49; $(x - 7)^2$
d. -49; $(x - 7)^2$

$\frac{-14}{2} = -7$ $(-7)^2 = 49$ $(x-7)^2$ 49, -7, -7, 14

A 13. Solve the system.

$$\begin{cases} y = 2x^2 + 5x + 9 \\ y = -4x + 5 \end{cases}$$

a. (−4, 21), (−0.5, 7)
b. (−4, 21), (0.5, 12)
c. (0.5, 3), (4, −11)
d. (−4, 21), (4, 61)

$2x^2 + 5x + 9 = -4x + 5$ $+4x - 5 \quad +4x - 5$ $2x^2 + 9x + 4 = 0$ $x = \frac{-9 \pm \sqrt{9^2 - 4(2)(4)}}{2(2)}$ $x = \frac{-9 \pm \sqrt{49}}{4}$ $x = \frac{-9 + 7}{4}$ $x = -\frac{1}{2}$ $x = \frac{-9 - 7}{4}$ $x = -4$

$y = -4(-4) + 5 = -11$ $(-4, 21)$ $y = -4(-\frac{1}{2}) + 5 = 3$ $(-\frac{1}{2}, 7)$

C 14. Which of the following pairs of points is the solution to the system of equations below? Solve by algebraically. (No credit for just plugging in values.)

$\begin{cases} y = x^2 - 1 \\ y = -x + 5 \end{cases}$

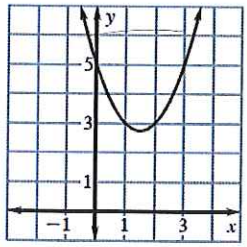
a. (2, 3), (4, 15)
b. (–3, 8), (1, 4)
c. (–3, 8), (2, 3)
d. (1, –1), (1, 4)

$y = 3+5 = 8$
$y = -2+5 = 3$
$(x+3)(x-2) = 0$
$x+3=0 \quad x=-3$
$x-2=0 \quad x=2$
(–3, 8)
(2, 3)

$x^2 - 1 = -x+5$
$+x \quad +x$
$x^2+x-1 = 5$
$-5 \quad -5$
$x^2+x-6=0$
3×-2 (−6, 1)

Short Answer

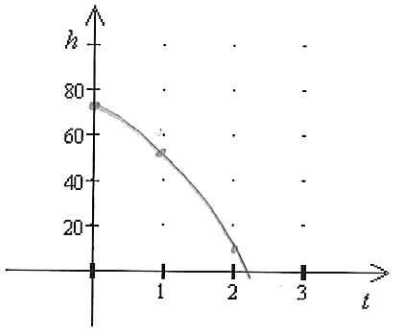
1. Solve the equation using the graph.
$x^2 - 3x + 5 = 0$



No solution
(No x-int)

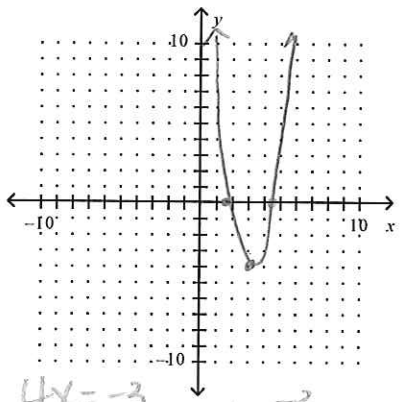
2. If an object is dropped from a height of 68 feet, the function $h = -16t^2 + 68$ gives the height of the object after t seconds. Graph this function. Approximately how long does it take the object to reach the ground ($h = 0$)?

$0 = -16t^2 + 68$
$-68 \quad -68$
$\frac{-68}{-16} = \frac{-16t^2}{-16}$
$\sqrt{\frac{17}{4}} = \sqrt{t^2}$
$\pm\sqrt{\frac{17}{4}}$
$+\sqrt{\frac{17}{4}}$
$t \approx 2.06$ seconds



3. Solve the quadratic equation by graphing. $2(x-3)^2+1 = 5$ Use technology.

$y = (x-3)^2 + 1$
$y = 5$
$-5 \quad -5$
$2(x-3)^2 - 4 = 0$
$x = 1.59, 4.41$



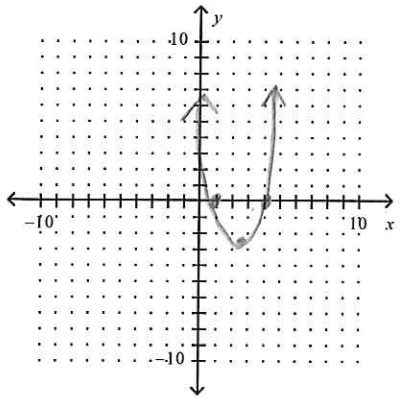
4. Solve $26x + 15 = -8x^2$ by factoring.
$+8x^2 \quad +8x^2$
$8x^2 + 26x + 15 = 0$
120, 20, 6, 26
$8x^2 + 20x + 6x + 15$
$4x(2x+5) + 3(2x+5)$
$(4x+3)(2x+5) = 0$

$4x+3=0 \quad 4x = -3 \quad x = -\frac{3}{4}$
$-3 \quad -3 \quad \frac{4x}{4} = \frac{-3}{4}$
$2x+5=0 \quad 2x = -5 \quad x = -\frac{5}{2}$
$-5 \quad -5 \quad \frac{2x}{2} = \frac{-5}{2}$

5. Use the Quadratic Formula to solve $x^2 + 6x + 58 = 0$.
$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(58)}}{2(1)}$
$x = \frac{-6 \pm \sqrt{-196}}{2}$
No Real Solutions

6. Solve the equation by graphing. State the x-intercepts, vertex.

$x^2 - 5x + 4 = 0$



(1,0)
(4,0) > x-int

Vertex (2.5, -2.25)

7. Solve by completing the square.

$x^2 - 4x + 2 = 0$

$-2 \quad -2$

$x^2 - 4x = -2$

$+4 \quad +4$

$\frac{-4}{2} = -2$

$(-2)^2 = 4$

$x^2 - 4x + 4 = 2$

-2×-2, 4, -4

$\sqrt{(x-2)^2} = \sqrt{2}$

$x - 2 = \sqrt{2}$

$+2 \quad +2$

$x - 2 = -\sqrt{2}$

$+2$

$x = 3.41$

$x = 0.59$

8. Solve by completing the square.

$2x^2 = -9x + 3$

$+9x \quad +9x$

$\frac{2x^2 + 9x}{2} = \frac{3}{2}$

$x^2 + \frac{9}{2}x = \frac{3}{2}$

$+81/16$

$\frac{9}{2} \div 2 = 9/4$

$(9/4)^2 = 81/16$

$x^2 + \frac{9}{2}x + \frac{81}{16} = \frac{105}{16}$

$81/16 \quad 9/4$

$9/4 \quad 9/2$

$\sqrt{(x + 9/4)^2} = \sqrt{\frac{105}{16}}$

$x + \frac{9}{4} = \pm\frac{\sqrt{105}}{4}$

$-9/4 \quad -9/4$

$x + \frac{9}{4} = -\frac{\sqrt{105}}{4}$

$-9/4 \quad -9/4$

$x = 0.31$

$x = -4.8$

9. Solve the equation.

$x^2 + 6x - 27 = 0$

-27

9×-3

16

$(x+9)(x-3) = 0$

$x + 9 = 0 \qquad x - 3 = 0$

$-9 \quad -9 \qquad +3 \quad +3$

$x = -9 \qquad x = 3$

10. Solve the equation. Round the solution(s) to the nearest hundredth. Square root property.

$\frac{3(x+6)^2}{3} = \frac{33}{3}$

$\sqrt{(x+6)^2} = \sqrt{11}$

$x + 6 = \sqrt{11} \quad -6 \qquad x + 6 = -\sqrt{11} \quad -6$

$-6 \qquad\qquad -6$

$x = -2.68 \qquad x = -9.32$

11. Use the quadratic formula to solve the equation. $x^2 + 7x + 7 = 0$

$X = \frac{-7 \pm \sqrt{7^2 - 4(1)(7)}}{2(1)}$ $X = \frac{-7 \pm \sqrt{21}}{2}$ $X = \frac{-7 + \sqrt{21}}{2} = -1.21$

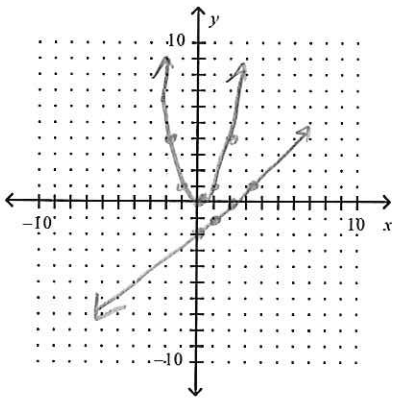
$X = \frac{-7 - \sqrt{21}}{2} = -5.79$

12. Find the points of intersection, if any, of the graphs in the system. Solve by graphing.

$y = x^2$

$y = x - 2$

No solution



13. Solve the system using substitution.

$y = -3x^2 + x - 2$

$y = -5x + 3$

$-3x^2 + x - 2 = -5x + 3$

$+5x - 3 \quad +5x \quad -3$

$-3x^2 + 6x - 5 = 0$

$X = \frac{-6 \pm \sqrt{6^2 - 4(-3)(-5)}}{2(-3)}$

$X = \frac{-6 \pm \sqrt{-24}}{-6}$ No Real Solution

14. Solve the system using substitution.

$y = 2x^2 - 5$

$y = 11 - 4x$

$11 - 4(2) = 3$

$11 - 4(-4) = 27$

$2x^2 - 5 = 11 - 4x$

$+4x \quad +4x$

$2x^2 + 4x - 5 = 11$

$-11 \quad -11$

$2x^2 + 4x - 16 = 0$

$X = \frac{-4 \pm \sqrt{4^2 - 4(2)(-16)}}{2(2)}$

$X = \frac{-4 \pm \sqrt{144}}{4}$

(2, 3)

(-4, 27)

$X = \frac{-4 + 12}{4} = 2$ $X = \frac{-4 - 12}{4} = -4$

Essay

15. An equation in the form $f(x) = -9.8t^2 + h$ gives the height h (in meters) of an object t seconds after it is dropped from a height of s meters.

Part A: An object is dropped from a height of 11.6 meters. About how many seconds does it take the object to reach the ground? Show your work.

Part B: Suppose the object is dropped from a height that is half the height from which it was originally dropped. What is the relationship of the time it takes to reach the ground in relation to the time it took to reach the ground when it was dropped from 11.6 meters? Is this a general result? Explain your reasoning.

A: $-9.8t^2 + 11.6 = 0$

$-11.6 \quad -11.6$

$\frac{-9.8t^2}{-9.8} = \frac{-11.6}{-9.8}$

$\sqrt{t^2} = \sqrt{1.18367}$ $t = 1.09$ seconds

B. $\frac{11.6}{2} = 5.8$ NOT ½ of 1.1

$-9.8t^2 + 5.8 = 0$

$-5.8 \quad -5.8$

$\frac{-9.8t^2}{-9.8} = \frac{-5.8}{-9.8}$

$\sqrt{t^2} = \sqrt{0.591837}$

$t = 0.77$ s

1.1 0.8