

4 Solve each equation by using the Quadratic Formula.

14. $x^2 + 45x = -200$

15. $4x^2 - 6 = -12x$

16. $3x^2 - 4x - 8 = -6$

17. $4x^2 - 9 = -7x - 4$

18. $5x^2 - 9 = 11x$

19. $12x^2 + 9x - 2 = -17$

20. **DIVING** Competitors in the 10-meter platform diving competition jump upward and outward before diving into the pool below. The height h of a diver in meters above the pool after t seconds can be approximated by the equation $h = -4.9t^2 + 3t + 10$.

a. Determine a domain and range for which this function makes sense.

b. When will the diver hit the water? $(27) -4 \pm \sqrt{16 - 4(-5)(1)}$ $(29) x = \frac{7 \pm \sqrt{49 - 4(-3)(-4)}}{2(-3)}$

Complete parts a–c for each quadratic equation. $\frac{-4 \pm \sqrt{36}}{-10} = \frac{-4 \pm 6}{-10}$ $x = \frac{7 \pm \sqrt{1}}{-6}$

a. Find the value of the discriminant.

b. Describe the number and type of roots.

c. Find the exact solutions by using the Quadratic Formula.

21. $2x^2 + 3x - 3 = 0$

22. $4x^2 - 6x + 2 = 0$

23. $6x^2 + 5x - 1 = 0$

24. $6x^2 - x - 5 = 0$

25. $3x^2 - 3x + 8 = 0$

26. $2x^2 + 4x + 7 = 0$

27. $-5x^2 + 4x + 1 = 0$

28. $x^2 - 6x = -9$

29. $-3x^2 - 7x + 2 = 6$

30. $-8x^2 + 5 = -4x$

31. $x^2 + 2x - 4 = -9$

32. $-6x^2 + 5 = -4x + 8$

33. **PHONES** While Darnell is talking to his friend Jack from his balcony, he drops his phone. Darnell stands at his bedroom window, and Jack stands directly below the window. If Jack tosses the phone to Darnell with an initial velocity of 35 feet per second, an equation for the height h in feet of the phone after t seconds is $h = -16t^2 + 35t + 5$.

a. If the window is 25 feet above the ground, will Darnell have 0, 1, or 2 chances to catch his phone?

b. If Darnell is unable to catch his phone, when will it hit the ground?



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34. **MP SENSE-MAKING** Civil engineers are designing a section of road that is going to dip below sea level. The road's curve can be modeled by the equation $y = 0.00005x^2 - 0.06x$, where x is the horizontal distance in feet between the points where the road is at sea level and y is the elevation. The engineers want to put stop signs at the locations where the elevation of the road is equal to sea level. At what horizontal distances will they place the stop signs?

$$(15) \quad 4x^2 + 12x - 6 = 0$$

$$- a=4 \quad b=12 \quad c=-6$$

$$x = \frac{-12 \pm \sqrt{12^2 - 4(4)(-6)}}{2(4)}$$

$$x = \frac{-12 \pm \sqrt{144 + 96}}{8}$$

$$x = \frac{-12 \pm \sqrt{240}}{8} = \frac{-12 \pm 4\sqrt{15}}{8}$$

$$x = \frac{-3 \pm \sqrt{15}}{2}$$

$$(17) \quad 4x^2 + 7x - 5 = 0$$

$$x = \frac{-7 \pm \sqrt{49 - 4(4)(-5)}}{2(4)}$$

$$x = \frac{-7 \pm \sqrt{129}}{8}$$

$$(21) \quad x = \frac{-3 \pm \sqrt{9 - 4(2)(-3)}}{2(2)}$$

$$x = \frac{-3 \pm \sqrt{33}}{4}$$

$$(23) \quad x = \frac{-5 \pm \sqrt{25 - 4(6)(-1)}}{2(6)}$$

$$x = \frac{-5 \pm \sqrt{49}}{12}$$

$$x = \frac{-5 \pm 7}{12}$$

$$x = \frac{2}{12} = \frac{1}{6} \quad x = -1$$

Exercises

Work cooperatively. Solve each equation. Round to the nearest tenth if necessary.

1. $x^2 - 7x + 12 = 0$
2. $x^2 + 5x + 6 = 0$
3. $x^2 - 3 = 2x$
4. $x^2 + 5x + 6 = 12$
5. $x^2 + 5x = 0$
6. $x^2 - 4 = 0$
7. $x^2 + 8x + 16 = 0$
8. $x^2 - 10x = -25$
9. $9x^2 + 48x + 64 = 0$
10. $2x^2 + 3x - 1 = 0$
11. $5x^2 - 7x = -2$
12. $6x^2 + 2x + 1 = 0$

$$(3) \quad x^2 - 2x - 3 = 0$$

$$x = -1, 3$$

$$(7) \quad x^2 + 8x + 16 = 0$$

$$x = -4$$

$$(9) \quad 9x^2 + 48x + 64 = 0$$

$$x = -2.667$$

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$$x = -2.667$$

$$(11) \quad 5x^2 - 7x + 2 = 0$$

$$x = .4, 1$$