

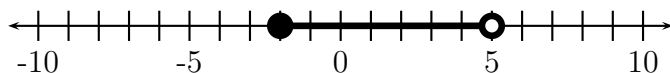
2 Solving Equations Worksheet

Concepts:

- Number Lines
- The Definitions of Absolute Value
- Absolute Value Equations and Inequalities
- Solving Equations with One Variable Type - The Algebraic Approach
- Solving Equations with a Variable in the Denominator - The Algebraic Approach
- Solving Power Equations - The Algebraic Approach
- Solving Quadratic Equations - The Algebraic Approach
 - The Zero Product Property
 - The Quadratic Formula
 - Completing the Square
- Solving Quadratic Type Equations

(Sections 1.1-1.2)

1. Which of the following numbers is included in the graph?

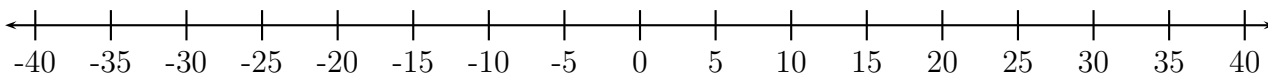


- (a) -5 (b) -2 (c) 0 (d) 5 (e) 8

2. Which of the following numbers are included in the interval $(-\infty, 7) \cup [20, 35)$?

- | | | | |
|----------------|----------------|-----------------|-----------------|
| (a) -2,000,000 | (e) 7.00000001 | (i) 20.00000001 | (m) 35.00000001 |
| (b) 0 | (f) 15 | (j) 24 | (n) 2,000,000 |
| (c) 6.99999 | (g) 19.99999 | (k) 34.99999 | |
| (d) 7 | (h) 20 | (l) 35 | |

3. Sketch the graph of $(-\infty, 7) \cup [20, 35)$.



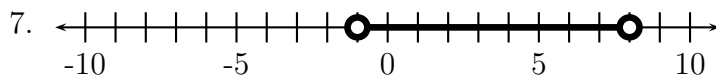
4. Complete the definition of $|x - 6|$.

$$|x - 6| = \begin{cases} \underline{\hspace{2cm}} & \text{if } x < \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \text{if } x \geq \underline{\hspace{2cm}} \end{cases}$$

5. Complete the definition of $|6 - x|$.

$$|6 - x| = \begin{cases} \underline{\hspace{2cm}} & \text{if } x < \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \text{if } x \geq \underline{\hspace{2cm}} \end{cases}$$

6. Find the exact value of $|\pi - 6|$. Your answer may not include absolute value symbols.



(a) Write a distance sentence that corresponds to this number line.

(b) Write an algebraic equation or inequality that corresponds to this number line.

8. Solve each equation or inequality algebraically. As you solve the equation or inequality, discuss the geometry (i.e., the number line) behind each step.

(a) $|x - 3| = 4$

(b) $|x + 5| > 2$

(c) $|4 - x| \leq 6$

9. Three pairs of equations are listed below. For each pair, determine if the two equations are equivalent.

(a) $x + 5 = 2$ and $2x + 10 = 4$

CIRCLE ONE: EQUIVALENT NOT EQUIVALENT

(b) $x = 2$ and $x^2 = 4$

CIRCLE ONE: EQUIVALENT NOT EQUIVALENT

(c) $\frac{1}{x} = 5$ and $1 = 5x$

CIRCLE ONE: EQUIVALENT NOT EQUIVALENT

10. Multiplying both sides of an equation by $x^2 + 1$ (always/sometimes/never) produces an equivalent equation.

11. Multiplying both sides of an equation by $|x|$ (always/sometimes/never) produces an equivalent equation.

12. Solve. (Describe the steps that are being applied to the variable. Think about how you will undo these to solve the equation.)

(a) $4(x - 2)^2 - 3 = 0$

(b) $4(x - 2)^2 + 3 = 0$

(c) $4(x - 2)^2 - 3 = 4x^2$

(d) $\frac{8-2s}{5} = 13$

(e) $-5[14 - (3x + 1)^3] = 11$

13. Solve for r .

$$C = 2\pi r$$

14. Solve for h .

$$V = \frac{\pi d^2 h}{4}$$

15. Solve for d .

$$V = \frac{\pi d^2 h}{4}$$

This is the formula for the volume of a cylinder. Does this simplify your solution?

16. Solve.

(a) $\frac{x}{x+2} = \frac{1}{x-5}$

(b) $\frac{3y^2 - 2y + 14}{y^2 + y - 2} = \frac{5}{y-1}$

(c) $\frac{x}{x+2} = \frac{5}{x} + 1$

17. How many solutions does each equation have?

(I) $x^3 + 5 = 0$

(II) $x^4 = -4$

Possibilities:

(a) Equation (I) has 3 solutions, and equation (II) has no solutions.

(b) Equation (I) has 3 solutions, and equation (II) has 1 solution.

(c) Equation (I) has 1 solution, and equation (II) has 2 solutions.

(d) Equation (I) has no solutions, and equation (II) has 2 solutions.

(e) Equation (I) has 1 solution, and equation (II) has no solutions.

18. Solve each equation or inequality or algebraically.

(a) $3|4x + 1| = 5$

(b) $3|4 - x| + 6 = 2$

(c) $2|x - 1| + 4 \leq 8$

(d) $|5x + 7| + 4 > 10$

(e) $|5x + 7| + 4 > 1$

19. Use the Zero Product Property to solve the quadratic equation.

(a) $x^2 - 14 = 3x + 14$

(b) $3x^2 + 16x + 5 = 0$

20. Solve the quadratic equation by completing the square.

(a) $x^2 - 2x = 12$

(b) $9x^2 = 12x + 1$

21. Solve the quadratic equation by a method of your choice.

(a) $20x + 35 = 3x^2 + 4x$

(b) $7x^2 + x + 1 = 0$

22. Find a number k such that the equation has exactly one real solution.

$$x^2 + kx + 25 = 0$$

23. For which values of k does the equation have exactly two real solutions.

$$kx^2 + 8x + 1 = 0$$

24. Solve.

(a) $2x^6 = 9x^3 + 5$

(b) $3x^8 + x^4 - 10 = 0$

(c) $(y - 2)^2 + 5(y - 2) = 3$

25. We have studied the following techniques for solving equations in class: unwrapping a variable, multiplying by a common denominator, taking roots of both sides of an equation, using the zero product property, completing the square, simplifying, using the quadratic formula, using geometry, and substituting in a quadratic type equation. For each of the following equations, determine which technique you could use to solve the equation. There may be more than one or zero techniques.

(a) $3 - x + 2x^2 = 5 + x$

(b) $3x^5 - 7 = 2$

(c) $x^5 + 3\sqrt{x} = 7$

(d) $\frac{5}{x+2} - \frac{5+x}{2x} = \frac{7x}{x+2}$

(e) $-4x + 3[5(x + 7) - 3x + 2] = 7(x + 5)$

(f) $\frac{1}{x+2} = 5x$

(g) $x^4 + 2x^2 - 1 = 0$

(h) $x^4 + 2x - 1 = 0$

On homework, quizzes, and exams, you will not be told which technique you should use. You should practice identifying techniques that can help you solve a problem.