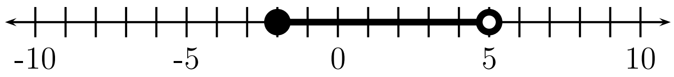
2.1 Solving Equations Practice Problems

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

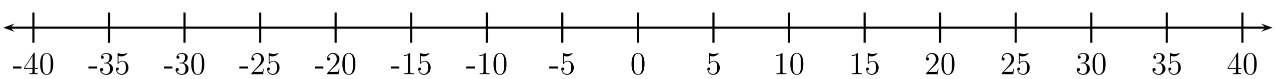


(a) -5 (b) -2 (c) 0 (d) 5 (e) 8

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

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

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



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

5. 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) $|x - 7| = 5$

(b) $|2x + 5| - 3 = 1$

(c) $|x + 1| = |2x - 1|$

(d) $3|4x + 1| = 9$

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

6. 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

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

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

9. 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) $-5[14-(3x+1)^3] = 11$

10. Solve for a.
$$a + b = c(d + f)$$

11. Solve for c.
$$a + b = c(d + f)$$

12. Solve for d.
$$a + b = c(d + f)$$

13. Solve for h.
$$V = \frac{\pi d^2 h}{4}$$

14. 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?

15. Solve.

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

   (b) $\dfrac{x}{x+2} = \dfrac{5}{x} + 1$

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

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

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

17. Solve the quadratic equation by completing the square.

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

   (b) $3x^2 = 12x + 1$

18. How many solutions does each equation have?

$$\textbf{(I)}\ x^3 + 5 = 0 \qquad\qquad \textbf{(II)}\ x^4 = -4$$

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.

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

(a) $20x + 35 = 3x^2 + 4x$
(b) $7x^2 + x + 1 = 0$

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

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

21. Solve.

(a) $2x^6 = 9x^3 + 5$
(b) $3x^{1/2} + x^{1/4} - 10 = 0$
(c) $t^3 - 2t^5 = 0$
(d) $\sqrt{3z - 5} = 3 - z$
(e) $3\sqrt{t} + 10 = t$

22. 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) $\dfrac{5}{x+2} - \dfrac{5+x}{2x} = \dfrac{7x}{x+2}$
(e) $-4x + 3[5(x + 7) - 3x + 2] = 7(x + 5)$
(f) $\dfrac{1}{x+2} = 5x$
(g) $x^4 + 2x^2 - 1 = 0$
(h) $x^4 + 2x - 1 = 0$
(i) $x^4 + 2x = 0$