

03 - Standard: Solving Equations

Name: Key

Algebra 1 Final Exam Review

Solve the equations below. Make sure to show all work and check your solutions.

There is a combination of equations that contain the distributive property, rational coefficients, and absolute value.

1. $2(3x - 1) = 10$

$$\begin{array}{r} 6x - 2 = 10 \\ +2 \quad +2 \\ \hline 6x = 12 \\ \frac{6x}{6} = \frac{12}{6} \end{array} \quad \boxed{x=2}$$

2. $3x - (2x - 1) = -6$

$$\begin{array}{r} 3x - 2x + 1 = -6 \\ x + 1 = -6 \\ -1 \quad -1 \\ \hline x = -7 \end{array} \quad \boxed{x=-7}$$

3. $|2x - 3| = 8$

$$\begin{array}{r} 2x - 3 = 8 \\ +3 \quad +3 \\ \hline 2x = 11 \\ \frac{2x}{2} = \frac{11}{2} \end{array} \quad \begin{array}{r} 2x - 3 = -8 \\ +3 \quad +3 \\ \hline 2x = -5 \\ \frac{2x}{2} = \frac{-5}{2} \end{array}$$

$\boxed{x=5\frac{1}{2} \text{ or } -2\frac{1}{2}}$

4. $6\left(\frac{x+1}{3} = \frac{x}{2}\right)$

$$\begin{array}{r} 6x + 6 = \frac{6x}{2} \\ \frac{6x}{3} = \frac{6x}{2} \\ 2x + 2 = 3x \\ \frac{2}{2} = \frac{x}{2} \end{array}$$

5. $-5(x - 1) + 2x = 2$

$$\begin{array}{r} -5x + 5 + 2x = 2 \\ -3x + 5 = 2 \\ -3x = -3 \\ \frac{-3x}{-3} = \frac{-3}{-3} \end{array} \quad \boxed{x=1}$$

6. $6\left(\frac{1}{2}x + \frac{1}{3}x - 7 = \frac{5}{6}x\right)$

$$\begin{array}{r} \frac{6}{2}x + \frac{6}{3}x - 42 = \frac{30}{6}x \\ 3x + 2x - 42 = 5x \\ 5x - 42 = 5x \\ -42 \neq 0 \end{array} \quad \boxed{\text{No Solution}}$$

7. $2x - 5(x + 4) = -2(x + 3)$

$$\begin{array}{r} 2x - 5x - 20 = -2x - 6 \\ -3x - 20 = -2x - 6 \\ -20 = x - 6 \\ -14 = x \end{array} \quad \boxed{-14 = x}$$

8. $2\left(\frac{1}{2}x - 4 + 1 = -3 - \frac{1}{2}x\right)$

$$\begin{array}{r} \frac{2}{2}x - 8 + 2 = -6 - \frac{2}{2}x \\ x - 8 + 2 = -6 - x \\ x - 6 = -6 - x \\ 2x = 0 \end{array} \quad \boxed{x=0}$$

9. $\frac{x-3}{x} = \frac{3}{5}$

$$\begin{array}{r} 5x - 15 = 3x \\ 2x = 15 \\ \frac{2x}{2} = \frac{15}{2} \end{array} \quad \boxed{x=7\frac{1}{2}}$$

10. $|3x + 2| + 4 = 12$

$$\begin{array}{r} |3x + 2| = 8 \\ 3x + 2 = 8 \\ -2 \quad -2 \\ \hline 3x = 6 \\ \frac{3x}{3} = \frac{6}{3} \end{array} \quad \begin{array}{r} 3x + 2 = -8 \\ -2 \quad -2 \\ \hline 3x = -10 \\ \frac{3x}{3} = \frac{-10}{3} \end{array}$$

$\boxed{x=2 \text{ or } -3\frac{1}{3}}$

$$11. (x+2)^2 = x^2 - x + 6$$

$$x^2 + 4x + 4 = x^2 - x + 6$$

$$4x + 4 = -x + 6$$

$$5x + 4 = 6$$

$$5x = 2$$

$$x = \frac{2}{5}$$

$$12. (x+3)(x-1) = x^2 + 2x + 1$$

$$x^2 + 2x - 3 = x^2 + 2x + 1$$

$$-3 \neq 1$$

No Solution

$$13. 6 + 3|x-2| = 12$$

$$\frac{-6}{-6} \quad \frac{-6}{-6}$$

$$\frac{3|x-2|}{3} = \frac{6}{3}$$

$$|x-2| = 2$$

$$x-2=2 \quad x-2=-2$$

$$x = 4 \text{ or } -4$$

$$15. \frac{x-5}{-2} = \frac{x-1}{-3}$$

$$-3x + 15 = -2x + 2$$

$$13 = x$$

$$14. (x(x+2) = (\frac{1}{2}x+2)(x-3))$$

$$x^2 + 2x = \frac{1}{2}x^2 + \frac{1}{2}x - 6$$

$$\frac{1}{2}x^2 + \frac{1}{2}x = -6$$

Can't solve yet!

$$16. 3 - 2|-3x+6| = -27$$

$$\frac{-3}{-3} \quad \frac{-3}{-3}$$

$$\frac{-2|-3x+6|}{-2} = \frac{-30}{-2}$$

$$\frac{-3x+6}{-6} = \frac{15}{-6}$$

$$\frac{-3x+6}{-6} = \frac{-15}{-6}$$

$$\frac{-3x}{-3} = \frac{9}{-3}$$

$$\frac{-3x}{-3} = \frac{-21}{-3}$$

$$x = -3 \text{ or } 7$$

$$17. 2x(x+1) = (2x+2)(x-1)$$

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

$$2x = -2$$

$$x = -1$$

$$18. (\frac{2}{3}x - 3 = \frac{1}{2}x - 7)$$

$$\frac{4}{3}x - 18 = \frac{1}{2}x - 42$$

$$4x - 18 = 3x - 42$$

$$x - 18 = -42$$

$$x = -24$$

Solve the following equations for the specific variable.

19. Solve for y: $4x + 2y = 6$

$$2y = -4x + 6$$
$$y = -2x + 3$$

20. Solve for x: $-5x + 4y = 10$

$$-5x = -4y + 10$$
$$x = \frac{4}{5}y - 2$$

21. Solve for w: $P = 2l + 2w$

$$P - 2l = 2w$$
$$w = \frac{P - 2l}{2} \text{ or } w = \frac{1}{2}P - l$$

22. Solve for d: $t = \frac{d}{r}$

$$d = tr$$

23. Solve for b: $t = an + b$ (for b)

$$b = t - an$$

24. $\frac{y}{3} - a = b$ (for y)

$$\frac{y}{3} = a + b$$
$$y = 3a + 3b \text{ or } y = 3(a + b)$$

25. $m = \frac{y}{x}$ (for y)

$$y = mx$$

26. $m = \frac{y}{x}$ (for x)

$$x = \frac{y}{m}$$

27. Determine if the statement below is always, sometimes, or never true. Justify your conclusion.

$$2(3 + 5x) = 6 + 5x$$

$$6 + 10x = 6 + 5x$$

$$10x = 5x$$

$$5x = 0$$

$$x = 0$$

only true when $x = 0$

Determine the mistakes in the solutions below. Then correct the mistake and find the correct solution.

28. $5(2x-1) - 3x = 5x + 9$
 $10x - 5 - 3x = 5x + 9$
 $* 7x - 5 = 5x + 9$
 $\quad +5 \quad +5$
 $12x = 4$
 $x = \frac{1}{3}$
 $7x = 5x + 14$
 $\quad -5x \quad -5x$
 $2x = 14$
 $x = 7$

29. $(x+4)^2 - 2x - 5 = (x-1)^2$
 $* x^2 + 16 - 2x - 5 = x^2 + 1$
 $16 - 2x - 5 = 1$
 $11 - 2x = 1$
 $-2x = -10$
 $x = 5$
 $x^2 + 8x + 16 - 2x - 5 = x^2 - 2x + 1$
 $6x + 11 = -2x + 1$
 $8x = -10$
 $x = -10/8 = -5/4 = -1 1/4$

30. $4x = 8(2x-3)$
 $4x = 16x - 24$
 $* 4x = 16x - 24$
 $-12x = -24$
 $x = \frac{-24}{-12}$
 $x = 2$
 $x = \frac{1}{4}$

31. $3x - 5 + 3x = x + 8 - x - 1$
 $6x - 5 = 2x + 7$
 $4x - 5 = 7$
 $4x = 12$
 $x = 3$
 $6x - 5 = 7$
 $6x = 12$
 $x = 2$

32. Rianna thinks that if $a = b$ and if $c = d$, then $a + c = b + d$. Is she correct? *yes*

33. Create a multi-step equation that has the specified number of solutions, then solve each of your equations.

Make sure to check with your teacher to make sure you set this one correctly because answers will vary

a. No Solution

End result
 $6 \neq 2$

b. Infinitely Many Solutions

End Result
 $x = x$

c. Two Solutions

Absolute Value
 $x = 7$ or 3