

# 1.5

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Objective: I can solve more equations.

## Steps for Solving with one Variable:

- Get the variable or the group (parentheses, absolute value, radical) that include the variable by itself.
  - Do add/subtract first
  - Then do the multiply/divide
- Do inverse operations to get rid of what is being done to the group with the variable.
  - Does it have an **exponent**? ---- **take the root** (the exponent as your index)
  - Does it have a **radical**? ----- raise both sides to an the **exponent** (from your index number)
  - Does it have **absolute value bars**? ----- Separate into **two equations**
- Finish getting the variable by itself

Examples: Solve for the variable. Leave answers as a simplified fraction. Show work.

1.  $2(x-4)^4 + 8 = 10$

*even exp = 2 ans.*  

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

$$\sqrt[4]{(x-4)^4} = \sqrt[4]{1}$$
  

$$-x-4 = \pm 1$$

*do 2 eq. - 1 for neg & 1 for pos ans.*  

$$x-4 = 1$$

$$\frac{x-4}{+4 \ +4} = \frac{1}{+4 \ +4}$$
  

$$x = 5$$

$$x-4 = -1$$

$$\frac{x-4}{+4 \ +4} = \frac{-1}{+4 \ +4}$$
  

$$x = 3$$

they are not the same # like on 1.4

$$\sqrt{x^2} = \sqrt{-4}$$

When take  $\sqrt{\quad}$  of neg # it is imaginary

$$x = \pm 2i$$

3.  $|x-3| = 9$

*x is not alone so keep going*

*ab val so write 2 eq.*

$$x-3 = 9$$
  

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

$$x = 12$$

$$x-3 = -9$$
  

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

$$x = -6$$

They are not the same # like on 1.4

4.  $-4\sqrt{x} + 6 = -18$

$$\frac{-4\sqrt{x} + 6}{-6 \ -6} = \frac{-18}{-6 \ -6}$$
  

$$-4\sqrt{x} = -24$$

$$\frac{\sqrt{x}}{\sqrt{\quad}} = \frac{6}{\sqrt{\quad}}$$

$$x = 36$$

5.  $\left|\frac{x}{5}\right| = 4$

$$\left(\frac{x}{5} = 4\right) 5 \quad \left(\frac{x}{5} = -4\right) 5$$

$$x = 20 \quad x = -20$$

6.  $\frac{1}{2}(x+4)^3 + 2 = 5$

$$\frac{\frac{1}{2}(x+4)^3 + 2}{-2 \ -2} = \frac{5}{-2 \ -2}$$
  

$$\frac{1}{2}(x+4)^3 = 3 \cdot 2$$

$$\sqrt[3]{(x+4)^3} = \sqrt[3]{6}$$

$$\frac{x+4}{-4 \ -4} = \frac{\sqrt[3]{6}}{-4 \ -4}$$
  

$$x+4 = \sqrt[3]{6}$$
  

$$x = \sqrt[3]{6} - 4$$

$$x = \sqrt[3]{6} - 4$$

$$7. \sqrt[3]{x-3} - 6 = -12$$

$$\begin{array}{r} \phantom{\sqrt[3]{x-3}} +6 \phantom{+6} \\ \hline \sqrt[3]{x-3} = -6 \\ x-3 = -216 \\ \phantom{x-3} +3 \phantom{+3} \\ \hline x = -213 \end{array}$$

$$9. \sqrt{3x-2} - 8 = 0$$

$$\begin{array}{r} \sqrt{3x-2} = 8 \\ \hline 3x-2 = 64 \\ 3x = 66 \\ \hline x = 22 \end{array}$$

$$11. \frac{3(2x-3)}{3} = \frac{6}{3}$$

$$\begin{array}{r} 2x-3 = 2 \\ \phantom{2x-3} +3 \phantom{+3} \\ \hline 2x = 5 \\ x = \frac{5}{2} \text{ or } 2.5 = x \\ \phantom{x} \text{ or } 2\frac{1}{2} = x \end{array}$$

OR since linear distribute

$$\begin{array}{r} 6x-9 = 6 \\ 6x = 15 \\ x = \frac{15}{6} = \frac{5}{2} \end{array}$$

$$13. \sqrt{x^2-8} = (x-7)^2 \rightarrow (x-7)(x-7)$$

$$\begin{array}{r} x^2-8 = x^2-14x+49 \\ -x^2 \phantom{+49} \\ \hline -8 = -14x+49 \\ -49 \phantom{+49} \\ \hline -57 = -14x \\ x = \frac{57}{14} \end{array}$$

$$8. 6|5x-1| + 4 = 88$$

$$\begin{array}{r} 6|5x-1| = 84 \\ |5x-1| = 14 \\ 5x-1 = 14 \quad 5x-1 = -14 \\ 5x = 15 \quad 5x = -13 \\ \hline x = 3 \quad x = -\frac{13}{5} \end{array}$$

$$10. \left( \frac{1}{3}|x-7| = 2 \right) \frac{3}{1}$$

$$\begin{array}{r} |x-7| = 6 \\ x-7 = 6 \quad x-7 = -6 \\ \hline x = 13 \quad x = 1 \end{array}$$

$$12. 2\sqrt[4]{4x+5} + 6 = 16$$

$$\begin{array}{r} 2\sqrt[4]{4x+5} = 10 \\ \sqrt[4]{4x+5} = 5 \\ 4x+5 = 625 \\ 4x = 620 \\ \hline x = 155 \end{array}$$

$$14. \sqrt{d^2-4ef} = g^2 \text{ solve for } d$$

$$\begin{array}{r} d^2-4ef = g^2 \\ \sqrt{d^2} = \sqrt{g^2+4ef} \rightarrow \text{married so you can't} \\ \hline d = \pm \sqrt{g^2+4ef} \end{array}$$