

$$\frac{p}{q}$$

$$\frac{2}{3}$$

$$\sqrt{\frac{5}{25}}$$

$$(E) \sqrt{\frac{64}{49}}$$

$$\frac{8}{10}$$

$$(42)$$

$$\frac{5}{15} \leftarrow \frac{2}{3}$$

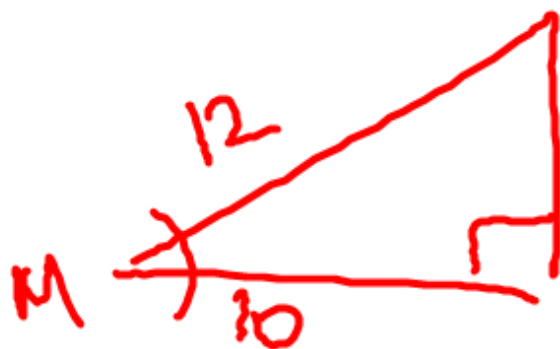
$$\frac{5}{15} \leftarrow \frac{3}{3}$$

(40)

$$\frac{8 \times 10^{12}}{4 \times 10^4}$$

$$2 \times 10^8$$

(38)



$$? \sqrt{44}$$

$$\frac{?}{12}$$

Lesson 9.1: Solving One Variable Equations and Inequalities

Solving Radical Equations

1. Remember that when taking an even root while solving, use a \pm
2. Remember to check for extraneous solutions

$$2\sqrt{x+1} - 5 = 7$$

$+5 \quad +5$

$$\frac{2\sqrt{x+1}}{2} = \frac{12}{2}$$
$$(\sqrt{x+1})^2 = (6)^2$$

$$x+1 = 36$$

$-1 \quad -1$

$$\boxed{x = 35} \checkmark$$

$$(\sqrt{x+2})^2 = (x-4)^2 \rightarrow (x-4)(x-4)$$

FOIL!

$$\begin{array}{r} x+2 = x^2 - 8x + 16 \\ -x - 2 \quad \quad -x - 2 \\ \hline \end{array}$$

$$0 = x^2 - 9x + 14$$

$$(x-7)(x-2)$$

$$\boxed{x=7} \checkmark, \quad x \neq 2 \quad \text{extraneous}$$

$$\begin{array}{l} \sqrt{7+2} = 7-4 \\ 3 = 3 \end{array}$$

$$\begin{array}{l} \sqrt{2+2} = 2-4 \\ 2 \neq -2 \end{array}$$

$$\left(\sqrt[3]{x^2 + 6x}\right)^3 = (x)^3$$

$$x^2 + 6x = x^3$$

$$0 = x^3 - x^2 - 6x$$

$$0 = x(x^2 - x - 6)$$

$$= x(x-3)(x+2)$$

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ \boxed{x=0} & \boxed{x=3} & \boxed{x=-2} \end{array}$$

$$(\sqrt{x})^2 = (\sqrt{x+3} - 1)^2 \quad (\sqrt{x+3} - 1)(\sqrt{x+3} - 1)$$

$$x = x + 3 - \sqrt{x+3} - \sqrt{x+3} + 1$$

$$\cancel{x} = \cancel{x} + 4 - 2\sqrt{x+3}$$

$$0 = 4 - 2\sqrt{x+3}$$

$$\frac{-4}{-2} = \frac{-2}{-2} \sqrt{x+3}$$

$$2 = (\sqrt{x+3})^2$$

$$x+3 = 4$$

$$\boxed{x=1} \checkmark$$

$$(2x + 1)^{\frac{2}{3}} - 5 = 11$$

$$(2x+1)^{\frac{2}{3}} = 16^{\frac{3}{2}}$$

$$2x+1 = \pm 64$$

$$2x+1 = 64$$

$$\frac{2x}{2} = \frac{63}{2}$$

$$x = \frac{63}{2}$$

$$x^{\frac{2}{3}} = \sqrt[3]{x^2}$$
$$= (\sqrt[3]{x})^2$$

$$2x+1 = -64$$

$$\frac{2x}{2} = \frac{-65}{2}$$

$$x = \frac{-65}{2}$$

$$(x-2)^{\frac{3}{4}} + 1 = 9$$

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

$$x-2 = 16$$

$$\boxed{x = 18} \checkmark$$

Solving Inequalities:

*When dividing or multiplying by a negative on both sides, switch the inequality sign.

$$4 + 2x \geq 7(x + 1) - 2$$

$$4 + 2x \geq 7x + 7 - 2$$

$$4 + 2x \geq 7x + 5$$

$$\begin{array}{cccc} -4 & -2x & -7x & -5 \end{array}$$

$$\begin{array}{cc} -5x & \geq 1 \\ \hline -5 & -5 \end{array}$$

$$-\frac{1}{5} \geq x$$

$$x \leq -\frac{1}{5}$$

$$-7 \leq 2x + 1 < 5$$

$$\underset{-1}{-7} \leq 2x + \underset{-1}{1}$$

$$2x + \underset{-1}{1} < \underset{-1}{5}$$

$$\underset{2}{-8} \leq \underset{2}{2x}$$

$$\underset{2}{2x} < \underset{2}{4}$$

$$-4 \leq x$$

$$x < 2$$

$$-4 \leq x < 2$$

$$|3x - 4| \leq 8$$

$$3x - 4 \leq 8$$

+4 +4

$$\frac{3x}{3} \leq \frac{12}{3}$$

$$x \leq 4$$

$$3x - 4 \geq -8$$

+4 +4

$$\frac{3x}{3} \geq \frac{-4}{3}$$

$$x \geq -\frac{4}{3}$$

$$-\frac{4}{3} \leq x \leq 4$$

$$|3x-4| = 8$$

$$3x-4 = 8$$

$$3x-4 = -8$$

$$|2x + 1| - 1 > 4$$

$+1 \quad +1$

$$|2x + 1| > 5$$

$$2x + 1 > 5$$

$-1 \quad -1$

$$2x > 4$$

$$x > 2$$

$$2x + 1 < -5$$

$$2x < -6$$

$$x < -3$$

$$x > 2 \text{ or } x < -3$$

25- The first stage of a rocket burns 28 seconds longer than the second stage. If the total burn time for both stages is 152 seconds, how long does each stage burn?

$$\frac{x+28}{\textcircled{1}} + \frac{x}{\textcircled{2}} = 152$$

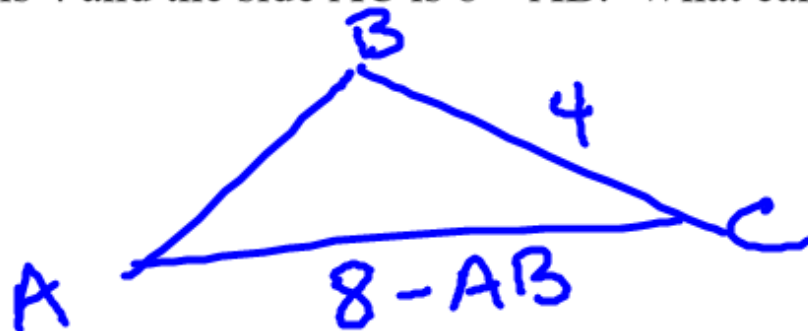
$$2x + 28 = 152$$

$$\frac{2x}{2} = \frac{124}{2}$$

Stage 2: $x = 62$ seconds

Stage 1: $152 - 62 = 90$ sec.

26- The sum of the lengths of any two sides of a triangle is greater than the length of the third side. In triangle ABC, the side BC is 4 and the side AC is $8 - AB$. What can you conclude about AB?



$$\textcircled{1} 4 + 8 - AB > AB \rightarrow 12 > 2AB \rightarrow 6 > AB$$

$$\textcircled{2} AB + 4 > 8 - AB \rightarrow 2AB + 4 > 8$$

$$2AB > 4$$

$$\textcircled{3} \cancel{8 - AB} + AB > 4$$

$$\cancel{8} > 4$$

$$AB > 2$$

$$2 < AB < 6$$