

UNIT 2: Reasoning with Linear Equations and Inequalities

$$3z - 3$$

Warmup: Solve the following equations:

$$\begin{array}{r} x + 4 = 10 \\ -4 \quad -4 \\ \hline x = 6 \end{array}$$

$$x = 6$$

$$\begin{array}{r} y - 2 = -5 \\ +2 \quad +2 \\ \hline y = -3 \end{array}$$

$$\begin{array}{r} 3z = 15 \\ \div 3 \quad \div 3 \\ \hline z = 5 \end{array}$$

$$1z = 5$$

$$z = 5$$

$$\begin{array}{r} 7 \cdot \frac{w}{7} = (4.2)7 \\ \div 7 \quad \div 7 \\ \hline w = 29.4 \end{array}$$

$$w = 29.4$$

$$w = \frac{147}{5}$$

E.Q.:

How do I justify the solution to an equation?

How do I solve an equation in one variable?

MGSE9-12.A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions.

MGSE9-12.A.REI.1 Using algebraic properties and the properties of real numbers, justify the steps of a simple, one-solution equation. Students should justify their own steps, or if given two or more steps of an equation, explain the progression from one step to the next using properties. Solve equations and inequalities in one variable

MGSE9-12.A.REI.3 Solve linear equations and inequalities in one variable including equations with coefficients represented by letters. For example, given $ax + 3 = 7$, solve for x .

Can you solve these multi-step equations?

$$2x + 6 = 10$$

$$\begin{array}{r} -6 \\ -6 \end{array}$$

$$\frac{2x}{2} = \frac{4}{2}$$

$$x = 2$$

$$\frac{2(x+3) = 10}{2} \quad \frac{10}{2}$$

$$\begin{array}{r} x + 3 = 5 \\ -3 \\ -3 \end{array}$$

$$x = 2$$

$$2(x+3) = 10$$

$$2x + 6 = 10$$

WHITE BOARD PRACTICE

SET #1

1. $x + 57 = 18$

$$\begin{array}{r} -57 \\ -57 \end{array}$$

$$x = -39$$

2. $-3m = 48$

$$\begin{array}{r} \overline{-3} \\ \overline{-3} \end{array}$$

$$m = -16$$

3. $\frac{1}{4}x = 20$

4. $-29 + p = 35$

$$\begin{array}{r} +29 \\ +29 \end{array}$$

$$p = 64$$

5. $7 \cdot \frac{x}{7} = -42 \cdot 7$

$$x = -294$$

SEW #2

6. $3m - 9 = 15$

$$\cancel{+9} +9$$

$$\frac{3m = 24}{\cancel{3} \quad \cancel{3}}$$

$$m = 8$$

7. $18 + \frac{1}{2}a = 24$

$$\cancel{-18} \quad -18$$

$$\frac{\frac{1}{2}a = 16}{\cancel{\frac{1}{2}} \quad \frac{1}{2}}$$

$$a = 32$$

8. $18 + \frac{x}{6} = 48$

$$\cancel{-18} \quad -18$$

$$\cancel{6} \cdot \frac{x}{\cancel{6}} = 30 \cdot 6$$

$$x = 180$$

$$\cancel{-18} + \frac{1}{2}a = 24$$

$$16 \div \frac{1}{2} = 32$$

$$\cancel{2} \cdot \frac{1}{\cancel{2}}a = 16 \cdot 2$$

$$1a = 32$$

What about when you have an equation with more than one variable term?

$$-5 - 8r = 1 - \underbrace{6r - 4r}$$

$$\frac{-5 - 8r}{+10r} = \frac{1 - 10r}{+10r}$$

$$\frac{-8}{+5} + 2r = \frac{1}{+5}$$

$$\frac{2r}{2} = \frac{6}{2}$$

$$r = 3$$

SET #3

9. $25 - 4m = 6m - 35$
 $\quad +4m \quad +4m$

$$25 = 10m - 35$$

$$+35 \qquad +35$$

$$\frac{60}{10} = \frac{10m}{10}$$

$$6 = m$$

$$28 = 3y + 49$$

$$\frac{-49}{-49}$$

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

$$-7 = y$$

10. $3y + 2y + 28 = 8y + 49$

$$\frac{-5y}{-5y} \quad \frac{-5y}{-5y}$$

$$28 = 3y + 49$$

11. $14 - 8 + 4x = 3x - 5$

$$6 + 4x = 3x - 5$$

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

$$6 + x = -5$$

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

$$x = -11$$

SET #4

$$12. \quad \frac{336}{7} = \frac{7(8-5m)}{7}$$

$$\frac{48}{-8} = \frac{8-5m}{-8}$$

$$\frac{40}{-5} = \frac{-5m}{-5}$$

$$\boxed{-8 = m}$$

$$\frac{336}{-56} = \frac{56-35m}{-56}$$

$$\frac{280}{-35} = \frac{-35m}{-35}$$

$$13. \quad 142 = 6(7-3x) - 2x$$

$$142 = 42 - 18x - 2x$$

$$142 = 42 - 20x$$

$$-42 \quad -42$$

$$\frac{100}{-20} = \frac{-20x}{-20}$$

$$\boxed{-5 = x}$$

$$142 = 6(7-3x) - 2x$$

$$+2x \quad \quad \quad +2x$$

$$\frac{142 + 2x}{6} = \frac{6(7-3x)}{6}$$

$$\frac{142}{6} + \frac{2}{6}x = 7 - 3x$$

LAST ONE!!

14. $-53 + 6p = 4 + 3(8 - 7p)$

$$-53 + 6p = 4 + 24 - 21p$$

$$\begin{array}{r} -53 + 6p = 28 - 21p \\ +21p \qquad +21p \end{array}$$

$$\begin{array}{r} -53 + 27p = 28 \\ +53 \qquad +53 \end{array}$$

$$\frac{27p}{27} = \frac{81}{27}$$

$$p = 3$$

15. $-2(1 - 6v) = 38 + 7v$

$$-2 + 12v = 38 + 7v$$

$$\begin{array}{r} -7v \qquad -7v \end{array}$$

$$-2 + 5v = 38$$

$$\begin{array}{r} +2 \qquad +2 \end{array}$$

$$\begin{array}{r} 5v = 40 \\ \hline 5 \quad 5 \end{array}$$

$$v = 8$$

HW #1 Solving Equations