MTH1W Grade 9 Mathematics

5.5 Solving Equations Involving Fractions and/or Distribution

Goal(s) - *To solve equations involving fractions with the unknown in either the numerator or denominator.*

- To solve problems that involve distribution on one or both sides of the equal sign.

Jun 19-8:29 AM

Solve each equation by inspection.

$\frac{w}{4} = 3$

$\frac{w}{4} \times 4 = 3 \times 4$

$w = 12$

$\frac{k}{5} = -6$

$\frac{k}{5} \times 5 = -6 \times 5$

$k = -30$

$\frac{24}{m} = 8$

$\frac{24}{m} \times m = 8 \times m$

$\frac{24}{8} = \frac{8m}{8}$

$3 = m$

Solve each equation by inspection.

$\frac{w}{4} = \frac{3}{12}$ (×3)

$\Rightarrow \frac{3w}{3} = \frac{3}{3}$

$w = 1$

$\frac{k}{5} = \frac{-12}{10}$ (×2)

$\Rightarrow \frac{2k}{2} = \frac{-12}{2}$

$k = -6$

$\frac{4}{5} = \frac{w}{20}$ (×4)

$\Rightarrow 4(4) = w$

$16 = w$

If a proportional relationship contains an unknown, the value can be determined by **inspection** or through the process of **cross-multiplication**.

$\frac{5}{60} = \frac{35}{d}$ (×7)

"If five times seven is thirty-five, then d is equal to sixty multiplied by seven...

$\therefore d = 420$!"

$\frac{5}{60} \times \frac{35}{d}$

$(5)(d) = (60)(35)$

$5d = 2100$

$\frac{5d}{5} = \frac{2100}{5}$

$d = 420$

Determine the value of each unknown.

$\frac{7}{9} = \frac{14}{w}$ (×2)

$\Rightarrow 9 \times 2 = w$

$18 = w$

OR

$7 \times w = 9 \times 14$

$\frac{7w}{7} = \frac{126}{7}$

$w = 18$

$\frac{-3}{12} = \frac{1}{g}$ (×-3)

$\Rightarrow 12 = g \times (-3)$

$\frac{12}{-3} = \frac{-3g}{-3}$

$-4 = g$

OR

$-3 \times g = 12 \times 1$

$\frac{-3g}{-3} = \frac{12}{-3}$

$g = -4$

$\frac{3.7}{m} = \frac{32.93}{89}$

$3.7 \times 89 = m \times 32.93$

$\frac{329.3}{32.93} = \frac{32.93m}{32.93}$

$10 = m$

Solve each equation.

$2(3x - 4) = 4$

Distribute the bracket

$\Rightarrow 2(3x) + 2(-4) = 4$

$6x - 8 = 4$

Using SAMDER...

$6x - 8 + 8 = 4 + 8$

$\frac{6x}{6} = \frac{12}{6}$

$x = 2$

Solve each equation.

$$-2(x + 1) = 10$$

Distribute the bracket

$\Rightarrow -2(x) - 2(1) = 10$

$-2x - 2 = 10$

Using SAMDEB...

$-2x - 2 + 2 = 10 + 2$

$\frac{-2x}{-2} = \frac{12}{-2}$

$x = -6$

Solve each equation.

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

Distribute both brackets

$\Rightarrow 3(x) + 3(-4) = 2(x) + 2(5)$

$3x - 12 = 2x + 10$

$3x - 2x = 10 + 12$

$x = 22$

Check

$3(22-4) = 2(22+5)$

$3(18) = 2(27)$

$54 = 54$

$LS = RS$ ✓

Two girls are the same **age**. One girl's age can be found by **increasing** a ***number*** by ***10*** and then **doubling** the result. The other girls age can be found by **reducing** a ***number*** by ***5*** and then **multiplying** the result by ***5***. Find the ***number***, find their **ages**!

Let n = the number

Girl #1 $\Rightarrow 2(n+10)$

Girl #2 $\Rightarrow 5(n-5)$

Girls are the same age

$\Rightarrow 2(n+10) = 5(n-5)$

$2(n)+2(10) = 5(n)+5(-5)$

$2n+20 = 5n-25$

$20+25 = 5n-2n$

$\frac{45}{3} = \frac{3n}{3}$

$15 = n$

Ages $= 2(15+10)$

$= 2(25)$

$= 50$ years old