

## 4-1 Ratios and Proportions

Make sure you know the definition of Ratio and Proportion!

Solve by cross multiplication and check.

$$1) \quad \frac{10}{x} = \frac{2}{11}$$

$$10(11) = 2(x)$$

$$\frac{110}{2} = \frac{2x}{2}$$

$$55 = x$$

{ 55 }

This is a “must see step”

Determine the product.

To solve for x, divide both sides by 2.

$$\sqrt{\phantom{x}}: \quad x = 55$$

$$\frac{10}{(55)} = \frac{2}{11}$$

$$\frac{2}{11} = \frac{2}{11}$$

Replace x with 55.

$\frac{10}{55}$  reduces to  $\frac{2}{11}$ , so the LHS = RHS

$$2) \quad \frac{3}{8} = \frac{x}{5}$$

$$3(5) = 8(x)$$

$$\frac{15}{8} = \frac{8x}{8}$$

$$1\frac{7}{8} = x$$

{  $1\frac{7}{8}$  }

Cross Multiply to solve.

This is a “must see step”

Determine the product.

To solve for x, divide both sides by 8.

$$\sqrt{\phantom{x}}: \quad x = \frac{15}{8}$$

$$\frac{3}{8} = \frac{\left(\frac{15}{8}\right)}{5}$$

Replace x with  $\frac{15}{8}$

**DO NOT CROSS MULTIPLY!!!** You must simplify using the order of operations!

$$\frac{3}{8} = \frac{15}{8} \div 5$$

Simplify the complex fraction on the right side by rewriting it as a division problem

$$\frac{3}{8} = \frac{15}{8} \cdot \frac{1}{5}$$

Use Division Rule (Multiply by the reciprocal)

$$\frac{3}{8} = \frac{3}{8}$$

The product of  $\frac{15}{8} \cdot \frac{1}{5}$  is  $\frac{3}{8}$ , so the LHS = RHS

$$\begin{aligned}
 3) \quad & \frac{6}{1-x} = \frac{2}{9} \\
 & \frac{6}{(1-x)} = \frac{2}{9} \\
 & 2(1-x) = 6(9) \\
 & 2 - 2x = 54 \\
 & -2 \quad -2 \\
 & \underline{-2x = 52} \\
 & \quad -2 \quad -2 \\
 & \quad x = -26
 \end{aligned}$$

{ -26 }

$$\begin{aligned}
 \checkmark: \quad & x = -26 \\
 & \frac{6}{(1-(-26))} = \frac{2}{9} \\
 & \frac{6}{(1+(+26))} = \frac{2}{9} \\
 & \frac{6}{27} = \frac{2}{9} \\
 & \frac{2}{9} = \frac{2}{9}
 \end{aligned}$$

Rewrite so the difference has parentheses around it.

Cross Multiply (this is a “must see step”)

Distribute

Solve for x by subtracting 2 from each side

Divide each side by -2

Replace x with -26

Subtraction Rule

Simplify the LHS’s denominator.

Reduce  $\frac{6}{27}$  and you get  $\frac{2}{9}$ , so the LHS = RHS.