Name: KEY Hour: _____ Date: _____

NOTES: Section 11.1 – Proportions

Goals: #1 - I can solve proportions using cross multiplication.

Homework: Section 11.1 Worksheet

Exploration #1: Work with a partner and answer the following questions.

1. Find the value of x that would make the following equivalent fractions.

a. $\frac{1}{2} = \frac{x}{8}$ ($\times 4$)

$x = 4$

b. $\frac{10}{x} = \frac{5}{6}$ ($\div 2$)

$x = 12$

c. $\frac{x}{9} = \frac{1}{3}$ ($\div 3$)

$x = 3$

Notes:

An equation that states that two ratios are equal is a proportion.

Example: $\frac{1}{2} = \frac{4}{8}$ → proportion (ratios)

If two ratios are equal, then their reciprocals are also equal.

Example: $\frac{1}{2} = \frac{4}{8} \rightarrow \frac{2}{1} = \frac{8}{4}$

To solve proportions, we will cross multiply.

Example #1: Solve the proportion.

1. $\frac{3}{y} \times \frac{5}{8}$

$5y = 3 \cdot 8$

$\frac{5y}{5} = \frac{24}{5}$

$y = \frac{24}{5}$

2. $\frac{9}{4} \times \frac{2c}{8}$

$4 \cdot 2c = 9 \cdot 8$

$\frac{8c}{8} = \frac{72}{8}$

$c = 9$

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Example #2: Solve the proportion.

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

$x(x+1) = 3 \cdot 4$

$x^2 + x = 12$

$x^2 + x - 12 = 0$

-12: $-3 + 4 = 1$

$x^2 + 4x - 3x - 12 = 0$

$x(x+4) - 3(x+4) = 0$

$(x+4)(x-3) = 0$

$x + 4 = 0$ $\quad$ $x - 3 = 0$

$\boxed{x = -4}$ $\quad$ $\boxed{x = 3}$

2. $\frac{x+3}{x+5} = \frac{x-3}{-3}$

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

$x^2 - 3x + 5x - 15 = -3x - 9$

$x^2 + 2x - 15 = -3x - 9$

$x^2 + 5x - 6 = 0$

-6: $6 + -1 = 5$

$x^2 + 6x - 1x - 6 = 0$

$x(x+6) - 1(x+6) = 0$

$(x+6)(x-1) = 0$

$x + 6 = 0$ $\quad$ $x - 1 = 0$

$\boxed{x = -6}$ $\quad$ $\boxed{x = 1}$

You practice: Solve the proportion.

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

$x(x) = 4(x-1)$

$x^2 = 4x - 4$

$x^2 - 4x + 4 = 0$

4: $-2 + -2 = -4$

$x^2 - 2x - 2x + 4 = 0$

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

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

same factor

$x - 2 = 0$

$\boxed{x = 2}$

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

$-3 \cdot 3 = x(x+6)$

$-9 = x^2 + 6x$

$x^2 + 6x + 9 = 0$

9: $3 + 3 = 6$

$x^2 + 3x + 3x + 9 = 0$

$x(x+3) + 3(x+3) = 0$

$(x+3)(x+3) = 0$

same factor

$x + 3 = 0$

$\boxed{x = -3}$