Proportional Reasoning

Ratios and proportions are used often in mixtures to keep a balance between ingredients.

Ex 1

An equivalent ratio can be made by multiplying or dividing all components by a constant amount.

Write an equivalent ratio for each given ratio

a) 3 : 6 = 12 : 24 (×4) **b) 4 : 9 = 8 : 18** **c) 6 to 10 = 3 to 5** (÷2)

ratio

proportion statement

Ex 2

A proportion is a statement to say that two ratios are equal. They can be used to solve mixture problems.

Orange Juice is made by combing 3 parts of water with 1 part of concentrate. If 9 parts of water are used to make Orange Juice then how much concentrate must be used?

Water : concentrate

$3 : 1 = 9 : C$

$\frac{3}{9} = \frac{1}{C}$

$\frac{3C}{3} = \frac{9}{3}$

C = 3 part concentrate

Ex 3

More complicated problems can incorporate more than two elements in the mixture.

A recipe for math biscuits uses 5 cups of flour, 1 cup of sugar and 2 cups of milk. How much flour and sugar must be used to make the biscuits if we have 4 cups of milk?

Flour : Sugar : Milk

$5 : 1 : 2 = F : G : 4$

$\frac{5}{F} = \frac{1}{G} = \frac{2}{4}$

$\frac{5}{F} = \frac{2}{4}$ $\qquad$ $\frac{1}{G} = \frac{2}{4}$

$\frac{2F}{2} = \frac{20}{2}$ $\qquad$ $\frac{2G}{2} = \frac{4}{2}$

F = 10 cups of Flour $\qquad$ G = 2 cups of sugar