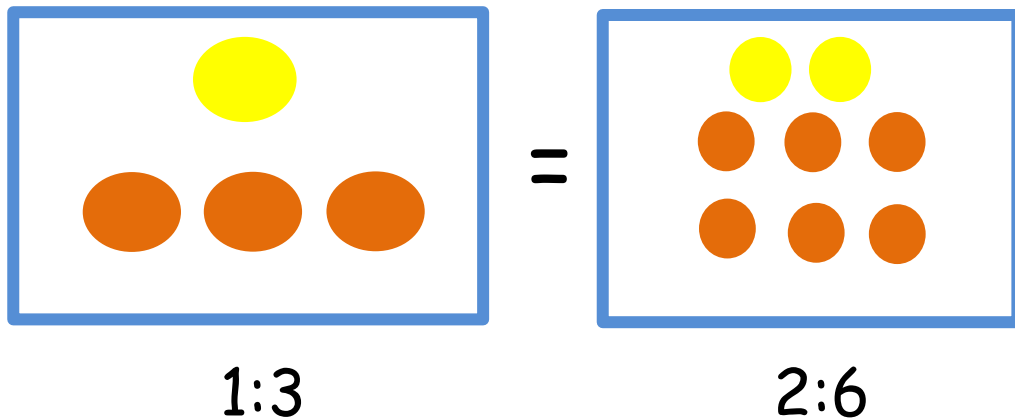


Proportions Guide Notes

Proportions

Proportion is the equality of two ratios (or fractions).



How do we write proportions?

Proportions can be written as follows:

A. Two equal fractions

$$\frac{1}{3} = \frac{2}{6}$$

B. Using a colon

$$1:3 = 2:6$$

Proportions Guide Notes

Is the proportion TRUE or FALSE?

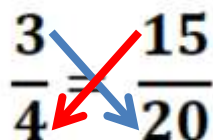
To determine whether given proportion is TRUE or FALSE, we use the process of "cross multiplication".

Example: Tell whether the given proportion $3:4 = 15:20$ is true or false.


Step 1: Rewrite the ratio in fraction form.

$$\frac{3}{4} = \frac{15}{20}$$

Step 2: Multiply the numerator of the first ratio by the denominator of the other ratio, and the numerator of the second ratio by the denominator of the first ratio.


$$\frac{3}{4} = \frac{15}{20}$$

Step 3: If the product are equal, then the proportion is TRUE. If not then the proportion is false.


$$\frac{3}{4} = \frac{15}{20}$$
$$(3)(20) = (15)(4)$$
$$60 = 60$$

Proportions Guide Notes

Sample Problem 1:

Tell whether the given proportions are TRUE or FALSE,

a. $2:4 = 15:30$

Solution: TRUE

$$60 = 60$$

b. $32:24 = 36:20$

Solution: FALSE

$$640 \neq 864$$

Finding the Unknown in a Proportion

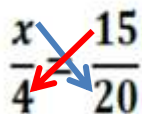
If it is known that the given ratios are proportional, then you can easily find the unknown quantity in a proportion.

Example: Solve for x in the proportion $x:4 = 15:20$.

Step 1: Write the given proportion in fraction form.

$$\frac{x}{4} = \frac{15}{20}$$

Step 2: Cross Multiply


$$\frac{x}{4} = \frac{15}{20}$$

Step 3: Solve for the unknown.

$$20x = 60$$

$$x = 30$$

Proportions Guide Notes

Sample Problem 2:

Find the unknown in the proportion $15:a = 25:5$.

Solution:

$$(25)(a) = (15)(5)$$

$$25a = 75$$

$$a = 3$$

Solving Problems Using Proportions

A lot of real life problems can be solved using the concept of proportions.

Example:

A photographer wants to enlarge a photograph with width 6 inches and length 9 inches. He wants to make the length of the new photograph 12 inches, but still want to keep the proportion of the width to length. What is the width of the enlarged photograph?

Solution:

Step 1: Determine the relationship of the ratio in the given problem.

width : length

Proportions Guide Notes

Step 2: Write a ratio that compares the quantities given in the problem.

Original photo - 6 inches : 9 inches

Enlarged photo - x : 12 inches

Step 3: Write a proportion that reflects the equality of the ratios in fraction form.

$$\frac{6}{9} = \frac{x}{12}$$

Step 4: Solve for x .

$$9x = 72$$

$x = 8$, therefore the enlarged photo has a width of 8 inches and 12 inches length.

Sample Problem 3:

Chris can type 5 pages in an hour. How long will it take him to complete 100 pages?

Solution:

5 pages : 1 hour = 100 pages : b

$$\frac{5}{1} = \frac{100}{b} \longrightarrow 5b = 100 \longrightarrow b = 20 \text{ hours}$$