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RAVEN'S WNCPC GRADE 10 MATHEMATICS

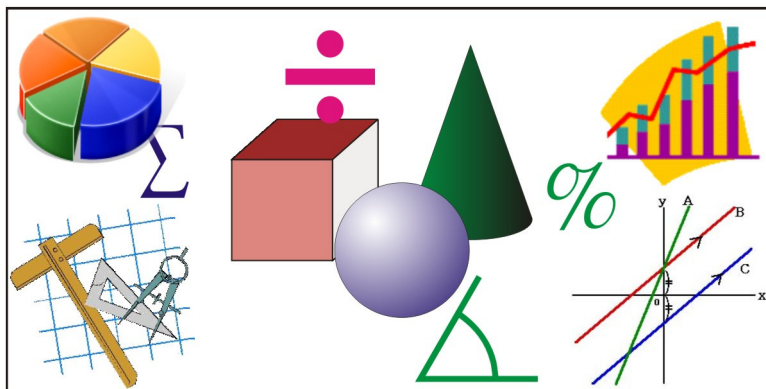
British Columbia – Foundations and Pre Calculus Math 10

Alberta – Mathematics 10 C

Saskatchewan – Foundations and Pre Calculus Math 10

Manitoba – Introduction to Applied & Pre Calculus Math 20S

STUDENT GUIDE AND RESOURCE BOOK



The Key to Student Success

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SAMPLE EXERCISES

1.F Ratio and Proportional Reasoning

- Soon we will be working with proportional reasoning to convert linear units in one measurement system to units in the other. Prior to doing this it is important to review the concept of ratio and how it relates to proportion.

Ratio

- A **ratio** compares one number to another, showing a relationship between the two. It is usually shown as a fraction where the first number is the numerator and the second number the denominator. e.g.

$$\text{ratio of 7 to 11: } \frac{7}{11} \quad ; \quad \text{ratio of 5 to 7: } \frac{5}{7} \quad ; \quad \text{ratio of 8 to 3: } \frac{8}{3}$$

- Sometimes ratios are shown with a colon between the numbers, where the first is the numerator and the second the denominator. e.g.

$$7:9 \rightarrow \frac{7}{9} \quad ; \quad 11:3 \rightarrow \frac{11}{3}$$

Proportion

- When one ratio is equal to another, it is called a **proportion**.
- Notice that in a proportion, the “diagonal products” are equal.

e.g.

$$\frac{1}{2} = \frac{8}{16} ;$$

$$\frac{1}{2} \begin{array}{c} \nearrow \searrow \\ \nwarrow \nearrow \end{array} \frac{8}{16} \rightarrow 1 \times 16 = 2 \times 8 \rightarrow 16 = 16$$

- Finding the products of numerators and denominators of alternate ratios and then setting them equal to each other is sometimes called “cross multiplication.”

Proportional Reasoning

- **Proportional reasoning** involves the ability to understand and compare ratios, and to predict and produce equivalent ratios. It requires comparisons between quantities and also between the relationships between quantities.

Examples with Solutions

<u>Question</u>	<u>Solution</u>
<u>Ratio</u>	
1. There are 11 boys and 9 girls in a local Karate club. Find the following ratios.	
a. ratio of boys to girls	<ul style="list-style-type: none"> ▪ the number of boys is 11, it is the numerator ▪ the number of girls is 9, it is the denominator ▪ the ratio is $\frac{11}{9}$
b. ratio of girls to boys	<ul style="list-style-type: none"> ▪ the number of girls is 9, it is the numerator ▪ the number of boys is 11, it is the denominator ▪ the ratio is $\frac{9}{11}$
c. ratio of boys to all members of the club	<ul style="list-style-type: none"> ▪ the number of boys is 11, it is the numerator ▪ the number of all members of the club is 20, it is the denominator ▪ the ratio is $\frac{11}{20}$

Proportion

Example 1:

Find the value of n if $\frac{5}{n} = \frac{3}{9}$

Solution

The diagonal products are equal so we will use cross multiplication.

$$5 \times 9 = 3 \times n$$

$$45 = 3n$$

$$15 = n$$

Example 2:

If 4 L of juice are needed for 6 people, how many litres are needed for 9 people?

We set up a proportion and solve.

Solution

The ratio of 4 litres to 6 people is equal to the ratio of x litres to 9 people

$$\begin{array}{ccc} \text{Litres} & \swarrow & \nwarrow \text{Litres} \\ & \frac{4}{6} = \frac{x}{9} & \\ \swarrow \text{People} & & \nwarrow \text{People} \end{array}$$

$$4 \times 9 = 6 \times (x)$$

$$x = 6$$

There are 6 L of juice needed for 9 people.

Exercises 1.F

1. Use cross multiplication to find the unknown in each proportion.

a. $\frac{30}{45} = \frac{5}{x}$

b. $\frac{14}{25} = \frac{x}{50}$

c. $\frac{x}{17} = \frac{100}{36}$

d. $\frac{250}{x} = \frac{16}{24}$

e. $\frac{15}{x} = \frac{100}{14}$

Use Proportional reasoning to solve each of the following.

2. If 400 stamps are needed to mail 24 letters, how many letters can be mailed with 1250 stamps?
3. If 16 doctors can serve 2352 patients, how many patients can 40 doctors serve?

