

Lab Framework

Text: CORD

Unit number and title: Unit 9

Short Description: Students will learn how to construct ratios and proportions and how to use them in practical applications to solve problems.

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Date: June 24, 2010

Resources Required:

Four 16 oz. bags of candy
Pencils
Index cards
Students
Calculators

- Review the definition of a ratio.

A ratio is a mathematical expression which can be written in several ways: 1:2, 1 to 2, and $1/2$

For our purposes we will use the fraction form, i.e. $1/2$

- Review the definition of vowels and consonants and demonstrate by the teacher using their own name.

Vowels are letters of the English alphabet represented by the letters "a," "e," "i," "o," "u," and sometimes "y."

Consonant letters of the English alphabet that denote a consonant sound. Consonant letters in the English alphabet are B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W, X, Z, and sometimes Y - the letter Y stands for a consonant in "yoke" but for a vowel in "myth", for example.

- Ask the students to write the number of vowel letters and consonant letters in their last name as a ratio of vowels to consonants on a sheet of paper. Ask three or four students to come to the board and write their name and the ratio of vowels to consonants.

- Divide the class into appropriate groups. Give each group ten ratio cards which ask the students to define and construct ratios.

Example: Smith College has graduating class of 180 students. Of the total 100 are female. The ratio of male to female graduates is 80 / 100 or 8 / 10

Explain the directions and set the timer for five minutes. After the elapsed time, tell the students to stop.

For example, have the students count off by twos and have the ones and the twos stand on opposite sides of the room. Have the students line up on opposite sides of the room according to their ratio to each other. Have a student from each group write their ratio on an index card and hold on to it. At your direction have them hold up their card.

Review the definition of proportion. A **proportion** is an equation that can be solved. When I say that a proportion is two ratios that are equal to each other, I mean this in the sense of two fractions being equal to each other. For instance, $\frac{5}{10}$ equals $\frac{1}{2}$. Solving a proportion means that you are missing one part of one of the fractions, and you need to solve for that missing value. For instance, the following equation is called a proportion. The objective is to solve for x.

$$\frac{x}{10} = \frac{1}{2}$$

- Give each group a bag containing at least 10 pieces of candy.
- **Clearly mark or label the price of the bag of candy.**
- Ask the students to calculate the cost of one piece of candy referred to as the unit cost. Have a student from each group record the group data on an index card or the board.
- Ask a member of each group to verbally state the unit cost of one piece of candy in the bag of the group and to justify their answer. Ask the class to determine if the data is correct.

Give each group two different amounts of the different products, i.e. toilet paper, paper napkins, candy, etc. Ask the students to determine the unit cost of each product and determine which purchase is the best buy. Ask them if the least expensive is always defined as the best buy?

Ancillary Question: A pair of Nike Air Max cost \$99 and a pair of Big 5 Roadrunners cost \$49. Given the shoes are similar in style and color are the Roadrunners the best purchase?

Have students designate a scribe and write down their answers on an index card. Ask the scribe to tape the index card to the board. Ask a member of each group to explain the data written on the board for that group. Have the class check the data written on the board and discuss its significance.

Performance Assessment:

At the end of the lab have students complete an exit ticket composed of two questions; one computational and one practical prior to leaving class. Exit ticket will be evaluated for accuracy and handed back the next class period.

Summary of learning

- Students will practice setting up basic ratios
- Students will develop an understanding of ratios and proportions both the structure and how to use them
- Students will practice setting up proportions using ratios and solving for a missing value
- Students will be able to apply ratios and proportions to practical situations

*4g of sugar = 1 teaspoon of granular sugar

Question: Given the above ratio of nutritional sugar content to granular sugar structure a proportion to determine how much many teaspoons granular sugar is in an 8 oz can of Monster energy drink if the can has 52 grams of sugar?

- An 8oz of **Hype** has 64 grams of sugar
- An 8oz of Boo-Koo Energy has 81 grams sugar

Expanded Optional activities

Expand the activity to analyze the best buy and healthiest choice based on the nutritional content of a product per specific USDA indicators, i.e. calories, protein, carbohydrates, *energy (sugar has 4 kcalories of energy in every gram)*, sodium, fat etc.

Geometry (similarity and indirect measure)

Trigonometry; studying triangles, particularly right triangles. Trigonometry deals with relationships between the sides and the angles of triangles, and with trigonometric functions, which describe those relationships and angles in general, and the motion of waves such as sound and light waves.

Career Applications

Human beings, Cooks, Construction workers, Dietitians and Nutritionists, Carpenters, Plumbers, Medical professionals, Video Game Designers, Graphic artists etc.

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