

## Math Strand 2: Algebraic Relationships

CLE: 2.2 Represent and analyze mathematical situations and structures using algebraic symbols.

Health Profession: Pharmacist

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### References:

LeFever Kee, Joyce & Marshall, Sally M. (2004). *Clinical Calculations*. Elsevier: Saunders.

[www.salarywizard.com](http://www.salarywizard.com)

### Objectives:

At the completion of this presentation the high school student will be able to:

1. Explain how to set up and solve a ratio and proportion problem.
2. Demonstrate how to set up and solve a ratio and proportion problem.
3. Identify the importance of this information as it relates to pharmacists.

### Background Summary of Information as Related to Pharmacy and CLE

To determine the dosage of medications the doctor has ordered we must set up a ratio proportion equation and solve for X.

$$H : V :: D : X$$

H and V on the left side of the equation are the known quantities, which are the dose on hand (H) and the vehicle (V).

D and X on the right side of the equation are the desired dose (D) and the unknown amount to give (X).

Multiply the means and the extremes. Solve for X. The extremes are the two outside numbers and the means are the two inside numbers.

### Example:

Order: Amrinone 65mg, IV bolus over 3 minutes.

Drug available: Amrinone 100mg per 20ml.

To set up the equation we take what is available on one side and what is desired on the other side.

$$100\text{mg} : 20\text{ml} :: 65\text{mg} : X$$

We then can solve the proportion by multiplying the 2 outside numbers (extremes) together and the 2 inside numbers (means) together.

$$100X = 1300\text{ml}$$

Lastly we solve for X by dividing.

$$X = 13\text{ml.}$$

**Scenario:**

Tommy, a twelve year old boy, had a seizure today at recess while playing basketball and was rushed by ambulance to the nearest emergency room. After confirming the diagnosis of tonic-clonic seizures the neurologist prescribed Dilantin 200mg, IV (intravenous), STAT. The drug is available in 250mg/5ml. The pharmacy received the order and the pharmacist began to process the order. A mistake was made while figuring the dosage. Instead of receiving the correct dose of Dilantin, Tommy received twice the correct dose. Soon after the nurse administered the Dilantin, Tommy became confused and stopped responding to questions. His breathing slowed dramatically, and a measles-like rash began to develop. Tommy's mom immediately pressed the call light for the nurse to come. After doing some investigating the mistake made by the pharmacist was discovered.

Upon graduation if a student should decide to pursue a career as a pharmacist a pre-pharmacy degree is offered at many institutions including Missouri Western State University. The closest School of Pharmacy to St. Joseph is the University of Missouri Kansas City, where a doctorate of pharmacy degree is offered. According to [www.salarywizard.com](http://www.salarywizard.com) the average salary of a pharmacist in the United States is \$102,449.

**Activity:**

At the beginning of the lecture have a partner act as if they are having a seizure. This will help to gain the students attention. Teach the basics of how to solve ratio proportion equations, and then introduce the scenario. Have the students work through the problem in the scenario and conclude that the person in the beginning of class was displaying signs of a seizure.

Break up into small groups of four to five students. One person from each group will be selected to come up to the board to compete against the students from the other groups. The group of the first student to answer the problem from the examples in the background information correctly will earn a point. The team with the most points in the end wins.

**Examples:**

Order: Amoxicillin 75mg.

Drug Available Amoxicillin 125mg/5ml.

$$125\text{mg} : 5\text{ml} :: 75\text{mg} : X\text{ml}$$

$$125X = 375$$

$$X = 3\text{ml}$$

**Order: Meperidine 60mg.**

**Drug Available: Meperidine 100mg/1ml.**

$$100\text{mg} : 1\text{ml} :: 60\text{mg} : X\text{ml}$$

$$100X = 60$$

$$X = 0.6\text{ml}$$

**Order: Cipro 500mg.**

**Drug Available: Cipro 250mg/1 tablet.**

$$250\text{mg} : 1\text{ tablet} :: 500\text{mg} : X$$

$$250X = 500$$

$$X = 2\text{ tablets}$$

**Order: Methyldopa 150mg.**

**Drug Available: Methyldopa 250mg/5ml.**

$$250\text{mg} : 5\text{ml} :: 150\text{mg} : X$$

$$250X = 750$$

$$X = 3$$

**Order: Amikacin 250mg.**

**Drug Available: Amikacin 1000mg/4ml.**

$$1000\text{mg} : 4\text{ml} :: 250\text{mg} : X$$

$$1000X = 1000$$

$$X = 1\text{ml}$$

**Order: Amoxicillin 250mg.**

**Drug Available: Amoxicillin 125mg/5ml.**

$$125\text{mg} : 5\text{ml} :: 250\text{mg} : X$$

$$125X = 1250$$

$$X = 10\text{ml}$$

**Order: Ceftin 400mg.**

**Drug Available: Ceftin 125mg/5ml.**

$$125\text{mg} : 5\text{ml} :: 400\text{mg} : X$$

$$125X = 2000$$

$$X = 16\text{ml}$$