



Dosage Calculations

Eighth Edition

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Percents-Ratio-Proportions

Textbook Assignment:

Pickar, G. (2007). *Dosage calculations: A ratio-proportion approach*. (2nd ed.)

Chapter 2

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What is a Ratio ?

- Indicates the relationship of one part of a quantity to the whole
 - May be in a fraction or separated by a colon

Example:

5 nurses per 35 patients $\frac{5}{35} = \frac{1}{7}$ reduced to 1/7
or

5:35 reduced to 1:7



What is Percent ?

- A type of ratio using 100ths
- To remember the value of a given percent
 - Replace % symbol with “/” for per and “100” for cent
 - Percent (%) means “100”

$$8\% = 8 \text{ percent} = \frac{8}{100} = 0.08$$



Convert Percent to Fraction

- To change a percent to a fraction
 - Drop % sign
 - Place remaining number as the numerator over denominator 100



Convert Percent to Fraction

- Reduce fraction to lowest terms
- THINK: per (/) cent (100)

$$75\% = \frac{75}{100} = \frac{3}{4}$$



Convert Percent to Ratio

- To change a percent to a ratio
 - Convert percent to a fraction in lowest terms
 - Place numerator to left of colon and denominator to right of colon



Convert Percent to Ratio

$$35\% = \frac{35}{100} = \frac{7}{20} = 7:20$$



Convert Percent to Decimal

- To change a percent to a decimal
 - Drop % sign
 - Divide by 100

$$4\% = 4 \div 100 = 0.04$$



Convert Decimal to Percent

- To change a decimal to percent
 - Multiply by 100
 - Add % sign

$$0.5 = 0.50. = 50\%$$



Convert Ratio to Decimal

- To change a ratio to a decimal
 - Convert ratio to a fraction
 - Divide numerator by denominator

$$1:4 = \frac{1}{4} = 1 \div 4 = 0.25$$



Convert Ratio to Percent

- To change a ratio to a percent
 - First write the ratio as a fraction
- Convert resulting fraction to a decimal and then to a percent



Convert Ratio to Percent

$$1:2 = \frac{1}{2} = 1 \div 2 = 0.5 = 0.50 = 50\%$$

Diagram illustrating the conversion of the ratio 1:2 to a percent. The sequence shows the ratio 1:2, followed by the fraction $\frac{1}{2}$, then the division $1 \div 2$, resulting in the decimal 0.5. The decimal 0.5 is then converted to 0.50 by adding a zero, and finally to 50% by multiplying by 100. Curved arrows indicate the progression from 0.5 to 0.50 and from 0.50 to 50%.



Comparing Percents and Ratios

- Many solutions administered by nurses have concentration markings:

Examples:

0.9% Sodium Chloride Intravenous Solution

5% Dextrose Intravenous Solution

0.5% Dakins Topical Solution



Comparing Percents and Ratios

- Compare concentrations:
0.9% Sodium Chloride = 0.9 parts to 100
5% Dextrose = 5 parts to 100

0.5% Dakins = 0.5 parts to 100
- Which one is the strongest concentration?
- Which one is the weakest concentration?



What is a Proportion?

- Two ratios that are equal
- A proportion can be written as two ratios separated by an equal sign or a double colon



Ratio-Proportion

$$5:10::10:20$$

$$5:10=10:20$$

Preferred 

$$\frac{5}{10} = \frac{10}{20}$$



Proportion Cross-Products

- If two fractions are equivalent, their cross products are also equal

$$\frac{5}{10} = \frac{10}{20}$$

$$5 \times 20 = 10 \times 10$$

$$100 = 100$$



Solving for X in a Proportion

• Cross Multiply $\frac{1}{4} = \frac{X}{8}$

$$\text{Therefore, } 4 \times X = 1 \times 8$$

$$\text{If } 4X = 8, \text{ then } \frac{4x}{4} = \frac{8}{4}, \text{ and } X = 2.$$



Percentage of a Quantity

- Percentage (Part)
= Percent $\times$ Whole Quantity
- Example: What is 12% of 48?
- Remember $12\% = 12/100 = 0.12$

$$X = 12\% \times 48 = 0.12 \times 48 = 5.76$$



An example of how we will be using Ratio Proportion to Perform Dosage Calculations

The physician has ordered **30 mg** of a medication to be administered. On hand you have the medication available as **15 mg per tablet**.

How many tablets will you administer?

$$\frac{15 \text{ mg}}{1 \text{ tab}} = \frac{30 \text{ mg}}{X}$$

$$15X = 30$$

$$\frac{15X}{15} = \frac{30}{15}$$

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



Dosage Calculations

- Ratio Proportion Method
 - Estimate what is a reasonable amount before attempting to calculate dosage
 - Start by selecting a “known” ratio from the problem. Then, set up remainder of proportion.
 - Ensure that all measurements are in the same system of measurement. If not **CONVERT** before solving for X.