

Whole Numbers, Fractions, Decimals, and Percentages

Unit: Effective Communication

Problem Area: Use Mathematical Skills

Lesson: Whole Numbers, Fractions, Decimals, and Percentages

- **Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

- 1 Practice adding, subtracting, multiplying, and dividing whole numbers, decimals, percentages, and fractions.**
- 2 Convert Fahrenheit into Celsius temperatures.**

- **List of Resources.** The following resources may be useful in teaching this lesson:

Badasch, Shirley A., and Doreen S. Chesebro. *Introduction to Health Occupations*, 6th ed. Prentice Hall, 2004.

Gerdin, Judith. *Health Careers Today*, 3rd ed. Mosby Elsevier, 2003.

Simmers, Louise. *Diversified Health Occupations*, 6th ed. Delmar Learning, 2004.

Sorrentino, Shelia. *Mosby's Textbook for Nursing Assistants*, 6th ed. Mosby Elsevier, 2004.

Venes, Donald. *Tabers Cyclopedic Medical Dictionary*, 18th ed. F.A. Davis, 1997.



■ List of Equipment, Tools, Supplies, and Facilities

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials

■ Terms. The following terms are presented in this lesson (shown in bold italics):

- ▶ mixed numbers
- ▶ non-whole numbers
- ▶ percentages
- ▶ whole numbers

■ Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situation. A possible approach is included here.

Tell the students that many health care careers rely on workers having excellent mathematical skills. Explain that health care workers must be able to do math quickly and accurately to care for patients. For example, these skills are needed when dealing with patient weights, calculating drug dosages, measuring a patient's intake and output, and more. Have students think of the last time they visited a doctor. Ask them what math skills were used by the doctor or nurse.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

Objective 1: Practice adding, subtracting, multiplying, and dividing whole numbers, decimals, percentages, and fractions.

Anticipated Problem: How do you add, subtract, multiply, and divide whole numbers, decimals, percentages, and fractions?

- I. Whole numbers, non-whole numbers (decimals), percentages, and fractions
 - A. Numbers are expressed in different forms.
 1. **Whole numbers** are the counting numbers and zero.
 2. **Non-whole numbers** are numbers with decimals.

3. **Percentages** are measured “by the hundred.”
 4. **Mixed numbers** are whole numbers with a fraction.
- B. Numbers with more than one digit are defined by their place value.
Examples:
1. 1,358 = 1 thousands, 3 hundreds, 5 tens, and 8 ones
 2. 658,443 = 6 hundred thousands, 5 ten thousands, 8 thousands, 4 hundreds, 4 tens, and 3 ones
- C. All numbers are written with a comma to the left of every third digit.
Examples:
1. 1,358
 2. 658,443
- D. Non-whole numbers are expressed to the right of a decimal point, and they have different place values. Examples:
1. 6.359 = 6 ones, 3 tenths, 5 hundredths, and 9 thousandths
 2. 51.2 = 5 tens, 1 ones, and 2 tenths
- E. The symbol for percent is “%.”
1. All of something is 100%.
 2. Half of something is 50%.
- F. Two or more whole numbers are added together by placing the numbers in columns.
1. A line should be drawn under the last number in the column, and the sum should be placed below that line.
 2. Example:

$$\begin{array}{r} 65 \\ +41 \\ \hline 106 \end{array}$$
 - a. The numbers in the far right column should be added first.
 - b. Column integrity should be maintained (ensure that each column sum is accurate) so the hundreds, tens, and ones will be correct.
 3. When a column of numbers totals more than “10,” it is necessary to carry numbers to the column to the left of the column being added. For example:

$$\begin{array}{r} 58 \\ +36 \\ \hline 94 \end{array}$$
 - a. In this case, the sum of the far right column is more than 10. It is 14.
 - b. The number 4 should be placed in the ones column, and the 1 should be moved to the tens column.
- G. Subtraction is the opposite of addition.
1. In subtraction, the answer can be checked by adding the result to the subtracted amount. It should equal the beginning total.

2. Subtracting by borrowing numbers is done by borrowing from the column to the left. This allows a larger number like an “8” to be subtracted from “5.”

3. Example:

$$\begin{array}{r} 45 \\ -28 \\ \hline 17 \end{array}$$

- In this problem, “ten” is borrowed from the four, making it “3 tens.”
- Adding the borrowed “ten” to the five makes it 15.
- Then 15 minus 8 equals 7.

H. Adding and subtracting decimals is done in the same fashion as whole numbers. All “like” columns should be aligned, and the decimals should be aligned.

I. Adding percentages is done in the same manner as whole numbers. For example, $50\% + 25\% = 75\%$.

J. Percentages may also be written as “hundredths.”

- $50\% = 0.50$
- $42\% = 0.42$

K. Decimals, percentages, and fractions may be expressed in different ways. Because numbers to the right of a decimal are less than a whole number, they may be expressed as a decimal or as a fraction.

- $1.5 = 150\% = \frac{150}{100} = 1\frac{1}{2}$
- $0.66 = 66\% = \frac{66}{100} = \frac{2}{3}$ (approximately)
- $0.25 = 25\% = \frac{25}{100} = \frac{1}{4}$

L. Changing a decimal into a percent is done by moving the decimal point two places to the right. For example, $0.50 = 50\%$.

M. Fractions may also be expressed as decimals. For example, $\frac{12}{10} = 2\frac{1}{5} = 2.20$.

N. Fractions may be added, subtracted, multiplied, and divided.

- To add fractions, the common denominator must be found. Then the numerators must be added over the new denominator. For instance, $\frac{1}{2} + \frac{1}{4} = \underline{\hspace{1cm}}$. (Read on.)
 - The least common denominator is 4.
 - So $\frac{1}{2}$ becomes $\frac{2}{4}$.
 - Next, it is necessary to add $\frac{2}{4}$ to $\frac{1}{4}$ to get a sum of $\frac{3}{4}$.
- To subtract fractions, the least common denominator must be found, and then the new numerators must be subtracted.
- To multiply fractions, the two numerators must be multiplied over the two denominators. For example: $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.
- To divide fractions, the fraction being divided must be inverted into the whole. For instance, $\frac{1}{2}$ divided by $\frac{1}{2} = \frac{1}{2} \times \frac{2}{1} = \frac{2}{2}$ (which is the same as “1”).

Have students use Chapter 7 in Introduction to Health Occupations. Use LS–A to allow students to practice math concepts in this objective. The answers to LS–A

are found in LS KEY-A. More problems are available in the workbook that accompanies the Introduction to Health Occupations text.

Objective 2: Convert Fahrenheit into Celsius temperatures.

Anticipated Problem: How is Fahrenheit converted into Celsius temperatures and vice versa?

II. Fahrenheit and Celsius conversion

- A. On the Fahrenheit scale, water freezes at 32° ; on the Celsius scale, it freezes at 0° .
- B. On the Fahrenheit scale, water boils at 212° ; on the Celsius scale, the boiling point is 100° .
- C. To convert degrees Fahrenheit into Celsius, subtract 32. Then multiply that figure by 5 and divide that figure by 9. Examples:
- $80^{\circ}\text{F} - 32 = 48$
 $48 \times 5 = 240$
240 divided by 9 = 26.67°C
 - $98.6^{\circ}\text{F} - 32 = 66.6$
 $66.6 \times 5 = 333$
333 divided by 9 = 37°C
- D. To convert degrees Celsius into Fahrenheit, multiply by 9, divide by 5, and add 32. Examples:
- $10^{\circ}\text{C} \times 9 = 90$
90 divided by 5 = 18
 $18 + 32 = 50^{\circ}\text{F}$
 - $25^{\circ}\text{C} \times 9 = 225$
225 divided by 5 = 45
 $45 + 32 = 77^{\circ}\text{F}$

Refer students to Chapter 11 in Introduction to Health Occupations to review a comparison chart of Fahrenheit and Celsius temperatures. Use VM-A and VM-B to illustrate the formulas for temperature conversion, and give students sample problems to solve.

Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the ends of chapters in the textbook may also be used in the review/summary.

■ **Application.** Use the included visual masters and lab sheet to apply the information presented in the lesson.

■ **Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.

■ **Answers to Sample Test:**

Part One: Short Answer

1. 37.2°C
2. Whole numbers are 0 and greater. Non-whole numbers are less than 1, or less than the whole.
3. “By the hundreds”

Part Two: True/False

1. F
2. T
3. F
4. T
5. F
6. T

Part Three: Matching

1. d
2. a
3. c
4. b

Whole Numbers, Fractions, Decimals, and Percentages

► Part One: Short Answer

Instructions: Complete the following.

1. If a patient's temperature is 99°F, what is the Celsius equivalent?

2. What is the difference between a whole number and a non-whole number?

3. What does the word "percentage" mean?

► Part Two: True/False

Instructions: Write T for true or F for false.

- ____ 1. If you wanted to express 0.5 as a fraction, it would be $\frac{1}{4}$.
- ____ 2. The sum of $\frac{1}{4}$ and $\frac{1}{2}$ is $\frac{3}{4}$.
- ____ 3. If you subtract $\frac{3}{8}$ from $\frac{5}{8}$, you end up with 1.



- ____ 4. If you convert 26°C into Fahrenheit, it is 78.5°F .
- ____ 5. Twenty-five percent of 40 is 20.
- ____ 6. As a fraction, 25% would be $\frac{1}{4}$.

► **Part Three: Matching**

Instructions: Match the term with the correct definition.

- a. mixed numbers
- b. non-whole numbers
- c. percentages
- d. whole numbers

- ____ 1. The counting numbers and zero
- ____ 2. Whole numbers with a fraction
- ____ 3. Numbers measured “by the hundred”
- ____ 4. Numbers with decimals

FAHRENHEIT AND CELSIUS CONVERSION FORMULAS

General information

- ◆ Under standard conditions, water boils at 212°F or 100°C .
- ◆ Under standard conditions, water freezes at 32°F or 0°C .

To convert Fahrenheit into Celsius:

- ◆ Subtract 32.
- ◆ Multiply by 5.
- ◆ Divide by 9.

To convert Celsius into Fahrenheit:

- ◆ Multiply by 9.
- ◆ Divide by 5.
- ◆ Add 32.



QUICK REFERENCE TABLE: TEMPERATURE CONVERSION

Celsius	Fahrenheit
-40°C	-40°F
-17.8°C	0°F
-10°C	14°F
0°C	32°F
5°C	41°F
10°C	50°F
15°C	59°F
20°C	68°F
25°C	77°F
30°C	86°F
35°C	95°F
40°C	104°F
50°C	122°F
60°C	140°F
70°C	158°F
80°C	176°F
90°C	194°F
100°C	

Math Applications: Whole Numbers, Percentages, Decimals, and Fractions

Purpose

The purpose of this activity is to demonstrate your knowledge of basic math computations as they apply to health care.

Objectives

1. Solve problems using addition, subtraction, multiplication, and division.
2. Convert percentages, decimals, and fractions to a different expression of equal value.
3. Solve problems in health care using basic math concepts.

Materials

- ◆ lab sheet
- ◆ writing utensil
- ◆ writing surface
- ◆ calculator (optional, as determined by the teacher)

Procedure

Complete each of the following computations.



Math Computations Worksheet

Part I: Write the place value of each number in this set of numbers. (For example, 113, would be written as 1 hundreds, 10 tens, 3 ones.)

1. 506
2. 10784
3. 6222
4. 336445
5. 28

Part II: Place commas in the appropriate locations for each number.

1. 2810
2. 63736
3. 4278
4. 560
5. 100500
6. 1608495

Part III: Write the place values for each number to the right of the decimal point. (For example, 5.123 would be 1 tenths, 2 hundredths, 3 thousandths.)

1. 6.59
2. 5.776
3. 30.5
4. 10.98

Part IV: Solve these percentage problems.

1. You are a physical therapy assistant assigned to walk a patient 100 feet each day. On Day 1, the patient walks 25 feet. What percentage of the walk is 25 feet? On Day 2, the patient walks 75 feet. What percentage of the walk is 75 feet?

2. Calculate the solid intake (in percentages) of a patient after the patient has eaten dinner. When all of the food on the patient tray has been consumed, what “percentage” would you record on the dietary flow sheet portion of the chart? What would you record when the patient eats $\frac{3}{4}$ of the meal? What would you record when the patient eats $\frac{1}{4}$ of the meal?

Part V: Addition and subtraction

1. Add these numbers:

a. 100, 58, 2

b. 1,360; 210; 50

2. Subtract these numbers:

a. 45–16

b. 176–48

c. 1,398–510

3. You are asked to weigh a patient who must remain in a wheelchair. The resulting weight of the patient and the wheelchair is 204 pounds. If the wheelchair weighs 45 pounds, how much does the patient weigh?

Part VI: Add or subtract these decimals as indicated.

1. $38.5 + 5.6$

2. $110.7 + 40.2$

3. $10.5 + 16.9$

4. $69.8 - 14.6$

5. $115.6 - 13.9$

6. $102.5 - 4.8$

Part VII: Express each decimal as a percent.

1. 0.16

2. 0.29

3. 0.91

Part VIII: Express each percent as a decimal.

1. 18%
2. 25%
3. 96%

Part IX: Express each decimal as a fraction and then as a percent. (For example, $0.75 = \frac{3}{4} = 75\%$.)

1. 0.25
2. 0.65
3. 0.86

Part X: Solve this percentage problem.

1. You are working in a doctor's office. A patient is losing weight from an unknown cause, and the doctor has instructed the patient to come to the office weekly to be weighed. You are to notify the doctor if the patient weight loss is greater than 2% in any week. The patient's starting weight is 198 pounds. For each of these weekly visits, indicate whether you would record "no report" or a "greater than 2% weight loss" notification.

Week One: patient weighs 196 pounds

Week Two: patient weighs 193 pounds

Week Three: patient weighs 188 pounds

Week Four: patient weighs 184.5 pounds

Math Applications: Whole Numbers, Percentages, Decimals, and Fractions

Part I.

1. five hundreds, zero tens, six ones
2. one ten thousands, zero thousands, seven hundreds, eight tens, four ones
3. six thousands, two hundreds, two tens, two ones
4. three hundred thousands, three ten thousands, six thousands, four hundreds, four tens, five ones
5. two tens, eight ones

Part II.

1. 2,810
2. 63,736
3. 4,278
4. no comma
5. 100,500
6. 1,608,495

Part III.

1. five tenths, nine hundredths
2. seven tenths, seven hundredths, six thousandths
3. five tenths
4. nine tenths, eight hundredths

Part IV.

1. Day 1 = 25%
Day 2 = 75%
2. All eaten = 100%
Three-fourths eaten = 75%
One-fourth eaten = 25%

Part V.

- a. 160
b. 1,620
- a. 29
b. 128
c. 888
- The patient weighs 159 pounds.

Part VI.

- 44.1
- 150.9
- 27.4
- 55.2
- 101.7
- 97.7

Part VII.

- 16%
- 29%
- 91%

Part VIII.

- 0.18
- 0.25
- 0.96

Part IX.

- $0.25 = \frac{25}{100}$ or $\frac{1}{4} = 25\%$
- $0.65 = \frac{65}{100}$ or $\frac{13}{20} = 65\%$
- $0.86 = \frac{86}{100}$ or $\frac{43}{50} = 86\%$

Part X.

Week One: no report

Week Two: no report

Week Three: greater than 2% weight loss notification

Week Four: no report