Relating Fractions, Decimals, and Percent

BUSINESS MATH

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Lesson Objectives

At the end of this lesson, the learners will be able to:
- add/subtract/multiply/divide decimals;
- convert fractions to decimals;
- convert terminating and repeating decimals to fractions;
- convert decimals to percent;
- convert percent to decimals;
- convert fractions to percent;
- arrange in ascending/descending order a combination of decimals and fractions; and
- add/subtract/multiply/divide combination of decimals and fractions.

Let's review…

DECIMALS

Concept of Decimal

A decimal is a representation of a fraction whose denominator is a multiple of 10.

Examples:

$\frac{1}{10} = 0.1$

$\frac{2}{100} = 0.02$

$\frac{456}{100} = 4\frac{56}{100} = 4.56$

$\frac{104}{1000} = 0.104$

$\frac{37}{10000} = 0.0037$

Remarks:

1) It is understood that for whole numbers, the decimal point is located right after the ones digit.
2) The series of digits to the right of the decimal point is also called the fractional part of the decimal number. Adding zeros after the last digit of the fractional part does not change the value of the number.
   Example: 0.5 = 0.50 = 0.500, i.e. $\frac{5}{10} = \frac{50}{100} = \frac{500}{1000}$

The **place value** of each digit with respect to the decimal point is illustrated below:

Thousands	*Hundreds*	*Tens*	*Ones*	*and*	*Tenths*	*Hundredths*	*Thousandths*
1,000	100	10	1	.	1/10	1/100	1/1000

Decimal Point

Examples:

$\frac{1}{10} = 0.1$ read as "one tenths"

$\frac{2}{100} = 0.02$ read as "two hundredths"

$\frac{456}{100} = 4\frac{56}{100} = 4.56$ read as "four and fifty-six hundredths"

$\frac{104}{1000} = 0.104$ read as "one hundred four thousandths"

$\frac{37}{10000} = 0.0037$ read as "thirty seven ten thousandths"

736.8952 is read as "seven hundred thirty-six and eight thousand nine hundred fifty-two ten thousandths" and written in expanded form as follows:

$$736.8952 = 7(100) + 3(10\_ + 6(1) + 8(\tfrac{1}{10}) + 9(\tfrac{1}{100}) + 5(\tfrac{1}{1000}) + 2(\tfrac{1}{10000})$$
$$= 700 + 30 + 6 + \tfrac{8}{10} + \tfrac{9}{100} + \tfrac{5}{1000} + \tfrac{2}{10000}$$

Ordering of Decimals

Ordering of decimals involves comparing the numerical value in each place value from right to left.

First, compare the whole number part (if any) and then the fractional part (digits after the decimal point or to the right of the decimal point).

For the fractional part, compare digits starting from tenths place, then hundredths place, then thousandths place, and so on.

Example: The decimal numbers 0.5671, 0.539, 1.0024, 0.12084323, 0.12184
if arranged in descending order is 1.0024, 0.5671, 0.539, 0.12184, 0.12084

Rounding-off Decimals

Rounding decimals is similar to rounding whole numbers. The digit being rounded to is increased by 1 if the next digit to it is 5 or more. Otherwise, it remains the same.

The rest of the digits after the digit being rounded to will then be replaced by zeros, provided these digits are located to the left of the decimal point. If these digits are located to the right of the decimal point, then they are simply deleted.

Examples:

1. 7,862.355 rounded to the nearest hundred is 7,900.
2. 7,862.355 rounded to the nearest tenths is 7,862.4
3. 7,862.355 rounded to the nearest hundredths is 7,862.36

Fundamental Operations

DECIMALS

Addition / Subtraction

Rule: Align the decimal points. Then, add/subtract as usual just like adding/subtracting whole numbers. The decimal point in the result is written directly below the decimal points in the problem.

Examples:

1)
```
  1 2 3. 4 5 6
    7 0. 9
+     8. 3 3 3
  2 0 2. 6 8 9
```

2)
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    9 8. 6 1 0
-   5 8. 2 9 5
    4 0. 3 1 5
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Multiplication

Rule: Disregard the decimal points and multiply the decimals just like whole numbers. The number of decimal places (i.e. number of digits to the right of the decimal point) in the resulting product is equal to the total number of decimal places of the factors.

Examples:

1) 3.102 x 54.7 = 169.6794

Solution:

```
  3.102 (3 decimal places)
x  54.7 (1 decimal place)
 21714
 12408
 15510
169.6794 (4 decimal places)
```

2) 11.98 x 0.2261 = 2.708678

Solution:

```
 11.98 (2 decimal places)
x 0.2261 (4 decimal places)
   1198
   7188
  2396
 2396
2.708678
```

Division

Similar to multiplication of decimals, division of decimals is done just like in whole numbers. The usual long division is applied and the position of decimal point in the resulting quotient will depend on the position of the decimal point in the dividend.

Three cases are given below:

(i) If both the divisor and dividend are whole numbers and the quotient has a fractional part, then the decimal point of the resulting quotient is placed directly above the decimal point in the dividend (which is right after the ones digit of the dividend). Note that we can add as many zeros as needed after the decimal point of the whole number in the dividend.

Example: 789 ÷ 15 = 52.6

(ii) If the divisor is a whole number and the dividend has a fractional part, then the decimal point of the quotient is located directly above the decimal point in the dividend. Note that we can add as many zeros after the last digit in the fractional part of the dividend.

Example: 858.4 ÷ 64 = 13.4125

(iii) If the divisor has a fractional part, multiply both the divisor and dividend by an appropriate multiple of 10 so that the divisor becomes a whole number, and then apply case (ii). Recall that multiplying by a multiple of 10 or a power of 10, i.e. 10^n is equivalent to moving the decimal point n places to the right.

Example: 1.4916 ÷ 0.24 = 149.16 ÷ 24 = 6.215

Fractions and Decimals

WHAT TO REMEMBER

How to convert fractions to decimals

There are two ways to convert fractions to decimals:

(i) First, convert the fraction to an equivalent fraction whose denominator is a power of 10. Then, convert it to decimal.

Examples:

1) $\frac{1}{2} = \frac{5}{10}$ hence, $\frac{1}{2} = 0.5$
2) $\frac{7}{50} = \frac{14}{100}$ hence, $\frac{7}{50} = 0.14$

(ii) Perform the usual long division wherein the numerator is the dividend and the denominator is the divisor.

From previous examples, we have $\frac{789}{15} = 52.6$

How to convert decimals to fractions

(i) To convert a terminating decimal to a fraction, apply the concept of place value.

Examples:

1) $0.23 = \frac{23}{100}$
2) $4.506 = 4\frac{506}{1000} = 4\frac{253}{500} = \frac{2,253}{500}$

(ii) To convert a repeating decimal to a fraction, refer to the examples below.

Examples:

1) Convert the repeating decimal 0.3 = 0.33333… to a fraction.

Solution: Let $x = 0.\overline{3}$ (multiply the equation by 10)

$10x = 3.\overline{3}$
$- \quad x = 0.\overline{3}$
$9x = 3$
$x = \frac{3}{9}$
Therefore, $0.\overline{3} = \frac{3}{9}$ or $\frac{1}{3}$.

2) Show that the repeating decimal 1.232323… or $1.\overline{26}$ is equal to $\frac{126}{99}$

Solution: Let $x = 1.\overline{26}$ (multiply the equation by 100)

$100x = 126.\overline{26}$
$- \quad x = 1.\overline{26}$
$99x = 125$
$x = \frac{125}{99}$
Therefore, $1.\overline{26} = \frac{125}{99}$

3) Convert 0.5481 to a fraction.

Solution: Let $x = 0.5\overline{481}$ (multiply the equation by 10,000)

$10{,}000x = 5481.\overline{481}$
$- \quad 10x = 5.\overline{481}$
$9990x = 5476$
$x =$ or
Therefore, $0.5\overline{481} = \frac{2738}{4995}$

Fractions, Decimals, Percent

SUMMING IT UP

A percent which means "per hundred" is a representation of a fraction whose denominator is 100. Thus, expressing a number in percent is like comparing it with 100.

Examples: $25\% = \frac{25}{100}$ $88\% = \frac{88}{100}$ $3\% = \frac{3}{100}$

Decimal to Percent

1. How to convert decimal to percent

Rule : Multiply the decimal by 100% . This is equivalent to moving the decimal point two places to the right and appending the % sign.

Examples:

1) 0.35 = 35%
2) 0.175 = 17.5%
3) 1.2 = 120%

Percent to Decimal

Rule: Divide the percent by 100% . This is equivalent to moving the decimal point two places to the left and dropping the % sign.

Examples:

1) 75% = .75
2) 1.468% = .01468
3) 239% = 2.39

Fraction to Percent

Rule: First, convert the fraction to decimal by applying C1. Then, convert the decimal to percent by applying D1.

Examples:

1) $\frac{1}{2} = 0.5 = 50\%$

2) $\frac{7}{50} = 0.14 = 14\%$

3) $\frac{36}{5} = 7.2 = 720\%$

Mastery Test

LET'S SOLVE THE FOLLOWING PROBLEMS

A. Perform the indicated operations and simplify. Express all answers in decimals (at most 6 decimal places).

1.2.13 (4.75 - 50.9908) + 0.626

2. $930.22 \div 5.078 - (6.11)^3$

B. Solve the following word problems.

1. Maria was asked to go to the market to buy $2\frac{1}{2}$ kilos of pork, $\frac{1}{4}$ kilo of garlic, and 6 pieces of saba. One kilo of pork costs PhP215, 1 kilo of garlic costs PhP105, and one piece of saba costs PhP2.30.

   If Maria is given PhP700, will she be able to buy everything she was asked to buy? If yes, how much change is left, if any?

2. Pedro needs to call his classmates to give them final instructions about their class project. He thinks he will need about 2 minutes to talk to each one of them. If his cellular phone has a current load worth PhP425 and a call would cost him PhP6.15 per minute, how many of his classmates will he be able to talk to?

3. Juan drove his car to the gas station for refuelling. If the price of the gasoline is PhP38.31 per liter and he paid PhP1000 for gas purchase, how many liters of gasoline were pumped into his car? Round off the answer to the nearest thousandths (or three decimal places).

4. If the old price of a product is PhP100 and the new price is PhP500, what is the percentage increase in the price?

5. Miguel agrees to lend you money for a monthly interest of 12%. How much will you pay him next month if you borrowed PhP500?

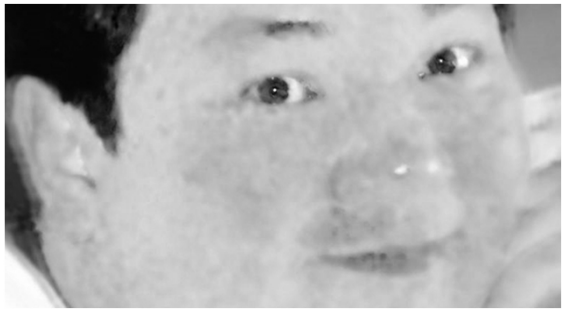
6. A house and lot in a certain subdivision is being sold for PhP1,013,450. If the lot measures 210 square meters, what is its cost per square meter?

7. A gadget costs PhP2000 before the 12% VAT. How much is the total cost of the gadget after VAT?

8. If your total bill is PhP176.75, how much of it is the VAT?

For lesson handout, visit:

http://jacs.weebly.com



THANK YOU!