MATH NEWS

Grade 5, Module 1, Topic A

LAFAYETTE PARISH SCHOOL SYSTEM
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5th Grade Math

Module 1: Place Value and Decimal Fractions

Math Parent Letter

This document is created to give parents and students a better understanding of the math concepts found in the Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material taught in the classroom. Grade 5 Module 1 of Eureka Math (Engage New York) covers place value and decimal fractions. This newsletter will discuss Module 1, Topic A.

Topic A: Multiplicative Patterns on the Place Value Chart

Words to know

- Thousandths/Hundredths/Tenths
- Place Value
- Decimal Fraction
- Exponents
- Digit
- Product
- Factors
- Equation

Thousandths – one of 1,000 equal parts; thousandth's place (in decimal notation) the position of the third digit to the right of the decimal point

Hundredths – one of 100 equal parts; hundredth's place (in decimal notation) the position of the second digit to the right of the decimal point

Tenths – one of 10 equal parts; tenth's place (in decimal notation) the position of the first digit to the right of the decimal point

Place Value - the value of the place of a digit (0-9) in a number

Decimal Fraction - a fractional number with a denominator of 10 or a power of 10 (10, 100, 1,000). It can be written with a decimal point.

Exponent - tells the number of times the base is multiplied by itself
Example: 10^4 – the 4 is the exponent and tells us the 10 (base) is multiplied 4 times (10 x 10 x 10 x 10)

Equation – statement that two mathematical expressions have the same value

Objectives of Topic A

- **Reason concretely and pictorially using place value understanding to relate adjacent base ten units from millions to thousandths.**
- **Reason abstractly using place value understanding to relate adjacent base ten units from millions to thousandths.**
- **Use exponents to name place value units and explain patterns in the placement of the decimal point.**
- **Use exponents to denote powers of 10 with application to metric conversions.**

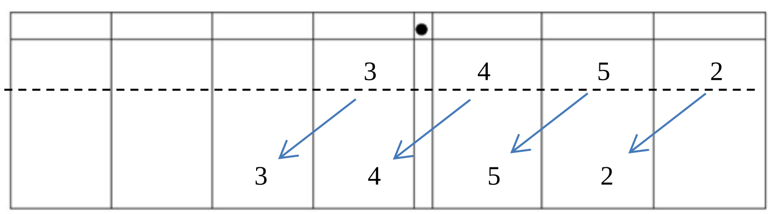
Focus Area – Topic A

Multiplication and Division Patterns on the Place Value Chart

When we **multiply** a **decimal fraction** by a power of 10, the **product** will be larger than the original number; therefore we are shifting to the left on the place value chart. The number of times we shift to the left depends on the power of 10. If multiplying by 10, we shift one place to the left. If multiplying by 100, we shift two places to the left and if multiplying by 1,000, we shift three places to the left and so on.

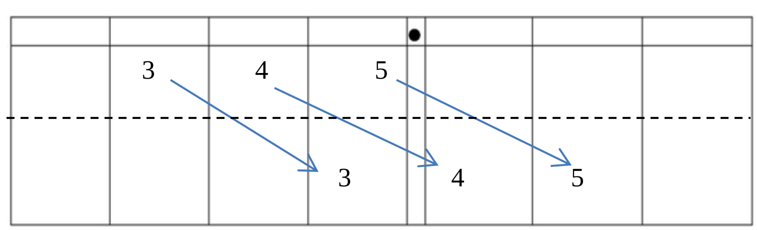
Example: Record the **digits** of the first factor on the top row of the **place value** chart. Draw arrows to show how the value of each digit changes when you multiply or divide. Record the product on the second row of the place value chart.

a. **3.452 x 10 = 34.52 (34.52 is 10 times greater than 3.452.)**



When we **divide** a **decimal fraction** by a power of 10, the **product** will be smaller than the original number; therefore we are shifting to the right on the place value chart. The number of times we shift to the right depends on the power of 10. If dividing by 10, we shift one place to the right. If dividing by 100, we shift two places to the right and if dividing by 1,000, we shift three places to the right and so on.

b. **345 ÷ 100 = 3.45 (3.45 is $\frac{1}{100}$ times as large as 345.)**



Exponents:

Example #1:
$10^5 = 10 \times 10 \times 10 \times 10 \times 10 = 100{,}000$

$10^3 = 10 \times 10 \times 10 = 1{,}000$

The students will recognize that the number of zeros in the **product** (answer in multiplication) is the same as the number of zeros in the **factors** (numbers being multiplied). A student could think of placing 10 on the place value chart and shifting the digits to the left. In 10^5 the 10 would have been shifted 5 places to the left.

Example #2:
$10{,}000 = 10 \times 10 \times 10 \times 10 = 10^4$
$100 = 10 \times 10 = 10^2$

The students will discover that the number of zeros in the number represents the number of times10 is being multiplied.

Example #3:
$$\begin{aligned} & 4 \times 10^3 \\ &= 4 \times 10 \times 10 \times 10 \\ &= 4 \times 1{,}000 \\ &= 4{,}000 \end{aligned}$$

Convert 3 meters to centimeters. (1 meter = 100 centimeter)
100 is the same as 10^2.
$$\begin{aligned} & 3 \text{ m} \times 10^2 \\ &= 3 \times 10 \times 10 \\ &= 3 \times 100 \\ &= 300 \text{ cm} \end{aligned}$$

Application Problems and Answers:

Canada has a population that is about $\frac{1}{10}$ as large as the United States. If United States population is about 320 million, about how many people live in Canada? Explain the number of zeros in your answer.

$\frac{1}{10}$ is the same as dividing by 10. To find the population of Canada, I divided 320,000,000 by 10 which equals 32,000,000. I pictured the place value chart in my head and I shifted 320,000,000 one place to the right which meant that instead of 7 zeros the number has 6 zeros.

$320{,}000{,}000 \div 10 = 32{,}000{,}000$

The population of Canada is 32,000,000.

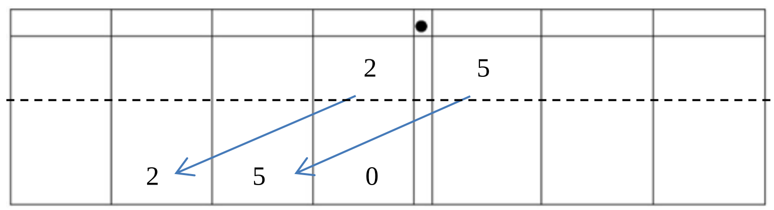
Shaunnie and Marlon missed the lesson on exponents. Shaunnie incorrectly wrote $10^5 = 50$ on her paper, and Marlon incorrectly wrote $2.5 \times 10^2 = 2.500$ on his paper.

a. What mistake has Shaunnie made? Explain using words, numbers, and pictures why her thinking is incorrect and what she needs to do to correct her answer.

Shaunnie believes that $10^5 = 10 \times 5$; however $10^5 = 10 \times 10 \times 10 \times 10 \times 10$ or 100,000. 10 is being multiplied times itself 5 times.

b. What mistake has Marlon made? Explain using words, numbers, and pictures why his thinking is incorrect and what he needs to do to correct his answer.

Marlon made the mistake of only adding zeros to the end of 2.5. He needs to remember that multiply by 10^2 makes a number 100 times greater, which is 250. He has to shift 2.5 two places to the left.



The length of the bar for a high jump competition must always be 4.75 m. Express this measurement in millimeters. Explain your thinking using an **equation** that includes an **exponent**.
(1 meter = 1,000 millimeter)

1,000 is the same as 10^3

$$\left.\begin{aligned} & 4.75 \times 10^3 \\ &= 4.75 \times 10 \times 10 \times 10 \\ &= 4.75 \times 1{,}000 \\ &= 4{,}750 \text{ mm} \end{aligned}\right\}$$

***Students could either draw a place value chart or picture one in their head. Knowing that 4.75 is multiplied by 1,000, the decimal fraction has to shift 3 places to the left. 4,750 is 1,000 times greater than 4.75.

James drinks 800 milliliters of water each during his workout. Henry drinks 600 milliliters daily during his workout. If James works out 3 days each week, and Henry works out 5 days each week, how many <u>**liters**</u> do the boys drink in all each week while working out?

James (800 ml x 3 = 2400 ml)   2400
Henry (600 ml x 5 = 3000 ml)   <u>+3000</u>
5400 ml

1,000 ml = 1 liter $5400 \div 1000 = 5.4$ L


(5400 is shifted to the right 3 places.)

The boys drank 5.4 liters of water.