MATH NEWS

Grade 7, Module 4, Topic C and D

LAFAYETTE PARISH SCHOOL SYSTEM

7th Grade Math

Module 4: Percent and Proportional Relationships

Math Parent Letter

This document is created to give parents and students a better understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material which is taught in the classroom. In Module 4, students deepen their understanding of ratios and proportional relationships from Module 1 by solving a variety of percent problems. They convert between fractions, decimals, and percents to further develop a conceptual understanding of percent and use algebraic expressions and equations to solve multi-step percent problems. An initial focus on relating 100% to "the whole" serves as a foundation for students.

Focus Area Topic C:

Scale Drawings

Students revisit scale drawings to solve problems in which the scale factor is represented by a percent. Students will construct scale drawings and find scale lengths and areas given the actual quantities and the scale factor (and vice-versa); however, in this module the scale factor is represented as a percent. Students are encouraged to develop multiple methods for making scale drawings. Students will recognize the proportional relationships between the scale drawings.

Words to Know:

Scale Drawing - an enlargement or reduction of a drawing

Proportional Relationship- A one-to-one matching between two types of quantities such that the measures of quantities of the first type are proportional to the measures of quantities of the second type

Scale Factor – the quotient of any length in the scale drawing and its corresponding length in the original drawing

Constant of Proportionality - If a proportional relationship is described by the set of ordered pairs that satisfies the equation y = kx, where k is a positive constant, then k is called the constant of proportionality.

Scale Factor as a Percent for a Scale Drawing

Given a scale factor as a percent, students make a scale drawing of a picture or geometric figure using that scale, recognizing that the enlarged or reduced distances in a scale drawing are proportional to the corresponding distances in the original picture. Students understand scale factor to be the constant of proportionality and students make scale drawings in which the horizontal and vertical scales are different.

Focus Area Topic C:

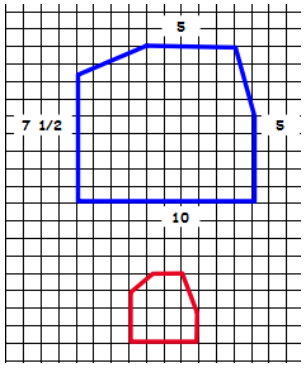
Scale Drawings

Scale Factor as a Percent for a Scale Drawing (continued)

Example:

Create a scale drawing of the picture below using a scale factor of 80%. Write equations that show how you determined the lengths of the parts of the resulting picture.

Scale Factor: $40\% = \frac{40}{100} = \frac{2}{5}$



Horizontal Distances:

$10\left(\frac{2}{5}\right) = 4$

$5\left(\frac{2}{5}\right) = 2$

Vertical Distances:

$5\left(\frac{2}{5}\right) = 2$

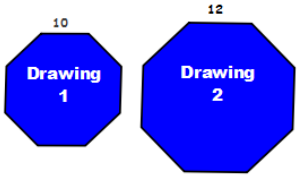
$7\frac{1}{2}\left(\frac{2}{5}\right) = \frac{15}{2}\left(\frac{2}{5}\right) = 3$

Changing Scales

Given Drawing 1 and Drawing 2 (a scale model of Drawing 1 with scale factor), students understand that Drawing 1 is also a scale model of Drawing 2 and compute the scale factor, and given three drawings that are scale drawings of each other and two scale factors, students will compute the other related scale factor.

Example:

A regular octagon is an eight-sided polygon with side lengths that are all equal. Both octagons are scale drawings of each other. Use the chart and the side lengths to compute each scale factor as a percent.



Actual Drawing to Scale Drawing	Scale Factor	Equation to Illustrate Relationship
Drawing 1 to Drawing 2	Quantity = Percent x Whole *Length in Drawing 2 = Percent x length in Drawing 1* *12 = Percent x 10* $\frac{12}{10}$ = 1.20 =120%	10(1.2) = 12
Drawing 2 to Drawing 1	Length in Drawing 1 = Percent x length in Drawing 2 *10 = Percent x 12* $\frac{10}{12} = \frac{5}{6} = 83\frac{1}{3}\%$	$12(0.8\overline{3}) = 10$

Focus Area Topic C:

Scale Drawings

Computing Actual Lengths from a Scale Drawing

Given a scale drawing, students compute the lengths in the actual picture using the scale factor.

Example:

The length of a rectangular picture is 8 inches, and the picture is to be reduced to be $45\frac{1}{2}$% of the original picture. Write an equation that relates the lengths of each picture. Explain how the equation illustrates the relationship.

$$8(0.455)=3.64$$

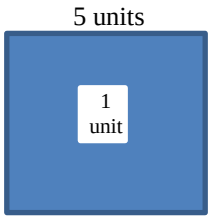
The length of the reduced picture is 3.64 inches. The equation shows that the length of the reduced picture, 3.64, is equal to the original length, 8, multiplied by the scale factor, 0.455.

Solving Area Problems Using Scale Drawings

Students solve area problems related to scale drawings and percent by using the fact that an area, A', of a scale drawing is k^2 times the corresponding area, A, in the original drawing, where k is the scale factor.

Example:

What percent of the area of the large square is the area of the small square?



Scale Factor Small to Large Square: $\frac{1}{5}$

Area of Small to Large: $\left(\frac{1}{5}\right)^2 = \left(\frac{1}{25}\right) = 0.04 = 4\%$

Focus Area Topic D:

Population, Mixture, and Counting Problems Involving Percents

Students are provided additional experience solving word problems related to percents. Students see the relevance and purpose of their algebraic work as they use it to efficiently solve multi-step word problems involving percents They also see percent applied to other areas of math and science. Students represent and solve population and mixture problems using algebraic expressions and equations. Topic D concludes with students solving counting problems involving percents, preparing them for future work with probability.

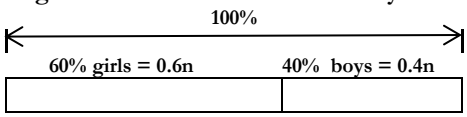
Population Problems

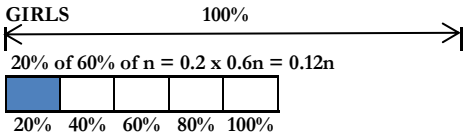
Students write and use algebraic expressions and equations to solve percent word problems related to populations of people and compilations.

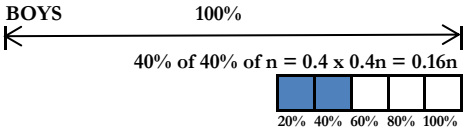
Example:

A school has 60% girls and 40% boys. If 20% of the girls wear glasses and 40% of the boys wear glasses, what percent of all students wears glasses?

Let n represent the number of students in the school. The number of girls is 0.6n. The number of boys is 0.4n.







The number of girls wearing glasses is as follows: $0.(0.6n)=0.12n$.
The number of boys wearing glasses is as follows: $0.(0.4n)=0.16n$.
The total number of students wearing glasses is as follows:
$0.12n+0.16n=0.28n$. $0.28=28\%$, ***so*** 28% ***of the students wear glasses.***

Mixture Problems

Students write and use algebraic expressions and equations to solve percent word problems related to mixtures.

Example:

Soil that contains 30% clay is added to soil that contains 70% clay to create 10 gallons of soil containing 50% clay. How much of each of the soils was combined?

Let x be the amount of soil with 30% clay.

1st soil amount (% of clay)	+	2nd soil amount (% of clay)	=	Resulting amount (resulting % of clay)

$$(0.3)x + (0.7)(10 - x) = (0.5)(10)$$
$$0.3x + 7 - 0.7x = 5$$
$$-0.4x + 7 - 7 = 5 - 7$$
$$-0.4x = -2$$
$$x = 5$$

Counting Problems

Students solve counting problems related to computing percents.

Example:

How many **4**-letter passwords can be formed using the letters "A" and "B"?

AAAA, AAAB, AABB, ABBB, AABA, ABAA, ABAB, ABBA, BBBB, BBBA, BBAA, BAAA, BBAB, BABB, BABA, BAAB **16 passwords.**

What percent of the 4-letter passwords contain no "A's"?

$\frac{1}{16} = 0.0625 = \mathbf{6.25}\%$