MATH NEWS

Grade 7, Module 4, Topic A

LAFAYETTE PARISH SCHOOL SYSTEM

7^{th} 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 A:

Finding the Whole

Students build on their conceptual understanding of percent from Grade 6 and relate 100% to "the whole." Students represent percents as decimals and fractions and extend their understanding from Grade 6 to include percents greater than 100% and percents less than 1%. They also use complex fractions to represent non-whole number percents. As the lessons progress students solve multi-step percent problems algebraically.

Words to Know:

Percent - "per hundred"; the same as $\frac{p}{100}$

Complex Fraction - a fraction in which the numerator or the denominator or both contain one or more fractions.

Percent

Students are able to convert between fractions, decimals and percents. ***Remember*: Percent means "out of one hundred" and can be written as a fraction with a denominator of 100.**

Focus	Explanation	Example(s)
Converting percents to fractions	Place the percent value over 100 and reduce if possible.	$30\% = \frac{30}{100} = \frac{3}{10}$ $300\% = \frac{300}{100} = \frac{3}{1}$
Converting a fraction to a percent	Find the equivalent fraction with the denominator of 100.	$\frac{7}{20} = \frac{?}{100}$ $\frac{7 \times 5}{20 \times 5} = \frac{35}{100} = 35\%$
Converting a percent to decimal	Divide by 100.	$8\% = \frac{8}{100} = 0.08$
Converting a decimal to a percent	Multiply by 100	$0.052 = 5.2\%$

Focus Area Topic A:

Finding the Whole

Percent (continued)

Students convert percents that are less than 1% or greater than 100% to a fraction or decimal.

Focus	Explanation	Example(s)
Percents less than 1%	Since percent means per 100 you can change the percent to a fraction by simply putting the percent over 100 and then divide by 100 to convert to a decimal.	$\frac{1}{4}\%$ or $0.25\% = \frac{\frac{1}{4}}{100}$ or $\frac{0.25}{100} = 0.0025$
Percents greater than 100%	Look like numbers that are bigger than 100% because they are bigger than the ratio $\frac{100}{100}$.	$225\% = \frac{225}{100} = \frac{9}{4}$
Non-whole number percents	Written as complex fractions and divided by 100	$37.5\% = \frac{37.5}{100} = 0.375$

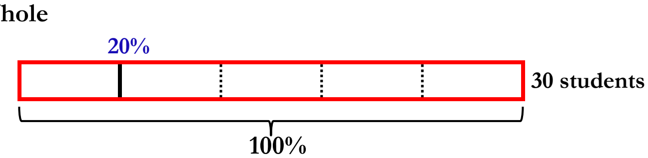
Part of a Whole as a Percent

Students solve percent problems using **visual models** and **proportional reasoning** then make connections to solving percent problems using numeric and **algebraic methods.**

Example:

In Ty's math class, 20% of students earned an A on a test. If there were 30 students in the class, how many got an A?

A Visual Approach to Finding a Part, Given a Percent of the Whole



- 30 students make up 100% of the class.
- There are 5 intervals of 20% in the tape diagram.
- If you divide the 30 students into 5 intervals you have 6 students in each interval.

6 students are 20% of Ty's class, therefore 6 students got an A on the test.

A Numeric Approach to Finding a Part, Given a Percent of the Whole

whole	→ 100%	**Identify the whole**
30	→ 100%	**30 students make up 100%**
$\frac{30}{100}$	→ 1%	**Divide both sides by 100**
$20 \cdot \frac{30}{100}$	→ 20%	**Multiply both sides by 20**
6	→ 20%	**6 is 20% of 30**

Part of a Whole as a Percent (continued)

An Algebraic Approach to Finding a Part, Given a Percent of the Whole

The percent equation (Part = Percent x Whole) can be used to solve the problem when given two of its three terms.

To solve a percent word problem, first identify the whole quantity in the problem, and then the part and percent. Use a variable to represent the term whose value is unknown.

part % whole

$$s = \frac{20}{100} \cdot 30$$ (Percent written as a fraction over 100)

$$s = \frac{600}{100}$$

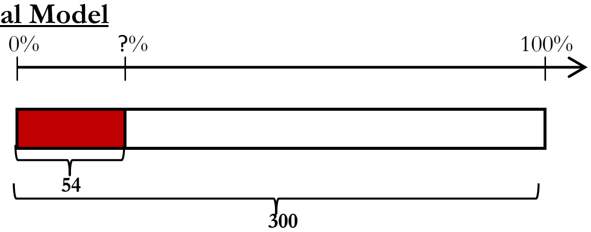
$$s = 6$$ Six students got an A on the test.

Comparing Quantities with Percent

Since the part in a percent problem may be greater than the whole, the formula **Part = Percent x Whole** will be changed to **Quantity = Percent x Whole** from this point forward. A visual model will help in understanding the problems that compare quantities with percents. The arithmetic method or an equation can be used to solve the problems.

Example:
The members of a club are making friendship bracelets to sell to raise money. Anna and Emily made 54 bracelets over the weekend. They need to produce 300 bracelets by the end of the week. What percent of the bracelets were they able to produce over the weekend?

Visual Model



Arithmetic Method

$300 \rightarrow 100\%$

$1 \rightarrow \frac{100}{300}\%$

$54 \rightarrow 54 \bullet \frac{100}{300}\%$

$54 \rightarrow 54 \bullet \frac{1}{3}\%$

$54 \rightarrow 18\%$

Algebraic Method

Quantity = Percent x Whole

$54 = p(300)$

$\frac{1}{300}(54) = \frac{1}{300}(300)$

$\frac{54}{300} = 1p$

$0.18 = p$

$0.18 = \frac{18}{100} = 18\%$

Anna and Emily were able to produce 18% of the total number of bracelets over the weekend.

Percent Increase and Decrease
Percent increase and percent decrease are measures of percent change, which is the extent to which something gains or loses value. Percent changes are useful to help people understand changes in a value over time.

Percent Increase
Example:
Cassandra likes jewelry. She has five rings in her jewelry box. Cassandra's aunt said she will buy Cassandra another ring for her birthday. If Cassandra gets the ring for her birthday, what will be the percent increase in her ring collection?

Quantity = Percent x Whole. Let p represent the unknown %.

$1 = p \cdot 5$

$\frac{1}{5} = p$

$\frac{1}{5} = \frac{20}{100} = 0.2 = 20\%$

Cassandra's ring collection increased by 20%.

Percent Decrease
Example:
Ken said that he is going to reduce the number of calories that he eats during the day. Ken's trainer asked him to start off small and reduce the number of calories by no more than 7%. Ken estimated and consumed 2,200 calories per day instead of his normal 2,500 calories per day until his next visit with the trainer. Did Ken reduce his calorie intake by 7%? Justify your answer.

Ken reduced his daily calorie intake by 300 calories. Does 7% of 2,500 calories equal 300 calories?

Quantity = Percent x Whole

$300 \stackrel{?}{=} \frac{7}{100}(2{,}500)$

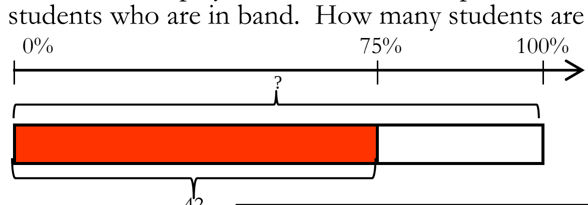
$300 \stackrel{?}{=} (0.07)(2{,}500)$

$300 \stackrel{?}{=} 175$ False, because $300 \neq 175$

Find One Hundred Percent Given Another Percent

A variety of methods can be applied to find 100% of a quantity (the whole) when given a quantity that is a percent of the whole.

Example:
The 42 students who play wind instruments represent 75% of the students who are in band. How many students are in band?



$42 \rightarrow 75\%$

$\frac{42}{3} \rightarrow 25\%$

$4\left(\frac{42}{3}\right) \rightarrow 100\%$

$4(14) \rightarrow 100\%$

$56 \rightarrow 100\%$

100% represents the total number of students in band, and 75% is $\frac{3}{4}$ of 100%. The greatest common factor of 75 and 100 is 25.

There are 56 students in the band.