COMMON CORE-ALIGNED TASK
WITH INSTRUCTIONAL SUPPORTS

Mathematics

GRADE 7 MATH:
PROPORTIONAL REASONING

SUPPORTS FOR STUDENTS
WITH DISABILITIES

Department of
Education
Dennis M. Walcott, Chancellor

GRADE 7 MATH: PROPORTIONAL REASONING

Instructional Supports for Students with Disabilities using UDL Guidelines

Provide Multiple Means of Representation

- *Offer ways of customizing the display of information* :

And/or

| 11:15 AM | 1:15 PM |

- *Display information in a flexible format* *by varying the layout of visuals, the size of pictures, and the contrast between the background and image.*

- *Offer alternatives for auditory information* by reading aloud and/or recording Assessment Questions 1-5, in order to provide students with multiple opportunities to hear and comprehend the task requirements.

- *Offer alternatives for visual information* by providing both images of clocks in both digital and analog form. Ensure that alternative representations are provided not only for accessibility, but for clarity and comprehensibility across all learners.

Provide Background Information

- Information is more accessible and likely to be assimilated by learners when it is presented in a way that primes, activates, or provides any prerequisite knowledge. ***Activate or supply background knowledge by anchoring instruction.*** Prepare students to determine whether a particular relationship is proportional or not by applying prior knowledge to connect to important mathematical concepts.

    1. Did you know that you use proportions and ratios every day, whether you realize it or not? Do any of members of your family drive a car? If so, do you ever hear them mention driving a certain number of **miles per hour**, or do you ever hear them say that they "are driving at the speed limit of 60 miles per hour?"

       When you go shopping with your family, have you ever seen prices like $2.98 per pound, $1.50 a gallon, or $8.00 a yard? You are using ratios, rates, and proportions.
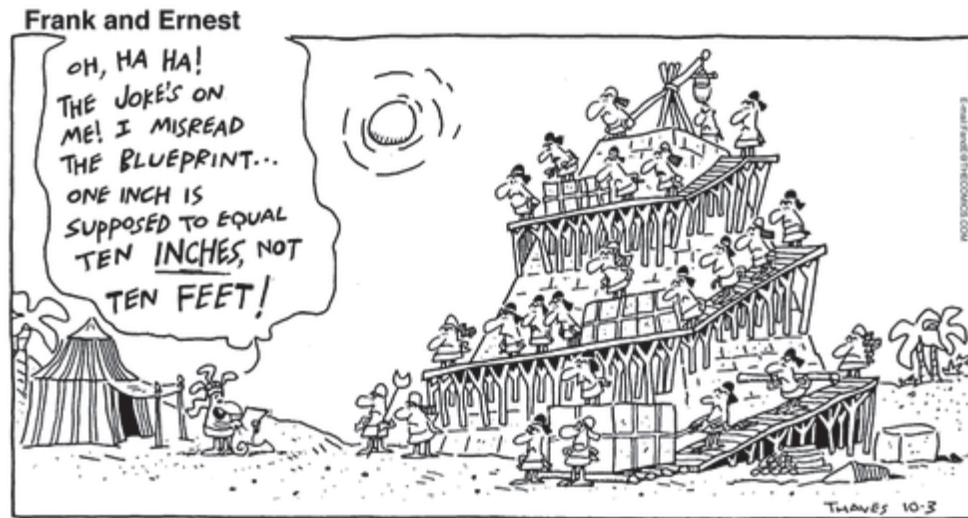
    2. Consider this problem: Robert reads 60 pages of a book in 30 minutes. How long should it take him to read 150 pages? What would you have to do to solve this problem?

Pages	60	150	
Minutes	30	X	

       Or, consider this problem: What if a car travels **90 miles** in **3 hours**, how long could it travel in **4 hours**? **5 hours**? **8 hours**?

Miles			90	X	X			X
Hours	1	2	3	4	5	6	7	8

3. <u>Or consider a cartoon</u>: What happened?

Frank and Ernest

OH, HA HA! THE JOKE'S ON ME! I MISREAD THE BLUEPRINT... ONE INCH IS SUPPOSED TO EQUAL TEN <u>INCHES</u>, NOT TEN <u>FEET</u>!

Copyright (c) 1993 by Thaves. Distributed from www.thecomics.com.

- ***Highlight patterns, critical features, big ideas, and relationships*** by articulating and reinforcing conceptual understandings: *In proportion problems, you have <u>two things</u> that <u>both change</u> at the <u>same rate</u>. For example, you have dollars and gallons in the one situation:*

2 gallons - 7.00 dollars	**90 miles - 3 hours**
6 gallons - X dollars	**X miles - 4 hours**

In both examples, there are <u>two things</u> that <u>both change</u> at the <u>same rate</u>.

Dollars		7.00				X
Gallons	1	2	3	4	5	6

Miles			90	X
Hours	1	2	3	4

Provide Support for Conceptual Understandings

The semantic elements through which information is presented – the words, symbols, numbers, and icons – are differently accessible to learners with varying backgrounds, languages, and lexical knowledge. To ensure accessibility for all, key vocabulary, labels, icons, and symbols should be linked to, or associated with, alternate representations of their meaning: an embedded glossary or definition, a graphic equivalent, or a chart or map.

- **Embed support for vocabulary and symbols** by providing online tools, such as *Math is Fun* and *Purplemath* which use multiple means of representation to explain concepts:

    http://www.mathsisfun.com/
    http://www.purplemath.com/modules/ratio2.htm

- **Embed support for unfamiliar references within the text** by defining academic vocabulary, such as *proportional reasoning, unit rate, ratio, proportion, rate, qualitative, quantitative, comparison*, and *equivalence*.

    A ratio is two things compared to each other. For example "3 dollars per gallon"
    is a ratio. Or, *40 miles per 1 hour*. Or, *15 girls versus 14 boys*. Or, *569 words in 2 minutes*. Or, *23 green balls to 41 blue balls*. A ratio is a comparison of two things.

    Proportion is when you have two ratios set to be equal to each other. For example, "3 dollars per gallon" equals "6 dollars per two gallons."   Or "40 miles per hour "equals 80 miles in two hours" Or, 2 teachers per 20 students equals 3 teachers per _____ students?

Teachers	2	3
Students	20	X

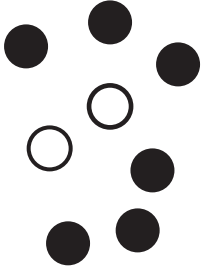   Note: *A ratio is a multiplicative comparison of two quantities or measures. A key developmental milestone is the ability of a student to begin to think of a ratio as a distinct entity, different from the two measures that made it up.*

    *Ratios and proportions involve **multiplicative rather than additive** comparisons. Equal ratios result from **multiplication or division,** not from addition or subtraction.*

    Proportional reasoning is developed through activities involving comparing and determining the equivalence of ratios and solving proportions in a wide variety of situations and contexts.

- **Provide multiple examples of novel solutions to authentic problems** by allowing students to see their peers' perspectives on proportional reasoning.

- *Provide alternatives in the permissible tools and scaffolds to optimize challenges* by providing calculators or *designing customized mini-lessons* to activate prior knowledge of the concept of proportional reasoning.

- *Present key concepts by illustrating through multiple media*.   Use ratio cards where students compare various visual representations of ratios intuitively.

	Proportion of black is Error! Bookmark not defined.$\frac{6}{8}$	Proportion of black is Error! Bookmark not defined.$\frac{3}{4}$	Ratio of black to white is 6:2	Ratio of black to white is 3:1

- *Facilitate managing information and resources*. Provide graphic organizers and templates for data collection and organizing information in order for students to explain how they solved a problem and how they know their answers make sense.

Planning Sheet for Assessment 1		
What questions am I being asked to answer? What problems am I being asked to solve?	What strategy or strategies can I use to solve the math word problem and answer <u>all</u> the questions?	Show how I made my decisions and arrived at my answers.
Did use a table or graph? Which one or both?		
Did I use a Math rule? Which one?		

Guide appropriate goal –setting. Review rubric and provide a checklist to support students' mathematical thinking and problem-solving strategies:

Student Checklist	
Did I read the math problem several times?	
Do I know what the problem is asking me to solve?	
Did I answer **all** the questions?	
Did I **label** my work correctly?	
Did I check all my computations and are they correct?	
Did I show how I solved the problem? Did I use a graph or table?	
Did I show **all** my mathematical thinking?	
Did I show how I made my decisions and arrived at my answers?	
Did I <u>underline</u>, circle, or draw a box around all my answers?	
Do I need draw a **diagram** to explain my answer? Did I label and include a **key** in my diagram?	