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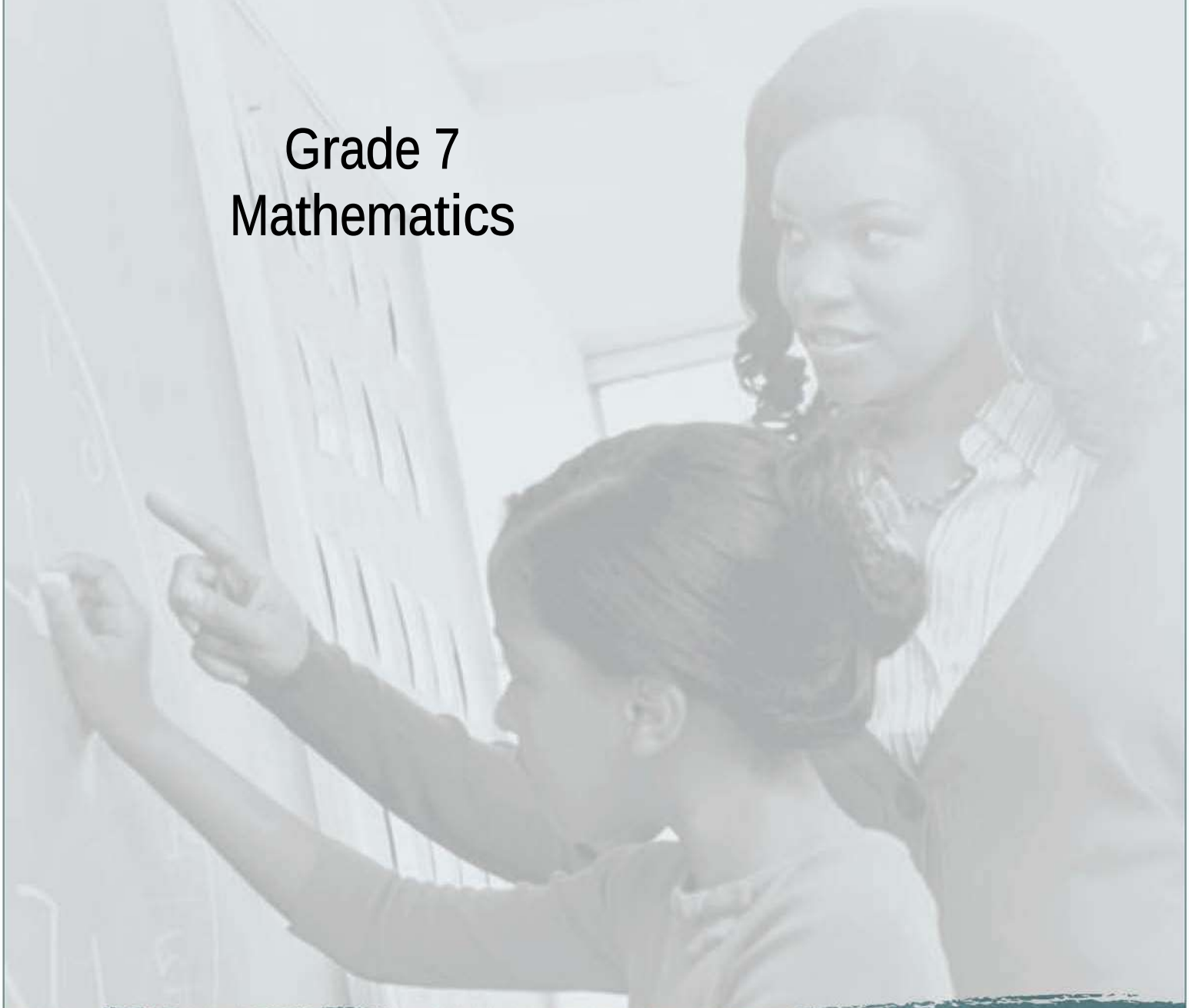
GLE Grade-Level Expectations

COMMON CORE STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

Grade 7 Mathematics



Transitional Curriculum

REVISED 2012

LOUISIANA DEPARTMENT OF EDUCATION

Grade 7
Mathematics

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2012 Louisiana Transitional Comprehensive Curriculum
Course Introduction

The Louisiana Department of Education issued the first version of the *Comprehensive Curriculum* in 2005. The *2012 Louisiana **Transitional** Comprehensive Curriculum* is aligned with Grade-Level Expectations (GLEs) and *Common Core State Standards (CCSS) as outlined in the 2012-13 and 2013-14 Curriculum and Assessment Summaries posted at http://www.louisianaschools.net/topics/gle.html. The Louisiana Transitional Comprehensive Curriculum* is designed to assist with the transition from using GLEs to full implementation of the CCSS beginning the school year 2014-15.

Organizational Structure
The curriculum is organized into coherent, time-bound units with sample activities and classroom assessments to guide teaching and learning. Unless otherwise indicated, activities in the curriculum are to be taught in 2012-13 and continued through 2013-14. Activities labeled as 2013-14 align with new CCSS content that are to be implemented in 2013-14 and may be skipped in 2012-13 without interrupting the flow or sequence of the activities within a unit. New CCSS to be implemented in 2014-15 are not included in activities in this document.

Implementation of Activities in the Classroom
Incorporation of activities into lesson plans is critical to the successful implementation of the Louisiana Transitional Comprehensive Curriculum. Lesson plans should be designed to introduce students to one or more of the activities, to provide background information and follow-up, and to prepare students for success in mastering the CCSS associated with the activities. Lesson plans should address individual needs of students and should include processes for re-teaching concepts or skills for students who need additional instruction. Appropriate accommodations must be made for students with disabilities.

Features
Content Area Literacy Strategies are an integral part of approximately one-third of the activities. Strategy names are italicized. The link (view literacy strategy descriptions) opens a document containing detailed descriptions and examples of the literacy strategies. This document can also be accessed directly at http://www.louisianaschools.net/lde/uploads/11056.doc.

Underlined standard numbers on the title line of an activity indicate that the content of the standards is a focus in the activity. Other standards listed are included, but not the primary content emphasis.

A *Materials List* is provided for each activity and *Blackline Masters (BLMs)* are provided to assist in the delivery of activities or to assess student learning. A separate Blackline Master document is provided for the course.

The *Access Guide to the Comprehensive Curriculum* is an online database of suggested strategies, accommodations, assistive technology, and assessment options that may provide greater access to the curriculum activities**.** This guide is currently being updated to align with the CCSS. Click on the *Access Guide* icon found on the first page of each unit or access the guide directly at http://sda.doe.louisiana.gov/AccessGuide.

Grade 7 Mathematics
Unit 1: Rational Number Relationships

Time Frame: Approximately 4 weeks

Unit Description

The focus of this unit is connecting and extending the relationships of fractions, decimals, integers and percents to enable deeper understanding and flexibility in thinking. Conceptual understanding of proportionality is developed.

Student Understandings

Students demonstrate their grasp of fraction, decimal, percent, and integer representations and operational understandings by comparing, ordering, contrasting, and connecting these numbers to real-life settings and solving problems. They demonstrate an understanding of reasonableness of answers by comparing them to estimates. Students can distinguish between unit rates and ratios and recognize quantities that are related proportionally.

Guiding Questions

1. Can students represent in equivalent forms and evaluate fractions, ratios, percents, decimals and integers?
2. Can students connect fractions, ratios, decimals, and integers to real-life applications?
3. Can students use proportional relationships to solve multistep ratio and percent problems in the context of real-life applications?
4. Can students demonstrate that the decimal form of a rational number terminates in 0s or eventually repeats?
5. Can students demonstrate the equality of ratios in a proportion?
6. Can students illustrate the reasonableness of answers to such problems?

Unit 1 Grade-Level Expectations (GLEs) and Common Core State Standards (CCSS)

Grade-Level Expectations	
GLE #	**GLE Text and Benchmarks**
Number and Number Relations	
1.	Recognize and compute equivalent representations of fractions, decimals, and percents (i.e., halves, thirds, fourths, fifths, eighths, tenths, hundredths) (N-1-M)

2.	Compare positive fractions, decimals, percents, and integers using symbols (i.e., <, ≤, =, ≥, >) and position on a number line (N-2-M)
7.	Select and discuss appropriate operations and solve single- and multi-step, real-life problems involving positive fractions, percents, mixed numbers, decimals, and positive and negative integers (N-5-M) (N-3-M) (N-4-M)
8.	Determine the reasonableness of answers involving positive fractions and decimals by comparing them to estimates (N-6-M) (N-7-M)
10.	Determine and apply rates and ratios (N-8-M)
11.	Use proportions involving whole numbers to solve real-life problems. (N-8-M)
CCSS for Mathematical Content	
CCSS#	**CCSS Text**
The Number System	
7.NS.2	Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers.

Sample Activities

Activity 1: Decimal Comparisons - Where's the Best Place? (GLE: 2; CCSS: 7.NS.2)

Materials List*:* *Where's the Best Place* BLM, *Numbers* BLM , learning log

Students will convert a rational number to a decimal and write inequalities with them.

Students play a game called Where's the Best Place? Students have four chances to create a fraction by taking turns drawing cards from a pile. Review division of fractions to create a decimal. Also, review symbols used to compare numbers (>, <, ≥, ≤, =). Place the students in groups of four.

Rules for the game:

- Give each player a copy of the *Where's the Best Place BLM* to play the game.
- Have students shuffle ten cards numbered 0 through 9 and place them face down in a pile. (Use the Numbers BLM to make the cards or use the cards 2-9 and an ace from a deck of playing cards.)
- One player draws a digit card from the pile. Each player must decide privately whether he/she wants to use that digit as the numerator, denominator or to discard it. The object is to try to create the largest number. **A player can discard only two cards.**
- After the player writes a digit on the game card, he/she cannot erase it and place it elsewhere. Once a digit is drawn, it cannot be used again in that game.

- Next, the second player draws another digit card from the pile. Each player must use this card to fill the place for either the numerator or denominator. A player may also choose to discard. *Note: If all players have used the cards drawn by the first two players, the game proceeds to the next step. Otherwise, players 3 and 4 continue to draw until all places are filled.*
- The game is over when all places on each game card are filled. Each student will use division to convert their fraction to a decimal. *The teacher should look for decimal conversions that terminate in 0s or eventually repeat and discuss with students[CCSS #7.NS.2 (d])* The player with the greatest number wins.
- Write an inequality using the rational numbers generated by the group. *Depending on the needs of students, the teacher may choose whether the students will write the inequality with the fractions or the decimals.*

Example for one player:
Draw #1—"4" is placed as the numerator.
Draw #2—"7" is discarded.
Draw #3—"6" is discarded *(Two discards have been used, so the player is forced to play the next card.)*
Draw #4—"3" is placed as the denominator.
Student divides $\frac{4}{3}$ and gets $1.\overline{3}$. He/she compares to the other players to determine who has the largest number.

Students should respond to the following prompt in their *learning logs* (view literacy strategy descriptions). This *learning log* should be a small notebook used primarily for recording math understanding. Explain to the students that their *learning logs* will be used all year to record new learning and write questions that they want answered through math class. Have students copy the prompt. For longer prompts, the teacher should copy the prompt and have students tape, glue, or staple into the *learning log*.

Prompt 1:

Some of the digits in the following numbers are hidden.

A. $3.\square\square\square$ B. $3.\square\square$

Give an example when each situation is true. Using mathematics, justify your answers.

1. the value of A is larger than the value of B
2. the value of B is larger than the value of A
3. the value of A is equal to the value of B

Activity 2: Fraction Comparisons (GLEs: 1, 2)

Materials List: several pieces of chart paper for every pair of students, Fraction Comparisons BLM for each pair of students

Students will write equivalent and nonequivalent fractions as well as inequalities to compare them.

To check the depth of understanding students have in dealing with equivalent fractions, have the students complete the Fraction Comparisons BLM while working with a partner. Circulate around the room and ask questions to find what strategies the students are using to find equivalent fractions.

A copy of the information provided on the BLM is reprinted below.

1. Using chart paper, complete the following situation. Be prepared to share your work in 20 minutes.
    a. Write two fractions that are equivalent. Explain how you know that they are equivalent.
    b. Look at the fractions you wrote in Part A. Write two other fractions, one that is equivalent to your first fraction and one that is equivalent to the second fraction.
    c. Are the four fractions you have written equivalent to each other? Why or why not?

2. Using chart paper, complete the following situation. Be prepared to share your work in 20 minutes.
    a. Write two fractions that are not equivalent. Tell which is larger, and explain how you know.
    b. Look at the fraction you wrote in Part A. Write two other fractions, one that is **not** equivalent to your first fraction and another one that is **not** equivalent to your second fraction.
    c. Order the four fractions you have written from smallest to largest, and explain how you know the order is correct.
    d. Write a mathematical statement using the symbols $<$, $\leq$, $=$, $\geq$, $>$ and your fractions.

Activity 3: Number Line Placement (GLEs: 1, 2)

Materials List: *Velcro*® strip, masking tape, or string for number line; a set of rational number index cards

Use this activity as a pre-assessment activity to get an idea of the students' level of understanding of number sense.

Use a *Velcro*® strip, masking tape, or string taped along the board to represent a number line. Place zero and one on the number line. Have students compare and determine the placement of rational numbers. Have numbers written on index cards for the students to use. (Examples of numbers: 1, $\frac{1}{2}$, 100%, .08, $\frac{1}{3}$, 75%, 0) Make sure to include several numbers which are equivalent—fractions, decimals and percents. Do not use negative numbers at this time. Give a card to a student. Have him/her place the card where he/she thinks it belongs on the number line using masking tape or a *Velcro*® strip. Have a discussion about the placement of this number (e.g., Must it go there? Could it be placed elsewhere?). Give another card for placement to another student. Continue until all numbers have been placed along the number line. There are many questions that can be asked with the placement of each number creating in-depth class discussions. Students may need to move some numbers on the number line once one or two numbers have been placed. Have students make observations about the number line and write 5 inequalities from the number line using the symbols $<, \leq, =, \geq, >$.

Activity 4: Representation of Equivalent Fractions, Decimals, and Percents (GLE: 1)

Materials List: Fraction Pieces BLMs (eight BLMs) for each student, scissors

Give each student a copy of each of the eight Fraction Pieces BLMs. Each BLM should be copied on a different color of paper. Each sheet will have a rectangle divided into equal portions by parallel lines. The rectangle on Fraction Pieces 2 BLM is divided into halves. The rectangle on Fraction Pieces 3 BLM is divided into fourths, etc. Model labeling and cutting strips from the paper using colored overhead sheets (i.e., cut along the parallel lines and then at the marking for ½). Show students how to represent each fraction, decimal, and percent with a different colored paper. A red strip of paper is cut into 2 pieces, and each piece is labeled $\frac{1}{2}$, 0.50, and 50%. A blue strip of paper is cut into 4 pieces, and each piece is labeled $\frac{1}{4}$, 0.25, and 25%, etc. On the overhead, show the placement of equivalent fractions of two different colors (e.g., 1 red piece is equivalent to 2 blue pieces, shown side by side on the overhead). Lead a discussion which includes equivalencies using decimals and percents. Have students work in groups of 4, cut their papers into pieces as modeled, and develop a presentation showing the maximum number of equivalent fractions.

Teacher Notes:

1. *Caution, if one graphic is resized, all graphics will need to be resized proportionally. Always copy the original. Copy and compare the sizes of each strip before duplicating in mass to give to students. Many photocopiers do not make exact duplicates of an image and the more copies that are made, the more variance there could be. The heat expands the paper. The last page copied may be more distorted than the first if the machine is hot.*

2. Fraction pieces are also used in Unit 1, Activity 5 and Unit 2, Activity 1. Have each group store the pieces in a gallon baggie to for future use.

Activity 5: Compare Fractions, Decimals, and Percents (GLE: 2)

Materials List: fraction strips from Activity 4, 6 index cards for each student (two fractions, two decimals, and 2 percents); Greater Than, Less Than, or Equal To BLM for each student or pair of students.

Review the concepts of equal, greater than, and less than with students who will work in groups of 2. Using the colored overhead strips from Activity 4, demonstrate the concepts of comparing numbers using the terms *greater than, less than, greater than or equal to, less than or equal to* and *equal*.

Give 6 index cards that include two fractions, two decimals, and two percents to each student. Have students form pairs and instruct each student to randomly select an index card. The pair should write an equality using the numbers on the cards drawn and be able to defend their reasoning to others.

Have each pair of students complete the modified math *word grid* (view literacy strategy descriptions) found on the Greater Than, Less Than, or Equal To BLM to show their understanding of greater than, less than, greater than or equal to, less than or equal to, and equal. A *word grid* is a visual technique for helping students learn important related terms and concepts. It provides students with an organized framework for learning mathematical concepts by analyzing the similarities and differences of key ideas. (Students should use the values given to them earlier to fill in the left column. Students may also create new fractions by rolling a number cube.) Once the grid is complete, instruct groups to switch inequalities with another group and check each other's work. While monitoring each group, make anecdotal notes regarding students requiring additional practice.

Example

Greater Than, Less Than, or Equal To					
	> ½	≤ ½	= ½	> 20%	< 0.75
¼		✓		✓	✓
50%		✓	✓	✓	✓

Place a check in any cell to indicate which statements are true when the number in the first column is combined with the information in the top row.

Activity 6: Equivalent Fractions, Decimals, and Percents (GLEs: 1, 2)

Materials List: at least 30 index cards per 4 students

Have groups of four students create a deck of cards using index cards. Cards should represent common fractions such as $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{2}{3}, \frac{2}{5}$, etc. and their decimal and percent equivalencies. Example: one card will have 0.5, a second card will have $\frac{1}{2}$, and the third card 50%. The three equivalent cards represent a set. Each deck of cards should contain 10 compete sets. A game is played in which five cards are dealt to each player and the rest are laid down for a draw. Use the rules for a Go Fish game. When a student draws a card, he/she asks, "Do you have anything equal to ____?" (e.g., Do you have anything equal to $\frac{1}{2}$? Do you have anything equal to 20%?). The students lay down cards when they have all three cards which comprise a set. The first student to use all of his/her cards wins.

Using the cards created, reinforce the concept of greater than, less than, and equal to, greater than or equal to and less than or equal to. Create cards for each of these symbols. Divide students into teams to play a spelling bee type game in which two cards are drawn from the deck of fractions, decimals, and percents. The team drawing the cards has one minute to choose which symbol is appropriate and explain why they chose the inequality symbol. If they cannot, the other team is given a chance. Scoring is one point per correct answer.

Activity 7: Is it Reasonable? (GLEs: 7, 8)

Materials List: teacher-made set of real-life problems involving positive fractions and decimals, paper, pencil, math learning log

Provide students with a list of real-life situations involving positive fractions and decimals. Individually, have the students estimate each answer. As a class, discuss their estimates and methods used for estimating. Example problem: 24% of the 7^{th} graders at West Middle School are helping tutor 4^{th} graders at West Elementary School. If there are 322 seventh graders at West Middle School, estimate how many seventh grade students are tutoring the 4^{th} graders.

Give the students a list of the correct answers, and have them select the appropriate exact answer from the list. Discuss the operations needed to solve the problems. Ask the students to compare their estimations to the exact answers. Were any estimations way off? Have a discussion of how far away from the correct answer is too far. Be sure to point out there is no "set limit"; it depends on the information. Give students examples such as this: when estimating the number of students in a classroom, ten students make a big difference, but if you are talking about estimating the number of people at a concert, ten people would not make a difference. Discuss what makes one estimate better than another?

Students should respond to the following prompt in their math *learning log* (view literacy strategy descriptions).
Prompt:

> Pam's class is asked to estimate 5.3% of 41.9. Pam estimates 8. Keith estimates 20, and Seth estimates 2. Who has the best estimate? Justify your answer using words and mathematical symbols.

Activity 8: Simple Percent Problems (GLE: 8)

Materials List: newspaper advertisements or B's Shoe Boutique BLM (at least one example for each group of 4 students), a half or quarter sheet of poster board per group, glue, scissors, markers/colored pencils

Divide students into groups of four. Introduce the idea of shopping when a store is having a sale. Using the store sale advertisements from the newspaper or B's Shoe Boutique BLM, have the student groups figure 10%, 20%, 30%, 50%, 75%, $33\frac{1}{3}\%$ and $66\frac{2}{3}\%$ off the cost of items in the advertisements, or figure the sale price using the percent that is given in the ad. Many times items are advertised as $\frac{1}{3}$ or $\frac{2}{3}$ off the original price. Have students work with a partner to prove how they know that $\frac{1}{3} = 33\frac{1}{3}\%$ and that $\frac{2}{3} = 66\frac{2}{3}\%$.

Have the students check to see if their answers are reasonable. Have students practice estimating 10%, 20%, 30%, 50%, 75%, $33\frac{1}{3}\%$ and $66\frac{2}{3}\%$ off the items in the ads, and then compare these answers to the answers they originally figured.

Give each group a budget and assign different discounts. Have students choose items from the sale papers, estimate the percents to determine if they have enough money to make the purchases they want, and then calculate the exact prices. On a quarter/half sheet of poster board, have the students create a display indicating their choices, the method used to calculate each price, and the total cost of their purchases. Allow students to cut and paste pictures of the items, and require them to show their work. As an extension, have students add the local sales tax or create a grocery shopping scenario.

Activity 9: Tipping at a Restaurant (GLE: 8)

Materials List: Tipping at a Restaurant BLM for each student or group, pencil

Discuss with the class the tip customers leave at restaurants, noting that customers pay their server a tip for providing good service. A typical tip is 15% to 20% of the cost of the meal. Indicate to students that they need to use estimation skill to figure a tip that will be left for the server because the check will seldom be a whole number. Discuss with the

students how to round in reasonable ways. Discuss mental math strategies when finding the tip at a restaurant.

Present the following situation to the class. Your bill at Logan's Restaurant is $19.45. What is a 10% tip on this bill? Instruct students to round off the amount to something they can reasonably work with. Some may say $19.50, but ask if this is reasonable for the situation. They may then say $1.95. Would it me more reasonable to leave $1.95 or $2.00? So a better process might be to round $19.45 up to $20.00 and then calculate a 10% tip for $20.00. Then have the students calculate 10% of $19.45. Have students compare their estimate with the calculation and check for reasonableness.

Practice several different amounts where students will need to use estimation and rounding to get a 10%, 15%, and 20% tip. Stress techniques that apply the distributive property: 15% is a 10% tip plus half that amount, 20% is double a 10% tip. Additional scenarios may be found on Tipping at a Restaurant BLM.

Activity 10: Rates (GLE: 10)

Materials List: sale papers/grocery items that can be used to figure unit cost and/or a copy of Grocery Shopping BLM, pencil, paper

Provide the students with a list of items they can purchase along with the prices. These items can be 6-packs of soft drinks, ounces of potato chips, pounds of peanuts, and so on. Be sure to use items that can be used to figure unit cost. Discuss with students why unit cost does not necessarily mean single units of an item and about how a "unit" changes with a situation. For example, in a grocery store you wouldn't buy a peanut or a potato chip, so you would use some other unit such as weight. Also, you usually don't buy one soft drink, so you say "units" are six-packs. Ask students to consider the following "what if's?" to extend the conversation about unit cost:

- What if you want to compare the price of a six-pack to the price of a 20-pack?
- What if you are talking about buying your soft drinks from a vending machine?

Have the students calculate the unit price of each item. Also, extend this to include rates such as $45.00 for 8 hours of work, driving 297 miles in 5 hours, reading 36 pages in 2 hours, and so on. Have the students figure unit rates for these types of problems also.

Put students in small groups, and give the students 5-10 minutes to review the information from the activity and to respond to one or both of the following situations. They should also write at least 3-5 questions they anticipate being asked by their peers and 2-5 questions to ask other experts. When time is up, the teacher will randomly select groups to assume the role of p*rofessor know-it-all* (view literacy strategy descriptions) and provide their answers and reasoning for the situation. Professor Know-it-All is an effective review strategy because it positions students as "experts" on newly learned information and concepts to inform their peers and be challenged and held accountable by them. They will also have to provide "expert" answers to questions from their peers about their reasoning. After the activity, students will reflect in their math *learning log*

(view literacy strategy descriptions) on the situations where their reasoning was challenged and how their thinking was changed, as a result.

Situation 1: Lucy and CJ are in charge of buying chips for a class party. They plan to purchase 1.5 to 2 oz of chips for each of the 24 students. Use the information below to help them make the best purchase.

Big Al's Grocery

1 – 1.75oz can for $0.75
12 – 1.75oz cans for $8.95
1 – 6oz can for $2.52

Solution:

Size	*Total Ounces*	*Total Cost*	*Cost per Ounce*	
1 – 1.75 oz can	*1.75*	*$0.75*	*0.428*	
12 – 1.75 oz cans	*21*	*$8.95*	*0.426*	
1 – 6 oz can	*6*	*$2.55*	*0.425*	*X*

Situation 2: Kenneth and Jena are in charge of buying sodas for a class party. They plan to purchase 6 oz of soda for each of the 26 students. Use the information in the table to help them make the best purchase.

PJ's Grocery

Container Size	Capacity in ounces	Cost
1 Liter	33.8 oz	$1.09
2 Liter	67.6 oz	$1.29
3 Liter	101.4 oz	$1.99

Solution: This table shows the different combinations of containers the students may use to get their target of 156 ounces. Be sure students are able to defend their choices; they may not choose the overall lowest unit cost which requires them to purchase additional soda. They will need to purchase a minimum of 156 ounces of soda.

Quantity	*Size*	*Total Ounces*	*Total Cost*	*Cost per Ounce*	
5	*1-L*	*169 oz*	*$5.45*	*$0.03*	
2	*2-L*				
1	*1-L*	*169 oz*	*$3.67*	*$0.021*	
3	*2-L*	*202.8 oz*	*$3.87*	*$0.0190*	*X*
1	*3-L*				
1	*2-L*	*169 oz*	*$3.28*	*$0.0194*	
2	*3-L*	*202.8 oz*	*$3.98*	*$0.0196*	
1	*3-L*				
2	*1-L*	*169 oz*	*$4.17*	*$0.024*	

Activity 11: Ratio Patterns (GLEs: 10, 11)

Materials List: pattern blocks or pieces of paper in 5 colors with squares, rectangles and triangles, scissors, pictures of quilts, patterns, repeating patterns

Use the following website to show the class pictures of quilts and patterns that have a repeating pattern such as an AB, ABA, or ABC pattern:
http://www.quilt.com/QuiltBlocksPage.html.

Distribute five different colors of paper (pattern blocks, if available) marked with varying shapes including squares, rectangles, and triangles about 2 inches in size. Divide students into groups, and have them cut out the shapes. Show students two shapes - an equal number of red squares and blue triangles. Discuss the ratio of red pieces to blue pieces or squares to triangles. Group different color pieces and shapes to create designs. Discuss how repeated patterns are pleasing to the eye. Ask volunteers to come forward to create a pattern with pieces. Have the volunteers give the ratio of the colors or shapes. Divide students into groups to create their own patterns using different color ratios. Next, give each group a different ratio of reds to greens and blues to yellow, etc. (e.g., the ratio of 3 blue to every 4 green or 2 red for every 5 yellow) and have students create a pattern and demonstrate how their ratio was used to create the pattern. Introduce the concept of *proportion* for the patterns the students have created (e.g., 4 green for every 2 red is the same as 8 green for every 4 red). Demonstrate how to set up a proportion: $\frac{4}{2}=\frac{8}{4}$. Help students realize the two fractions are equivalent; the numerator and denominator of the second have only increased by a common factor of 2. Cross multiply to create an equation that shows the cross products are equal: $4\times 4=2\times 8$.

Give the following situation to students and instruct students how to set up and solve the proportion:

Grandma's quilt was made with the ratio of yellow squares to red squares as 3 to 4. If she has 15 red squares she needs to use, how many yellow squares will she need if she keeps the same ratio of yellow to red? Ask students which units are being compared? *Red squares to yellow squares.* Ask students to write a ratio comparing the squares (including the units):

$\frac{\text{3 red squares}}{\text{4 yellow squares}}$

Next, ask students to use the ratio to write a proportion that will help us to determine how many yellow squares will be needed.

$\frac{\text{3 red squares}}{\text{4 yellow squares}} = \frac{\text{15 red squares}}{x}$

While working with setting up proportions, it is important that students write the proportions with the units described in the situation. This will enable them to make sense of the problem contextually rather than just working with "naked numbers." At this point, discuss other possible ways to set up the proportion keeping in mind that the two ratios must be set up in the same manner. A conversation regarding the use of the variable may also be necessary. Ask students to work with a partner to determine the different mathematical ways that can be used to find the number of yellow squares needed. *Students should see that: 1) the second ratio has increased by a common factor of 5 so the number of yellow squares needed is 20 (4 x 5); 2) that cross multiplication can be used to find the yellow squares: 3x = 60, so x = 20*

Challenge the students to create their own quilt patterns and to determine the ratio/proportion of the colors they used. Have the students change the ratio of the colors used to a percent of colors used.

Activity 12: What's the Recipe? (GLEs: 7, 11)

Materials List: a different recipe for each pair of students, What's the Recipe BLM

Discuss situations where a recipe may need to be reduced or increased. Discuss the fact that all ingredients must be increased or decreased *proportionally* in order for the recipe to turn out correctly. (For example, use a recipe for making chocolate chip cookies that makes 24 cookies, but the recipe needs to be increased so that everyone in a class of 36 gets a cookie.) If the given recipe produces 2 dozen cookies, what would the recipe be for producing 1 dozen cookies? 4 dozen? 6 dozen? 7 dozen? $\frac{1}{2}$ dozen? Give each pair of students a different recipe or the What's the Recipe BLM, and have them reduce or increase the recipe proportionally by two given amounts. Also, have students create new recipes based on a given percent of the original recipe.

A hot chocolate recipe is a good choice; after calculating how much of each ingredient is needed, the students could make hot chocolate for the class. Water could be heated in a coffee pot.

Activity 13: What's the Situation? (GLE: 10, 11)

Materials List: Chart paper and markers for each group of students; What's the Situation Group Cards BLM (cut out each problem to be distributed to each group), calculators

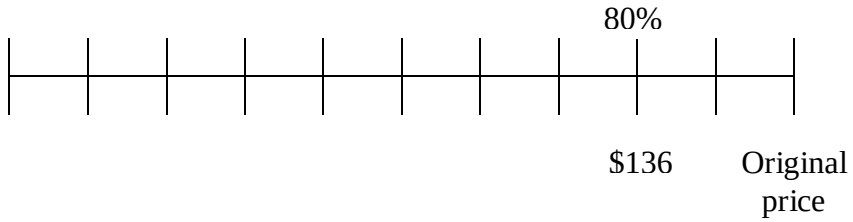
Use a modified math *SQPL* (view literacy strategy descriptions) strategy to prompt students to ask and answer their own questions. In this modified version, students will be prompted to ask questions about a mathematical diagram. Once the diagram is presented, allow students to pair up and brainstorm questions that can be answered from the diagram. Elicit students' questions and write them on the board, overhead or computer.

Students work in groups of four to answer questions about the mathematical diagram. At the end of the activity, be sure to check that students have found answers to their questions and that their answers are accurate.

In this activity, students will describe in words the percent situation illustrated in a mathematical model and then pose questions whose answers can be determined by reasoning from the model.

Arrange students in groups of four and display Situation 1 from the What's the Situation BLM using a document camera or overhead. Ask groups to describe in words the first situation illustrated, using no other numbers in their descriptions than those shown on the model. *If students are familiar with the game Pictionary®, the teacher may tell them this is similar. A drawing is presented, labeled with minimal words and numbers, to represent a situation. Their job is to tell what situation is represented, using only the visual clues given in the drawing.*

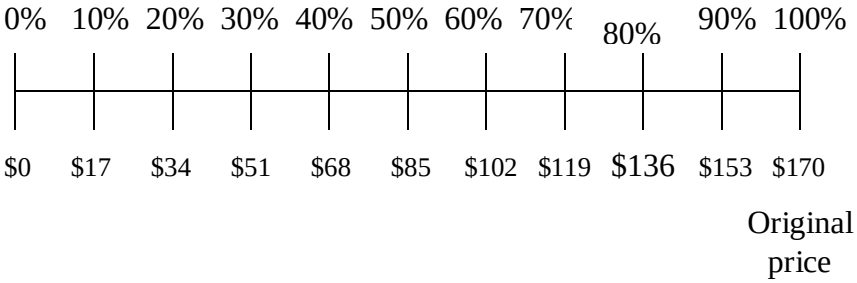
SITUATION 1: Ashleigh's new bicycle.



After agreement is reached on the description of the situation, have each group write questions on their chart paper whose answers can be determined by reasoning from the model. Students should estimate either before solving or to check the answers for reasonableness. Discuss, exploring students' methods of answering the questions they pose (calculators may be needed to carry out the computations suggested by what students see in the model). Ask students to describe how they know whether their answer is reasonable. Here is the situation represented by the drawing: Ashleigh bought a new bicycle. She paid $136, which is 80% of the original price of the bike. *The point here is to interpret what is given before drawing conclusions.*

Questions that could be asked include:

- What is the value of 10%? (Since 80% is $136, 10% is $136 ÷ 8 = $17. To help students see the proportional relationships, label the model in increments of $17)



- What was the original price of the bicycle? (100% is 10 x \$17 = \$170 or $\frac{80}{100} = \frac{136}{x}$ which is \$170, the original price)
- What is the amount of the discount?(Since 10% is \$17, the discount was 20% or 2 x \$17 = \$34)
- What is the difference between the original and the price paid? (Subtract the price paid from the original--\$170 - \$136 = \$34, the same thing as the discount).

To check the depth of understanding students have in solving percent problems, distribute the remaining problems from What's the Situation Group Cards BLM to each group of four. Circulate around the room and ask questions to find what strategies the students are using when thinking about percent problems. Each group will present their questions and solutions to the class. The answer key includes additional questions to extend student thinking.

Activity 14: Proportional or Not? (GLE: 11)

Materials List: Pencil, grid paper, Proportional or Not BLM

In this activity, students will compare proportional and nonproportional situations involving the rates of two taxicab companies.

Background: Being able to solve problems that reflect proportional situations involves more than solving traditional missing-value problems by using the standard cross-product algorithm. By comparing proportional contexts with nonproportional contexts, students can strengthen their understanding of the multiplicative relationship behind proportions.

Before beginning this activity, lead a class discussion on the nonnumeric proportion problem below that involves two girls biking on a path. *Because students tend to "misuse" numbers by applying them to some algorithm, they should focus on underlying proportional relationships and create an environment that nurtures proportion sense. One way is to strip problems of numbers that force students to examine the relationship between variables directly.*

Ask students to consider the following problem:

> Catherine and Rachel like to ride their bicycles along the bike path in Forever Green Park. Today, they both started riding at the beginning of the trail; each rode continuously at a constant speed, making no stops, to the end of the trail. Rachel took more time than Catherine to reach the end of the path. Which girl was biking faster? Why? Explain your answer. *Students should easily see that Catherine rode faster because the bikers made no stops, rode the same distance, and they took different amounts of time to reach the end. Additional discussion should*

include: Catherine could have taken a shortcut decreasing her distance and affecting her time; although both started at the beginning, the text did not say they started at the same time. This problem not only focuses on the relationship between time and speed but also allows students to analyze other factors such as distance and starting time that might affect whether the relationship is truly proportional.

Pair students and distribute Proportional or Not BLM. Students will decide whether the quantities in each taxicab situation are in a proportional relationship by testing for equivalent ratios in a table, graphing on a coordinate plane, and observing whether the graph is a straight line through the origin. *In the situation that is proportional, students should be able to identify the constant of proportionality (unit rate) in the table, graph and verbal description of the relationship.* After the table and graph have been constructed, students will use a *graphic organizer* (view literacy strategy descriptions) to compare and contrast the two situations. Graphic organizers are visual displays that enable students to assimilate new information by organizing in a visual and logical way. The graphic organizer used in this activity is a Venn diagram, which will help students make sense of the table and graph and then decide which situation is proportional. Monitor students' completion of the diagram to ensure understanding. Once the Venn diagram is completed, students will use it as a study aid when determining the proportionality of any situation.

Activity 15: Number Line with Integers (GLE: 2)

Materials List: *Velcro*® strip or string and tape for number line (from Activity 3), a set of index cards labeled with positive and negative integers

Using a *Velcro*® strip or string number line from Activity 3, have students compare rational number and integers and determine the placement of the numbers on the number line. Make index cards for the students to use. (Examples of numbers: 1, -1, $\frac{1}{2}$, 100%, -4, $-\frac{1}{3}$, 50%, 0). Make sure to use positive and negative fractions and decimals, whole numbers, and percents to place on the number line. Give a card to a student and ask him/her to place the card where it belongs on the number line. Have a discussion about the placement of this number. Must it go in that exact location? Could it be placed elsewhere? Give out another card for placement. Continue until all numbers have been placed along the number line. Ask many questions about the placement of each number creating in-depth class discussions. Some numbers may need to be moved on the number line once one or two numbers have been placed on the number line.

Sample Assessments

General Assessments:

- Determine student understanding as the student engages in the various activities.
- Whenever possible, create extensions to an activity by increasing the difficulty or by asking "what if" questions.
- Encourage students to create their own questions.
- Ask students to create and demonstrate math problems by acting them out or using manipulatives to provide solutions on the board or overhead.
- Observe the student's presentations.
- Have students complete math *learning log* entries (view literacy strategy descriptions) by responding to prompts such as:
    - Explain the meaning of 10%, 20%, 25%, $33\frac{1}{3}\%$, 50%, $66\frac{2}{3}\%$, 75%, and 100% and write their fractional and decimal equivalents. Give examples of their use in real-life situations.

    - The 4-H advisor is in charge of buying drinks for the club's landscaping day. She conducted a survey to determine if students liked *Dr. Pepper*® or *Coca Cola*®. Here are her results:

	Grade 6	Grade 7	Grade 8
Dr. Pepper®	80	75	85
Coca Cola®	70	90	80

Tell whether the statements 1-4 are accurate based on the information in the table. Explain your answer for each item.

1. 15 more seventh graders prefer *Dr. Pepper*® to *Coca Cola*®.
2. The ratio of seventh graders who prefer *Dr. Pepper*® to *Coca Cola*® is 5 to 6.
3. 50% of the students surveyed prefer *Dr, Pepper*®.
4. $\frac{7}{8}$ of the sixth graders prefer *Coca Cola*®.

Tell whether an exact answer or an estimate is needed to determine the grade in which 52% preferred *Dr. Pepper*®. Explain your answer.

The *Coca Cola*® for the party would cost $168 and the *Dr. Pepper*® would cost $180. Will the students pay the same price for *Coca Cola*® and Dr. *Pepper*®? Justify your answer using the cost per student.

Teacher may want to copy longer prompts and have students tape, glue, or staple into math learning logs.

- Assign the following project: Collect several flyers from local restaurants advertising their specials and menu items. In groups of four, students will plan a dinner party at a restaurant for their group with a set budget and prepare a presentation on poster board. The poster will show each person's order, tax and tip on the total bill, and the final cost.

Activity-Specific Assessments:

- Activity 3: Given a list of 8 different representation of numbers (fractions, decimals, percents) and a blank number line, the student will place the numbers in the correct position on the number line and write three inequalities using the given numbers and the symbols $<, \leq, \geq, >$.

- Activity 7: Present the following scenario to the student, and evaluate the student's ability to answer the questions asked orally.
  Latoya is at a grocery store near her house. She has $10.00 but no calculator or paper or pencil. At the right is a list of the items she would like to buy. Use mental calculations and estimation to answer the following questions.

Item	Price
Milk	$2.47
Eggs	$1.09
Cheese	$1.95
Bread	$0.68
Honey	$1.19
Cereal	$3.25
Avocado	$0.50

  1. Latoya believes she can purchase all of the items she wants. Is this reasonable? Justify your answer.
  2. What different items could she buy to come as close as possible to spending $5.00?
  3. Approximately what percent of the $10.00 did Latoya spend on eggs?

  Solutions:
  1. *No, she cannot buy all the items. By estimating to the nearest half dollar, she will need at least $10.50. She must have $11.13 before tax.*
  2. *Solutions may vary: Sample solutions: milk, avocado, and cheese or eggs, cheese, honey and avocado*
  3. *$1.09 out of $10.00 is about 10%.*

- Activity 8: On a sheet of unlined paper, the student will create an ad for the newspaper. The ad must include the item (a drawn picture) with a description, the regular price of the item, the percent of discount, and sale price. The student will show how he/she arrived at the sale price on the back of the ad.

- Activity 12: The student will work the following problem correctly: A certain recipe for brownies calls for 2 teaspoons of vanilla and 6 teaspoons

of oil. If you want to make a large batch of brownies for your class using 10 teaspoons of oil, how much vanilla would you need? Hint--make a table.

Solution: $3\frac{1}{3}$ teaspoons of vanilla

oil	3	6	9	10	11	12
vanilla	1	2	3	$3\frac{1}{3}$	$3\frac{2}{3}$	4

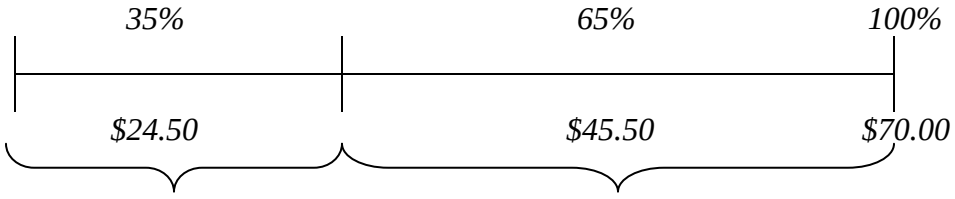
- Activity 13: Given a situation, students will draw and label a model showing the mathematical relationships in the situation. Students will estimate a solution before solving and then justify why their estimation is reasonable.

  Teacher may choose one or more of the following situations depending on student need:

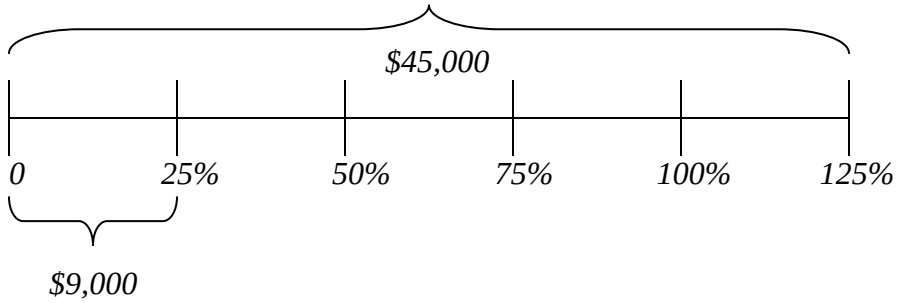
  a) Jana paid $24.50 for a dress which was on sale for 65% off the regular price. What was the original cost of the dress?
  b) A telethon for a local charity raised $45,000. This was 125% of the goal. What was the goal?
  c) A length of string that is 180 cm long is cut into 3 pieces. The second piece is 25% longer than the first, and the third piece is 25% shorter than the first. How long is each piece?

  Solutions:

  a) If the dress were 65% off, then she paid 35%, so $\frac{35}{100} = \frac{24.50}{x}$*, or $70.00 (original cost)*



b) 25% of the goal: $45,000 ÷ 5 = $9,000, so the goal is 4 x $9,000 = $36,000



c) *Each section: 180 cm ÷ 12 = 15 cm*
Length of 1st string: 4 x 15 cm = 60 cm
Length of 2nd string: 5 x 15 cm = 75 cm
Length of 3rd string: 3 x 15 cm = 45 cm