INSTRUCTIONAL FOCUS DOCUMENT
Sixth Grade/Mathematics

UNIT: 01 **TITLE: Rational Numbers** **SUGGESTED DURATION:** 17 days

Exemplar Lesson 01: Equivalent Rational Numbers and Percents

State Resources:
MTC 6 – 8: Peanut Butter Fudge
http://www.tea.state.tx.us/math/training/materials/MTC/index.htm
Mathematics TEKS Toolkit: TEKS Clarifying Activity/Lesson/Assessment
http://www.utdanacenter.org/mathtoolkit/index.php
MSTAR Math Academy: Day 3 – Representing Fractions

RATIONALE:

This unit bundles student expectations that address generating equivalent forms of rational numbers through a variety of models, as well as representing percents as fractions and decimals and with concrete models in order to compare and order rational numbers in a variety of equivalent forms.

Prior to this unit, in Grade 5, students generated equivalent fractions to a given fraction and used models to relate decimals to fractions that name tenths, hundredths, and thousandths. This unit will extend the concept of equivalent forms of rational numbers and percents. As a result of this extension, students will become flexible in moving from one representation to the next in order to solve problems involving computation with rational numbers (Unit 03).

According to the National Council of Teachers of Mathematics (2000), “In the middle grades, students should become facile in working with fractions, decimals, and percents. At the heart of flexibility in working with rational numbers is a solid understanding of different representations for fractions, decimals, and percents. In the middle grades, students should build on and extend this experience to become facile in using fractions, decimals, and percents meaningfully. Students can develop a deep understanding of rational numbers through experiences with a variety of models, such as fraction strips, number lines, 10 x 10 grids, area models, and objects. These models offer students concrete representations of abstract ideas and support students’ meaningful use of representations and their flexible movement among them to solve problems. As they solve problems in context, students can also consider the advantages and disadvantages of various representations of quantities” (pp. 215-216).

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics.* Reston, VA: National Council of Teachers of Mathematics, Inc.

MISCONCEPTIONS/UNDERDEVELOPED CONCEPTS:

MISCONCEPTIONS:
- Some students may think that the numerator and denominator in a fraction are two separate whole numbers instead of a single numerical value.
- Some students may think that fractions with larger numbers in the denominator have a greater value than fractions with a smaller denominator.
- Some students may think that 50% and the whole number 50 have the same value.

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According to the Texas Administrative Code, school districts shall implement English Language Proficiency Standards (ELPS) as an integral part of each subject in the required curriculum. http://www.tea.state.tx.us/curriculum/biling/elps.html

PERFORMANCE INDICATORS	CONCEPTS	KEY UNDERSTANDINGS FOR LEARNERS
Generate equivalent forms of non-negative rational numbers (whole numbers, fractions, decimals) and percents using a variety of models such as fraction strips, percent bars, etc. Represent percents with concrete models, fractions, and decimals and justify the equivalence of the variety of forms. (6.1A, 6.1B; 6.3B) ELPS: 1C, 1E, 2E, 2I, 3D, 3H, 4E, 5B, 5F, 5G	Number – Non-Negative Rational Quantitative Reasoning – Equivalence	Non-negative rational numbers can be written as whole numbers, fractions, or decimals. For each non-negative rational number there is an equivalent whole number, fraction, or decimal. Non-negative rational numbers can be represented using a variety of models to demonstrate equivalence.
Write a paragraph to describe how the number line is a tool that may be used to compare and order a set of non-negative rational numbers. (6.1A, 6.1B) ELPS: 1C, 1E, 2E, 2I, 3D, 3H, 4E, 5B, 5F, 5G	Quantitative Reasoning – Compare and Order	Non-negative rational numbers are ordered according to their value and placed on the number line relative to their position between whole numbers.

KEY ACADEMIC VOCABULARY SUPPORTING CONCEPTUAL DEVELOPMENT

- **Non-negative rational numbers** – the set of numbers that include whole numbers, fractions, and decimals
- **Percents** – an equivalent representation for fractions with a denominator of 100

TEKS# / SE#	TEKS	SPECIFICITY
6.1	***Number, operation, and quantitative reasoning. The student represents and uses rational numbers in a variety of equivalent forms. The student is expected to:***	
6.1A	**Compare and order non-negative rational numbers.**	Represent, Use, Compare, Order NON-NEGATIVE RATIONAL NUMBERS Including, but not limited to: • number sets (non-negative rational, whole, natural (counting), and zero) • decimals (greater than or equal to 0) • fractions (positive, unit, equivalent, proper, improper, and mixed numbers) • relationships to benchmarks of 0, $\frac{1}{2}$, and 1 • verbal, numerical, and written expressions to compare numbers • number lines to compare numbers • place value • inequality words and symbols • multiple forms of non-negative rational numbers within a single problem

		• real-world problems
6.1B	**Generate equivalent forms of rational numbers including whole numbers, fractions, and decimals.**	Represent, Use, Generate EQUIVALENT FORMS OF NON-NEGATIVE RATIONAL NUMBERS Including, but not limited to: • whole numbers, fractions, and decimals • variety of models to represent equivalent forms of rational numbers • real-world problems Note: • 5th grade develops equivalent fractions, mixed numbers, and improper fractions from concrete to pictorial.
6.3	***Patterns, relationships, and algebraic thinking. The student solves problems involving direct proportional relationships. The student is expected to:***	
6.3B	**Represent ~~ratios and~~ percents with concrete models, fractions, and decimals.**	Solve, Represent PERCENTS Including, but not limited to: • percents using concrete models, fractions and decimals • real-world problems using concrete models involving percents

TEKS# / SE#	Ongoing Underlying Processes and Mathematical Tools TEKS
6.11	***Underlying processes and mathematical tools. The student applies Grade 6 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to:***
6.11A	**Identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics;**
6.11B	**Use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness;**
6.11C	**Select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem; and**
6.11D	**Select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems.**
6.12	***Underlying processes and mathematical tools. The student communicates about Grade 6 mathematics through informal and mathematical language, representations, and models. The student is expected to:***
6.12A	**Communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models; and**
6.12B	**Evaluate the effectiveness of different representations to communicate ideas.**
6.13	***Underlying processes and mathematical tools. The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to:***
6.13A	**Make conjectures from patterns or sets of examples and nonexamples; and**
6.13B	**Validate his/her conclusions using mathematical properties and relationships.**