Grade 2 Mathematics, Quarter 3, Unit 3.2

Problem Solving with Money, Measurement and Data

Overview

Number of Instructional Days: **20** (1 day = 45-60 minutes)

Content to Be Learned	Mathematical Practices to Be Integrated
• Solve addition and subtraction word problems with money as a context. • Use the $ and ¢ symbols appropriately when working with money problems. • Generate and display measurement data in a horizontal line plot (whole numbers units on scale). • Draw picture and bar graphs to display data with up to four categories. • Solve problems using information represented in a bar and picture graph. • Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, … to display data.	**1. Make sense of problems and persevere in solving them.** • Devise a strategy and execute a plan to solve problems. • Determine if results are accurate by checking your work. • Solve problems represented in graphs. **4. Model with mathematics.** • Solve everyday problems involving money, measurement, and data displayed in graphs. • Interpret real world data from line plots, bar graphs and picture graphs. **5. Use appropriate tools strategically.** • Use appropriate measurement tools to generate data. • Use a number line as a tool for addition and subtraction. • Use data displays as a tool to solve problems. **6. Attend to precision.** • Accurately label and represent data on line plots, picture graphs and bar graphs. • Accurately describe problem solving strategies and use money symbols.

Essential Questions	
• What comparison questions can be answered by using the data in your graphs? • How can line plots help you solve problems? • How do we use graph, charts and tables to organize data? • Why is it important to use the correct symbols when writing the value of money?	• In what ways can you represent your data using a picture graph, bar graph, line plot? • How can bar/pictures graphs help you solve problems and interpret data? • How do number lines help you represent data? • What tools can you use to help you solve addition and subtraction with money? (Number lines, coins, pictures, tables…_)

Written Curriculum

Common Core State Standards for Mathematical Content

Measurement & Data 2.MD

Relate addition and subtraction to length.
6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.

Work with time and money.
8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?

Represent and interpret data.
9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems[1] using information presented in a bar graph.

[1] See Glossary, Table 1.

Common Core Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

4. Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5. Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6. Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Clarifying the Standards

Prior Learning

In grade 1, students ordered three objects in length and compared the lengths of two objects indirectly by using a third object. Students expressed the length of an object as a whole number of length units by iterating. In addition, they organized, represented, and interpreted data with up to three categories. Students asked and answered questions about the total number of data points, how many are in each category, and how many more or less are in one category than another.

Current Learning

Earlier in grade 2, students measure the length of an object using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. In this unit, they select and use the appropriate tool to measure an object. Students measured an object twice using units of different lengths for the two measurements. They described how the two measurements related to the size of the unit chosen.

In this unit, students represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram. This work lays the foundation for fractions on a number line in grade 3.

Students solve simple put-together, take-apart, and compare problems using information presented in a bar graph. The developmental component of this unit is solving problems by taking apart information in a bar graph. See glossary Table 1 for more concrete examples.

Future Learning

In grade 3, students will tell and write time to the nearest minute and intervals in minutes. They will draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Students will also generate measurement data by measuring lengths, using rulers marked with halves and fourths of an inch. They will show their data by making a line plot. Students will begin to measure and estimate liquid volumes and masses using standard units of grams.

Additional Findings
Valuable information can be gained from accessing the following resources:

CCSS Progression Documents:
http://ime.math.arizona.edu/progressions/

Arizona's College and Career Ready Standard (provides examples of each standard):
http://www.azed.gov/azccrs/mathstandards/k-2/

PARCC Model Content Frameworks (K-2):
http://parcconline.org/parcc-model-content-frameworks