Guided Support
Lesson Sample

Lessons Included:

• Word Problems with Coins (Grade 2)
• Equivalent Fractions Using Number Lines (Grade 3)
• Compound Theoretical Probability (Grade 7)
Goal: Students will use models and count on to solve word problems involving coins.

Guided Support 15 MINUTES

Materials
- Blackline Master: Coin-Sorting Mat (1 per student)
- Manipulative money: quarters, dimes, nickles, and pennies (3 each per student)

Begin the Activity
Distribute a group of coins and the Coin-Sorting Mat to each student. Have students find a quarter. What is the value of a quarter? 25¢ Practice skip counting by 25 with students. Have students find a dime. What is the value of a dime? 10¢ Practice skip counting by 10 with students. Have students find a nickel. What is the value of a nickel? 5¢ Practice skip counting by 5 with students. Have students find a penny. What is the value of a penny? 1¢ Practice skip counting by 1 with students. Have students place the coins in order from greatest to least. Explain that the size of the coin does not relate to its value. Tell students ordering the coins from greatest to least makes it easier to count them.

Next, present students with a word problem: Liz has 2 dimes, 1 quarter, and 2 nickels. How much money does she have? Write the word problem on the board. Explain that students will model the problem using their mats. Remind students to start with the coin with the greatest value. For support, they can use the mat, which orders the coins from greatest to least. Which coin in the word problem is the greatest? the quarter How many quarters are in the problem? 1 Have students model this by placing 1 quarter on the section of the mat labeled quarters. Which coin has the next greatest value in the word problem? the dime How many dimes are in the problem? 2 Have students model this by placing 2 dimes in a row on the section of the mat labeled dimes. Which coin has the next greatest value in the word problem? the nickel How many nickels are in the problem? 2 Have students model this by placing 2 nickels in a row on the section of the mat labeled nickels. Why is it helpful to sort the coins into groups? Sample answer: It is helpful because it is makes it easy to skip count by the same number.

Explain that students have modeled the problem by sorting and ordering the coins. Tell students that next they need to count on to find the total value of the coins. Explain that students should start with the quarter. Have students point to the quarter and say, “25.” Then have students point to the first dime on the mat. Explain that because a dime has a value of 10¢, students will count on 10 from 25. Have students point to the dime and say, “35.” Tell students that to
move to the next dime, they count on 10 from 35. Have students point to the next dime and say, “45”. Have students point to the first nickel on the mat. Explain that because a nickel has a value of 5¢, students will count on by 5 for the next two coins. Have students point to the first nickel and say, “55”. Then have students point to the second nickel and say, “60”. **What is the total value of coins? 60 cents**. **How much money does Liz have? 60 cents**. On the board, show students how to write 60 cents using the cent symbol. Then have students write 60¢ on the back of their coin mats.

Repeat the procedure above with other word problems. Use student’s names to create word problems with these sets of coins:

- 2 quarters, 1 nickel, 2 pennies
- 3 quarters, 2 dimes, 1 nickel
- 1 quarter, 3 nickels, 2 pennies
- 2 quarters, 2 dimes, 2 pennies

**Conclude the Activity**

Discuss with students their strategies for solving word problems involving coins. Remind students that it is important to sort and order the coins from greatest to least. Tell students that this makes counting the coins easier. Have students place 2 quarters, 1 dime, and 3 nickels on their mats. As a group, count on to find the total value of the set (75¢).

**Questions**

- **What is the value of each coin?** A quarter is worth 25¢. A dime is worth 10¢. A nickel is worth 5¢. A penny is worth 1¢.
- **How do you solve a word problem involving coins?** Sample answer: I read the problem. Next, I model the problem by drawing or placing the coins from greatest to least. Then I count on to find the total value. Finally, I write the answer using a cent sign.
Goal: Students will use a number line to find equivalent fractions.

Guided Support [15 MINUTES]

Materials
- Fraction tiles (1 set of all tiles to eighths per student)
- Blackline Master: Number Lines (0–1)

Begin the Activity

Present the one-whole fraction tile to students. Explain it is one whole. Discuss with students what it could represent (1 whole cheese stick, 1 whole carrot stick, etc.). Then have students place two \( \frac{1}{2} \)-fraction tiles equally aligned on top of the whole fraction tile. Discuss with students what they observe, such as two halves make one whole. Repeat with the \( \frac{1}{4} \)-fraction tiles on top of the whole fraction bar. Explain that each fraction tile is one part of a whole. Then present Number Lines (0–1).

First Number Line:
- Refer to the first number line. Have students place the one-whole fraction tile above the number line. Guide students to understand that the number line from 0 to 1 represents one whole, just as the one-whole fraction tile does. Have students make a tick mark on the line at both ends of the one-whole fraction tile to indicate the one whole on the number line. Tell students to mark the first tick mark 0 and the second tick mark 1. Remove the fraction tile.
- Have students place two \( \frac{1}{2} \)-fraction tiles (side-by-side) along the line between the 0 and 1 tick marks. Explain that two \( \frac{1}{2} \)-fraction tiles make up the whole number line. Tell students that instead of using tiles to mark the halves, we use tick marks.
- Have students remove the second \( \frac{1}{2} \)-tile, leaving the first \( \frac{1}{2} \)-tile along the line. At the end of the first tile, have students draw a tick mark on the number line and remove the tile. Explain this marks \( \frac{1}{2} \) of the number line. Students should label the tick mark \( \frac{1}{2} \). Explain that we know this marks \( \frac{1}{2} \), because it shows one part out of two total parts.
- Have students point to each section on the number line, not the tick marks, to count the parts of this number line. Counting the tick marks to determine the denominator is a common mistake made by many students. Ensure that students are counting the sections between tick marks.

Second Number Line:
- Refer to the second number line. Have students place the one-whole fraction tile along the number line and make a tick mark on the line at both ends of the 1 whole fraction tile to indicate the one whole on the number line. Tell
students to mark the first tick mark 0 and the second tick mark 1. Have students use the $\frac{1}{4}$-tile to repeat the process of creating tick marks on the second number line.

- As you count the parts of this number line with the students, have them add a fraction tile to each section as you count. As they add a tile, help students label the tick marks by referring to the number of tiles they have placed along the number line. For example, label the third tick mark $\frac{3}{4}$, because the students have placed three $\frac{1}{4}$-tiles on the number line.

- After labeling each tick mark, remove all the tiles.

**Third Number Line:**

- Refer to the third number line. Have students place the one-whole fraction tile along the number line. Make a tick mark on the line at both ends of the one-whole fraction tile to indicate the one whole on the number line. Tell students to mark the first tick mark 0 and the second tick mark 1. Have students use the $\frac{1}{8}$-tile to repeat this process of creating tick marks on the third number line.

- As you count the parts of this number line with students, have them add a fraction tile to each section as you count. As they add a tile, help students label the tick marks by referring to the number of tiles they have placed along the number line. For example, label the third tick mark $\frac{3}{8}$, because the students have placed three $\frac{1}{8}$-tiles on the number line.

- After labeling each tick mark, remove all the tiles.

Demonstrate forming equivalent fractions. Explain that equivalent fractions are fractions that may look different, but equal the same amount of the whole. How many fourths are equal to one half? Have students take one $\frac{1}{2}$-tile and place it along the first number line between the 0- and $\frac{1}{2}$-tick marks. Explain that this shows $\frac{1}{2}$. Have students experiment with $\frac{1}{4}$ tiles along the second number line to create an equivalent fraction.

Guide students to correctly place two $\frac{1}{4}$-tiles along the second number line. How do you know these fractions are equal? Students may line up the end of the tiles or place them on top of each other to check. Point out that the $\frac{1}{2}$-tick mark is at the same point on the first number line as the $\frac{2}{4}$-tick mark is on the second. Mark each tick mark with a dot and remove the tiles. Explain that these dots represent points. Points can be used to mark fractions instead of tiles. How can we write $\frac{1}{2}$ and $\frac{2}{4}$ to show that they are equivalent fractions? After discussing, guide students to write
\[
\frac{1}{2} = \frac{2}{4}
\]
in the box labeled *Equivalent Fractions*.

Now refer to the third number line, separated into eighths. How many eighths are equal to two-fourths? Have students experiment with tiles on the second and third number lines to represent these equivalent fractions. Once the students have represented these fractions using tiles, they should add a point to identify two-fourths and four-eighths. How do you know these fractions are equal? Guide students to understand that \(\frac{4}{8}\) is at the same point on the second number line as \(\frac{2}{4}\) is on the first number line.

**How can we write \(\frac{2}{4}\) and \(\frac{4}{8}\) to show that they are equivalent fractions?**

Guide students to write \(\frac{2}{4} = \frac{4}{8}\) in the box labeled *Equivalent Fractions*.

Repeat with other representative examples, such as finding equivalent fractions for \(\frac{1}{4}, \frac{3}{8}, \frac{2}{8}\), and \(\frac{6}{8}\). Note: if further examples are needed, students will have to erase the dots drawn. Gradually reduce students’ dependence on the tiles and encourage the use of the points to identify equivalent fractions.

**Conclude the Activity**

To conclude the lesson, review with students the meaning of equivalent fractions and how to determine equivalent fractions using points on number lines.
Goal Students will use a number line to find equivalent fractions.

Guided Support 15 MINUTES

Materials
- Coin (1 per student)
- 1 – 6 Number Cube (1 per student)

Begin the Activity
Ask the student to roll a 1–6 number cube and flip a coin five times. Say: Each result is called an outcome. Create a list of the outcomes. Ask: Are there any other outcomes possible? What are some ways we can show all possible outcomes without leaving any out or repeating any?

Have the student generate a complete sample space as an organized list, table, or tree diagram.

Write the definition of probability.

\[
\text{probability} = \frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}}
\]

Say, Pretend that you will win a prize if you roll a 6 and flip a head. How likely or probable is it that you will win? Have the student look at the list, chart, or tree diagram to find the number of (6, head) combinations as well as the total number of possible outcomes. Say: There are 12 possible outcomes. One possible outcome is rolling a 6 and flipping a head. The probability of rolling a 6 and flipping a head is \(\frac{1}{12}\). Then ask the student to find other probabilities such as rolling an even number and flipping a tail or rolling a number less than 5 and flipping a tail. Have the student think aloud and explain the process for each probability.

Conclude the Activity
Sketch two spinners.
Ask: How would you find the probability of spinning an A and a 3? [Sample answer: First I would make a list of all possible outcomes. Then I would count to see how many there are altogether. Then I would see how many times (A, 3) appeared in the list. Finally I would write a ratio of the number of (A, 3)s to the total number of outcomes.] How would you find the probability of spinning a consonant and an even number? [Sample answer: I would make a table showing all possible outcomes. Then I would count to see how many there are altogether. Then I would circle all the outcomes that had a B or C and a 2 or 4. Finally I would write a ratio of the number of outcomes with a constant and an even number to the total number of outcomes.]

Questions

- What do you need to know to find the probability of two events happening? [Sample answer: The total number of outcomes and how many times the two events happen in the same outcome.]
- How can you find the total number of outcomes accurately? [Sample answer: You need to be organized. You could use a list, a table, or a tree diagram.]
- How do you write the probability? [Sample answers: You write it as a ratio with the number of outcomes you want in the numerator and the total number of outcomes in the denominator.]