Partners and Leftovers: Exploring Odd and Even Numbers

Strand: Number and Number Sense

Topic: Identifying and describing odd and even numbers.

Primary SOL: 5.3 The student will

  b) identify and describe the characteristics of even and odd numbers

Related SOL: 5.3a

Materials

- Chart paper
- Colored tiles or counters
- Bag or basket to hold the counters
- Exploring Evens and Odds: Part 1 activity sheet (attached)
- Exploring Evens and Odds: Part 2 activity sheet (attached)

Vocabulary

difference, equal groups, even, odd, pair, partner, product, sum

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Have each student grab a handful of tiles or counters. Ask, "*Without counting your tiles, how can you tell if you have grabbed an even or an odd number of tiles? Explore with your tiles to help you decide.*" Allow students time to explore with the tiles, then allow volunteers to share ways they arranged their tiles to prove whether they have an even or odd number.

2. Work with the students to come up with a class definition of even numbers and odd numbers, and record the final definition on chart paper. These definitions should highlight two particular methods that students will likely share:
   - Equal Groups: Divide your tiles into two equal groups, and note whether there is an extra tile.
   - Partners: Arrange your tiles into pairs, or "partners," and note whether there is a tile without a partner.

   Have students arrange their tiles using each method to strengthen understanding, and then have them draw these arrangements in their notes or mathematics journals. Students should write the corresponding method (equal groups or partners) next to each drawing.

Exploring Odds and Evens: Partners and Leftovers Activity

3. Distribute the Exploring Odds and Evens: Part 1 activity sheet to each student and a bag of tiles or counters for every two students. Have students work in pairs to follow the instructions on the activity sheet and record their answers in the table as each student takes turns grabbing tiles, arranging them in equal groups or partners, determining

whether there are leftovers, and whether the number is even or odd. Have students answer the question at the bottom of the activity sheet after they complete the table.

4. To debrief the activity, say, *"What patterns do you notice about the number of tiles, leftovers, and if numbers are even or odd? Discuss with your partner."* After partner discussions, allow volunteers to share their observations. Ultimately, students should confirm that if there are no leftovers, then there is an even number of tiles. If there is a leftover, then there is an odd number of tiles.

Exploring Odds and Evens: Questions to Explore

5. Have students work with the Exploring Odds and Evens: Part 2 activity sheet. Students should continue to work in pairs to explore each question with tiles, represent their tile answers with drawings, and select the answer to each question. Remind students to ask themselves why their response would be true for numbers identified.

    After students have completed the chart, ask volunteers to share their drawings and answers to each question. For each answer, ask, *"Who agrees?" "Does anyone have a different answer or drawing?" "Who can explain why?"* Come to a consensus about the answer to each question.

    Answers:
    a. <u>Even</u> numbers are divisible by 2 because they can be put into two equal groups with no leftovers.
    b. The sum of two even numbers is <u>even</u> because each addend can be put into two equal groups with no leftovers.
    c. The sum of two odd numbers is <u>even</u>: Each addend has one leftover when two equal groups are made. Those two leftovers can be partnered, leaving no leftovers.
    d. The sum of an even number and an odd number is <u>odd</u> because the even addend has no leftovers but the odd addend does have a leftover. When the two addends are partnered, there is one leftover.
    e. The product of two even numbers is <u>even</u> because there is an even number of even groups. The product will have no leftovers.
    f. The product of two odd numbers is <u>odd</u> because there is an odd number of groups with an odd number in each group. When groups are partnered, all groups but one will have partners. The odd group will have one leftover.
    g. The product of an even and an odd number is <u>even</u>. If we have an even number of odd groups, each leftover of the odd numbers will have a partner.

6) As an exit ticket, ask students to write about one new thing they learned about even and odd numbers today.

Assessment

-   **Questions**
    o   How can you tell whether a number is even or odd?
    o   Is the sum of two even numbers even or odd? Why?
    o   Is the sum of two odd numbers even or odd? Why?
    o   Is the sum of an even number and an odd number even or odd? Why?

    o How can you prove that a number is odd?

- **Journal/writing prompts**
  - o Describe to your third-grade cousin the difference between even and odd numbers. Use drawings and symbols to help explain.
  - o Explain in your own words the results of adding or multiplying two odd numbers.
  - o Explain why you would need to know whether a number is even or odd.
- **Other Assessments**
  - o Explain the results of adding two even numbers.
  - o Explain the results of adding or multiplying one even number and one odd number.
  - o Think about a number line, and explain how to use a number line to find the even numbers.

Extensions and Connections

- Lead students in the exploration of subtracting evens and odds to see whether the outcomes will be the same as with addition.
- Lead students in the exploration of dividing evens and odds to see what happens when an even number is divided by another even, an odd by an odd, an even by an odd, and an odd by an even. Have students determine whether the results would be the same as with multiplication.
- How does a city use even and odd number with addresses? Why are the addresses arranged this way?
- Explore where zero falls. Is it odd or even?

Strategies for Differentiation

- Some students may need to use a hundreds chart to color code even and odd numbers to see the patterns.
- Demonstrate arranging tiles.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Exploring Evens and Odds: Part 1

Name _____ **Date** _____

- Each student needs an activity sheet, and each pair of students needs a bag of tiles or counters.
- Work with a partner to record your answers in the Partners and Leftovers table below.
- Take turns pulling out a handful of tiles, then both people record the number of tiles.
- Use the tiles or counters to test for even or odd by determining whether there is a leftover, and record the results of the test in the second column.
- In the third column, state whether the number is even or odd.

Partners and Leftovers

Number of Tiles	Leftover or No Leftover?	Odd or Even?

Answer the following question after you complete the Partners and Leftover table.

Your teacher has announced that your class will be getting a new student tomorrow. She asked you to work with that new student, Maria, to teach her how to determine whether a number is even or odd. Use pictures and words to explain what you will show and say to Maria.

Exploring Evens and Odds: Part 2

Name _____ **Date** _____

Questions to Explore: Use tiles to explore these questions. Draw a picture to prove each answer.

Question	Drawing
a. Which numbers are divisible by two: <u>odds</u> or <u>evens</u>? _____	
b. Is the sum of two even numbers <u>even </u>or <u>odd</u>? _____	
c. Is the sum of two odd numbers <u>even</u> or <u>odd</u>? _____	
d. Is the sum of an even and an odd number <u>even</u> or <u>odd</u>? _____	

Explain why your response to Question c above is always true when you find the sum of two odd numbers.

Explore as many of the following as you can.

Question	Drawing
e. Is the product of two even numbers <u>even</u> or <u>odd</u>? _____	
f. Is the product of two odd numbers <u>even</u> or <u>odd</u>? _____	
g. Is the product of an even number and an odd number <u>even</u> or <u>odd</u>? _____	