Unit 6, Lesson 21

Problems with Remainders

Let's think about remainders to solve problems.

Warm-up

Number Talk: Dividing by 7

Find the value of each expression mentally.

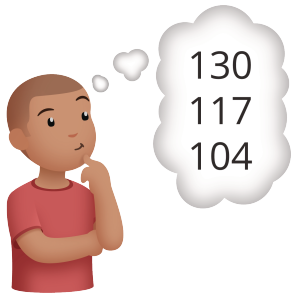
- $21 \div 7$
- $35 \div 7$
- $140 \div 7$
- $196 \div 7$

Activity 1

Write Multiples

1. Han starts writing multiples of a number. When he reaches 104, he has written 8 numbers.

   For each of the following questions, explain or show your reasoning.



   a. What number is Han writing multiples of?

   b. What is the 15th multiple of this number?

   c. Han gets to 286. How many numbers has he written at that point?

2. Kiran wants to know how many multiples of 7 are between 0 and 150.

   a. He thinks he can use division to find out. Do you agree? Explain your reasoning.

   b. How many multiples will he find? Show your reasoning.

   c. Is 150 a multiple of 7? Show how you know.

3. Han writes the number 295. He is wondering if he made a mistake. Determine if 295 is a multiple of 8 and explain your reasoning.

Activity 2

Jada's Mystery Number

Jada writes multiples of a mystery number. After writing some numbers, she writes the number 126.

- Mai says 6 is the mystery number.
- Priya says 8 is the mystery number.
- Andre says 9 could be the mystery number.

1. Which student do you agree with? Show how you know using equations.

2. Jada gives one more clue: "If I keep writing multiples, I'll get to 153."

   What is the mystery number? Explain or show your reasoning.

Activity 3

Watch Your Remainder!

Directions:

- Spin the spinner to get your one-digit divisor.
- Each partner:
  - Use 3–4 cards to create a dividend.
  - Write a multiplication equation to represent the quotient. (For example, $109 \div 9$ is written as $(9 \times 12) + 1$ and your score is 1.)
  - Check your partner's work to make sure you agree.
  - Your score for each round is the remainder.
- Take new cards so that you have 4 cards to start the next round.
- The partner who has the fewest points once the recording sheet is full wins the game.

Section C Summary

We solved different problems that involved dividing whole numbers.

We recalled two ways of thinking about division.

For example, if $274 \div 8$ represents a situation where 274 markers are put into equal groups. The value of $274 \div 8$ can tell us:

- How many markers are in each group if there were 8 groups.
- How many groups can be made if there were 8 markers in each group.

We learned that in $274 \div 8$, the 274 is called the **dividend**, and the 8 is called the **divisor.** We then identified many ways to find the value of a **quotient** —or the result of the division. For $274 \div 8$, we can:

- Think about whether one number is a multiple or factor of another number. For example, "Is 274 a multiple of 8?" or "Is 8 a factor of 274?"
- Divide by place value and think about putting 2 hundred, 7 tens, and 4 ones into 8 equal groups.
- Divide in parts and find partial quotients. For example, we can first find $160 \div 8$ (which is 20), and then $80 \div 8$ (which is 10), and then $32 \div 8$ (which is 4).
- Think in terms of multiplication. For example, we can think of $8 \times 20 = 160$, $8 \times 10 = 80$, and so on.

Here is one way to record division using partial quotients.

34	
4	
10	
20	
$8 \overline{)\,274}$	
$-\ 160$	8×20
114	
$-\ 80$	8×10
34	
$-\ 32$	8×4
2	

Sometimes a division results in a leftover that can't be put into equal groups or is not enough to make a new group. We call the leftover a **remainder**. Dividing 274 by 8 gives 34 and a remainder of 2.