Divide Using Repeated Subtraction

Essential Question: How can you use repeated subtraction and multiples to find quotients?

Investigate

Materials: ■ counters ■ grid paper

John is building a backyard pizza oven with an arch opening. He has 72 bricks. He will place 6 bricks at a time as he builds the oven. If he arranges the bricks in piles of 6, how many piles will he have?

You can use repeated subtraction to divide $72 ÷ 6$.

A. Begin with 72 counters. Subtract 6 counters.

   How many are left? _____

B. Record the subtraction on grid paper as shown.

   Record the number of counters left and the number of times you subtracted.

   
   \[
   \begin{array}{c}
   72 \\ - 6 \\ \hline
   \end{array}
   \]

   1 time

   _____ times

   _____ times

C. Can you reach zero evenly? Explain.

   ________________________________________________________________
   ________________________________________________________________

D. Count the number of times you subtracted 6 counters. _____________

   So, there are _____ piles of 6 bricks.
**Draw Conclusions**

1. Explain the relationship between the divisor, the dividend, the quotient, and the number of times you subtracted the divisor from the dividend.

2. What happens if you subtract multiples of 6? Complete the example at the right.
   - What multiples of 6 did you use? How did you use them?
   - What numbers did you add? Why?
   - How did using multiples of the divisor help you?

3. **THINK SMARTER** Why should you subtract $10 \times 6$ and not $9 \times 6$ or $20 \times 6$?

**Make Connections**

Another way to divide by repeated subtraction is to use a number line. Count back by 4s from 52 to find $52 \div 4$.

How many equal groups of 4 did you subtract? ____

So, $52 \div 4 = ____$. 
Use repeated subtraction to divide.

1. $84 \div 7 = \underline{12}$
2. $60 \div 4 = \underline{15}$
3. $91 \div 8 = \underline{11}$

Draw a number line to divide.

4. $65 \div 5 = \underline{13}$

Problem Solving • Applications

5. **Use Appropriate Tools** Can you divide 32 by 3 evenly? Use the number line to explain your answer.

6. **Go Deeper** John has $40 to spend at the yard sale. He buys 6 books for $2 each. He would like to spend the rest of his money on model cars for his collection. If the cars cost $7 each, how many can he buy? Explain.
7. **THINK SMARTER** A new playground will be 108 feet long. Builders need to allow 9 feet of space for each piece of climbing equipment. They want to put as many climbers along the length of the playground as possible. How many climbers can they place?

a. What are you asked to find?

__________________________

b. How can you use repeated subtraction to solve the problem?

__________________________

__________________________

c. Tell why you might use multiples of the divisor to solve the problem.

__________________________

d. Show steps to solve the problem.

e. Complete the sentences.

There are _____ equal parts of the playground, each _____ feet long.

So, _____ climbers can fit along the length of the playground.

8. **THINK SMARTER** Which model matches each expression? Write the letter on the line next to the model.

A  \[ \frac{240}{80} \]

B  \[ \frac{240}{60} \]
Problem Solving

Divide Using Repeated Subtraction

Use repeated subtraction to divide.

1. \(42 \div 3 = \underline{14}\)  
2. \(72 \div 4 = \underline{18}\)  
3. \(93 \div 3 = \underline{31}\)

\[
\begin{array}{c|c}
3 & 42 \\
\hline
-30 & \boxed{10} \\
\hline
12 & \boxed{10} \\
\hline
-12 & \boxed{14} \\
\hline
0 & \\
\end{array}
\]

4. \(35 \div 4 \underline{8}\)  
5. \(93 \div 10 \underline{9}\)  
6. \(86 \div 9 \underline{9}\)

Draw a number line to divide.

7. \(70 \div 5 = \underline{14}\)

Problem Solving

8. Gretchen has 48 small shells. She uses 2 shells to make one pair of earrings. How many pairs of earrings can she make?

9. Write Math. Show how you can use repeated subtraction to find \(84 \div 6\).
Lesson Check (4.NBT.B.6)

1. Randall collects postcards that his friends send him when they travel. He can put 6 cards on one scrapbook page. How many pages does Randall need to fit 42 postcards?

2. Ari stocks shelves at a grocery store. He puts 35 cans of juice in each display case. The case has 4 shelves with an equal number of cans, and one shelf with only 3 cans. How many cans are on each of the equal shelves?

Spiral Review (4.OA.A.3, 4.NBT.A.1, 4.NBT.B.5, 4.NBT.B.6)

3. Fiona sorted her CDs into separate bins. She placed 4 CDs in each bin. If she has 160 CDs, how many bins did she fill?

4. Eamon is arranging 39 books on 3 shelves. If he puts the same number of books on each shelf, how many books will there be on each shelf?

5. A newborn boa constrictor measures 18 inches long. An adult boa constrictor measures 9 times the length of the newborn plus 2 inches. How long is the adult?

6. Madison has 6 rolls of coins. Each roll has 20 coins. How many coins does Madison have?