Interpreting the Quotient
Going Deeper

Essential question: How do you solve problems by interpreting the quotient?

Prerequisites
Dividing decimals by decimals

Math Background
When solving real-world problems with division, students will often need to use the context to determine if the quotient needs to be rounded up or down. In some cases, a quotient with a remainder is appropriate. For example, if an 18-inch ribbon is cut into 5 pieces, the length of each piece is given by $18 \div 5$, or 3.6 inches. Here, the remainder is simply the decimal part of the length.

Present the following problem: “The pages of a photo album can each hold 4 photos. If you have 25 photos to place in the album, how many pages will you need?” Students should find that they need 7 pages. Ask students to explain how they arrived at this answer. If necessary, help them understand that $(25 \div 4 = 6 \text{ R}1)$ and that the remainder of 1 means that an additional page is needed for the leftover photo.

Questioning Strategies
- In part A, what division problem models the situation? $62 \div 8$
- What is the quotient? What is the remainder? The quotient is 7 R6; the remainder is 6.
- What does the remainder tell you? If you pack the loaves of bread into 7 boxes, there will still be 6 loaves left over.

Essential Question
How do you solve problems by interpreting the quotient?
Possible answer: When a real-world problem requires division, first calculate the quotient and any remainder. Then decide whether an exact answer is required or if the situation calls for rounding up or down to the next whole number.

Summarize
Have students write three original division problems: one in which an exact answer is needed, one in which the quotient should be rounded up, and one in which the quotient should be rounded down.

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This lesson offers an ideal opportunity to address Standard 4 (Model with mathematics). A key part of the modeling process is interpreting results in the context of the problem. Point out to students that it is not enough to know how to divide decimals and correctly express the remainder. When a division problem arises from a real-world context, it is essential to reread the problem and interpret the quotient as needed.

Where skills are taught |
| Where skills are practiced |

| EXSPLORE | EXS. 1–6 |
**Interpreting the Quotient**

**Going Deeper**

Essential question: How do you solve problems by interpreting the quotient?

Many real-world situations require an exact answer to a problem. But in some cases, you may need to round your answer up or down for it to make sense in the given situation.

1. **EXPLORE**
   **Interpreting Quotients**

   Choose the best answer to each problem. Explain your answer.

   **A.** At a bakery, 8 loaves of bread can be packaged in one box for transport. The bakery has an order for 62 loaves of bread to deliver to a grocery store today. How many boxes are needed for the shipment?

   - 7 boxes
   - 7.75 boxes
   - 8 boxes

   **Sample answer:** Since 62 ÷ 8 = 7.75, she can fill 7 boxes completely. There will be 4 flowers left over, leaving her 5 flowers short of filling another vase.

   **B.** For a woodworking project, D’Andre needs several pieces of wood that are each 14 inches long. How many 14-inch pieces can he cut from a board that is 78.5 inches long?

   - 5 pieces
   - 5.6 pieces
   - 6 pieces

   **Sample answer:** Since 78.5 ÷ 14 is about 5.6 so the board is not long enough to cut 6 pieces. The choice of 5.6 pieces does not make sense since the partial piece is shorter than the required 14 inches.

2. **REFLECT**

   **1a. Reasoning**

   Explain how your reasoning in **A** was different than your reasoning in **B**.

   **Sample answer:** In **A**, it was necessary to round the exact quotient up. In **B**, the exact quotient needed to be rounded down.

3. **TRY THIS!**

   **1b.** How many 6-ounce servings can you pour from a 33.6-ounce container?

   **Sample answer:** 5 servings

**PRACTICE**

Solve each problem. Explain your answer.

1. A florist is placing flowers in vases to be sold in her shop. Each vase will hold 9 flowers and she has an assortment of 85 flowers to use. How many vases can she fill completely?

   **Sample answer:** Since 85 ÷ 9 = 9 R4, she can fill 9 vases completely. There will be 4 flowers left over, leaving her 5 flowers short of filling another vase.

2. Two bags of apples weigh 8.2 pounds and cost $7.36. How many bags of apples will fit in a box with a 50 pound weight limit?

   **Sample answer:** Since 8.2 ÷ 2 = 4.1 so one bag of apples weighs 4.1 pounds. The box will contain only full bags.

3. A company sells recycled golf balls through their online store. The golf balls are sold in packages of 6 balls. The company recently received a shipment of 200 golf balls for packaging. How many packages can be completely filled from this shipment?

   **Sample answer:** Since 200 ÷ 6 = 33 R2, 33 packages can be completely filled. There will be 2 golf balls left over.

4. A florist is placing flowers in vases to be sold in her shop. Each vase will hold 9 flowers and she has an assortment of 85 flowers to use. How many vases can she fill completely?

   **Sample answer:** Since 85 ÷ 9 = 9 R4, she can fill 9 vases completely. There will be 4 flowers left over, leaving her 5 flowers short of filling another vase.

5. A florist is placing flowers in vases to be sold in her shop. Each vase will hold 9 flowers and she has an assortment of 85 flowers to use. How many vases can she fill completely?

   **Sample answer:** Since 85 ÷ 9 = 9 R4, she can fill 9 vases completely. There will be 4 flowers left over, leaving her 5 flowers short of filling another vase.

6. Two bags of apples weigh 8.2 pounds and cost $7.36. How many bags of apples will fit in a box with a 50 pound weight limit?

   **Sample answer:** Since 8.2 ÷ 2 = 4.1 so one bag of apples weighs 4.1 pounds. The box will contain only full bags.

7. A company sells recycled golf balls through their online store. The golf balls are sold in packages of 6 balls. The company recently received a shipment of 200 golf balls for packaging. How many packages can be completely filled from this shipment?

   **Sample answer:** Since 200 ÷ 6 = 33 R2, 33 packages can be completely filled. There will be 2 golf balls left over.
Assign these pages to help your students practice and apply important lesson concepts. For additional exercises, see the Student Edition.

**Answers**

**Additional Practice**

1. B  
2. H  
3. A  
4. H  
5. 6 costumes  
6. 11 weeks  
7. 6 costumes  
8. $2.19

**Problem Solving**

1. $3.35  
2. 6 vans  
3. 5 necklaces  
4. $0.57  
5. B  
6. J  
7. A  
8. H
**Additional Practice**

**Circle the letter of the correct answer.**

1. You spent a total of $6.75 for 15 yards of ribbon. How much did the ribbon cost per yard?
   - A $0.50
   - B $0.45
   - C $1.35
   - D $1.45

2. Buttons come in packs of 12. How many packs should you buy if you need 100 buttons?
   - F 10
   - G 8
   - H 9
   - J 12

3. Your sewing cabinet has compartments that hold 8 spools of thread. You have 50 spools of thread. How many compartments can you fill?
   - A 6
   - B 7
   - C 5
   - D 8

4. You spent a total of $35.75 for velvet cloth. Each yard of the velvet costs $3.25. How many yards did you buy?
   - F 10
   - G 10.5
   - H 11
   - J 11.5

**Write the correct answer.**

5. You used a total of 67.5 yards of cotton material to make costumes for the play. Each costume used 11.25 yards of cloth. How many costumes did you make?

6. You are saving $17.00 each week to buy a new sewing machine that costs $175.50. How many weeks will you have to save to have enough money to buy the sewing machine?

7. Sequins come in packs of 75. You use 12 sequins on each costume. If you have one pack of sequins, how many costumes can you make?

8. You pay $26.28 for a subscription to Sewing Magazine. You get an issue every month for a year. How much does each issue cost?

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**Problem Solving**

**Write the correct answer.**

1. Five friends split a pizza that costs $16.75. If they shared the bill equally, how much did each pay?

2. There are 45 choir members going to the recital. Each van can carry 8 people. How many vans are needed?

3. Tara bought 150 beads. She needs 27 beads to make each necklace. How many necklaces can she make?

4. Cat food costs $2.85 for five cans. Ben only wants to buy one can. How much will it cost?

5. Tennis balls come in cans of 3. The coach needs 50 tennis balls for practice. How many cans should he order?
   - A 16 cans
   - B 17 cans
   - C 18 cans
   - D 20 cans

6. The rainfall for three months was 4.6 inches, 3.5 inches, and 4.2 inches. What was the average monthly rainfall during that time?
   - F 41 inches
   - G 12.3 inches
   - H 4.3 inches
   - J 4.1 inches

7. Tom has $15.86 to buy marbles that cost $1.25 each. He wants to know how many marbles he can buy. What should he do after he divides?
   - A Drop the decimal part of the quotient when he divides.
   - B Drop the decimal part of the dividend when he divides.
   - C Round the quotient up to the next highest whole number to divide.
   - D Use the entire quotient of his division as the answer.

8. Mei needs 135 hot dog rolls for the class picnic. The rolls come in packs of 10. She wants to know how many packs to buy. What should she do after she divides?
   - F Drop the decimal part of the quotient when she divides.
   - G Drop the decimal part of the dividend when she divides.
   - H Round the quotient up to the next highest whole number.
   - J Use the entire quotient of her division as the answer.