Who Gets What?

Adding and Subtracting Fractions with Like Denominators

Students should be able to answer these questions after Lesson 3.1:
- What is a like fraction?
- What is an unlike fraction?
- How can you add and subtract like fractions?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. Drew, Alyssa, and Rex are sharing an extra-large pizza. The pizza is cut into 16 pieces. Drew ate 4 pieces. Alyssa ate 3 pieces. Rex ate 5 pieces. Write an expression that describes which fraction of the pizza each friend ate. Then find the amount of pizza that is left for their friend Danielle.

   Step 1 Decide what the denominator of the fractions should be. Because there are 16 slices in the whole pizza, the denominator should be 16.

   $$\frac{16}{16} = 1 \text{ whole extra-large pizza}$$

   Step 2 Write an expression using fractions that shows the amount of pizza eaten. The numerator of each fraction will be the number of pieces of the whole pizza that each person ate.

   $$\underset{\text{Drew's share}}{\frac{4}{16}} + \underset{\text{Alyssa's share}}{\frac{3}{16}} + \underset{\text{Rex's share}}{\frac{5}{16}} =$$

   Step 3 Add the numerators to find the amount of pizza eaten.

   $$\frac{4}{16} + \frac{3}{16} + \frac{5}{16} = \frac{12}{16}$$

   Step 4 Subtract the amount of pizza eaten from the whole pizza.

   $$\frac{16}{16} - \frac{12}{16} = \frac{4}{16}$$

   Step 5 Simplify your answer.

   $$\frac{4}{16} = \frac{1}{4}$$

   One fourth of the pizza, or 4 slices, is left for Danielle.

   > ### Numerators and Denominators
   > The *numerator*, or top number of a fraction, represents the number of parts of the whole. The *denominator*, or bottom number of a fraction, represents the number of total parts in the whole.

2. Kylie has 28 action figures. Three are robots. Nine are monsters. What part of her collection is made of robots and monsters? State your answer as a fraction. Simplify your answer, if possible.

3. Paul's soccer team scored 7 goals in its last game. Paul scored 1 goal and Roberto scored 2 goals. Find the fraction of the team's goals that were scored by players other than Paul and Roberto. Simplify your answer, if possible.

Old-Fashioned Goodies

Adding and Subtracting Fractions with Unlike Denominators

Students should be able to answer these questions after Lesson 3.2:

- What is an unlike fraction?
- What is the least common denominator?
- How can you add and subtract unlike fractions?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. Three sisters want to buy a treadmill. One sister has offered to pay $\frac{1}{3}$ of the cost of the treadmill. Another sister can pay $\frac{2}{5}$ of the cost of the treadmill. What fraction of the cost will the third sister have to pay?

   Step 1 Find the LCD of $\frac{1}{3}$ and $\frac{2}{5}$ so that you can tell what fraction of the cost of the treadmill the first two sisters can pay.

   The LCD of $\frac{1}{3}$ and $\frac{2}{5}$ is 15.

   Step 2 Convert $\frac{1}{3}$ and $\frac{2}{5}$ to equivalent fractions with a denominator of 15.

   $$\frac{1}{3} = \frac{5}{15} \qquad \frac{2}{5} = \frac{6}{15}$$

   > ### Working with Unlike Fractions
   > To add or subtract unlike fractions, find the least common denominator and rewrite the fractions as equivalent like fractions. Then add or subtract the numerators just as you do with like fractions.

   Step 3 Add the like fractions.

   $$\frac{5}{15} + \frac{6}{15} = \frac{11}{15}$$

   So, the first two sisters can pay $\frac{11}{15}$ of the cost of the treadmill.

   Step 4 Subtract the amount that the first two sisters can pay from the total cost of the treadmill. The total cost of the treadmill can be written as $\frac{15}{15} = 1$.

   $$\frac{15}{15} - \frac{11}{15} = \frac{4}{15}$$

   So, the third sister must pay $\frac{4}{15}$ of the cost of the treadmill.

2. Jon has $\frac{3}{4}$ gallon of milk. He gives Rachel $\frac{1}{5}$ gallon of milk. How much milk does Jon have left?

3. Wei is making pineapple muffins. The recipe calls for $\frac{1}{2}$ cup of white sugar and $\frac{1}{3}$ cup of brown sugar. How much total sugar does she need to make the muffins?

Fun and Games
Improper Fractions and Mixed Numbers

Students should be able to answer these questions after Lesson 3.3:
- What is an improper fraction?
- What is a mixed number?
- How can you add and subtract improper fractions and mixed numbers?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. Josh decided to weigh some flower pots. The first flower pot weighs $2\frac{2}{3}$ pounds. The second flower pot weighs $3\frac{1}{4}$ pounds. The third flower pot weighs $2\frac{1}{8}$ pounds. How much do all of the pots weigh together? Express your answer as a mixed number.

   Step 1 Rewrite each mixed number as an improper fraction.

   $$2\frac{2}{3} = \frac{8}{3} \qquad 3\frac{1}{4} = \frac{13}{4} \qquad 2\frac{1}{8} = \frac{17}{8}$$

   Step 2 Find the least common denominator.

   The LCD of 3, 4, and 8 is 24.

   Step 3 Rewrite each improper fraction as an equivalent fraction whose denominator is 24.

   $$\frac{8}{3} = \frac{64}{24} \qquad \frac{13}{4} = \frac{78}{24} \qquad \frac{17}{8} = \frac{51}{24}$$

   Step 4 To add the fractions, add the numerators, and keep the same denominator. The answer is the sum of the numerators over the same denominator.

   $$\frac{64}{24} + \frac{78}{24} + \frac{51}{24} = \frac{193}{24}$$

   Step 5 Write the improper fraction as a mixed number.

   $$\frac{193}{24} = 8\frac{1}{24} \text{ pounds}$$

   So, all of the pots together weigh $8\frac{1}{24}$ pounds.

2. Find the sum. Simplify your answer, if possible. Write your answer as a mixed number.

   $$\frac{3}{4} + \frac{1}{8} + \frac{5}{6} =$$

3. Find the difference. Simplify your answer, if possible. Write your answer as a mixed number.

   $$3\frac{2}{3} - 1\frac{1}{4} =$$

Parts of Parts
Multiplying Fractions

Students should be able to answer this question after Lesson 3.4:

● How can you multiply fractions?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. Multiply. Write your answer in simplest form.

$$\frac{2}{7} \times \frac{5}{6}$$

Step 1 Multiply the numerators.

$2 \times 5 = 10$

This number becomes the numerator of the answer.

Step 2 Multiply the denominators.

$7 \times 6 = 42$

This number becomes the denominator of the answer.

Step 3 Write the answer as a fraction.

$$\frac{10}{42}$$

Step 4 Use the GCF to simplify the fraction. The GCF of 10 and 42 is 2.

So, $\frac{2}{7} \times \frac{5}{6} = \frac{10}{42} = \frac{5}{21}$.

> ### Multiplying Fractions
> When multiplying fractions, multiply the numerators and multiply the denominators. The products become the numerator and denominator of the answer. Write the answer in simplest form.

2. Multiply. Write your answer in simplest form.

$$\frac{3}{5} \times \frac{4}{9} =$$

3. Multiply. Write your answer in simplest form.

$$\frac{1}{3} \times \frac{3}{5} =$$

Parts in a Part
Dividing Fractions

Students should be able to answer these questions after Lesson 3.5:

● What is a remainder?

● What is the multiplicative identity?

● What is the multiplicative inverse, or reciprocal?

● How can you divide fractions?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. Find the quotient. Express your answer in simplest terms.

$$\frac{5}{7} \div \frac{2}{3}$$

Step 1 Rewrite the problem as a multiplication problem using the inverse of the second term.

$$\frac{5}{7} \div \frac{2}{3} = \frac{5}{7} \times \frac{3}{2}$$

Step 2 Multiply the numerators and the denominators.

$$\frac{5}{7} \div \frac{2}{3} = \frac{5}{7} \times \frac{3}{2} = \frac{15}{14}$$

> ### Dividing Fractions
> To divide two fractions, rewrite the second term as its multiplicative inverse, or reciprocal. Then multiply the numerator of the first term by the new numerator of the second term. Do the same with the denominators. Simplify the answer.

Step 3 Rewrite the answer as a mixed number. Simplify, if necessary.

$$\frac{15}{14} = 1\frac{1}{14}$$

2. Find the quotient. Write your answer in simplest form.

$$\frac{2}{5} \div \frac{2}{3} =$$

3. Find the quotient. Write your answer in simplest form.

$$\frac{2}{7} \div \frac{7}{8} =$$

All That Glitters

Adding and Subtracting Mixed Numbers

Students should be able to answer these questions after Lesson 3.6:

- How can you add mixed numbers?
- How can you subtract mixed numbers?

Directions

Read Question 1 and its solution. Then complete Question 2.

1. Emily picked $3\frac{1}{2}$ cartons of raspberries one morning. Her friend Jacob picked $2\frac{2}{3}$ cartons. How many cartons did they pick in all? If they give $2\frac{1}{4}$ cartons to their friend Anna, how many cartons do Emily and Jacob have left?

   Step 1 Rewrite the mixed numbers $3\frac{1}{2}$ and $2\frac{2}{3}$ as improper fractions.

   $$3\frac{1}{2} = \frac{7}{2} \qquad 2\frac{2}{3} = \frac{8}{3}$$

   Step 2 Find the LCD of 2 and 3 and rewrite the fractions.

   $$\text{LCD} = 6 \qquad \frac{7}{2} = \frac{21}{6} \qquad \frac{8}{3} = \frac{16}{6}$$

   > **Working with Mixed Numbers**
   >
   > To add or subtract mixed numbers, first convert the mixed numbers to improper fractions. Then find the LCD, perform the operation, and write the answer as an improper fraction. Finally, rewrite the answer as a mixed number.

   Step 3 Add the improper fractions. Simplify if necessary, and write your answer as a mixed number.

   $$\frac{21}{6} + \frac{16}{6} = \frac{37}{6} = 6\frac{1}{6} \text{ cartons}$$

   Step 4 Next, rewrite the mixed number of $2\frac{1}{4}$ as an improper fraction.

   $$2\frac{1}{4} = \frac{9}{4}$$

   Step 5 Then find the LCD of 4 and 6 and rewrite the fractions.

   $$\text{LCD} = 12 \qquad \frac{37}{6} = \frac{74}{12} \qquad \frac{9}{4} = \frac{27}{12}$$

   Step 6 Subtract $\frac{27}{12}$ from $\frac{74}{12}$ and write your answer as a mixed number. Simplify, if necessary.

   $$\frac{74}{12} - \frac{27}{12} = \frac{47}{12} = 3\frac{11}{12} \text{ cartons}$$

   So, Emily and Jacob picked $6\frac{1}{6}$ cartons. After giving $2\frac{1}{4}$ cartons to Anna, they have $3\frac{11}{12}$ cartons left.

2. Find the answer. Write your answer as a simplified mixed number.

   $$4\frac{5}{8} - 2\frac{1}{3} = \underline{\hspace{2cm}}$$

Project Display
Multiplying and Dividing Mixed Numbers

Students should be able to answer these questions after Lesson 3.7:
- How can you multiply mixed numbers?
- How can you divide mixed numbers?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. Multiply $3\frac{1}{5} \times 2\frac{1}{8}$. Then divide the product by $1\frac{2}{3}$.

   Step 1 Rewrite the first two mixed numbers as improper fractions.

   $$3\frac{1}{5} = \frac{16}{5} \qquad 2\frac{1}{8} = \frac{17}{8}$$

   Step 2 Multiply the two improper fractions.

   $$\frac{16}{5} \times \frac{17}{8} = \frac{272}{40}$$

   Step 3 Rewrite the product as a mixed number and simplify.

   $$\frac{272}{40} = 6\frac{32}{40} = 6\frac{4}{5}$$

   > **Operations with Mixed Numbers**
   >
   > To multiply mixed numbers, rewrite the factors as improper fractions, then multiply. To divide mixed numbers, rewrite the factors as improper fractions, then divide.

   Step 4 Write the division problem using simplified, improper fractions.

   $$6\frac{4}{5} = \frac{34}{5} \qquad 1\frac{2}{3} = \frac{5}{3} \qquad \frac{34}{5} \div \frac{5}{3}$$

   Step 5 Find the reciprocal of the second term and multiply. Then write your answer as a mixed number.

   $$\frac{34}{5} \div \frac{5}{3} = \frac{34}{5} \times \frac{3}{5} = \frac{102}{25} = 4\frac{2}{25}$$

2. Multiply $5\frac{5}{6} \times 3\frac{4}{7}$. Then divide the product by $2\frac{3}{8}$. Write your answer as a mixed number in simplest form.

3. Multiply $5\frac{1}{2} \times 3\frac{1}{3}$. Then divide the product by $2\frac{3}{4}$. Write your answer as a mixed number in simplest form.

Carpenter, Baker, Mechanic, and Chef
Working with Customary Units

Students should be able to answer these questions after Lesson 3.8:
- What are the important units in the U.S. customary system of measurement?
- How do they relate to one another?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. A builder is building a new room on a house. She needs to cut a 16-foot-long board into pieces with the following lengths.

   - Four pieces that are each $7\frac{3}{16}$ inches.
   - Five pieces that are each $5\frac{7}{8}$ inches.
   - Seven pieces that are each $13\frac{1}{4}$ inches.

   Can she cut all of these pieces from the 16-foot board? If she can, how much of the board will be left over?

   > **The U.S. Customary System**
   >
   > Remember these units when working with the U.S. customary system:
   >
   > length: inch, foot, yard, mile
   > weight: ounce, pound, ton
   > capacity: fluid ounce, cup, pint, quart, gallon

   Step 1 Convert the 16-foot board to inches.

   $16 \times 12 = 192$ inches

   Step 2 Find the total length of each of the three kinds of pieces.

   $$4 \times 7\frac{3}{16} = 28\frac{3}{4} \qquad 5 \times 5\frac{7}{8} = 29\frac{3}{8} \qquad 7 \times 13\frac{1}{4} = 92\frac{3}{4}$$

   Step 3 Add these totals to find the total length to be cut from the 16-foot board.

   $$28\frac{3}{4} + 29\frac{3}{8} + 92\frac{3}{4} = 150\frac{7}{8} \text{ inches}$$

   Step 4 Subtract the total length from Step 3 from 192 inches.

   $$192 - 150\frac{7}{8} = 41\frac{1}{8} \text{ inches}$$

   So, the builder can cut all of the pieces from the 16-foot board and she will have $41\frac{1}{8}$ inches left over.

2. One newborn twin baby weighs $6\frac{3}{8}$ pounds. Her brother weighs 97 ounces. Which twin is heavier? By how much? Write your answers in ounces.

3. Caitlin, who is $5\frac{3}{4}$ feet tall, plays on the basketball team. Her friend Sarah is 67 inches tall. Which player is taller? By how much? Write your answers in inches.

Cents Sense

Decimals as Special Fractions

Students should be able to answer these questions after Lesson 4.1:
- What number is most U.S. money based on?
- How can you convert cents written as decimals into fractions?

Directions

Read Question 1 and its solution. Then, for Questions 2 and 3 use the currency given to write its value.

1. In May 2005, $2.25 U.S. was equal to 8.56 Malaysian ringgits. Complete the statement.

   8.56 ringgits = ___ whole ringgits + (5 × ___ of a ringgit) + (6 × ___ of a ringgit)

   Step 1 To write the whole number of ringgits, find the number to the left of the decimal point.

   8.56 ringgits = _8_ whole ringgits + (5 × ___ of a ringgit) + (6 × ___ of a ringgit)

   Step 2 To find the next number, determine the place value of the 5. Five is in the tenths place.

   8.56 ringgits = 8 whole ringgits + (5 × $\frac{1}{10}$ of a ringgit) + (6 × ___ of a ringgit)

   Step 3 To find the next number, determine the place value of the 6. Six is in the hundredths place.

   8.56 ringgits = 8 whole ringgits + (5 × $\frac{1}{10}$ of a ringgit) + (6 × $\frac{1}{100}$ of a ringgit)

2. In May 2005, $25 U.S. was equal to 177.60 Swedish Krona. Complete the statement.

   177.60 Krona = ___ 100s + ___ 10s + ___ 1s + ___ $\frac{1}{10}$s + ___ $\frac{1}{100}$s

3. In May 2005, $100 U.S. was equal to $125.03 Canadian. Complete the statement.

   125.03 Canadian dollars = ___ hundreds + ___ tens + ___ ones + ___ tenths + ___ hundredths

What's in a Place?
Place Value and Expanded Form

Students should be able to answer these questions after Lesson 4.2:
- How can you write a decimal in word form?
- How can you write a decimal in expanded form?

Directions

Read Question 1 and its solution. Then, for Questions 2 through 4 write the number in the different forms given.

1. Write the number in standard form and in expanded form: five hundred three and sixty-two hundredths.

   Step 1 Write the number in standard form. Use 0 as a place-holder for a value not given. Remember to use a decimal point for "and."

   503.62

   Step 2 Write the expanded form for each digit. If a zero holds a place, you do not need to include it. Use parentheses to separate each place value.

   $503.62 = (5 \times 100) + (3 \times 1) + (6 \times 0.1) + (2 \times 0.01)$

   So, five hundred three and sixty-two hundredths = 503.62 = $(5 \times 100) + (3 \times 1) + (6 \times 0.1) + (2 \times 0.01)$

2. standard form: 64.037

   word form: _____

   expanded form: _____

3. expanded form: $(2 \times 1000) + (9 \times 10) + (1 \times 0.01) + (6 \times 0.001)$

   word form: _____

   standard form: _____

4. word form: four hundred seventy-eight and fifty-one hundredths

   standard form: _____

   expanded form: _____

My Dog Is Bigger Than Your Dog
Decimals as Fractions: Comparing and Rounding Decimals

Students should be able to answer these questions after Lesson 4.3:
- What is the strategy for rounding decimals?
- How can you compare decimals?

Directions

Read Question 1 and its solution. Then, for Question 2 compare the decimals. Finally, write the decimal numbers rounded to the nearest inch and tenth of an inch.

1. Taylor has two Lhasa Apso dogs. Flower is 11.032 inches tall. Snow is 10.583 inches tall. Compare the heights of the two dogs. Which is greater? Then round each decimal number to the nearest inch and the nearest tenth of an inch.

    Step 1 Compare the heights of the two dogs. First, compare the numbers in the greatest place value (tens).

    11.032 ___ 10.583

    Step 2 Because the digits are equal, compare the next digits (the ones place).

    11.032 ___ 10.583

    Step 3 Because 1 is greater than 0, you do not need to look any further. The dog that is 11.032 inches tall (Flower) is taller than the dog that is 10.583 inches tall (Snow).

    11.032 > 10.583   Flower is taller than Snow.

    Step 4 Round each number to the nearest inch by looking at the digit to the right of the ones place (that is, the tenths place). If the digit is 5 or greater, round up. If the digit is 4 or less, round down.

    11.032 to the nearest inch is 11 inches.
    10.583 to the nearest inch is 11 inches.

    Step 5 Round each number to the nearest tenth of an inch by looking at the digit to the right of the tenths place (that is, the hundredths place).

    11.032 to the nearest tenth is 11.0 inches.
    10.583 to the nearest tenth is 10.6 inches.

2. Cody has two Fox terriers. Foxy is 16.07 inches tall. Snapper is 16.53 inches tall. Which dog is taller? Round each dog's height to the nearest inch and nearest tenth of an inch.

Making Change and Changing Hours
Adding and Subtracting Decimals

Students should be able to answer these questions after Lesson 4.4:

- What rule can help you to add and subtract with decimals?
- How can base-ten pieces help you to represent decimals?

Directions

Read Question 1 and its solution. Then complete Question 2.

1. Jenny worked 4.5 hours one week and 2.25 hours the next. How many hours did she work in two weeks?

   Step 1 Write the addition problem, aligning the numbers at the decimal point. Add a zero as a placeholder, if needed.

   $$\begin{array}{r} 4.50 \\ + \ 2.25 \\ \hline \end{array}$$

   Step 2 Add, beginning at the right. Regroup as needed, keeping the decimal in the same place.

   $$\begin{array}{r} 4.50 \\ + \ 2.25 \\ \hline 6.75 \end{array}$$

   Step 3 Draw the base-ten pieces to represent the answer. One hundred blocks equals one whole, one column of 10 blocks equals one tenth, and one block equals one hundredth.
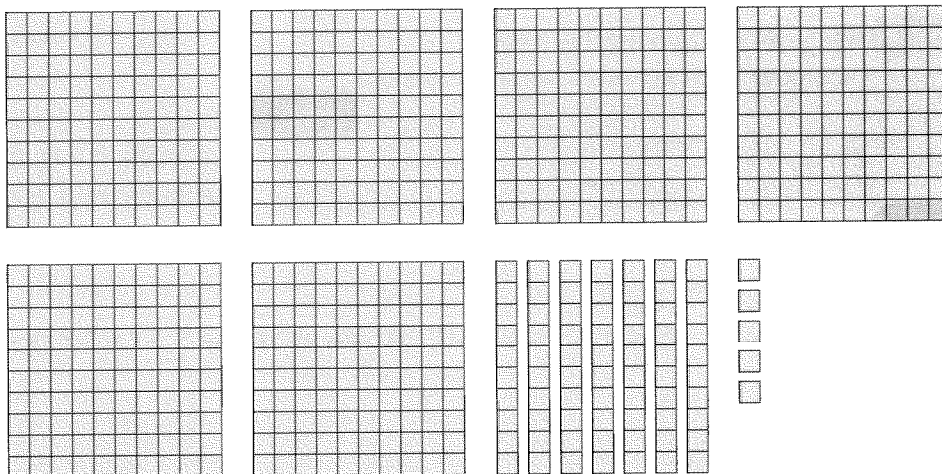
   Jenny worked 6.75 hours in two weeks.

2. A customer bought an item from Jenny that totalled $7.60. The customer paid with $10. How much change should the customer get back from Jenny?

Rules Make the World Go Round
Multiplying Decimals

Students should be able to answer these questions after Lesson 4.5:
- How do you multiply decimals?
- What rules can make multiplying decimals easier?
- How can you estimate products of decimals?

Directions

Read Question 1 and its solution. Then, for Questions 2 and 3 estimate and multiply to find the answer. Show all your work.

1. The punch clock at your new job keeps track of your hours using decimals instead of minutes. You earn $4.25 an hour. How much will you make if you work 3.4 hours?

Step 1 Estimate your answer by rounding each number, then multiplying.

$4.25 is about $4
3.4 hours is about 3 hours
$4 × 3 = $12

Step 2 Write each decimal as a mixed number.

$$4.25 = 4\frac{25}{100} \qquad 3.4 = 3\frac{4}{10}$$

Step 3 Write each mixed number as an improper fraction.

$$4\frac{25}{100} = \frac{425}{100} \qquad 3\frac{4}{10} = \frac{34}{10}$$

Step 4 Multiply the improper fractions.

$$\frac{425}{100} \times \frac{34}{10} = \frac{14,450}{1000}$$

Step 5 Write the answer as a mixed number.

$$\frac{14,450}{1000} = 14\frac{450}{1000}$$

Step 6 Write the mixed number as a decimal. Because you are working with money, make sure the amount only has 2 decimal places (for the cents).

$$14\frac{450}{1000} = 14.450 = \$14.45$$

Step 7 Compare your answer to your estimate. If they are close, you are probably right. If not, go back and try the problem again!

$12 is not too far from $14.45.

You will make $14.45 that day.

2. One day you clocked in for only a few minutes before you realized you weren't scheduled to be there that day! The punch clock recorded that you worked 0.05 hour that day. How much will you get paid for working that day?

3. In one week, you worked 13.5 hours. How much did you get paid that week?

4.6

The Better Buy
Dividing Decimals

Students should be able to answer these questions after Lesson 4.6:
- How can you divide a decimal by a whole number or another decimal?
- What can you do with a remainder in a division problem?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. You and your dad are building a shelf in the garage. A box of nails costs $16.80. If the box holds 25 nails, how much does each nail cost?

Step 1 Set up the problem and write the decimal point for the quotient (answer) directly above where it is in the dividend (the number you're dividing).

$$25\overline{)16.80}$$

Step 2 Find the number you can divide 25 into. 25 does not divide into 1 or 16, but it does divide into 168, 6 times. Write 6 above the last digit you used in your mini-division problem. Write the multiplied answer to 6 × 25 below and subtract.

$$\begin{array}{r} 0.6 \\ 25\overline{)16.80} \\ -15\ 0 \\ \hline 1\ 8 \end{array}$$

Step 3 Bring down any number still left in the dividend. If there is none, but you have a remainder from the subtraction problem, add 0 (which you do not have to do in this case).

$$\begin{array}{r} 0.6 \\ 25\overline{)16.80} \\ -15\ 0 \\ \hline 1\ 80 \end{array}$$

Step 4 Divide 25 into 180 and subtract.

$$\begin{array}{r} 0.67 \\ 25\overline{)16.80} \\ -15\ 0 \\ \hline 1\ 80 \\ -1\ 75 \\ \hline 5 \end{array}$$

Step 5 Bring down any number still left in the dividend. If there is none, but you have a remainder from the subtraction problem, add 0 (which you must do here).

$$\begin{array}{r} 0.67 \\ 25\overline{)16.800} \\ -15\ 0 \\ \hline 1\ 80 \\ -1\ 75 \\ \hline 50 \end{array}$$

Step 6 Divide 25 into 50 and subtract.

$$\begin{array}{r} 0.672 \\ 25\overline{)16.800} \\ -15\ 0 \\ \hline 1\ 80 \\ -1\ 75 \\ \hline 50 \\ -50 \\ \hline 0 \end{array}$$

Step 7 Bring down any number still left in the dividend. If an answer looks like it will repeat, round. If the number needs to be expressed in dollar amounts, round to the nearest cent (nearest hundredth).

0.672 = $0.67

Each nail costs $0.67.

2. You can buy 50 individual nails for a total cost of $32.50. How much does each individual nail cost? Which is a better buy: the box of 25 nails from Question 1 or 50 individual nails?

3. The wood board that you have is 10 feet long. You need to make shelves that are 2.5 feet long. How many shelves can you make out of the wood board?

Bonjour!

Working with Metric Units

Students should be able to answer these questions after Lesson 4.7:
- How can you convert measures within the metric system?
- How can metric measures compare to customary measures?

Directions

Greatest   **Smallest**

kilo-	hecto-	deka-	unit	deci-	centi-	milli-
kilometer	hectometer	dekameter	**meters**	decimeter	centimeter	millimeter
kiloliter	hectoliter	dekaliter	**liter**	deciliter	centiliter	milliliter
kilogram	hectogram	dekagram	**gram**	decigram	centigram	milligram

Read Question 1 and its solution. Then, for Questions 2 through 4 convert each measure correctly. Show all your work.

1. Yvette, your pen pal, says that she is 1.48 meters tall. How many centimeters tall is she?

   Step 1 Compare meters to centimeters to decide which operation to use.

   To convert from a greater unit to a lesser unit, multiply.

   To convert from a lesser unit to a greater unit, divide.

   Because meters are greater than centimeters, you will multiply.

   Step 2 Count the number of places to the right or left that meters are from centimeters in the table.

   Meters are two places away from centimeters.

   Step 3 Multiply by 100 (the amount of zeroes is the same as the number of places away).

   $1.48 \times 100 = 148$

   Yvette is 148 centimeters tall.

2. Yvette says that the pond in front of her house holds about 3500 liters of water. How many kiloliters is that?

3. Yvette says she weighs 32 kilograms. How many grams does she weigh?

4. Yvette's poodle, Meurtrier (Killer), is 442 millimeters tall. How tall is the dog in centimeters?

Heard It and Read It
Ratios and Fractions

Students should be able to answer these questions after Lesson 5.1:

- What is a ratio?
- What is an equivalent ratio?
- How can you compare ratios?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. William's family owns 12 movies on DVD. Of these DVDs, eight are action films and four are comedies. Write the ratio of action films to comedies. Then write the ratio of comedies to all of the films that William's family owns. Which ratio is greater?

   Step 1 Find the three quantities you will use to write the ratios.

   action films = 8   comedies = 4   total number of films = 12

   Step 2 Write the first ratio of action films to comedies.

   8 action films : 4 comedies or $\dfrac{8 \text{ action films}}{4 \text{ comedies}}$

   Step 3 Write the second ratio of comedies to all of the DVDs that William's family owns.

   4 comedies : 12 total films or $\dfrac{4 \text{ comedies}}{12 \text{ total films}}$

   Step 4 Compare the ratios.

   > **Working with Ratios**
   > A ratio is a way to compare two numbers using division. Write a ratio as a fraction or with a colon. When writing ratios, include the quantity names to be clear about what is being compared.

   8 action films : 4 comedies is greater than 4 comedies : 12 total films

2. There are 40 bikes in the school bike rack. Of these 40 bikes, 35 are locked. Write the ratio of unlocked bikes to locked bikes. Then write the ratio of locked bikes to all bikes. Which ratio is greater?

3. In Jennifer's math class of 28 students, 24 students have backpacks for their books. Write the ratio of students with backpacks to those without backpacks. Then write the ratio of students without backpacks to the whole class. Which ratio is less?

Equal or Not, That Is the Question
Writing and Solving Proportions

Students should be able to answer these questions after Lesson 5.2:

- How can you write proportions?
- How can you solve proportions using equivalent ratios and rates?
- How can you find the means and extremes of a proportion?
- How can you use means and extremes to solve proportions?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. Find the missing quantity by using the means and extremes.

   16 inches : 12 pounds :: ? inches : 132 pounds

   Step 1 Write the proportion as equivalent fractions. Don't forget to keep the quantities in your equation.

   $$\frac{16 \text{ inches}}{12 \text{ pounds}} = \frac{? \text{ inches}}{132 \text{ pounds}}$$

   Step 2 Multiply the extremes.

   $16 \times 132 = 2112$

   Step 3 Set up an equation with the means and extremes.

   $12 \times ? = 2112$

   Step 4 Divide each side of the equation by 12.

   $$\frac{12 \times ?}{12} = \frac{2112}{12}$$

   $? = 176$

   > ## Working with Proportions
   > To solve a proportion, remember that the product of the means and the product of the extremes must be equal. Multiply the terms you have. Then use division to find the term you do not have.

   Step 5 Rewrite the proportion with the missing term.

   $$\frac{16 \text{ inches}}{12 \text{ pounds}} = \frac{176 \text{ inches}}{132 \text{ pounds}}$$

2. Find the missing quantity by using the means and extremes.

   $$\frac{24 \text{ people}}{26 \text{ horses}} = \frac{? \text{ people}}{130 \text{ horses}}$$

3. Find the missing quantity by using the means and extremes.

   8 : 28 :: 56 : ?

The Survey Says
Using Ratios and Rates

Students should be able to answer these questions after Lesson 5.3:
- What is a unit rate?
- How can you use your knowledge of proportions and means and extremes to solve problems?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. An 18-ounce bag of frozen corn costs $2.19. A 10-ounce bag costs $1.29. In order for the small bag to have the same unit rate as the large bag, what would the price of the small bag need to be? Use proportions to find the answer. Round your answer if necessary.

   Step 1 Write a proportion that shows the cost and size of a large bag and the size of the small bag. Place a question mark where the cost of the small bag should be.

   $$\frac{\$2.19}{18 \text{ oz}} = \frac{?}{10 \text{ oz}}$$

   Step 2 Solve the proportion by first multiplying the extremes.

   $2.19 \times 10 = 21.90$

   Step 3 Divide 21.90 by 18 to find the missing term.

   $$\frac{21.90}{18} = 1.21\overline{666}$$

   > **Working with Proportions**
   >
   > To solve proportions, remember that the product of the means and the product of the extremes must be the same.

   Step 4 Round your answer. Check to see that you have labeled your answer with the correct unit.

   $1.21\overline{666} = \$1.22$

   In order for the small bag to have the same unit rate as the large bag, the small bag's price would have to be $1.22.

2. A car gets 375 miles to 14 gallons. If the driver used 49 gallons, how many miles did she drive?

3. The rate of people returning a survey about shopping habits is two surveys returned for every five sent out. If the company conducting the survey sent out 9000 surveys, how many were returned?

Who's Got Game?

Using Proportions to Solve Problems

Students should be able to answer these questions after Lesson 5.4:

- What is a variable?
- How can you solve proportions using variables?

Directions

Read Question 1 and its solution. Then complete Questions 2 and 3.

1. Solve the proportion by finding the value of x.

$$\frac{2 \text{ feet}}{0.6096 \text{ meter}} = \frac{1300 \text{ feet}}{x \text{ meters}}$$

Step 1 Multiply 0.6096 meter times 1300 feet to get one side of the equation.

0.6096 meter • 1300 feet = 792.48 feet–meters

Step 2 Write an equation using x.

792.48 feet–meters = $(x \cdot 2)$ feet–meters

Step 3 Divide each side of the equation by 2 feet–meters.

$$\frac{792.48 \text{ feet–meters}}{2 \text{ feet–meters}} = \frac{(x \cdot 2) \text{ feet–meters}}{2 \text{ feet–meters}}$$

Step 4 Perform the operations to find the value of x. Check to make sure your answer has the correct units.

396.24 meters = x

Variables

A variable is a symbol for an unknown quantity's value in an equation. This unknown quantity is called a variable because its value changes, or varies, depending on the numbers that appear in the equation with it.

2. Solve the proportion by finding the value of x.

$$\frac{3 \text{ ft}}{0.9144 \text{ m}} = \frac{x \text{ ft}}{679 \text{ m}}$$

3. Solve the proportion by finding the value of x.

$$\frac{11 \text{ miles}}{x \text{ kilometers}} = \frac{6 \text{ miles}}{9.656 \text{ kilometers}}$$

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