Problem Set Answer Key

Table of Contents

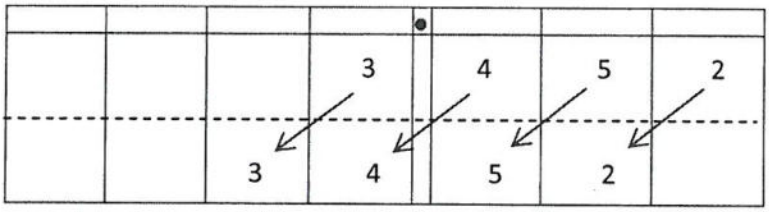
GRADE 5 • MODULE 1

Place Value and Decimal Fractions

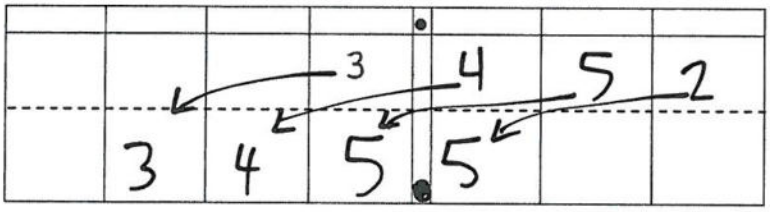
Name _____ Date _____

1. Record the digits of the first factor on the top row of the place value chart. Draw arrows to show how the value of each digit changes when you multiply. Record the product on the second row of the place value chart. The first one has been done for you.

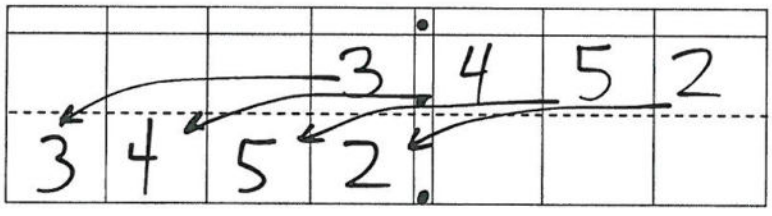
a. 3.452 x 10 = 34.52



b. 3.452 x 100 = 345.2



c. 3.452 x 1000 = 3452.



d. Explain how and why the value of the 5 changed in (a), (b), and (c).

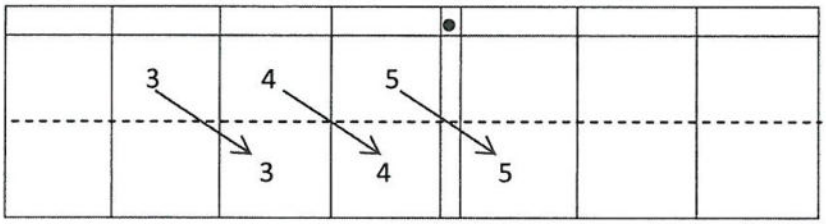
(a) The 5 became 10 times more valuable.

(b) The 5 became 100 times more valuable.

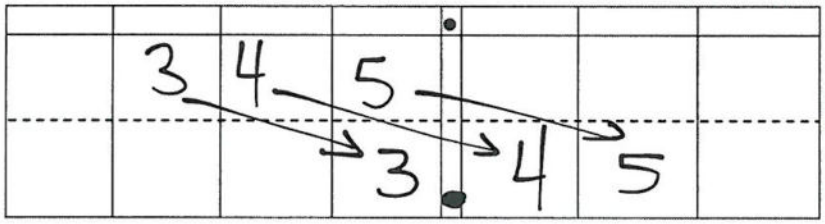
(c) The 5 became 1000 times more valuable.

2. Record the digits of the dividend on the top row of the place value chart. Draw arrows to show how the value of each digit changes when you divide. Record the quotient on the second row of the place value chart. The first one has been done for you.

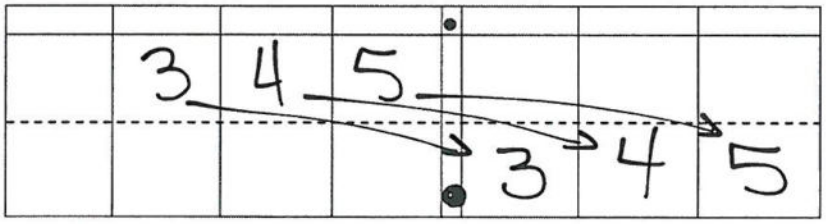
a. $345 \div 10 =$ 34.5



b. $345 \div 100 =$ 3.45



c. $345 \div 1000 =$ 0.345



d. Explain how and why the value of the 4 changed in the quotients in (a), (b), and (c).

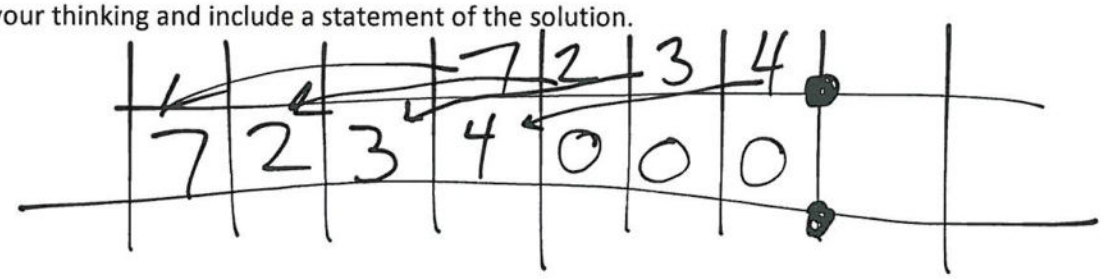
(a) The 4 became 10 times smaller.

(b) The 4 became 100 times smaller.

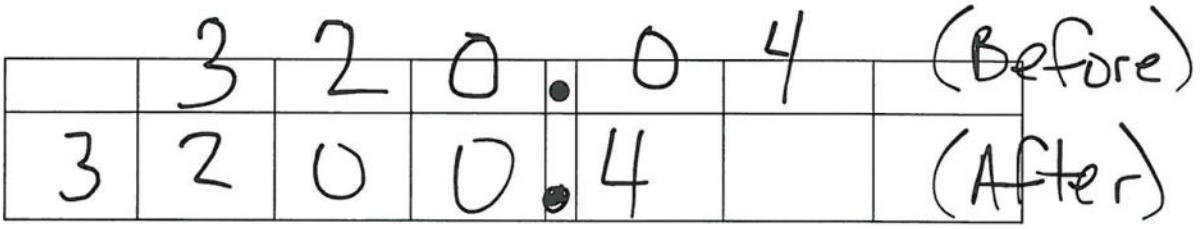
(c) The 4 became 1000 times smaller.

3. A manufacturer made 7,234 boxes of coffee stirrers. Each box contains 1000 stirrers. How many stirrers did they make? Explain your thinking and include a statement of the solution.

7234 x 1000



4. A student used his place value chart to show a number. After the teacher instructed him to multiply his number by 10, the chart showed 3200.4. Draw a picture of what the place value chart looked like at first.

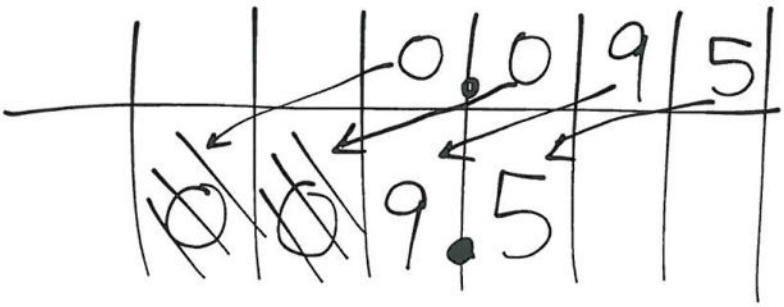


a. Explain how you decided what to draw on your place value chart. Be sure to include your reasoning about how the value of the digits was affected by the multiplication. Use words, pictures, or numbers.

Each digit in "After" should be 10 times larger than "Before".

5. A microscope has a setting that magnifies an object so that it appears 100 times as large when viewed through the eyepiece. If a tiny insect is 0.095 cm long, how long will the insect appear in centimeters through the microscope? Explain how you know.

0.095 x 100 = 9.5



Name _____ Date _____

1. Solve.

a. 54,000 x 10 = 540,000

b. 54,000 ÷ 10 = 5400

c. 8.7 x 10 = 87

d. 8.7 ÷ 10 = 0.87

e. 0.13 x 100 = 13

f. 13 ÷ 1000 = 0.013

g. 3.12 x 1000 = 3120

h. 4031.2 ÷ 100 = 40.312

2. Find the products.

a. 19,340 x 10 = 193,400

b. 19,340 x 100 = 1,934,000

c. 19,340 x 1000 = 19,340,000

the number of zeros in 10 or 100 or 1000 tells how many columns to the left each digit gets moved.

d. Explain how you decided on the number of zeros in the products for (a), (b), and (c).

3. Find the quotients.

a. 152 ÷ 10 = 15.2

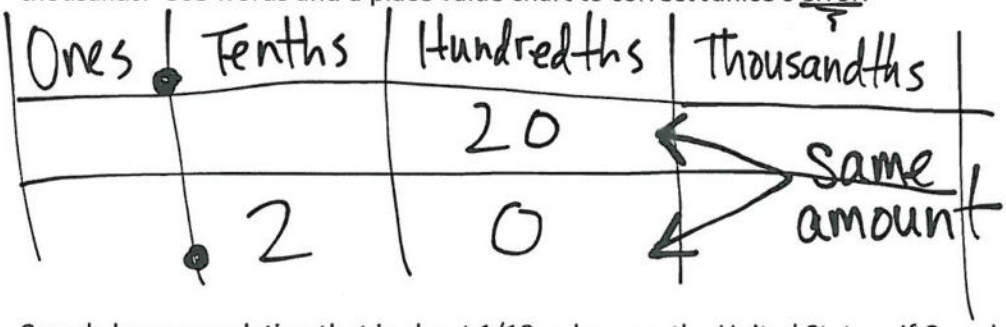
b. 152 ÷ 100 = 1.52

c. 152 ÷ 1000 = 0.152

the number of zeros in 10 or 100 or 1000 tells how many columns to the right each digit gets moved.

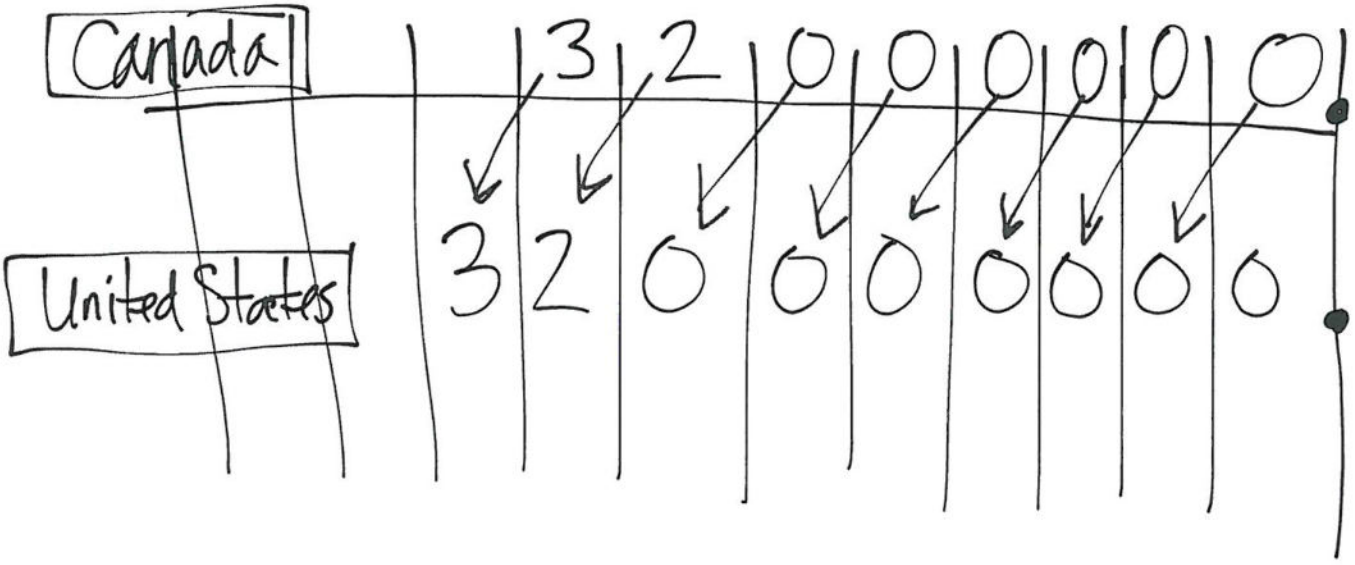
d. Explain how you decided where to place the decimal in the quotients in (a), (b), and (c).

4. Janice thinks that 20 hundredths is equivalent to 2 thousandths because 20 hundreds is equal to 2 thousands. Use words and a place value chart to correct Janice's error.



20 hundredths is equal to 2 tenths.

5. Canada has a population that is about 1/10 as large as the United States. If Canada's population is about 32 million, about how many people live in the United States? Explain the number of zeros in your answer.



Name _____ Date _____

1. Write the following in exponential form (e.g., $100 = 10^2$).

a. $10{,}000 = 10^4$

b. $1000 = 10^3$

c. $10 \times 10 = 10^2$

d. $100 \times 100 = 10000 = 10^4$

e. $1{,}000{,}000 = 10^6$

f. $1000 \times 1000 = 1000000 = 10^6$

2. Write the following in standard form (e.g., $5 \times 10^2 = 500$).

a. $9 \times 10^3 = 9000$

b. $39 \times 10^4 = 390000$

c. $7200 \div 10^2 = 72$

d. $7{,}200{,}000 \div 10^3 = 7200$

e. $4.025 \times 10^3 = 4025$

f. $40.25 \times 10^4 = 402500$

g. $725 \div 10^3 = 0.725$

h. $7.2 \div 10^2 = 0.072$

3. Think about the answers to Problem 2(a–d). Explain the pattern used to find an answer when you multiply or divide a whole number by a power of 10.

The digits stay the same. They get moved to the left for multiplication and to the right for division. Zeros are added to the number.

4. Think about the answers to Problem 2(e–h). Explain the pattern used to place the decimal in the answer when you multiply or divide a decimal by a power of 10.

The digits stay the same. They get moved to the left for multiplication and to the right for division. The decimal appears to move to the right or left.

5. Complete the patterns.

a. 0.03 0.3 3 30 300 3000

b. 6,500,000 65,000 650 6.5 0.065

c. 94300 9,430 943 94.3 9.43 0.943

d. 999 9990 99,900 999000 9990000 99900000

e. 0.075 7.5 750 75,000 7500000 75000000

f. Explain how you found the missing numbers in set (b). Be sure to include your reasoning about the number of zeros in your numbers and how you placed the decimal.

Divide by 100 to get the next number.

g. Explain how you found the missing numbers in set (d). Be sure to include your reasoning about the number of zeros in your numbers and how you placed the decimal.

Multiply by 10 to get the next number.

6. Shaunnie and Marlon missed the lesson on exponents. Shaunnie incorrectly wrote $10^5 = 50$ on her paper, and Marlon incorrectly wrote $2.5 \times 10^2 = 2.500$ on his paper.

a. What mistake has Shaunnie made? Explain using words, numbers, and pictures why her thinking is incorrect and what she needs to do to correct her answer.

(S) thought 10^5 meant 10×5, but it really means $10 \times 10 \times 10 \times 10 \times 10$

b. What mistake has Marlon made? Explain using words, numbers, and pictures why his thinking is incorrect and what he needs to do to correct his answer.

(M) added two zeros, which would be correct if the number being multiplied was a whole number. Since it is a decimal, he needs to move the digits two columns to the left making 250.

Name _____ Date _____

1. Convert using an equation with an exponent.

a. 3 meters to centimeters $3 \times 10^2 = 300$ cm

b. 900 centimeters to meters $900 \div 10^2 = 9$ m

c. 8.1 liters to milliliters $8.1 \times 10^3 = 8100$ mL

d. 537 milliliters to liters $537 \div 10^3 = 0.537$ L

e. 90.5 kilometers to meters $90.5 \times 10^3 = 90500$ m

f. Convert 23 meters to kilometers. $23 \div 10^3 = 0.023$ km

g. 0.4 kilograms to grams $0.4 \times 10^3 = 400$ g

h. 80 grams to kilograms $80 \div 10^3 = 0.08$ kg

i. Circle the conversion factor in each equation above. Explain why converting from meters to centimeters uses a different conversion factor than converting from liters to milliliters, kilometers to meters, and kilograms to grams.

Answers will vary.

2. Read each aloud as you write the equivalent measures.

a. 3.5 km = 3 km 500 m

b. 1.23 L = 1 L 230 mL

c. 2.002 kg = 2 kg 2 g

d. 3 mL = 0.003 L

e. 3012 g = 3.012 kg

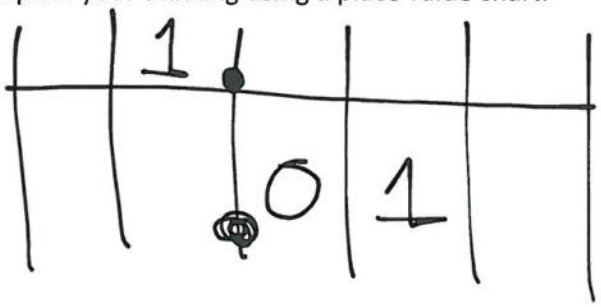
f. 0.021 m = 2.10 cm

3. The length of the bar for a high jump competition must always be 4.75 m. Express this measurement in millimeters. Explain your thinking using an equation that includes an exponent.

$4.75\text{ m} \times 1000 = 4750\text{ mm}$

4. A honey bee's length measures 1 cm. Express this measurement in meters.

   a. Explain your thinking using a place value chart.



   b. Explain your thinking using an equation that includes an exponent.

$1\text{ cm} \div 10^2 = 0.01\text{ m}$

5. James drinks 800 mL of water each day during his workout. Henry drinks 600 mL daily during his workout. If James works out 3 days each week, and Henry works out 5 days each week, how many liters do the boys drink in all each week while working out?

James : $800 \times 3 = 2400$

Henry : $600 \times 5 = 3000$

$$\begin{array}{r} 3000 \\ +\ 2400 \\ \hline 5400 \end{array}$$

5400 mL

6. Katrina needs to tie ribbons around 10 flower arrangements for a party. Each arrangement requires 1.2 m of ribbon. She also needs 325 cm of ribbon to tie to the balloons for the party. If Katrina buys 15 m of ribbon, will she have enough? If so, how much ribbon (in meters) will she have left? If not, how many more meters of ribbon will she need to buy?

$1.2 \times 10 = 12$ m

$12 \times 100 = 1200$ cm

$$\begin{array}{r} 1200 \\ +\ 325 \\ \hline 1525 \text{ cm} \end{array}$$

1525 cm = 15.25 cm

Katrina does <u>not</u> have enough.

Name _____ Date _____

1. Express as decimal numerals. The first one is done for you.

a. four thousandths	0.004
b. twenty-four thousandths	0.024
c. one and three hundred twenty-four thousandths	1.324
d. six hundred eight thousandths	0.608
e. six hundred and eight thousandths	600.008
f. $\frac{46}{1000}$	0.046
g. $3\frac{946}{1000}$	3.946
h. $200\frac{904}{1000}$	200.904

2. Express in words.

a. 0.005 five thousandths

b. 11.037 eleven and thirty-seven thousandths

c. 403.608 four hundred three and six hundred eight thousandths

3. Write the number on a place value chart then write it in expanded form using fractions or decimals to express the decimal place value units. The first one is done for you.

a. 35.827

tens	ones		tenths	hundredths	thousandths
3	5	●	8	2	7

$35.827 = 3 \times 10 + 5 \times 1 + 8 \times \left(\frac{1}{10}\right) + 2 \times \left(\frac{1}{100}\right) + 7 \times \left(\frac{1}{1000}\right)$ *or*

$= 3 \times 10 + 5 \times 1 + 8 \times 0.1 + 2 \times 0.01 + 7 \times 0.001$

b. 0.249

tens	ones	tenths	hundredths	thousandths
	0	2	4	9

$0.249 = 2 \times \frac{1}{10} + 4 \times \frac{1}{100} + 9 \times \frac{1}{1000}$

c. 57.281

tens	ones	tenths	hundredths	thousandths
5	7	2	8	1

$57.281 = 5 \times 10 + 7 \times 1 + 2 \times \frac{1}{10} + 8 \times \frac{1}{100} + 1 \times \frac{1}{1000}$

4. Write a decimal for each of the following. Use a place value chart to help if necessary.

a. $7 \times 10 + 4 \times 1 + 6 \times \left(\frac{1}{10}\right) + 9 \times \left(\frac{1}{100}\right) + 2 \times \left(\frac{1}{1000}\right) = 74.692$

b. $5 \times 100 + 3 \times 10 + 8 \times 0.1 + 9 \times 0.001 = 530.809$

c. $4 \times 1000 + 2 \times 100 + 7 \times 1 + 3 \times \left(\frac{1}{100}\right) + 4 \times \left(\frac{1}{1000}\right) = 4207.034$

5. Mr. Pham wrote 2.619 on the board. Christy says its two and six hundred nineteen thousandths. Amy says its 2 ones 6 tenths 1 hundredth 9 thousandths. Who is right? Use words and numbers to explain your answer.

They are both correct.

Christy: $2.619 = 2\frac{619}{1000}$

Amy: $2.619 = 2 \times 1 + 6 \times \frac{1}{10} + 1 \times \frac{1}{100} + 9 \times \frac{1}{1000}$

Name _____ Date _____

1. Show the numbers on the place value chart using digits. Use >, <, or = to compare. Explain your thinking to the right.

34.223 < 34.232

	3	4	2	2	3
	3	4	2	3	2

0.8 > 0.706

		0	8		
		0	7	0	6

2. Use >, <, or = to compare the following. Use a place value chart to help if necessary.

a. 16.3	<	16.4
b. 0.83	=	$\frac{83}{100}$
c. $\frac{205}{1000}$	=	0.205
d. 95.580	=	95.58
e. 9.1	>	9.099
f. 8.3	=	83 tenths
g. 5.8	>	Fifty-eight hundredths

h. Thirty-six and nine thousandths	>	4 tens
i. 202 hundredths	<	2 hundreds and 2 thousandths
j. One hundred fifty-eight thousandths	<	158,000
k. 4.15	<	415 tenths

3. Arrange the numbers in increasing order.

a. 3.049 3.059 3.05 3.04

3.04 3.049 3.05 3.059

b. 182.205 182.05 182.105 182.025

182.025 182.05 182.105 182.205

4. Arrange the numbers in decreasing order.

a. 7.608 7.68 7.6 7.068

7.68 7.608 7.6 7.068

b. 439.216 439.126 439.612 439.261

439.612 439.261 439.216 439.126

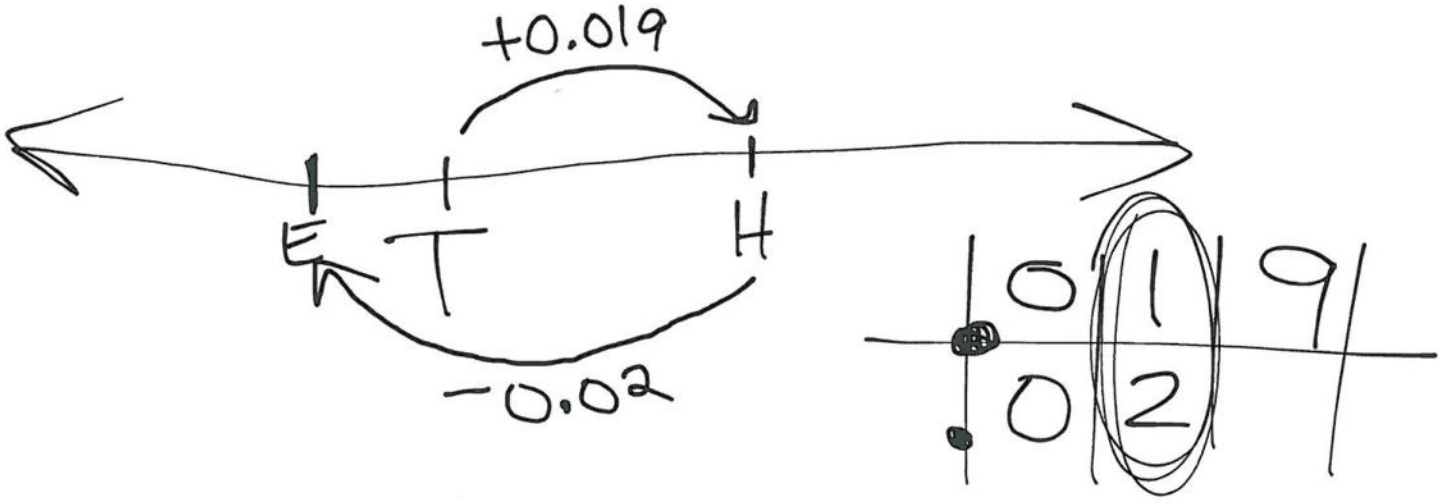
5. Lance measured 0.485 liter of water. Angel measured 0.5 liter of water. Lance said, "My beaker has more water than yours because my number has 3 decimal places and yours only has 1." Is Lance correct? Use words and numbers to explain your answer.

Lance is wrong because 5 tenths is bigger than 4 tenths, so the extra two decimal places do not change the comparison.

0.485
0.5

these digits do not change the comparison

6. Dr. Hong prescribed 0.019 liter more medicine than Dr. Tannenbaum. Dr. Evans prescribed 0.02 less than Dr. Hong. Who prescribed the most medicine? Who prescribed the least? Explain how you know using a place value chart.

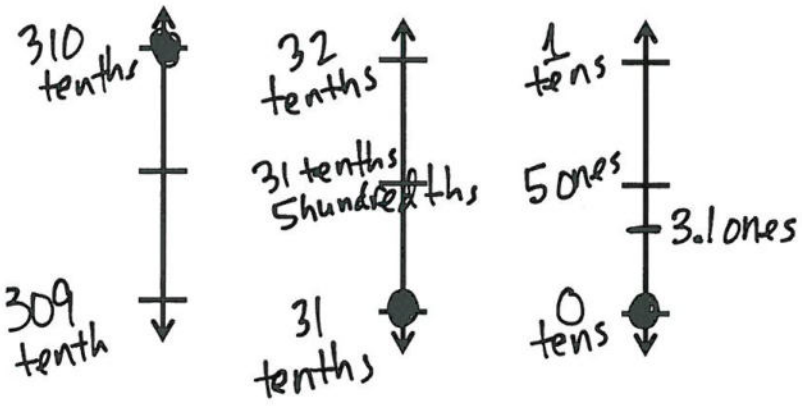


Name _____ Date _____

Fill in the table then round to the given place. Label the number lines to show your work. Circle the rounded number.

1. 3.1

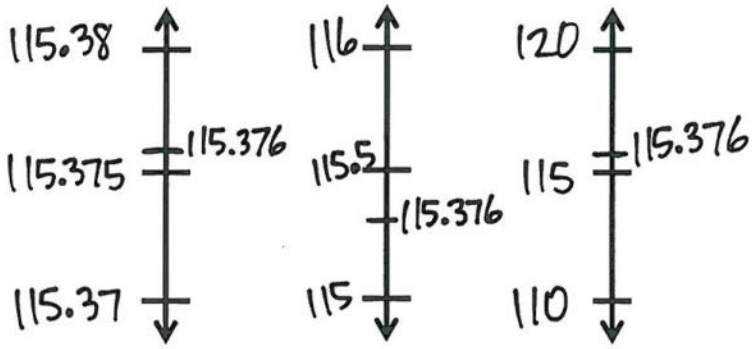
a. hundredths b .tenths c. tens



tens	1s	Tenths	Hundredths	Thousandths
	3	1		
		31		
			310	

2. 115.376

a. hundredths b. ones c. tens

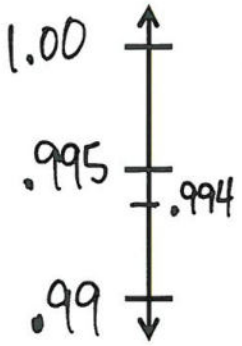


Tens	Ones	Tenths	Hundredths	Thousandths
11	5	3	7	6
	115	3	7	6
		1153	7	6
			11537	6

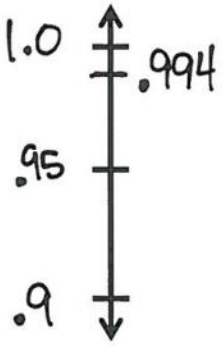
3. 0.994

Tens	Ones	Tenths	Hundredths	thousandths

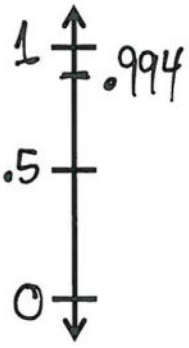
a. hundredths



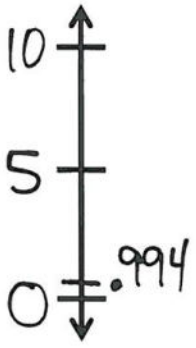
b. tenths



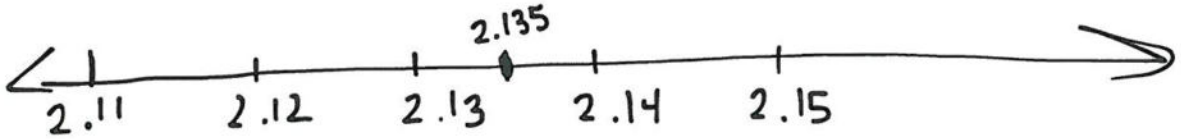
c. ones



d. tens

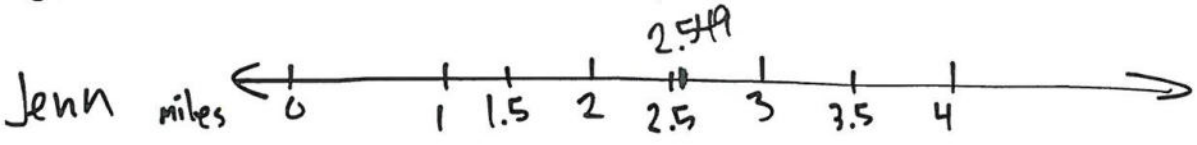


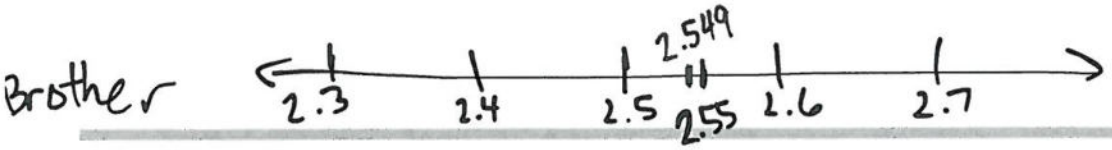
4. For open international competition, the throwing circle in the men's shot put must have a diameter of 2.135 meters. Round this number to the nearest hundredth to estimate the diameter. Use a number line to show your work. 2.135 rounds to 2.14



5. Jen's pedometer said she walked 2.549 miles. She rounded her distance to 3 miles. Her brother rounded her distance to 2.5 miles. When they argued about it, their mom said they are both right. Explain how that could be true. Use number lines and words to explain your reasoning.

Jenn rounded to the nearest whole, while her brother rounded to the nearest 10th.

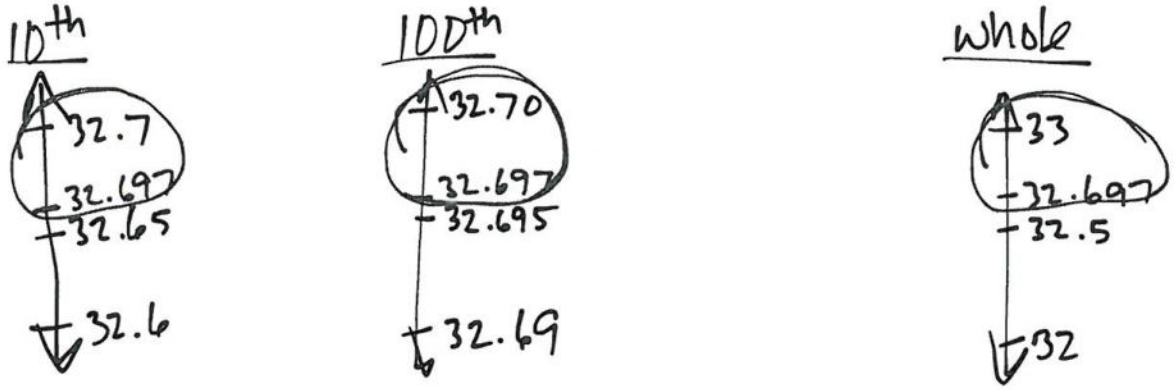




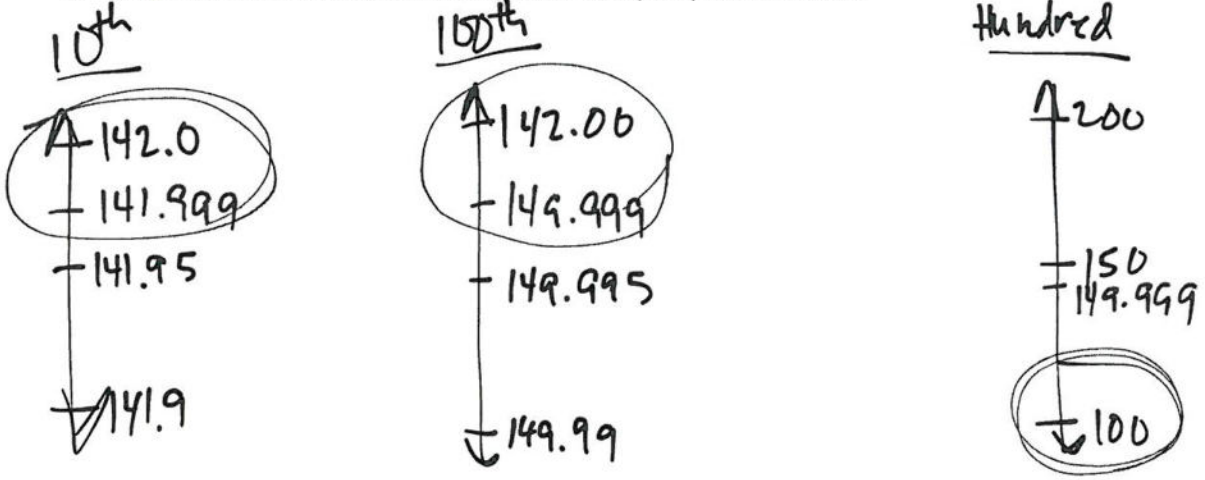
Name _____ Date _____

1. Write the decomposition that helps you, and then round to the given place value. Draw number lines to explain your thinking. Circle the rounded value on each number line.

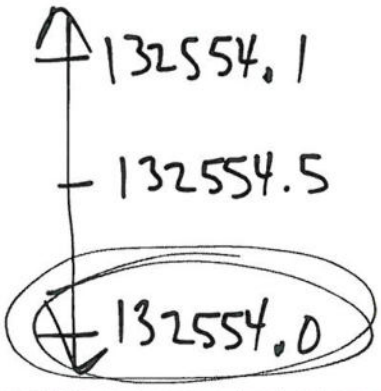
   a. Round 32.697 to nearest tenth, hundredth, and whole number.



   b. Round 141.999 to nearest tenth, hundredth, ten, and hundred.



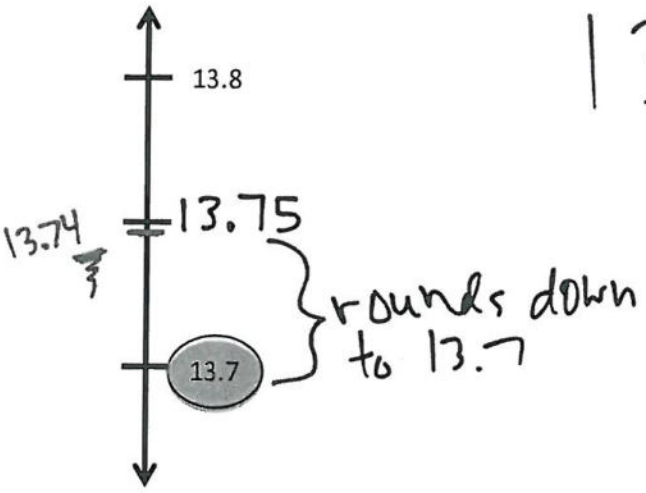
2. A root beer factory produces 132,554 cases in 100 days. About how many cases does the factory produce in 1 day? Round your answer to the nearest tenth of a case. Show your thinking on the number line.



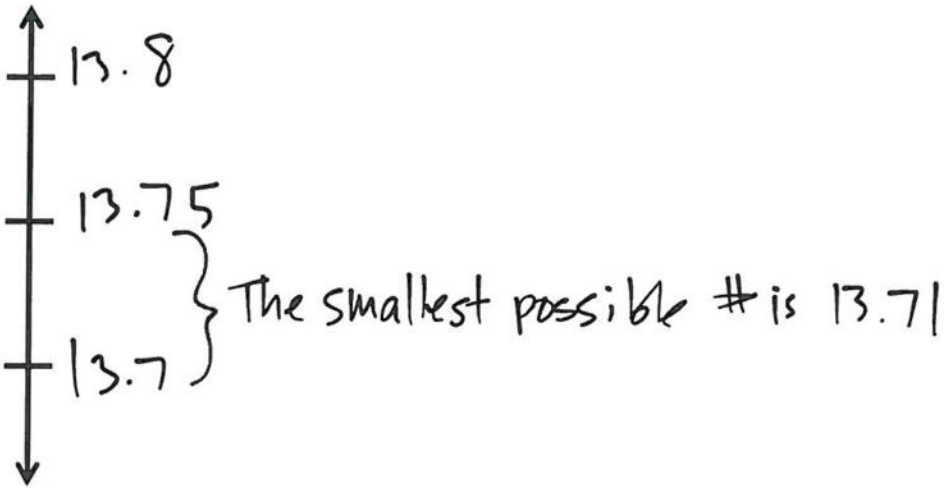
3. A decimal number has two digits to the right of its decimal point. If we round it to the nearest tenth, the result is 13.7.

   a. What is the maximum possible value of this number? Use words and the number line to explain your reasoning. Include the midpoint on your number line.

13.74 because at 13.750 it rounds up to 13.8.



   b. What is the minimum possible value of this decimal? Use words and the number line to explain your reasoning. Include the midpoint on your number line.



Name _____ Date _____

1. Solve, and then write the sum in standard form. Use a place value chart if necessary.

   a. 1 tenth + 2 tenths = 3 tenths = 0.3

   b. 14 tenths + 9 tenths = 23 tenths = 2 one(s) 3 tenth(s) = 2.3

   c. 1 hundredth + 2 hundredths = 3 hundredths = 0.03

   d. 27 hundredths + 5 hundredths = 32 hundredths = 3 tenths 2 hundredths = 0.32

   e. 1 thousandth + 2 thousandths = 3 thousandths = 0.003

   f. 35 thousandths + 8 thousandths = 43 thousandths = 4 hundredths 3 thousandths = 0.043

   g. 6 tenths + 3 thousandths = 603 thousandths = 0.603

   h. 7 ones 2 tenths + 4 tenths = 76 tenths = 7.6

   i. 2 thousandths + 9 ones 5 thousandths = 9007 thousandths = 9.007

2. Solve using the standard algorithm.

a. 0.3+ 0.82 = 1.12 0.30 + 0.82 1.12	b. 1.03 + 0.08 = 1.11 1.03 + 0.08 1.11
c. 7.3 + 2.8 = 10.1 7.3 + 2.8 10.1	d. 57.03 + 2.08 = 59.11 57.03 + 2.08 59.11

e. 62.573 + 4.328 = 66.901	f. 85.703 + 12.197 = 97.900
62.573 + 4.328 66.901	85.703 + 12.197 97.900

3. Van Cortlandt Park's walking trail is 1.02 km longer than Marine Park. Central Park's walking trail is 0.242 km longer than Van Cortlandt's.

   a. Fill in the missing information in the chart below.

Van Cortlandt: 1.02 + 1.28 = 2.30

Central Park: 0.242 + 2.30 = 2.542

New York City Walking Trails	
Central Park	2.542 km
Marine Park	1.28 km
Van Cortlandt Park	2.30 km

   b. If a tourist walked all 3 trails in a day, how many kilometers would he or she have walked?

2.542 + 1.28 + 2.30 = 6.122

They would walk 6.122 km.

4. Meyer has 0.64 GB of space remaining on his iPod. He wants to download a pedometer app (0.24 GB), a photo app (0.403 GB), and a math app (0.3 GB). Which combinations of apps can he download? Explain your thinking.

He definitely can't buy 3 apps because they are 0.943 GB. He could get the photo app by itself, but he can't combine it with anything, or he can get the pedometer and math app. together.

0.24 + 0.403 + 0.3 = 0.943 ✗

0.403 + 0.3 = 0.703 ✗

0.24 + 0.403 = 0.643 ✗

0.24 + 0.3 = 0.54 ✓

Name _____ Date _____

1. Subtract, writing the difference in standard form. You may use a place value chart to solve.

   a. 5 tenths – 2 tenths = 3 tenths = 0.3

   b. 5 ones 9 thousandths – 2 ones = 3 ones 9 thousandths = 3.009

   c. 7 hundreds 8 hundredths – 4 hundredths = 7 hundreds 4 hundredths = 700.04

   d. 37 thousandths – 16 thousandths = 21 thousandths = 0.021

2. Solve using the standard algorithm.

a. 1.4 – 0.7 = 0.7

$$\begin{array}{r} {}^{0}\,{}^{14} \\ 1.4 \\ -\ 0.7 \\ \hline 0.7 \end{array}$$

b. 91.49 – 0.7 = 90.79

$$\begin{array}{r} {}^{0}\,{}^{14} \\ 91.49 \\ -\ 0.7 \\ \hline 90.79 \end{array}$$

c. 191.49 – 10.72 = 180.77

$$\begin{array}{r} {}^{0}\,{}^{14} \\ 191.49 \\ -\ 10.72 \\ \hline 180.77 \end{array}$$

d. 7.148 – 0.07 = 7.078

$$\begin{array}{r} {}^{0}\,{}^{14} \\ 7.148 \\ -\ 0.07 \\ \hline 7.078 \end{array}$$

e. 60.91 – 2.856 = 58.054

$$\begin{array}{r} {}^{5}\,{}^{10}\ {}^{8}\,{}^{10}\ {}^{10} \\ 60.9\not{1}\ \not{0} \\ -\ 2.856 \\ \hline 58.054 \end{array}$$

f. 361.31 – 2.841 = 358.469

$$\begin{array}{r} {}^{5}\,{}^{10}\ {}^{12}\,{}^{10}\ {}^{10} \\ 36\not{1}.3\not{1}0 \\ -\ 2.841 \\ \hline 358.469 \end{array}$$

3. Solve.

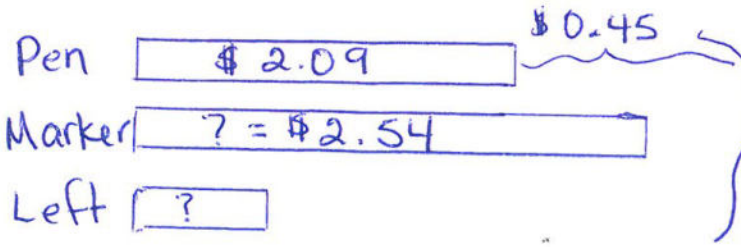
a. 10 tens – 1 ten 1 tenth $\overset{0\ 9\ 9\ 10}{100.0}$ $-\ 10.1$ 89.9	b. 3 – 22 tenths $\overset{2\ 10}{3.0}$ $-\ 2.2$ 0.8	c. 37 tenths – 1 one 2 tenths 3.7 $-\ 1.2$ 2.5
d. 8 ones 9 hundredths – 3.4 $\overset{7\ 10}{8.09}$ $-\ 3.4$ 4.69	e. 5.622 – 3 hundredths $\overset{5\ 12}{5.622}$ 0.03 5.592	f. 2 ones 4 tenths – 0.59 $\overset{1\ 13\ 10}{2.40}$ 0.59 1.81

4. Mrs. Fan wrote *5 tenths minus 3 hundredths* on the board. Michael said the answer is 2 tenths because 5 minus 3 is 2. Is he correct? Explain.

Michael is not correct. He is subtracting units that aren't alike. The problem was $0.5 - 0.03$.

He was thinking that the problem was $0.5 - 0.3$.

5. A pen costs $2.09. It costs $0.45 less than a marker. Ken paid for one pen and one marker with a five dollar bill. Use a tape diagram with calculations to determine his change.



$\$2.09 + \$0.45 = \$2.54$

$\$2.09 + \$2.54 = \$4.63$

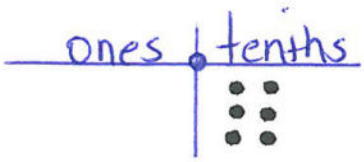
$\overset{4\ 9\ 10}{\$5.00} - \$4.63 = \$0.37$

Ken will get $0.37 change.

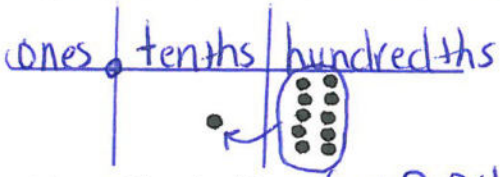
Name _____ Date _____

1. Solve by drawing disks on a place value chart. Write an equation, and express the product in standard form.

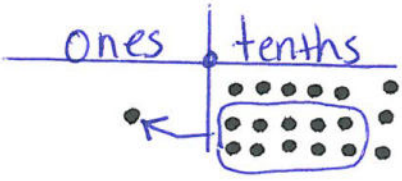
a. 3 copies of 2 tenths $3 \times 0.2 = 0.6$



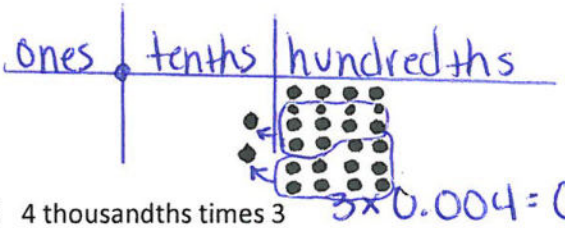
b. 5 groups of 2 hundredths $5 \times 0.02 = 0.10$



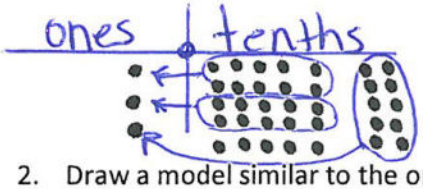
c. 3 times 6 tenths $3 \times 0.6 = 1.8$



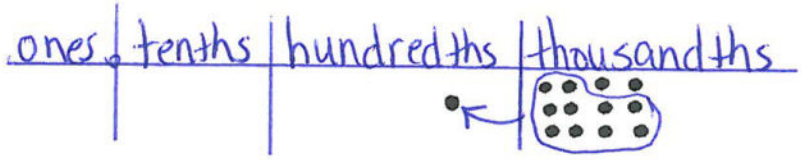
d. 6 times 4 hundredths $6 \times 0.04 = 0.24$



e. 5 times as much as 7 tenths $5 \times 0.7 = 3.5$



f. 4 thousandths times 3 $3 \times 0.004 = 0.012$



2. Draw a model similar to the one pictured below for Parts (b), (c), and (d). Find the sum of the partial products to evaluate each expression.

a. 7×3.12

	3 ones	+ 1 tenth	+ 2 hundredths
7	7 × 3 ones	7 × 1 tenth	7 × 2 hundredths

21 + .7 + 0.14 = 21.84

b. 6×4.25

	4 ones	2 tenths	5 hundredths
6	6 × 4 ones 24 ones	6 × 2 tenths 12 tenths	6 × 5 thousandths 30 thousandths

24 + 1.2 + 0.30 = 25.5

c. 3 copies of 4.65

	4 ones	+ 6 tenths	+ 5 hundredths
3	3 x 4 ones 12 ones	3 x 6 tenths 18 tenths	3 x 5 hundredths 15 hundredths

12 + 0.6 + 0.15 = 13.95

d. 4 times as much as 20.075

	2 tens	+ 7 hundredths	+ 5 thousandths
4	4 x 2 tens 8 tens	4 x 7 hundredths 28 hundredths	4 x 5 thousandths 20 thousandths

80 + 0.28 + 0.020 = 80.30 = 80.3

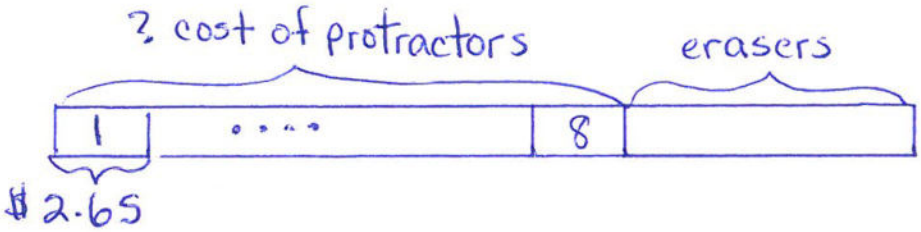
3. Miles incorrectly gave the product of 7 × 2.6 as 14.42. Use a place value chart or an area model to help Miles understand his mistake.

	2 ones	+ 6 tenths
7	7 x 2 ones 14 ones	7 x 6 tenths 42 tenths

14 + 4.2 = 18.2

This is where Miles made his mistake. He wrote 42 hundredths, instead of 42 tenths. 42 tenths is 4 ones and 2 tenths.

4. Mrs. Zamir wants to buy 8 protractors and some erasers for her classroom. She has $30. If protractors cost $2.65 each, how much will Mrs. Zamir have left to buy erasers?



$2.65

$30.00
- 21.20
$ 8.80

	2 ones	+ 6 tenths	+ 5 hundredths
8	16 ones	48 tenths	40 hundredths

16 + 4.8 + 0.40 = 21.20

Mrs. Zamir will have $8.80 to buy erasers.

Name _____ Date _____

1. Choose the reasonable product for each expression. Explain your reasoning in the spaces below using words, pictures, or numbers.

a. 2.5×4 0.1 1 10 100

Twenty-five tenths x 4 is 100 tenths. 100 tenths is 10.

b. 3.14×7 2198 219.8 21.98 2.198

I know the product has to be 3x7 plus some more. The answer has to be 21 and something.

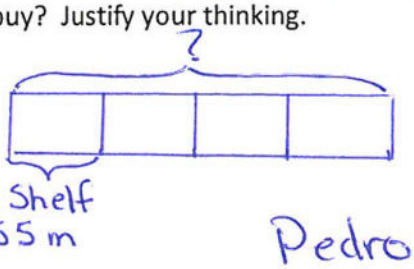
c. 8×6.022 4.8176 48.176 481.76 4817.6

8x6=48 8x0.022 is rounded to 8x0.02. 8x two hundredths is 16 hundredths. 48 + .16 is close to 48.176.

d. 9×5.48 493.2 49.32 4.932 0.4932

9x5=45 I rounded .48 to .5. 9x.5=.45 45 + 4.5 is 49.5. 49.5 is close to 49.32.

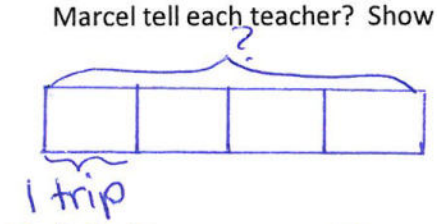
2. Pedro is building a spice rack with 4 shelves that are each 0.55 meter long. At the hardware store, Pedro finds that he can only buy the shelving in whole meter lengths. Exactly how many meters of shelving does Pedro need? Since he can only buy whole number lengths, how many meters of shelving should he buy? Justify your thinking.



1 unit = .55 m
4 units = 4 x .55 m = 2.20 meters

Pedro needs exactly 2.2 meters of shelving. He should buy 3 meters.

3. Marcel rides his bicycle to school and back on Tuesdays and Thursdays. He lives 3.62 kilometers away from school. Marcel's gym teacher wants to know about how many kilometers he bikes in a week. Marcel's math teacher wants to know exactly how many kilometers he bikes in a week. What should Marcel tell each teacher? Show your work.

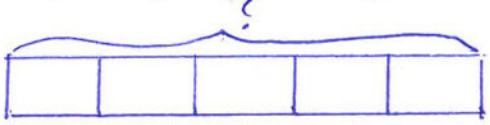


estimation
1 unit ≈ 3.5 km
4 units ≈ 14 km

exact
1 unit = 3.62 km
4 units = 14.48 km

Marcel should tell his gym teacher he rides about 14 km each week. He should tell his math teacher he rides 14.48 km.

4. The poetry club had its first bake sale, and they made $79.35. The club members are planning to have 4 more bake sales. Leslie said, "If we make the same amount at each bake sale, we'll earn $3,967.50." Peggy said, "No way, Leslie! We'll earn $396.75 after five bake sales." Use estimation to help Peggy explain why Leslie's reasoning is inaccurate. Show your reasoning using words, numbers, or pictures.



$79.35 can be estimated to $80.00. $80 x 5 is $400.00. Leslie did not estimate correctly.

Name _____ Date _____

1. Complete the sentences with the correct number of units, and then complete the equation.

a. 4 groups of 4 tenths is 1.6. $1.6 \div 4 =$ 0.4

16 tenths ÷ 4 = 4 tenths

b. 8 groups of 4 hundredths is 0.32. $0.32 \div 8 =$ 0.04

32 hundredths ÷ 8 = 4 hundredths

c. 7 groups of 12 thousandths is 0.084. $0.084 \div 7 =$ 0.012

84 thousandths ÷ 7 = 12 thousanths

d. 5 groups of 4 tenths is 2.0. $2.0 \div 5 =$ 0.4

20 tenths ÷ 5 = 4 tenths

2. Complete the number sentence. Express the quotient in units and then in standard form.

a. $4.2 \div 7 =$ 42 tenths ÷ 7 = 6 tenths = 0.6

b. $2.64 \div 2 =$ 2 ones ÷ 2 + 64 hundredths ÷ 2

= 1 ones + 32 hundredths

= 1.32

c. $12.64 \div 2 =$ 12 ones ÷ 2 + 64 hundredths ÷ 2

= 6 ones + 32 hundredths

= 6.32

d. 4.26 ÷ 6 = 42 tenths ÷ 6 + 6 hundredths ÷ 6

= 7 tenths + 1 hundredth

= 0.71

e. 4.236 ÷ 6 = 42 tenths ÷ 6 + 36 thousandths ÷ 6

= 7 tenths + 6 thousandths

= 0.706

3. Find the quotients. Then, use words, numbers, or pictures to describe any relationships you notice between each pair of problems and quotients.

a. 32 ÷ 8 = 4 3.2 ÷ 8 = 0.4

The first quotient is 10 times larger than the second because the number we started with in the first one is 10 times larger than the 2nd one but they are both being divided into 8 equal parts.

b. 81 ÷ 9 = 9 0.081 ÷ 9 = 0.009

They are both being divided into 9 parts. The first one is 81 ones, but the second is 81 thousanths. So the answer to the first is ones, the answer to the second is thousandths. The first number is 1000 times as large as the second so the answer is 1,000 times larger.

4. Are the quotients below reasonable? Explain your answers.

a. 5.6 ÷ 7 = 8

No. The divided is only about 6. If that is divided into 7 parts, the answer must be less than a whole.

b. 56 ÷ 7 = 0.8

No. These are 56 ones ÷ 7. We should get 8 ones, not 8 tenths.

c. .56 ÷ 7 = 0.08

Yes. 56 hundredths ÷ 7 is 8 hundredths. But also, the amount we start with is small. After it gets divided, the answer in each part is even smaller so it makes sense.

5. 12.48 milliliters of medicine were separated into doses of 4 mL each. How many doses were made?

$12.48 \div 4$

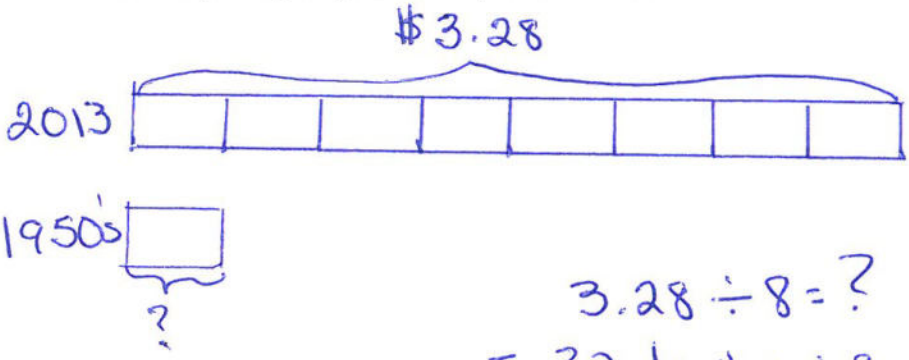
= 12 ones ÷ 4 + 48 hundredths ÷ 4

= 3 ones + 12 hundredths

= 3.12

3.12 doses were made

6. The price of milk in 2013 was around $3.28 a gallon. This was eight times as much as you would have probably paid for a gallon of milk in the 1950s. What was the cost for a gallon of milk during the 1950s? Use a tape diagram, and show your calculations.



$3.28 \div 8 = ?$

= 32 tenths ÷ 8 + 8 hundredths ÷ 8

= 4 tenths + 1 hundredth

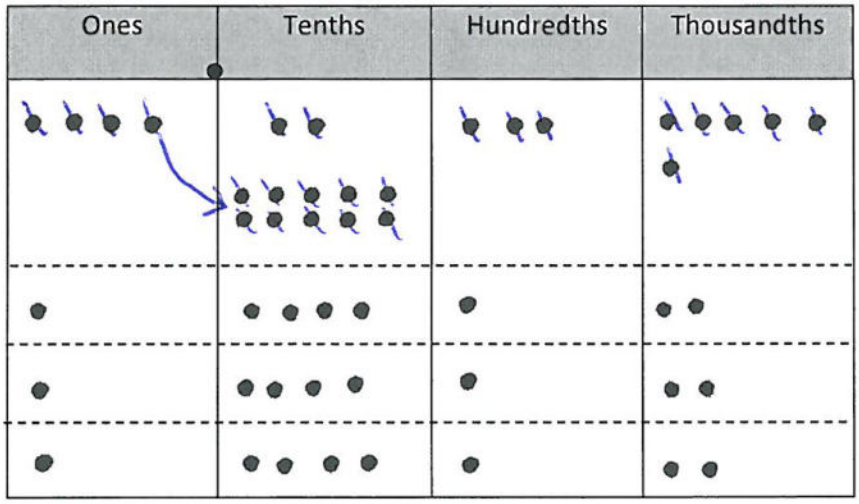
= 0.41

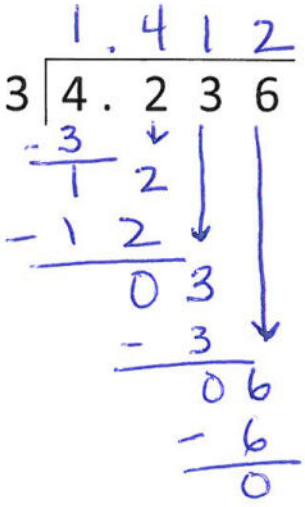
Milk cost $0.41 a gallon in the 1950's.

Name _____ Date _____

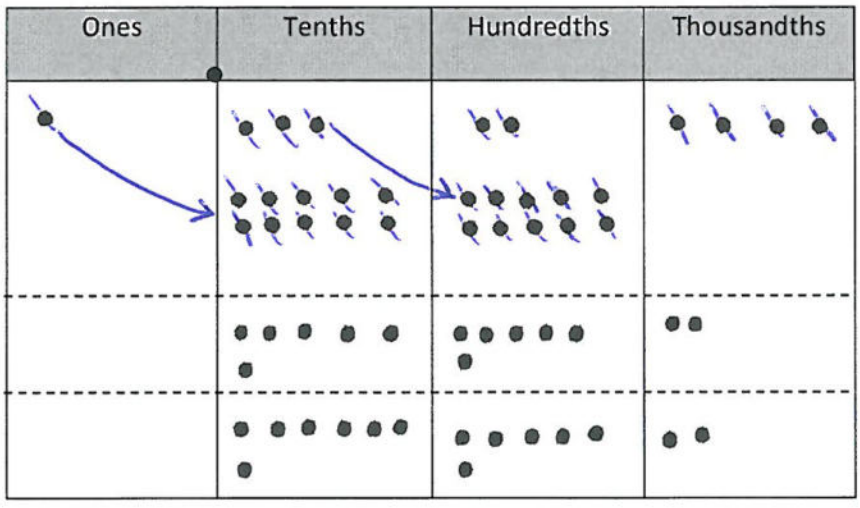
1. Draw place value disks on the place value chart to solve. Show each step using the standard algorithm.

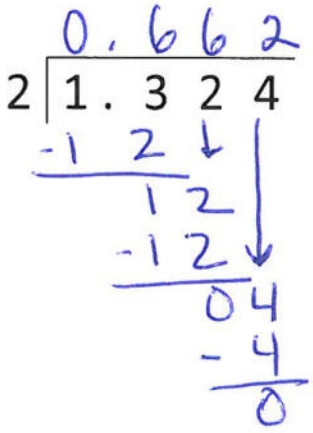
a. $4.236 \div 3 =$ 1.412





b. $1.324 \div 2 =$ 0.662





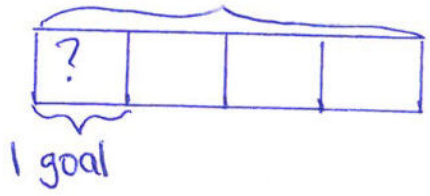
2. Solve using the standard algorithm.

a. $0.78 \div 3 =$ 0.26	b. $7.28 \div 4 =$ 1.82	c. $17.45 \div 5 =$ 3.49
0.26 3 ⟌ 0.78 -6↓ 18 -18 0	1.82 4 ⟌ 7.28 -4↓ 32 -32↓ 08 -8 0	3.49 5 ⟌ 17.45 -15↓ 24 -20↓ 45 -45 0

3. Grayson wrote $1.47 \div 7 = 2.1$ in her math journal.
Use words, numbers, or pictures to explain why Grayson's thinking is incorrect.

1.47 ÷ 7 cannot equal 2.1 because 2.1 is greater than 1.47, which is the number that is being divided. Grayson divided 14 tenths by 7 and thought it was 14 wholes.

4. Mrs. Nguyen used 1.48 meters of netting to make 4 identical mini hockey goals. How much netting did she use per goal?

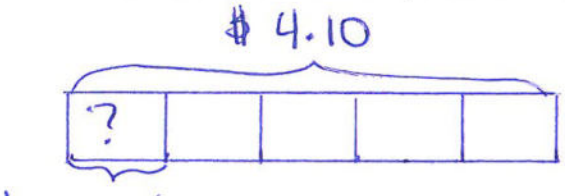


0.37
4 ⟌ 1.48
-12↓
28
-28
0

1.48m ÷ 4 = 0.37m

She used 0.37m per goal.

5. Esperanza usually buys avocados for $0.94 apiece. During a sale, she gets 5 avocados for $4.10. How much money did she save per avocado? Use a tape diagram and show your calculations.



0.82
5 ⟌ 4.10
-40↓
10
-10
0

$0.94
- 0.82
$0.12

She saves $0.12 per avocado.

Name _____ Date _____

1. Draw place value disks on the place value chart to solve. Show each step in the standard algorithm.

a. $0.5 \div 2 =$ 0.25

Ones	•	Tenths	Hundredths	Thousandths
		●●●●●	●●●●●	
		●●	●●●●●	
		●●	●●●●●	

$$
\begin{array}{r}
0.25 \\
2\overline{)0.50} \\
-04\downarrow \\
\hline
10 \\
-10 \\
\hline
0
\end{array}
$$

b. $5.7 \div 4 =$ 1.425

Ones	•	Tenths	Hundredths	Thousandths
●●●●●		●●●●●	●●●●●	●●●●●
●		●●●●	●●	●●●●●
●		●●●●	●●	●●●●●
●		●●●●	●●	●●●●●
●		●●●●	●●	●●●●●

$$
\begin{array}{r}
1.425 \\
4\overline{)5.700} \\
4\downarrow \\
\hline
17 \\
-16 \\
\hline
10 \\
-8 \\
\hline
20 \\
-20 \\
\hline
0
\end{array}
$$

2. Solve using the standard algorithm.

a. $0.9 \div 2 = 0.45$

$$2\overline{)0.90}$$
-8
10
-10
0

b. $9.1 \div 5 = 1.82$

$$5\overline{)9.10}$$
-5
41
-40
10
-10
0

c. $9 \div 6 = 1.5$

$$6\overline{)9.0}$$
-6
30
-30
0

d. $0.98 \div 4 = 0.245$

$$4\overline{)0.980}$$
-8
18
-16
20
-20
0

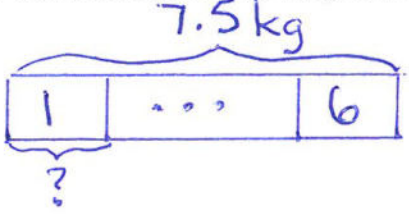
e. $9.3 \div 6 = 1.55$

$$6\overline{)9.30}$$
-6
33
-30
30
-30
0

f. $91 \div 4 = 22.75$

$$4\overline{)91.00}$$
-8
11
-8
30
-28
20
-20
0

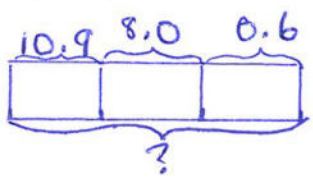
3. Six bakers shared 7.5 kilograms of flour equally. How much flour did they each receive?



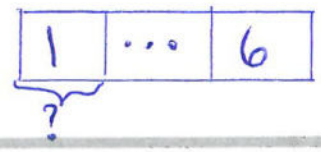
$$6\overline{)7.50}$$
-6
15
-12
30
-30
0

Each baker received 1.25 kilograms.

4. Mrs. Henderson makes punch by mixing 10.9 liters of apple juice, 0.6 liters of orange juice, and 8 liters of ginger ale. She pours the mixture equally into 6 large punch bowls. How much punch is in each bowl? Express your answer in liters.



$$\begin{array}{r} 10.9 \\ 8.0 \\ +\ 0.6 \\ \hline 19.5 \end{array}$$



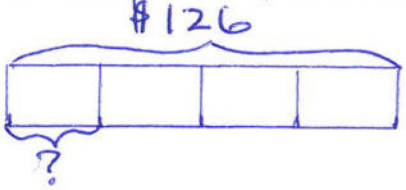
$$6\overline{)19.50}$$
-18
15
12
30
-30
0

Each bowl has 3.25 liters of punch.

Name _____ Date _____

Solve.

1. Mr. Frye distributed $126 equally among his 4 children for their weekly allowance.
   a. How much money did each child receive?

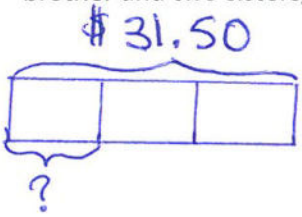


$126 = 4 units
1 unit = $126 ÷ 4

$$\begin{array}{r} 31.5 \\ 4\overline{)126.0} \\ -12\downarrow \\ \hline 06 \\ -4\downarrow \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

Each of Mr Frye's children gets $31.50

   b. John, the oldest child, paid his siblings to do his chores. If John pays his allowance equally to his brother and two sisters, how much money will each of his siblings have received in all?



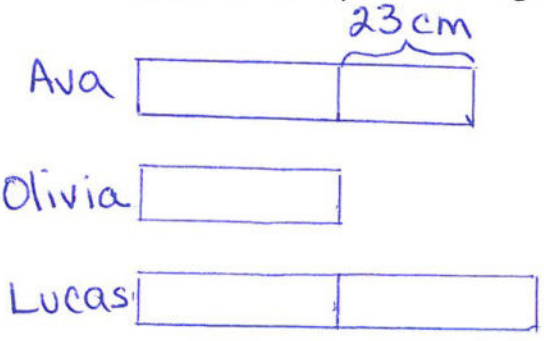
$31.50 = 3 units
1 unit = $31.50 ÷ 3

$$\begin{array}{r} 10.50 \\ 3\overline{)31.50} \\ -3\downarrow \\ \hline 01 \\ 0\downarrow \\ \hline 15 \\ 15\downarrow \\ \hline 00 \\ 0 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 10.50 \\ +31.50 \\ \hline 42.00 \end{array}$$

Each of John's siblings gets $42.00.

2. Ava is 23 cm taller than Olivia, and Olivia is half the height of Lucas. If Lucas is 1.78 m tall, how tall are Ava and Olivia? Express their heights in centimeters.

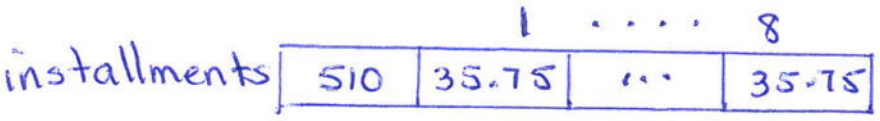


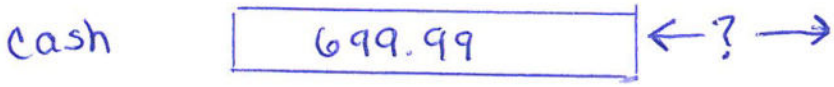
178cm ÷ 2 = 89cm

89 cm + 23 cm = 112 cm

Olivia is 89cm tall.
Ava is 112 cm tall.

3. Mr. Hower can buy a computer with a down payment of $510 and 8 monthly payments of $35.75. If he pays cash for the computer, the cost is $699.99. How much money will he save if he pays cash for the computer instead of paying for it in monthly payments?





$510 + 286 = 796$

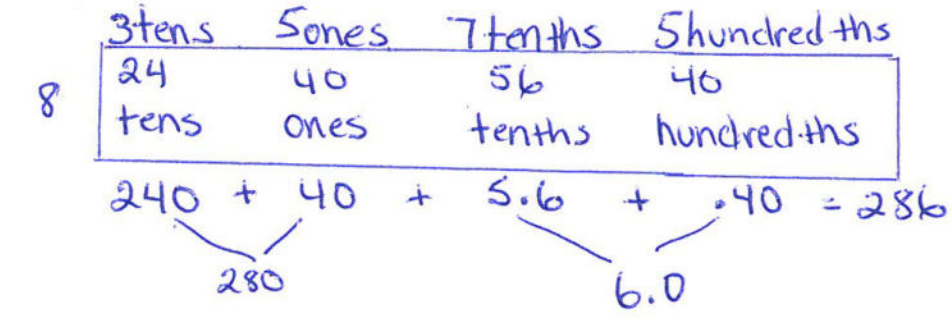
$699.99 - 796$

$796 - 700 = 96$

$96 + 0.01 = 96.01$

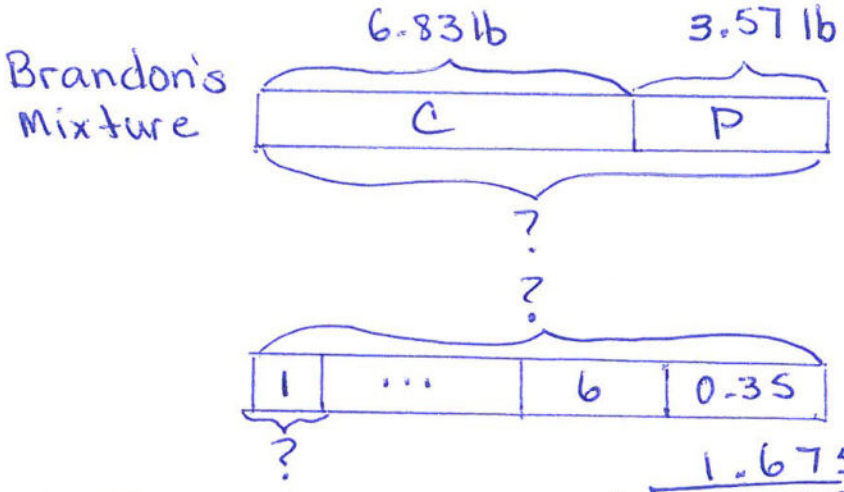
or

$699.99 - 96.01 = 603.98$



Mr. Hower will save $96.01 if he pays cash

4. Brandon mixed 6.83 lb of cashews with 3.57 lb of pistachios. After filling up 6 bags that were the same size with the mixture, he had 0.35 lb of nuts left. What was the weight of each bag? Use a tape diagram and show your calculations.



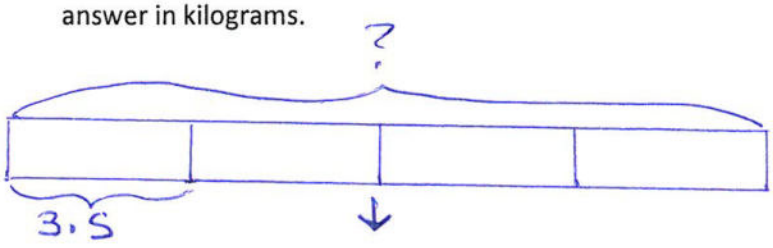
$6.83 + 3.57 = 10.40$

$10.40 - 0.35 = 10.05$

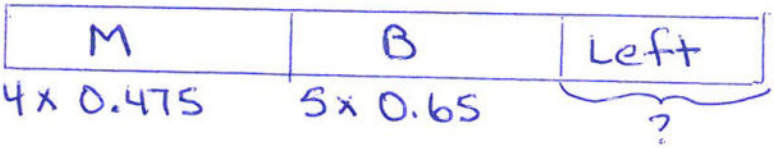
$10.050 \div 6 = 1.675$

Each bag contained 1.675 lb of nuts.

5. The bakery bought 4 bags of flour containing 3.5 kg each. 0.475 kg of flour is needed to make a batch of muffins, and 0.65 kg is needed to make a loaf of bread.
   a. If 4 batches of muffins and 5 loaves of bread are baked, how much flour will be left? Give your answer in kilograms.



$$\begin{array}{r} 3.5 \\ \times\ 4 \\ \hline 14.0 \end{array}$$



$$\begin{array}{r} 0.475 \\ \times\ 4 \\ \hline 1.900 \end{array}$$

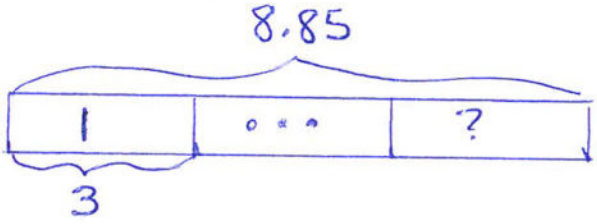
$$\begin{array}{r} 0.65 \\ \times\ 5 \\ \hline 3.25 \end{array}$$

$$\begin{array}{r} 1.90 \\ 3.25 \\ \hline 5.15 \end{array}$$

$$\begin{array}{r} 14.00 \\ -\ 5.15 \\ \hline 8.85 \end{array}$$

8.85 kg of flour will be left.

   b. The remaining flour is stored in bins that hold 3 kg each. How many bins will be needed to store the flour? Explain your answer.



$$\begin{array}{r} 2.95 \\ 3\overline{)\ 8.85} \\ -\ 6\downarrow \\ \hline 28 \\ -\ 27\downarrow \\ \hline 15 \\ -\ 15 \\ \hline 0 \end{array}$$

Three bins are needed to store the remaining flour. All three bins will not be completely filled.

Name Zenin Date

1. Compare using >, <, or =.

a. 0.4 > 0.127

b. 2 thousandths + 4 hundredths > 0.036

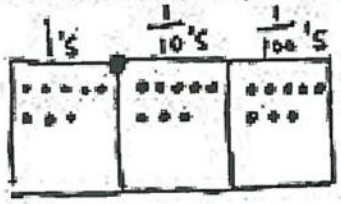
c. 2 tens 3 tenths 1 thousandth < 20.31

d. 24 tenths < 2.5

e. $4 \times 10^3 + 2 \times 100 + 3 \times \frac{1}{10}$ = $4 \times 1000 + 2 \times 10^2 + 3 \times \frac{1}{10}$

f. $3 \times \frac{1}{10} + 4 \times \frac{1}{1000}$ < 0.340

2. Model the number 8.88 on the place value chart.



a. Use words, numbers, and your model to explain why each of the digits has a different value. Be sure to use "ten times as large" and "one tenth as large" in your explanation.

8.88

This is 8 x 1

8 x 1/100

8 x 1/10

Even though there are 8 dicks in each column, they are different units so they have different values.

8 ones is 10 times as large as 8 tenths.

8 hundredths is $\frac{1}{10}$ as large as 8 tenths.

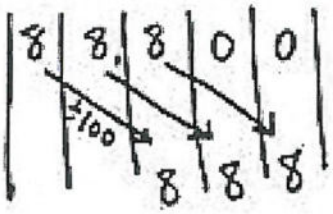
b. Multiply 8.88×10^4. Explain the shift of the digits and the change in the value of each digit.

$8.88 \times 10^4 = 88{,}800$

When multiplying by 10^4, each digit shifts 4 places to the left. 10^4 equals $10 \times 10 \times 10 \times 10$, or 10,000, so each digit becomes 10,000 times as large.

c. Divide the product from (b) by 10^2. Explain the shift of the digits and the change in the value of each digit.

$88{,}800 \div 10^2 = 888$



When dividing by 10^2, each digit shifts 2 places to the right. 10^2 equals 10×10, or 100, so each digit becomes $\frac{1}{100}$ as large.

3. Rainfall collected in a rain gauge was found to be 2.3 cm when rounded to the nearest tenth of a centimeter.

a. Circle all the measurements below that could be the actual measurement of the rainfall.

2.251 cm 2.349 cm 2.352 cm 2.295 cm

b. Convert the rounded measurement to meters. Write an equation to show your work.

$2.3 \div 10^2 = 0.023$

$2.3 \text{ cm} = 0.023 \text{ m}$

4. Annual rainfall total for cities in New York are listed below.

Rochester	0.97 meters
Ithaca	0.947 meters
Saratoga Springs	1.5 meters
New York City	1.268 meters

a. Put the rainfall measurements in order from least to greatest. Write the smallest total rainfall in word form and expanded form.

0.947 m , 0.97 m , 1.268 m , 1.5 m

nine hundred forty-seven thousandths

$9 \times \frac{1}{10} + 4 \times \frac{1}{100} + 7 \times \frac{1}{1000}$

b. Round each of the rainfall totals to the nearest tenth.

0.97m ≈ 1.0 m

0.947m ≈ 0.9m

1.5m ≈ 1.5m

1.268m ≈ 1.3m

c. Imagine New York City's rainfall is the same every year. How much rain would fall in 100 years?

1.268 m × 100 = 126.8 m

126.8 m would fall in 100 years.

d. Write an equation using an exponent that would express the 100-year total rainfall. Explain how the digits have shifted position and why.

$1.269\ m \times 10^2 = 126.8\ m$

Each digit shifts 2 places to the left when multiplying by 10^2. The value of each digit becomes 100 times as large.

1 × 100 = 100

0.2 × 100 = 20

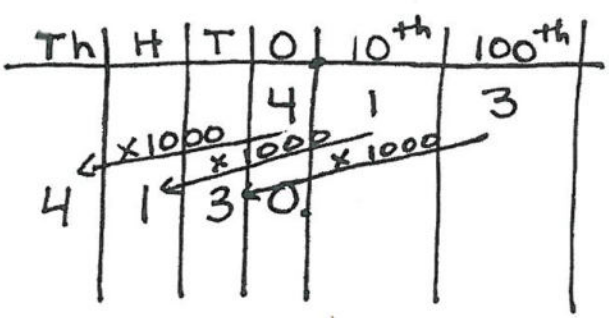
0.06 × 100 = 6

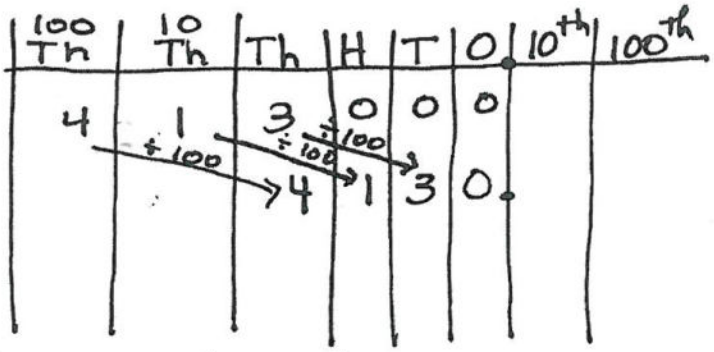
0.008 × 100 = 0.8

Name Ruthie Date Oct. 2

1. The following equations involve different quantities and use different operations, yet produce the same result. Use a place value chart and words to explain why this is true.

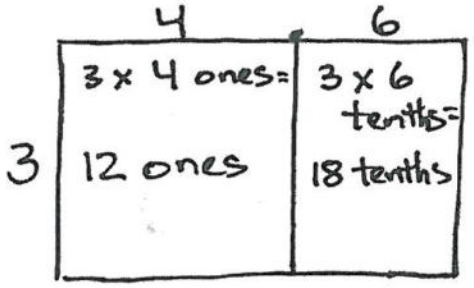
$4.13 \times 10^3 = 4130$ $413{,}000 \div 10^2 = 4130$





When I multiplied, the digits moved 3 places to the left, because they got larger. When I divided, the digits moved 2 places to the right, because they decreased.

2. Use an area model to explain the product of 4.6 and 3. Write the product in standard form, word form, and expanded form.



12 + 1.8 = 13.8

thirteen and eight tenths

$1 \times 10 + 3 \times 1 + 8 \times \frac{1}{10}$

3. Compare using >, <, or =.

a. 2 tenths + 11 hundredths  0.13

b. 13 tenths + 8 tenths + 32 hundredths  2.42

c. 342 hundredths + 7 tenths  3 + 49 hundredths

d. $2 + 31 \times \frac{1}{10} + 14 \times \frac{1}{100}$  2.324

e. $14 + 72 \times \frac{1}{10} + 4 \times \frac{1}{1000}$  21.24

f. $0.3 \times 10^2 + 0.007 \times 10^3$  $0.3 \times 10 + 0.7 \times 10^2$

4. Dr. Mann mixed 10.357 g of chemical A, 12.062 g of chemical B, and 7.506 g of chemical C to make 5 doses of medicine.

   a. About how much medicine did he make in grams? Estimate the amount of each chemical by rounding to the nearest tenth of a gram before finding the sum. Show all your thinking.

A $10.357_g \approx 10.4\ g$

B $12.062_g \approx 12.1\ g$

C $7.506_g \approx 7.5\ g$

$$\begin{array}{r} 10.4 \\ 12.1 \\ +\ 7.5 \\ \hline 30.0 \end{array}$$

Dr. Mann made about 30 grams of medicine.

   b. Find the actual amount of medicine mixed by Dr. Mann. What is the difference between your estimate and the actual amount?

$$\begin{array}{r} 10.357 \\ 12.062 \\ +\ 7.506 \\ \hline 29.925 \end{array}$$

$$\begin{array}{r} {}^{2}\not{3}\,{}^{9}\not{0}\,{}^{9}\not{9}\,{}^{9}\not{0} \\ -\ 29.925 \\ \hline 0.075 \end{array}$$

The difference in the estimated and actual amounts is 0.075 grams.

   c. How many grams are in one dose of medicine? Explain your strategy for solving this problem.

$$\begin{array}{r} 5.985 \\ 5\overline{)29.925} \\ -25 \\ \hline 49 \\ -45 \\ \hline 42 \\ -40 \\ \hline 25 \\ -25 \\ \hline 0 \end{array}$$

I used the algorithm to find my answer.

There are 5.985 grams of medicine in one dose.

   d. Round the weight of one dose to the nearest gram.

$5.985_g \approx 6\ g$