

Name: _____

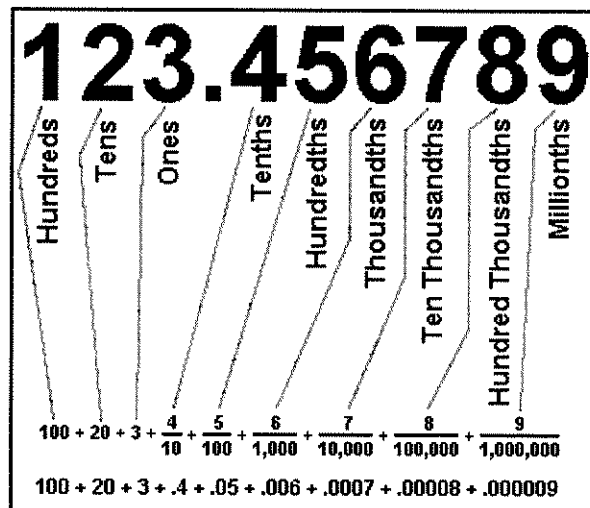
Start date: _____

Hand in date: _____

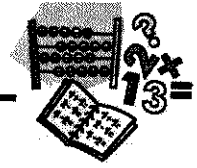
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Math 9 K&E

Decimals



Decimals, Fractions and Money



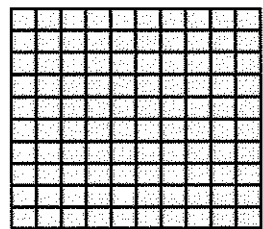
When dealing with money, it is important to know your decimals and fractions.

The following symbols represent pennies and dimes.



■ = 1 penny

 = 1 dime (10 pennies)

 = 1 dollar
= 10 dimes
= 100 pennies

One penny (one cent) is $\frac{1}{100}$ of a dollar. That is, 100 pennies are in 1 dollar. This could be expressed:

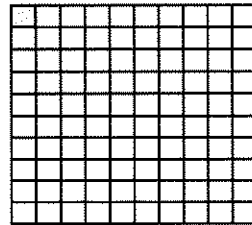
in diagram form \longrightarrow

in money form: \$0.01 or 1¢

in decimal form: 0.01

in fraction form: $\frac{1}{100}$

in word form: one one hundredth



Twenty-four cents can be expressed:

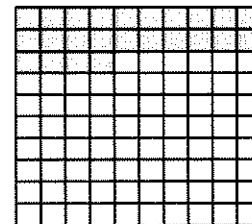
in diagram form \longrightarrow

in money form: \$0.24 or 24¢

in decimal form: 0.24

in fraction form: $\frac{24}{100}$

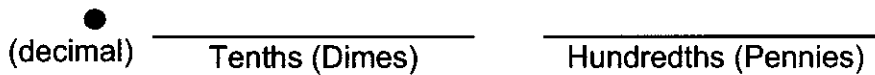
in word form: twenty-four one hundredths



Can you recognize a pattern when writing numbers with two decimal places?

Dimes are placed in the tenths position because 10 dimes = 1 dollar.

Pennies are placed in the hundredths position because 100 pennies = 1 dollar.



Examples

A) 24ϕ could be represented as:

- \$0.24
- 24 pennies
- 2 dimes and 4 pennies.

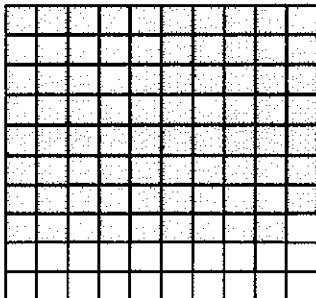
Two is placed in the tenths position.

Four is placed in the hundredths position.

B) \$0.79 can be shown as:

- 79 cents
- zero decimal seventy-nine
- 79 pennies
- 7 dimes and 9 pennies.

\$0.79 can also be represented by shading 79 squares on a 10 x 10 grid. Notice that 79 of the total 100 squares are shaded.



The following chart shows the relationships among money, fractions, decimals and word forms.

Money Value	Dimes	Pennies	Fraction	Decimal	Word Form
\$0.57	5	7	$\frac{57}{100}$	0.57	fifty-seven hundredths
\$0.42	4	2	$\frac{42}{100}$	0.42	forty-two hundredths
\$0.35	3	5	$\frac{35}{100}$	0.35	thirty-five hundredths
\$0.60	6	0	$\frac{60}{100}$	0.60	sixty hundredths

If a value has pennies and no dimes, a zero is placed in the tenths position as a place holder.

Example 0.05

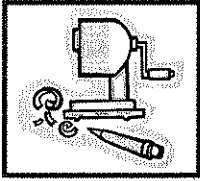
If a value has dimes and no digit in the hundredths position, a zero is placed in the pennies (hundredths) position as a place holder.

Example 0.20

When writing cheques, money values are written in digits and words.

Example

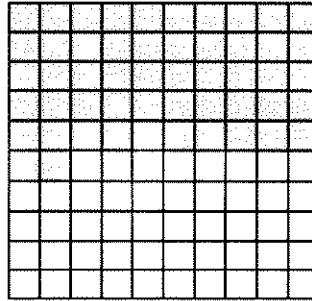
No. 007	
Pay to the order of _____	\$ 146.72
One hundred forty-six dollars	$\frac{72}{100}$
_____ Signature	



Practice: Decimals, Fractions and Money

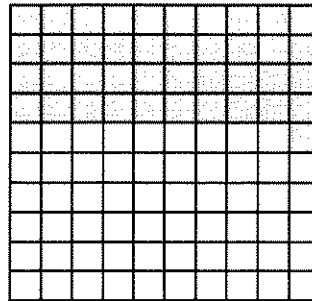
1.

- How many squares are shaded?
- What is the money form?
- What is the fraction form?
- What is the decimal form?
- How do you say it in word form?



2.

- How many squares are shaded?
- What is the money form?
- What is the fraction form?
- What is the decimal form?
- How do you say it in word form?



3. Select a partner. Shade some of the squares in a grid. Ask your partner to identify the money, decimal, fraction and word forms.

With your partner, complete a variety of similar activities to review your understanding of the relationship among money, decimals and fractions.

4. Place the following money values on the chart and discuss your placement with a classmate. Remember, cents are less than a whole dollar, so they are written as decimal numbers. The first two questions have been done for you.

- a) 1¢
- b) 24¢
- c) 56¢
- d) 20¢
- e) 84¢
- f) 7¢

	Hundreds	Tens	Ones	●	Tenths	Hundredths	Money Value
a)				•	0	1	1¢
b)				•	2	4	24¢
c)				•			
d)				•			
e)				•			
f)				•			

5. Complete the following:

- a) 56¢ is fifty-six hundredths
- b) 20¢ is _____
- c) 84¢ is _____
- d) 7¢ is _____

6. We know that 1¢ can be expressed in fraction form as $\frac{1}{100}$.

24¢ expressed in fraction form is $\frac{24}{100}$.

Write the fraction forms of:

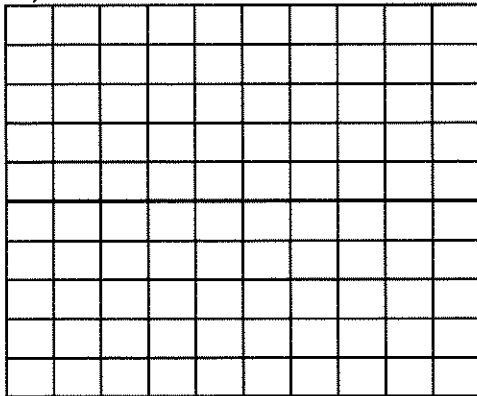
- a) 56¢
- b) 20¢
- c) 84¢
- d) 7¢

7. Complete the chart.

Money Value Cents (pennies)	Decimal form	Fraction form	Word form
1¢	0.01	$\frac{1}{100}$	one one hundred <u>th</u>
24¢	0.24	$\frac{24}{100}$	twenty-four one hundred <u>ths</u>
56¢			
84¢			
7¢			
96¢			
10¢			
3¢			
69¢			
77¢			

8. Shade the grids to illustrate the values and fill in the blanks.

a) \$0.49



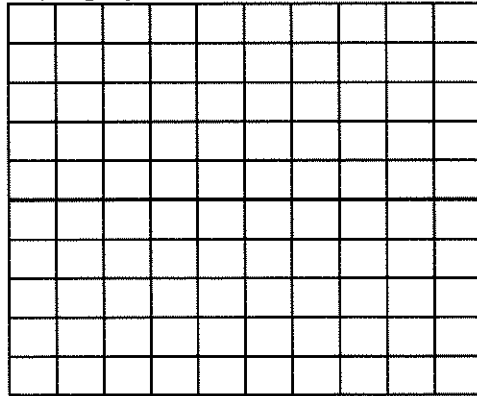
Money form: _____

Decimal form: _____

Fraction form: _____

Word form: _____

b) eighty-seven cents



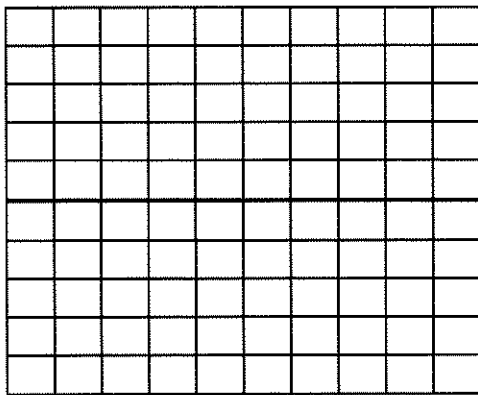
Money form: _____

Decimal form: _____

Fraction form: _____

Word form: _____

c) 0.65



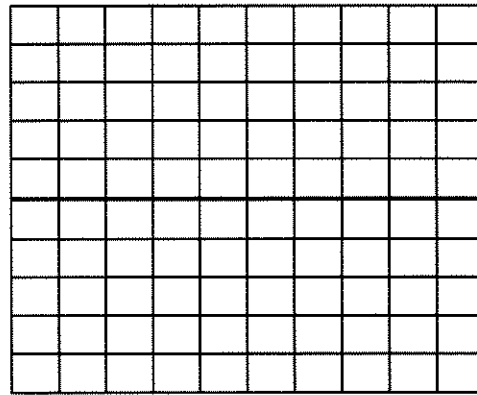
Money form: _____

Decimal form: _____

Fraction form: _____

Word form: _____

d) 37¢

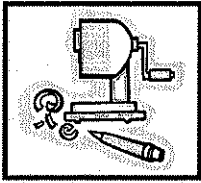


Money form: _____

Decimal form: _____

Fraction form: _____

Word form: _____



Practice: Comparing Fractions, Decimals and Money

9. Complete the chart by filling in the blank spaces with the correct values or terms.

Money Value	Dimes	Pennies	Fraction	Decimal	Word Form
\$0.18	1	8	$\frac{18}{100}$	0.18	eighteen hundredths
\$0.71		1		0.71	
	6	9			
			$\frac{40}{100}$		
					ninety-nine hundredths
	8	6			
\$0.55					
			$\frac{32}{100}$		

Did you know?

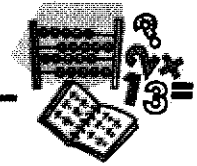
In the United States people write cents as: 25¢ not \$0.25

Think About ...

Many jobs involve handling money. Can you think of ten jobs in your community?

Do you think that good money skills could help you get a job?

Expressing Decimal Numbers in Word Form



When reading decimal numbers, the decimal can be expressed by saying *decimal*, *point* or *and*.

Examples

A) 307 518.537

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	•	Tenths	Hundredths	Thousandths
3	0	7	5	1	8	•	5	3	7

- Three hundred seven thousand five hundred eighteen AND five hundred thirty-seven thousandths

OR

- Three hundred seven thousand five hundred eighteen DECIMAL five hundred thirty-seven thousandths

OR

- Three hundred seven thousand five hundred eighteen POINT five hundred thirty-seven thousandths

B) 54 763.04

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	•	Tenths	Hundredths	Thousandths
	5	4	7	6	3	•	0	4	

- Fifty-four thousand seven hundred sixty-three AND four hundredths
- Fifty-four thousand seven hundred sixty-three DECIMAL four hundredths
- Fifty-four thousand seven hundred sixty-three POINT four hundredths

Zero is a **place holder**. Zeros can be added to the **right** of the final digit in a decimal number and the value of the number remains the same.

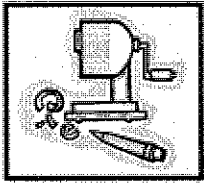
Examples

- A) 0.56, 0.560 and 0.5600 have the same value.
- B) 0.08, 0.080 and 0.0800 have the same value.

Zeros between the decimal and the digits to the right of the decimal hold place values of tenths, hundredths, thousandths, and so on, as needed.

Example

0.27, 0.027 and 0.0027 do not have the same value.



Practice: Expressing Decimals in Word Form

1. Write the following decimal numbers in the chart:

- a) 405 867.39
- b) 301.70
- c) 10 590.01
- d) 26.703

	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	●	Tenths	Hundredths	Thousandths
a)							●			
b)							●			
c)							●			
d)							●			

Take turns with a classmate and say the decimal numbers in words.

2. Write the decimal numbers below in numeric digits.

- a) Twelve thousand seven hundred three and eighty-eight hundredths
- b) Sixty-eight thousand twenty-nine and five hundredths
- c) Three million fifty-four thousand nine hundred eight and fourteen hundredths
- d) Three thousand four hundred seventy-six and twenty hundredths

3. Complete the blank spaces in the chart below. The first one has been done for you.

Fraction	Decimal	Money Value	Word Form
$\frac{37}{100}$	0.37	\$0.37	thirty-seven cents
	0.80		
		\$0.29	
			eighteen cents
$\frac{4}{100}$			
			nineteen cents
		\$0.53	
	0.41		
$\frac{76}{100}$			

Write a statement about the pattern of writing decimals and money forms of numbers.

4. Kevin works in a clothing store. Kevin must record the prices in both word form and money value (decimal form) for store records.



Fill in the missing blanks in the chart below.

Item	Word Form	Money Value
Yellow sweat shirt		\$16.90
Blue jeans		\$45.99
White T-shirts	seven dollars and sixty-five cents	
Ladies' vest	twenty-one dollars and eight cents	
Men's dress shirt		\$12.38
Dress pants		\$19.42
Leather belt	eight dollars and seventy-seven cents	

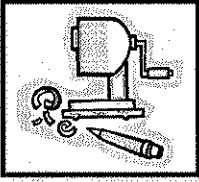
5. Challenge!

Keep a record of all the things you spend money on in a week and record the cost of each item in words and numbers. Compare your list with the lists of your classmates.

6. Treena is building a doll house for her cousin. She wants it to be perfect so she is taking precise measurements. Identify the digit that is in the tenths position and the digit that is in the hundredths position, and record them in the chart below. The first one has been done for you.



Item	Measurement	Tenths	Hundredths
Height of door	20.654 cm	6	5
Width of door	7.23 cm		
Height of wall	26.340 cm		
Length of wall	24.035 cm		
Length of roof	30.324 cm		
Width of roof	27.045 cm		



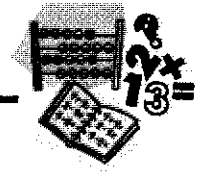
Practice: Expressing Money in Word Form

1. Fill in the chart with the following money values. The first two have been done for you.

- a) Two hundred twenty-six dollars and thirty-four cents
- b) Thirty-nine dollars and two cents
- c) Six hundred seventy-one dollars and fifty cents
- d) Seven dollars and eighty-nine cents
- e) Four hundred dollars and ten cents
- f) Fifty-one dollars and six cents

	Hundreds	Tens	Ones	•	Tenths	Hundredths
a)	2	2	6	•	3	4
b)		3	9	•	0	2
c)				•		
d)				•		
e)				•		
f)				•		

Comparing Decimal Numbers



Understanding and comparing money helps us understand and compare decimals.

Examples

We know that:

- ten cents is more money than seven cents
 $\$0.10 > \0.07
- sixty-seven cents is more money than sixty-two cents
 $\$0.67 > \0.62

The greater the number, the greater the value of the money.
This pattern works the same for decimal numbers that are not money values.

We can represent and compare decimal numbers using diagrams, grids and number lines.

Diagrams/Grids:

Seven of the 10 squares are shaded.
 0.7 is shaded.



Four of the 10 squares are shaded.
 0.4 is shaded.



0.7 has more shaded squares than 0.4 . Therefore, $0.7 > 0.4$.

To compare a number out of 100 with a number out of 10, *add a zero to the end of the number out of 10*. The additional zero is a place holder and does not change the value of the number.

For example: 50 cents can be expressed as $\$0.50$ or $\$0.5$.
Both can be expressed as $50/100$.
 $0.50 = 0.5$

Examples

- Compare 0.5 and 0.30.
Ignore the decimal point and the zero to the left of the decimal point.
Which number has the greater value, 30 or 50?
50 is greater.
0.50 is greater than 0.30.
 $0.5 > 0.30$
- Compare 0.65 and 0.4.
Which number has the greater value, 65 or 40?
65 is greater.
0.65 is greater than 0.40.
 $0.65 > 0.4$
- Compare 0.07 and 0.7.
Which number has the greater value, 7 or 70?
70 is greater.
0.70 is greater than 0.07.
 $0.7 > 0.07$

Examples

Some decimal numbers can be difficult to put in order because many of the digits are the same. For example:

12.3

12.03

12.31

To determine which is greater, begin by comparing the digits farthest left and move to the right, comparing each place value. A chart can help.



Number	Tens	Ones	•	Tenths	Hundredths
12.3	1	2	•	3	0
12.03	1	2	•	0	3
12.31	1	2	•	3	1

Hint: Tenths are bigger than hundredths.

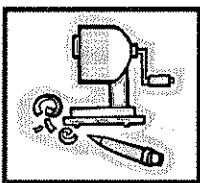
To compare similar numbers, follow the steps on the next page. Refer to the numbers in the above chart.

Explanation	Example
1. Add zeros to the right to ensure that all numbers have the same number of digits after the decimal.	12.3 becomes 12.30.
2. Compare the digits in the tens position.	All of the numbers have a 1 in the tens position.
3. Compare the digits in the ones position.	All of the numbers have a 2 in the ones position.
4. Compare the digits in the tenths position.	The tenths column has: 3 0 3
5. Compare the digits of the remaining 2 numbers in the hundredths position.	1 is larger than 0, so 12.31 is greater than 12.30

The order of the numbers, from least to greatest, is: 12.03, 12.3, 12.31

Think About ...

How do you think being able to tell what number is greater or smaller can help you at **home**, in your **community** and in the **workplace**?



Practice: Comparing Decimals

1. Compare the following and indicate which is greater.

- a) 0.8 or 0.80
- b) 0.47 or 0.4
- c) 0.05 or 0.5
- d) 0.6 or 0.61
- e) 0.22 or 2.2
- f) 0.41 or 0.05
- g) 0.75 or 0.77
- h) 0.9 or 0.90

2. Gather information about temperatures using a variety of sources, such as newspapers, other media, a library or the Internet. Locate a map that identifies a variety of temperatures, either within one city over a period of time or a number of different cities in a specific time frame.

Select temperatures that are reported to the nearest tenth of a degree (one number to the right of the decimal).

Print or make a copy of the map you are using. Order the temperatures from highest to lowest and list the locations.



3. Gather data about temperatures using a thermometer. Place containers of water throughout the school, inside and outside. Take the initial temperatures. Leave the containers for a set time and take the temperatures again. Record the initial and final temperatures on a chart. Compare and order the temperatures.

Develop a set of questions to discuss with your classmates about the changes in temperatures throughout the time period, such as:

- At which location did the temperature change the most? The least?

Write a summary statement about the data collected.

Use the data to develop graphs.



4. a) Write the temperatures in the chart below.

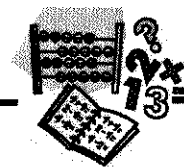
Temp.	Tens	Ones	•	Tenths	Hundredths
26.02°C			•		
25.02°C			•		
26.2°C			•		
26.24°C			•		
25.21°C			•		

b) Compare and write the temperatures in order from least to greatest on the lines below.

Order of temperatures from least to greatest:

_____ , _____ , _____ , _____ , _____

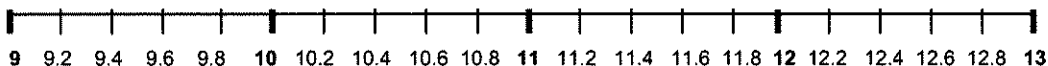
Rounding Decimal Numbers



Rounding decimal numbers is a good strategy to use when estimating amounts, such as the cost of items in a store.

Decimal numbers represent parts of whole numbers, similar to fractions.

In the number line below, the **bold** numbers are **whole numbers**. The other numbers are **decimal numbers** — they have a decimal point in them.



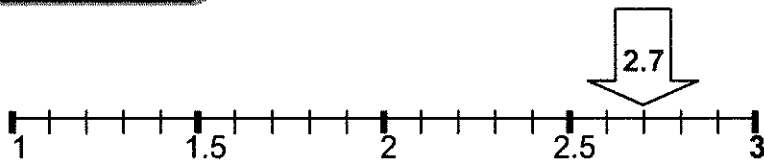
Think: Why is the number line broken into four equal parts between each whole number? Remember what you know about intervals. Notice how the decimals count up by 2s.

Decimal numbers can be rounded using number lines. Remember that you can think of this number line as a mountain. See [Rounding Whole Numbers](#) for an example.

Rounding to the Nearest Whole Number

Examples

A) Round 2.7 to the nearest whole number.



Locate the whole numbers 2 and 3 on the number line.

Locate 2.7.

2.7 is closer to the whole number 3 than to the whole number 2.

So, 2.7 rounded to the nearest whole number is 3.

B) Round 7.4 and 7.9 to the nearest whole numbers.

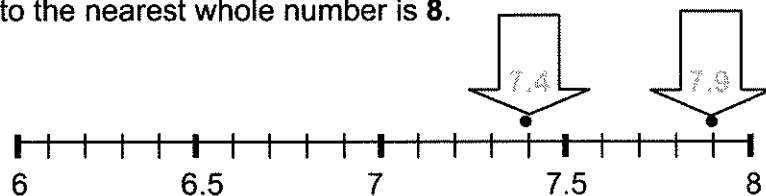
7.4 lies between 7 and 8.

7.4 is closer to the whole number 7.

7.9 is closer to the whole number 8.

So, 7.4 rounded to the nearest whole number is 7, and

7.9 rounded to the nearest whole number is 8.



When a number is halfway between two numbers, round up to the larger number.

C) Round 7.5 to the nearest whole number.

7.5 is exactly halfway between 7 and 8.

Therefore, 7.5 rounds to 8.

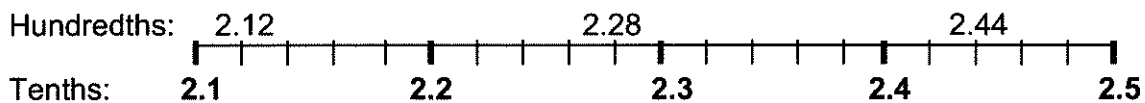
Rounding to the Nearest Tenth

To round to the nearest tenth using a number line, look at the tenth place value closest to the number you are rounding.

Example

Round 2.12, 2.28 and 2.44 to the nearest tenth.

The number line shows a calibration that increases by 0.02. The bold numbers show tenths, the numbers above are in hundredths.



2.12 is closest to **2.1** and rounds to 2.1.

2.28 is closest to **2.3** and rounds to 2.3.

2.44 is closest to **2.4** and rounds to 2.4.

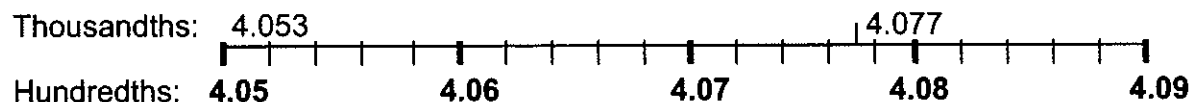
Rounding to the Nearest Hundredth

To round to the nearest hundredth using a number line, look at the hundredth place value closest to the number you are rounding.

Example

Round 4.053 and 4 to the nearest hundredths.

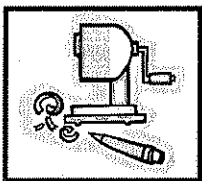
The bold numbers on this number line show numbers in the **hundredths** decimal place. The numbers above the line are in the thousandths.



4.053 lies between 4.05 and 4.06.
4.053 is closer to **4.05**, so it rounds to 4.05.

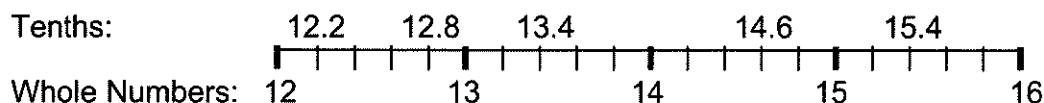
4.077 lies between 4.07 and 4.08.
4.077 is closer to **4.08** so it rounds to 4.08.

Check this out! Another strategy to use when rounding can be found in [Hints for Rounding](#).



Practice: Rounding to Whole Numbers, Tenths and Hundredths

1. Refer to the number line below. Which **whole number** is each of the following decimal numbers closest to and therefore rounds to?



- a) 12.2 is closest to the whole number 12 and rounds to 12.
- b) 15.4 is closest to the whole number and rounds to .
- c) 14.6 is closest to the whole number and rounds to .
- d) 13.4 is closest to the whole number and rounds to .
- e) 12.8 is closest to the whole number and rounds to .
2. Create a rule to help determine which **whole number** a decimal number is closest to. (Hint: Look at the number to the right of the decimal point.)
- Compare your rule to that of a classmate.

3. Round the decimal numbers to the nearest **tenth** using a number line.



- a) 8.13 is closest to 8.1 and rounds to 8.1.
- b) 8.37 is closest to and rounds to .
- c) 8.32 is closest to and rounds to .
- d) 8.45 is closest to and rounds to .
- e) 8.21 is closest to and rounds to .

4. Create a rule to help determine which **tenth** a decimal number is closest to. (Hint: Look at the second number to the right of the decimal point.)

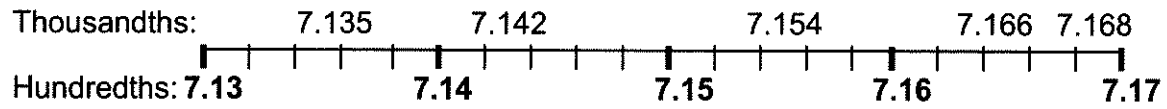
Discuss your rule with your teacher or a classmate.

Remember, a number exactly in the middle of two other numbers rounds up.

5. Michael works at a stockyard. His job is to weigh each of the calves as they are brought in. He must record the mass of each calf to the nearest **tenth** of a kilogram. Round each mass to the nearest tenth and place the answer in the blanks. The first one has been done for you.

Calf Mass (in kg)	Calf Mass to the Nearest Tenth of a kg
83.37	83.4
78.92	
66.09	
75.24	
93.55	
69.38	
86.73	
90.36	
62.51	
89.66	
76.34	
76.19	
97.88	

6. Use the number line to round the decimal numbers to the nearest **hundredth**.



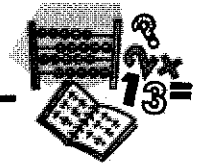
- a) 7.168 is closest to 7.17 and rounds to 7.17.
- b) 7.142 is closest to and rounds to .
- c) 7.166 is closest to and rounds to .
- d) 7.154 is closest to and rounds to .
- e) 7.135 is closest to and rounds to .

7. In downhill skiing competitions, times are often only hundredths of a second apart. Look at the following times and round them to the nearest hundredth of a second. The first time has been done for you.



Downhill Skiing Times	Downhill Skiing Times Rounded to the Nearest Hundredth of a Second
56.286	56.29
56.174	
55.359	
55.431	
56.747	
55.322	
57.453	
55.980	
57.455	
56.768	
55.719	
58.343	
56.657	

Adding and Subtracting Decimal Numbers



There are three ways to add and subtract decimals: paper and pencil method, a calculator, and manipulatives and drawings.

Adding and Subtracting Decimals Using Paper/Pencil Method

Line up the decimals when adding and subtracting to put the digits in their correct place value column (e.g., tens above tens, tenths above tenths). Use rounding or other methods to check your answers for reasonableness.

Examples

Addition:

$$\begin{array}{r} \$12.34 \\ +18.51 \\ \hline \$30.85 \end{array}$$

Subtraction:

$$\begin{array}{r} \$38.84 \\ -24.51 \\ \hline \$14.33 \end{array}$$

Adding and Subtracting Decimals Using a Calculator

Use the decimal key on your calculator to place a decimal in a number.

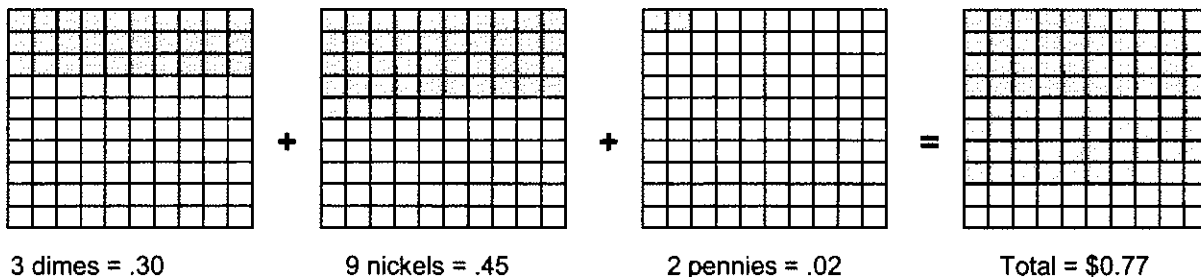
Example

1	2	.	3	4	+	1	8	.	5	1	=	30.85
---	---	---	---	---	---	---	---	---	---	---	---	-------

Adding and Subtracting Decimals Using Drawings or Manipulatives

Example

Sarah has 3 dimes, 9 nickels and 2 pennies. Use base 10 blocks, manipulatives or another strategy to figure out how much money she has.



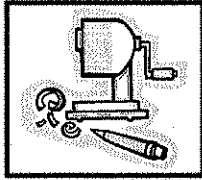
Money can be represented on a place value chart.

\$	Hundreds	Tens	Ones	•	Tenths (dimes)	Hundredths (pennies)	Word Form
\$		2	6	•	7	9	twenty-six dollars and seventy-nine cents
\$	1	8	3	•	5	2	one hundred eighty-three dollars and fifty-two cents

Think About ...

Have you ever had a sales clerk count back your change to you? Counting back is when a person starts at the cost of the item adds the change until they reach the amount given to them, for example:

Item cost \$7.25. You gave \$10.00. Clerk counts back “75 cents is \$8.00 and two dollars makes \$10.00”. The clerk gave 2 dollars and 75 cents change.



Practice: Adding and Subtracting Decimals

1. Solve two of the addition and two of the subtraction questions below using the pencil and paper method. Apply one or several other strategies, such as drawing a diagram, using manipulatives or using a calculator, to solve the other questions.

Check each of your answers. Use one or several strategies to check your answers, such as estimation, opposite operation or a calculator.

- a) $\$34.46 + \$86.23 =$ f) $\$86.23 - \$34.46 =$
b) $\$45.60 + \$29.30 =$ g) $\$45.60 - \$29.30 =$
c) $\$86.27 + \$13.66 =$ h) $\$86.27 - \$13.66 =$
d) $\$34.47 + \$98.38 =$ i) $\$98.38 - \$34.47 =$
e) $\$17.52 + \$63.31 =$ j) $\$63.31 - \$17.52 =$

2. a) Calculate the total cost of the following bill without GST.

Item	Price
Milk	\$3.46
Lettuce	\$2.18
Apples	\$3.74
Potatoes	\$1.05
Corn	\$2.96
Total	



- b) Estimate the GST (7%) on the bill. Use a calculator or another method to check your answers.

3. Solve the following problems. Include a summary statement.

- a) Karen and her class are collecting money for a school picnic. By Tuesday, they had collected \$65.89. On Wednesday, she collected the following amounts: \$3.45, \$5.68, \$10.50, \$7.08 and \$8.53. How much money do Karen and her class have in total?

If Karen's class had a goal to contribute \$125.00, how much more money do they need to collect?

- b) Gerald is building a fence around a yard. He took the following measurements. How much wire should Gerald buy? How much should he buy if he wants to go around the yard twice?

10.67 m, 3.43 m, 12 m, 13.09 m, 4.92 m

- c) Jan drove the following distances while doing errands and visiting friends one week. How many kilometres did Jan travel during that week?

122.1 km, 32.02 km, 116.98 km, 48 km

- d) Liam packages cabbages in a food store. The packages cannot be greater than 7 kg. In one hour, he lifted, weighed and stored five packages of cabbages with the following masses.

6.91 kg, 6.39 kg, 5.97 kg, 6.72 kg, 6.9 kg

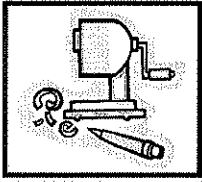
How many kilograms in total did Liam lift during the hour?

- e) Lee earned \$67.45 in tips during his shift at the restaurant. How much money did Lee have left after he paid his friend the \$25.00 he owed her?

- f) Nicole works part-time at a car rental company. When cars are returned, she records their mileage. How many kilometres did the customer drive if Nicole recorded 6037.42 km before the car was rented and 7400.09 km when the car was returned?

- g) Andrew bought a used exhaust system for his car. He gave the parts person \$200.00 and received \$15.67 change. How much did the exhaust system cost?

Use an appropriate strategy to look back and check your solutions for accuracy.




Practice: Making Change

1. Lydia bought some candy and received \$0.36 change from a dollar coin. What are the possible combinations of coins that Lydia could have received?
2. Bryan found \$2.06 when he cleaned out his school locker. What are all the possible combinations of coins he could have?



Compare and discuss your combinations with a classmate or your teacher.

3. Create situations that will challenge your classmates to identify the greatest possible combinations of coins for money values below \$3.00.
4. Draw or use coins to show how much change would be given for each situation.

	Amount of money customer gives	Cost of the item	Change
a)	\$3.00	\$2.45	
b)	\$2.00	\$0.69	
c)	\$5.00	\$3.80	
d)	\$10.00	\$8.45	
e)	\$7.00	\$5.50	

	Amount of money customer gives	Cost of the item	Change
f)	\$7.50	\$7.33	
g)	\$12.00	\$11.82	
h)	\$1.25	\$1.12	

Multiplying and Dividing Decimal Numbers



Multiplying and Dividing by 10, 100 and 1000

Moving decimals to the left or right when multiplying or dividing by 10, 100 and 1000 will help calculate solutions when using mind math.

When multiplying decimal numbers by 10, 100 and 1000, the decimal is moved to the right and zeros are used to fill in the spaces.

Examples

A) $3.2 \times 10 = 32$
 $3.2 \times 100 = 320$
 $3.2 \times 1000 = 3200$

The decimal is moved one space to the right.
The decimal is moved two spaces to the right.
The decimal is moved three spaces to the right.

B) $4.69 \times 10 = 46.9$
 $4.69 \times 100 = 469$
 $4.69 \times 1000 = 4690$

The decimal is moved one space to the right.
The decimal is moved two spaces to the right.
The decimal is moved three spaces to the right.

When dividing decimal numbers by 10, 100 and 1000, the decimal is moved to the left and zeros are used as placeholders.

Examples

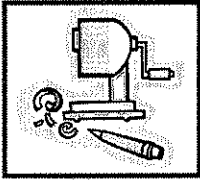
A) $2 \div 10 = 0.2$
 $2 \div 100 = 0.02$
 $2 \div 1000 = 0.002$

The decimal is moved one space to the left.
The decimal is moved two spaces to the left.
The decimal is moved three spaces to the left.

B) $4.1 \div 10 = 0.41$
 $4.1 \div 100 = 0.041$
 $4.1 \div 1000 = 0.0041$

The decimal is moved one space to the left.
The decimal is moved two spaces to the left.
The decimal is moved three spaces to the left.

Discuss the pattern of how many spaces to move the decimal with your teacher or a classmate.



Practice: Multiplying and Dividing Decimal Numbers by 10, 100 and 1000

1. Solve the following using mind math and discuss your answers with a classmate.

a) 14.6×10

b) 0.3×100

c) 9.69×1000

d) 1.03×100

e) 16.74×1000

f) 2.03×10

2. Discuss the pattern of how many spaces to move the decimal with your teacher or a classmate.

$$3.76 \div 10 = 0.376$$

$$16.4 \div 10 = 1.64$$

$$3.76 \div 100 = 0.0376$$

$$16.4 \div 100 = 0.164$$

$$3.76 \div 1000 = 0.00376$$

$$16.4 \div 1000 = 0.0164$$

3. Solve the following using mind math and discuss your answers with a classmate.

a) $3.8 \div 100$

b) $14.69 \div 10$

c) $47 \div 1000$

d) $98.4 \div 1000$

e) $5.1 \div 10$

f) $22.7 \div 100$

4. Solve the following using mind math and by moving decimals.

Decimal number	Operation (\times or \div)	Number	=	Answer
2.30	\times	100	=	
	\times	10	=	4600
7800	\div		=	780
6.6	\times		=	6600
34.600	\div	100	=	0.346
	\div	1000	=	130
0.3	\times	100	=	
5.6	\div	10	=	
	\times	1000	=	3500
800	\times		=	8000
4900	\div		=	49.0
30	\times		=	30 000
	\div	100	=	18
400	\times	10	=	
750 000	\div	1000	=	
3000	\div		=	0.3

5. Frederick works for a catering company. Many people call him to get estimates for catered wedding dinners. Use mind math strategies to fill in the total cost that Frederick gave to each person who phoned him.

Number of guests	Price per person	Total cost
30	\$10.00 (think 10)	
500	\$8.00 (think 8)	
1000	\$9.00 (think 9)	
40	\$12.00 (think 12)	
200	\$15.00 (think 15)	

6. Jena is in charge of organizing a school-wide luncheon for students. She contacted a number of different caterers to get some prices. Use mind math and complete the blanks in the table below to calculate the cost per student.

Total cost	Number of students	Cost per student
\$2500	100	
\$800	200	
\$180	60	
\$350	50	
\$400	50	

Multiplying Decimal Numbers

Solutions to problems can be estimated or calculated accurately using a variety of strategies.

Estimating Solutions by Rounding Decimals

Example

Use rounding to estimate how much 12.50×15.24 is.

- 12.50 rounds to the whole number 13.
- 15.24 rounds to the whole number 15.

Multiply 15×13 to provide an estimated answer.

$$15 \times 13 = 195$$

OR

Round to multiples of 10 and then multiply.

- 15 rounds to 20.
- 13 rounds to 10.

$$20 \times 10 = 200.$$

(The accurate answer is $12.50 \times 15.24 = 190.5$.)

Multiplying Decimals Using Paper/Pencil Method

Start by using the same strategies as when multiplying numbers that are not decimals.

Then, to place the decimal correctly in the product, count the number of digits to the right of the decimal in the multiplicand and the multiplier.

Example

$$\begin{array}{r} 4.31 \\ \times 1.2 \\ \hline 862 \\ 4310 \\ \hline 5.172 \end{array}$$

4.31 has 2 digits to the right of the decimal.

1.2 has 1 digit to the right of the decimal.

Place the decimal so the product has the same number of digits to the right of the decimal (3).

Multiplying Decimals Using a Calculator



Enter each number with the decimal. Insert the decimal using the decimal function.

Dividing Decimal Numbers

Solutions to division problems can be estimated or calculated using a variety of strategies.

Dividing Decimals Using Paper/Pencil Method

Start by using the same strategies as when dividing numbers that are not decimals.

Example

$$\begin{array}{r} 3.6 \\ 2 \overline{) 7.2} \\ \underline{6} \\ 1 \\ \underline{1} \\ 0 \end{array}$$

Then, place the decimal directly above its position in the original question.

Divide as with whole numbers.



Dividing Decimals Using a Calculator

Enter the dividend, the division sign, the divisor and the equal sign. Enter a decimal as it is placed in the numbers you are dividing.

$$47.3 \div 3.9 = 12.128$$

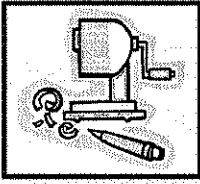
Think About ...

In what kinds of jobs do people use calculators on a daily basis?

Think about why the following people would need to use a calculator in the workplace:

nurse
pipefitter
insurance agent

carpenter
building supply store manager
bank teller



Practice: Multiplying and Dividing Decimal Numbers

Estimate, then calculate, solutions to the following problems.

1. Wu has a part-time job supervising a children's ride at an amusement park. His hourly wage is \$7.56. He works 24.5 hours per week. Estimate and then calculate Wu's weekly wage.

Estimate	Calculate

How much money would Wu earn if he worked for 7 weeks?

2. Wendy bought 164.26 m^2 of carpet at $\$5.40/\text{m}^2$. How much money did Wendy spend on carpet?

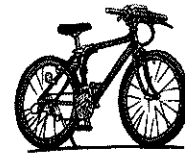
Estimate	Calculate

3. Gary's 3 dogs weigh 56.35 kg, 42.12 kg and 23.47 kg. How many kilograms do the dogs weigh in total?



Estimate	Calculate

4. Sandy bicycled 32.47 km every day for 4 days. How many kilometres did she bike in total?



Estimate	Calculate

5. Cindy spread 240.76 kg of fertilizer over 72 acres. How much fertilizer per acre did she use?

Estimate	Calculate

6. Pedro worked 27 hours one week. He earned \$168.75. How much did Pedro earn per hour?

Estimate	Calculate

7. Heather's honeybees produced 62.75 kg of honey. If she has 15 hives, how much honey did each hive produce?



Estimate	Calculate

Use appropriate strategies to look back and check your solutions for accuracy.

8. Round the decimals to the nearest whole number or multiple of 10, then estimate solutions for the following questions. Calculate exact answers using paper and pencil or a calculator. The first one is done for you.

a) $16.33 \times 18.56 =$

Rounded: $16 \times 19 = 304$

or: $20 \times 20 = 400$

Actual: $16.33 \times 18.56 =$ _____

b) $25.12 \times 36.98 =$

Rounded: _____ \times _____ = _____

Actual: $25.12 \times 36.98 =$ _____

c) $45.58 \div 15.26 =$

Rounded: _____ \div _____ = _____

Actual: $45.58 \div 15.26 =$ _____

d) $56.28 \div 8.04 =$

Rounded: _____ \div _____ = _____

Actual: $56.28 \div 8.04 =$ _____

e) $12.37 \times 2.05 =$

Rounded: _____ \div _____ = _____

Actual: $12.37 \times 2.05 =$ _____

f) $78.92 \div 10.27 =$

Rounded: _____ \div _____ = _____

Actual: $78.92 \div 10.27 =$ _____

g) $15.31 \times 38.45 =$

Rounded: _____ \times _____ = _____

Actual: $15.31 \times 38.45 =$ _____

h) $22.89 \times 21.09 =$

Rounded: _____ \times _____ = _____

Actual: $22.89 \times 21.09 =$ _____

i) $96.22 \div 21.14 =$

Rounded: _____ \div _____ = _____

Actual: $96.22 \div 21.14 =$ _____

9. a) Anna is a carpet installer. She has obtained the following measurements for different rooms in her client's home. For each measurement, estimate (to the nearest whole number) the amount of carpet required. Then, calculate the actual amount of carpet required. Round your answer to the nearest tenth.

Room	Length	Width	Estimate (to nearest whole number)	Actual answer in m ² (Area)	Round actual to nearest tenth
Living Room	8.34 m	6.06 m			
Den	4.048 m	3.658 m			
Bedroom #1	6.989 m	5.387 m			
Bedroom #2	4.25 m	3.69 m			

- b) Record each of your answers in a complete sentence.

1. Living Room _____
2. Den _____
3. Bedroom #1 _____
4. Bedroom #2 _____

- c) If the carpet costs \$7.45/m², use the rounded numbers from the column on the right in the table to calculate the cost of the carpet.

10. Find a partner. Each partner should write down a number that has two digits to the right of the decimal point. Exchange papers and round each number to the nearest whole number. Then multiply the two estimates together. Check your answer using a calculator or pencil and paper.

Discuss the reasonableness of your estimate. Repeat the above steps several times, taking turns deciding on the number of digits to the right of the decimal and rounding place value.

