

## WARM-UP ACTIVITY – Introduction

**W**hich answer seems more reasonable? Explain.

- The sum of 3.2, .06, 19.03 and 4 is  
**a) 2.629    b) 262.9    c) 26.29    d) .2629**
- The difference between 15.32 and 20 is  
**a) 15.12    b) 35.32    c) 4.32    d) 4.68**
- The product of 7.3 and 1.002 is  
**a) 7.3146    b) 73.146    c) 8.302    d) 1.075**
- The quotient of 10.92 and 2.1 is  
**a) 0.52    b) 5.2    c) 0.0052    d) 52**
- The length of a piece of ribbon is  $\sqrt{3}$  inches. This equals:  
**a) 1.5 in    b) 9 in    c) 1.732    d) 3 in**
- The difference in  $3^2$  and  $.8^3$ , increased by  $.5^2$  is  
**a) 496    b) 52.8    c) 9.262    d) 8.738**

MA.A.3.4.1 The student understands and explains the effects of addition, subtraction, multiplication and division on real numbers, including square roots, exponents, and ~~appropriate inverse relationships~~.

# Where is the error?

7. A diagonal brace is  $8\sqrt{2}$  ft or 16 ft.

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8. \$15 less a \$3.20 discount is \$12.20

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9. A \$50 item at 50% off saves 50 cents.

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10. A deposit of \$15.35, \$7.30, and \$12 is \$22.77

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11.  $\frac{2}{5}$  of a dollar savings is 4 cents.

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12. 13 thousand dollars invested is  $1.3 \times 10^3$

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**MA.A.1.4.3** The student understands concrete and symbolic representations of rational and irrational numbers in real-world situations. Understands that numbers can be represented in a variety of equivalent forms using integers, fractions, decimals, and percents, scientific notation.

## WARM-UP ACTIVITY - Introduction

### ANSWER KEY

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- The difference between 15.32 and 20 is  
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- The length of a piece of ribbon is  $\sqrt{3}$  inches. This equals:  
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- The difference in  $3^2$  and  $.8^3$ , increased by  $.5^2$  is  
a) 496 b) 52.8 c) 9.262 **d) 8.738**

**W**here is the error?

- A diagonal brace is  $8\sqrt{2}$  ft or 16 ft.  
 $8\sqrt{2}$  is not  $8 \times 2$ , but is  $8 \times \sqrt{2}$  or  $8 \times 1.414$ , which  $\approx 11.312$  ft  
*(This answer will vary slightly if students are using scientific calculators.)*
- \$15 less a discount of \$3.20 = \$12.20 \$.20 was added instead of subtracted.
- A \$50 item at 50% off saves 50 cents. 50% is half price, not 50¢ off
- A deposit of \$15.35, \$7.30, and \$12 is \$22.77 \$12 was added as 12¢.
- $\frac{2}{5}$  of a dollar savings is 4 cents.  $\frac{2}{5}$  is  $2 \div 5 = 0.4$  or 40¢ not 4¢.

12. 13 thousand dollars invested is  $1.3 \times 10^3$  The exponent counted only zeros behind the decimal instead of digits.

## WARM-UP ACTIVITY

I. Correctly place the decimal in the answers to the following problems involving addition, subtraction, multiplication, and division. Add or drop zeros when appropriate.

1.  $3.75 + 1.2 + 5 + 7.76 + .01 = 1772$       Ans. \_\_\_\_\_

2.  $50 - 13.46 = 3654$       Ans. \_\_\_\_\_

3.  $17.6 \times .003 = 528$       Ans. \_\_\_\_\_

4.  $24.32 \div 7.6 = 230$       Ans. \_\_\_\_\_

5.  $\sqrt{5} + 5^2 = 27236$       Ans. \_\_\_\_\_

II. Rewrite the answers to the following problems using proper money notation.

6.  $\$145 - \$13.52 = 13148$       Ans. \_\_\_\_\_

7.  $\$13 + \$0.32 + \$1.45 + \$5 = 1977$       Ans. \_\_\_\_\_

8.  $\$45 \div 0.3 = 135$       Ans. \_\_\_\_\_

9.  $\$55.7 \times 0.5 = 2785$       Ans. \_\_\_\_\_

10.  $(\$9.20 - \$0.32) + \$5 = 1388$       Ans. \_\_\_\_\_



III. Find the answers to the following and leave in standard money notation.

11. 15 dollars less 2 dollars and 42 cents      Ans. \_\_\_\_\_

12. 3 dollars and twenty cents plus 4 dollars and a half      Ans. \_\_\_\_\_

13. 36 dollar item at 30% off      Ans. \_\_\_\_\_

14. 5 items purchased at 42 cents each      Ans. \_\_\_\_\_

15. Cost each if cost for 5 people is 52 dollars and a quarter      Ans. \_\_\_\_\_

## WARM-UP ACTIVITY

## ANSWER KEY

I. Correctly place the decimal in the answers to the following problems involving addition, subtraction, multiplication, and division. Add or drop zeros when appropriate.

- $3.75 + 1.2 + 5 + 7.76 + .01 = 1772$       Ans. 17.72
- $50 - 13.46 = 3654$       Ans. 36.54
- $17.6 \times .003 = 528$       Ans. 0.0528
- $24.32 \div 7.6 = 320$       Ans. 3.2
- $\sqrt{5} + 5^2$       Ans. 27.236

II. Rewrite the answers to the following problems using proper money notation.

- $\$145 - \$13.52 = 13148$       Ans.  $\$131.48$
- $\$13 + \$0.32 + \$1.45 + \$5 = 1977$       Ans.  $\$19.77$
- $\$45 \div 0.3 = 135$       Ans.  $\$150.00$
- $\$55.7 \times 0.5 = 2785$       Ans.  $\$27.85$
- $(\$9.20 - \$0.32) + \$5 = 1388$       Ans.  $\$13.88$



III. Find the answers to the following and leave in standard money notation.

- 15 dollars less 2 dollars and 42 cents      Ans.  $\$12.58$
- 3 dollars and twenty cents plus 4 dollars and a half      Ans.  $\$7.70$
- Amount of discount of 36 dollar item at 30% off      Ans.  $\$10.8$
- 5 items purchased at 42 cents each      Ans.  $\$2.10$
- Cost each if cost for 5 people is 52 dollars and a quarter      Ans.  $\$10.45$

**PROBLEM #1**



Many carpet cleaners charge according to the area of the carpet, often calculated to the nearest tenth of a square foot. They also vary their price according to the difficulty of the particular carpet. Determine the total cost of the following job:

<u>Type of Carpet</u>	<u>Area (sq ft)</u>	<u>Cost per sq ft</u>
Wall-to-wall short pile	418	24¢
Wall-to-wall deep shag	268	30¢
Area rug on premises	177.4	40¢
Area rug at plant	209.8	75¢

**PROBLEM #2**



To calculate the total cost of a carpeting job, a decorator finds the retail cost of all materials. Tax can be charged only on the wholesale cost. It is not applied to labor. Your job is to determine the total cost of the following carpeting job.

**Wholesale price of all materials:** \$18.50 per sq yd for the carpet, \$1.60 per sq yd for the pad, and \$0.35 per ft for the tacking strip.

**Total cost plus labor (before taxes):** 60 sq yds of carpet at \$24.95 per sq yd, 60 sq yds of pad at \$2.50 per sq yd, and 96 feet of tacking strip at \$0.75 per foot.

**Sales tax:** 6% of the wholesale price of all materials

**PROBLEM #3**



Since payroll taxes are not applied to sick leave, the controller must calculate the total wages for sick leave separately from the wages for all other hours. If an employee had 119 total hours, including 5.5 hours of sick leave, calculate:

- a) the sick leave wages.
- b) the wages for the remaining hours.

The employee's rate of pay is \$6.2826 per hour. (Round to nearest cent.)

**PROBLEM #4**



In a certain neighborhood, houses are valued at \$50 per sq foot, patios at \$2.50 per sq foot, driveways at 95¢ per sq foot, and fences at \$6.75 per linear foot.

Determine the value of a 1950-square-foot house with the following added features:

- 350 sq feet of patio
- 720 sq feet of driveway
- 400 feet of fence

**PROBLEM #5**



After finding the house of their dreams, Mr. & Mrs. Johnson were able to finance 80% through a local mortgage company. That means they had to come up with a 20% down payment. If the house they found is selling for \$147,900, find the following:

- a) How much is the down payment?
- b) How much will they have to finance?
- c) How much interest will they pay over 30 years at  $6\frac{1}{2}\%$ ? ( $I = prt^*$ )

\*This is the formula for simple interest: Interest = principal times rate times time.)

**PROBLEM #6**



The ABC local food mart is advertising the following specials:

Tomatoes:	1.19/lb
Bread:	1.89/loaf
Milk:	1.59/gal
Lemons:	2 for 23¢
Roast Beef:	3.98/lb
CC Cookies:	12¢ each

You purchase the following items: 2 lbs of tomatoes, a loaf of bread, a gallon of milk, 6 lemons, 2 pounds of roast beef, and 5 chocolate chip cookies. What is the total cost including a local tax of 2%? (Round to the nearest cent.)

**PROBLEM #7**



The payroll supervisor must compute the amount of withholding tax to deduct from your paycheck. You make \$575.50 per week before taxes and must pay \$5450.68 withholding tax over the course of the year. (Round to the nearest cent.)

- a) How much withholding tax must be paid per week?
  
- b) What would your weekly check be after deducting this tax?

**PROBLEM #8**

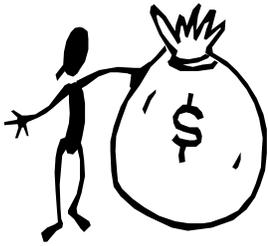
**It's vacation time!**



You have booked 10 nights at the Sheraton Waikiki for  $\$1.25 \times 10^2$  per night, 6 nights at the Kona Surf for  $\$1.40 \times 10^2$  per night, and 4 nights at the Maui Marriott for  $\$1.75 \times 10^2$  per night. Average cost for meals is \$50 per day. The round trip airline ticket of \$956 is a major expense. You have a special motel discount card that saves 20% on each night's hotel stay. Find the total cost of the vacation.

## ANSWER KEY FOR GROUP ACTIVITY

1.  $418 \times 0.24 = \$100.32$       The effect of multiplication and addition increases the cost.  
 $268 \times 0.30 = 80.40$   
 $177.4 \times 0.40 = 70.96$   
 $209.8 \times 0.75 = \underline{157.35}$   
**\$409.03**
  
2. Total cost inc. labor:  $60 \times \$24.95 = \$1497.00$       Sales Tax:  $6\% = 0.06$   
 $60 \times \$2.50 = 150.00$        $0.06 \times \$1233.6 = \underline{\$74.02}$   
 $96 \times 0.75 = \underline{72.00}$   
**\$1719.00**      The effect of multiplication and addition increases the cost.  
 Wholesale price:  $60 \times \$18.50 = \$1110.00$   
 (materials only)  $60 \times \$1.60 = 90.00$   
 $96 \times 0.75 = \underline{33.60}$   
**\$1233.60**  
 Total cost including tax =  $\$1719.00 + \$74.02 = \underline{\$1793.02}$
  
3. Sick leave wages:  $5.5 \times \$6.2826 = 34.5543 \approx \underline{\$34.55}$       The effect of multiplication increases the wages. The effect of subtraction decreases the # of hours taxed.  
 Remaining hours:  $119 - 5.5 = 113.5$   
 Remaining wages:  $113.5 \times \$6.2826 = \$713.0751 \approx \underline{\$713.08}$
  
4. House:  $1950 \times \$50 = \$97,500$       The effect of multiplication and addition increases the value of the house.  
 Patio:  $350 \times \$2.50 = 875$   
 Driveway:  $720 \times \$0.95 = 684$   
 Fence:  $400 \times \$6.75 = \underline{2,700}$   
**\$101,759**
  
5. a) Down Payment:  $\$147,900 \times .20 = \underline{\$29,580}$       The effect of multiplying by a decimal reduces the amount financed. The effect of multiplying over a per of yrs increases the total interest paid.  
 b) Amount Financed:  $\$147,900 \times .80 = \underline{\$118,320}$   
 c) Interest Paid:  $\$118,320 \times 30 \times .065 = \underline{\$230,724}$
  
6. 2 lbs of tomatoes:  $2 \times 1.19 = \$2.38$       Local tax:  $2\% = .02$   
 1 loaf of bread:  $1.89$        $\$15.11 \times .02 \approx \underline{\$0.30}$   
 1 gal of milk :  $1.59$   
 6 lemons:  $3 \times .23 = .69$       Total Cost:  $\$15.11 + 0.30 = \underline{\$15.41}$   
 2 lbs roast beef:  $2 \times 3.98 = 7.96$       The effect of multiplication and addition increases the cost.  
 5 CC cookies:  $5 \times .12 = \underline{.60}$   
**\$15.11**
  
7. a) 1 year = 52 weeks      The effect of division lowers the weekly amount as compared to the yearly. The effect of subtraction reduces the amount of the weekly check.  
 $\$5450.68 \div 52 \approx \underline{\$104.82}$   
 b)  $\$575.50 - 104.82 = \underline{\$470.68}$
  
8.  $\$1.25 \times 10^2 = \$125$  per night  $\times 10 = \$1250$       20 days  $\times \$50$  a day for meals =  $1000$   
 $\$1.40 \times 10^2 = \$140$  per night  $\times 6 = 840$       Airline ticket:  $= 956$   
 $\$1.75 \times 10^2 = \$175$  per night  $\times 4 = 700$        $\$1956$   
 Total for Hotel =  $\$2790$       The effects of mult. & add. increase the cost.  
 Less 20% discount for hotel stay:  $\$2790 \times .20 = \$558$ .  $\$2790 - 558 = \$2232 + \$1956 = \underline{\$4188}$   
 (Student **responses** will vary. Check for clearly defined explanations demonstrating understanding of concepts!)



## 'DECIMALS MAKE CENTS' PROBLEM SOLVING

Name \_\_\_\_\_

**Directions:** Solve the following problems involving concrete and symbolic representations of rational numbers in real-world situations. Show all work and watch the decimal point! Answers only are not acceptable. Explanations must be clearly defined demonstrating understanding of the effects of operations on real numbers. (Irrational numbers are not addressed in this lesson.)

1. How much would you save on a \$5.25 item marked on sale at 30% off?



2. How much would you pay for a new automobile selling for \$14,299 if the tax rate were  $7\frac{1}{2}\%$ ?



3. You received a refund check that showed \$3550 in the amount and thirty-five dollars and 50 cents written in the legal line. Explain what is wrong with the numerical amount and demonstrate how it should be written correctly.



4. You have been saving all year for a new stereo system. If you put 3 dimes, 2 nickels, and 5 quarters a day in your piggy bank, how much would you have at the end of the year?



5. A diagonal brace needs to be replaced that supports a 3' x 6' gate. If the required length of the brace is  $3\sqrt{5}$  feet, how much would it cost to add the brace if lumber costs \$2.37 per foot? Round answer to the nearest cent.



6. Calculate the total cost, excluding fees and taxes, of the following special vacation package for two to Lucaya Beach and Golf Resort in the Bahamas.



Hotel accommodations: 4 days/3 nights for \$192, double occupancy\*

Airfare from Miami: \$94.75 per person

Meals: \$47.50 per person per day

Taxi: 95¢ per mile (minimum of 90 miles)

Souvenirs: \$150 per person

\*The hotel accommodations are a flat rate for 2 people all nights.

7. You need to purchase a camcorder to take on your vacation. The best deal in town is the Cammy Cam. A special sale advertises the camera at 35% off the regular price of \$399.95.



a) What is the sale price of the camera?

b) What is the total purchase price of the camera on sale if the sales tax rate is  $7\frac{1}{2}\%$ ?

8. You recently cashed in 36 shares of very expensive stock. If the price of the stock was listed at  $\$3.78 \times 10^2$  per share, how much cash did you receive?





# ‘DECIMALS MAKE CENTS’ PROBLEM SOLVING ANSWER KEY

Students are required to show all work. Answers only are not acceptable. Explanations must be clearly defined demonstrating understanding of the effects of operations on real numbers. Therefore, this answer key serves only as a guide since student responses will vary. It is of teacher discretion how many of these problems to require students to solve. It is not the number of problems assigned that is the issue, but the students’ demonstration of the understanding of concepts being clearly defined!

1.  $30\% = 0.30$

30% represents ‘a fraction of’ so multiplication will determine the amount of savings.

$$\$5.25 \times .30 = \$1.575 \approx \underline{\$1.58 \text{ Saved}}$$

2. Tax is a percentage of a number. Therefore multiplication will determine the amount of tax to be added which increases the total price.

$$7\frac{1}{2}\% = 0.075$$

$$\$14,299 \times 0.075 = \$1072.425 \approx \$1072.43 \text{ Sales Tax}$$

$$\$14,200 + 1072.43 = \underline{\$15371.43 \text{ Total Price}}$$

3. \$3550 represents a numerical amount equal to 3 thousand 5 hundred 50 dollars. The actual amount written is 35 dollars and 50 cents. The decimal point should be placed between the two 5’s. **\$35.50**

4. Savings over the course of a period of time will increase as more money is added. Since multiplication is a shortcut for addition, the amount saved will increase as time goes on.

$$3 \text{ dimes, } 2 \text{ nickels, } 5 \text{ quarters} = 3(0.10) + 2(0.05) + 5(0.25) = 0.30 + 0.10 + 1.25 = \$1.65 \text{ saved daily}$$

$$365 \text{ days} = 1 \text{ year}$$

$$\$1.65 \times 365 = \underline{\$602.25 \text{ Saved by the end of the year}}$$

5. Converting  $3\sqrt{5}$  feet to a decimal requires the understanding of the meaning of square root. The square root of 5 is a decimal less than 5 since this is a division process.  $3\sqrt{5}$  means 3 times the square root of 5 which is a multiplication process increasing the amount. Since fencing costs \$2.37 per foot, this represents the cost for one foot of fencing. Multiplying the length needed by the cost of one foot increases the cost.

$$3\sqrt{5} \approx 3(2.236) \approx 6.708$$

$$6.708 \times \$2.37 = \$15.89796 \approx \underline{\$15.90 \text{ Total Cost}}$$

## Decimals Make Cents Problem Solving

6.

Hotel accommodations:	4 days/3 nights for \$192, double occupancy	=	\$192.00
Airfare from Miami:	\$94.75 per person = $94.75 \times 2$	=	189.50
Meals:	\$47.50 per person per day = $47.50 \times 2 \times 4$	=	380.00
Taxi:	95¢ per mile (min of 90 miles) = $90 \times 0.95$	=	85.50
Souvenirs:	\$150 per person = $150 \times 2$	=	<u>300.00</u>
	<b>TOTAL COST</b>	=	<b><u>\$1147.00</u></b>

The hotel accommodations are a flat rate. The airfare and cost for souvenirs double since they are quoted for one person. Since the meal quote is for one person per day, the total cost for meals increases because of the multiplication factor. The taxi fare increase because it must be multiplied for the minimum number of miles since the rate is based on one mile. The effect of addition increases the total cost of the vacation package.

7.

35% off the regular price of \$399.95 requires multiplying by a decimal, which will produce a lesser amount.

$$.35 \times 399.95 = \$139.9825 \approx \$139.98$$

Subtracting the amount reduced from the regular price will produce the sale price, which is a reduction, lowering the price.

$$\$399.95 - 139.98 = \underline{\$259.97 \text{ Sale Price}}$$

Calculating the sales tax requires multiplying by a decimal, which will produce a lesser amount.

$$\$259.97 \times 0.075 = \$19.49775 \approx \$19.50$$

Adding the sales tax to the discount price will increase the cost.

$$\$259.97 + \$19.50 = \underline{\$279.20 \text{ Total Purchase Price}}$$

8.

The symbolic representation  $\$3.78 \times 10^2$  per share is \$378 expressed in scientific notation. Multiplying by a power of 10 moves the decimal to the right increasing the amount. Since this is the price of one share, multiplying by the total number of shares will result in a much larger amount of money.

$$36 \times \$378 = \underline{\$13,608 \text{ Cash}}$$