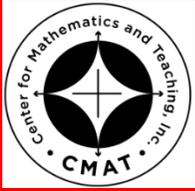


Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_



**Mathlinks**

**6-9**

STUDENT PACKET

**MATHLINKS: GRADE 6  
STUDENT PACKET 9  
EXPRESSIONS AND EQUATIONS 1**

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<b>9.1</b>	<b>Introduction to Variables and Expressions</b>	<b>1</b>
	<ul style="list-style-type: none"><li>• Solve problems involving money and decimals.</li><li>• Use variables in expressions.</li><li>• Use the distributive property and the conventions for order of operations to evaluate expressions.</li><li>• Write verbal statements numerically and symbolically.</li></ul>	
<hr/>		
<b>9.2</b>	<b>Equations</b>	<b>9</b>
	<ul style="list-style-type: none"><li>• Solve problems involving money and decimals.</li><li>• Use variables in equations.</li><li>• Select values of variables from a specified set that make equations true.</li><li>• Write verbal statements numerically and symbolically.</li></ul>	
<hr/>		
<b>9.3</b>	<b>Inequalities</b>	<b>15</b>
	<ul style="list-style-type: none"><li>• Solve problems involving money and decimals.</li><li>• Determine whether inequalities are true or false.</li><li>• Select values of variables from a specified set that make inequalities true.</li><li>• Find and write solutions to inequalities.</li></ul>	
<hr/>		
<b>9.4</b>	<b>Skill Builders, Vocabulary, and Review</b>	<b>19</b>

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# WORD BANK

Word or Phrase	Definition or Description	Example or Picture
coefficient		
constant term		
expression		
equation		
factor		
inequality		
like terms		
product		
terms		
variable		

# INTRODUCTION TO VARIABLES AND EXPRESSIONS

**Summary**

We will write and evaluate algebraic expressions. We will represent the costs of items on a menu algebraically. We will translate verbal statements into numerical or variable expressions.

**Goals**

- Solve problems involving money and decimals.
- Use variables in expressions.
- Use the distributive property and the conventions for order of operations to evaluate expressions.
- Write verbal statements numerically and symbolically.

### Warmup

**Vocabulary Review**

For the equation  $3 \cdot 8 = 24$ , 3 and 8 are factors, and 24 is the product.  
 For the equation  $3(2 + 6) = 24$ , 3 and  $(2 + 6)$  are the factors, and 24 is the product.

Fill in the table below.

Equation	Factors	Product
1. $60 = 12 \cdot 5$		
2. $6(19 - 11) = 48$		
3. $49 = (2 + 5)(9 - 2)$		

4. One granola bar costs \$1.15. How much do 6 granola bars cost? Find your answer in two or three different ways.\*

Method 1:	Method 2:	Method 3:
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\*For all problems in this packet, we assume that tax is included.

# INTRODUCTION TO THE PIZZA SHOP

1. What do you think  $c + p$  means?

2. Define your variables below.

Let \_\_\_\_ = the cost of a \_\_\_\_\_

Menu Item	Price
<b>Pizza Slice:</b>	
Cheese .....	\$1.00
Pepperoni .....	\$1.25
<b>Drinks:</b>	
Small .....	\$0.95
Medium .....	\$1.20
Large .....	\$1.60

Your teacher will give you some algebraic expressions that represent food orders. Use the variables that you recorded above to write expressions that match each order. Evaluate each expression below by substituting the price of the items in for the variables in the expressions.

<p>3. Expression: <u>    <math>c + m</math>    </u></p> <p>Meaning:</p>   <p>Evaluate:</p>	<p>4. Expression: _____</p> <p>Meaning:</p>   <p>Evaluate:</p>
<p>5. Expression: _____</p> <p>Evaluate:</p>	<p>6. Expression: _____</p> <p>Evaluate:</p>

7. Verify that  $m + m + m = 3m$  for the given value of  $m$  in the menu above.

If the price of a medium drink was changed, would this equation still be true? \_\_\_\_\_

## INTRODUCTION TO THE PIZZA SHOP (Continued)

<b>PIZZA SHOP MENU</b> (The variable represents the cost of an item.)			
<b>Pizza</b>			<b>Drinks</b>
Cheese slice ( $c$ )	\$1.00		Small drink ( $s$ )
Pepperoni slice ( $p$ )	\$1.25		Medium drink ( $m$ )
			Large drink ( $L$ )

Evaluate expressions given to you by your teacher.

8. Expression: _____ Evaluate:	9. Expression: _____ Evaluate:
10. Expression: _____ Evaluate:	11. Expression: _____ Evaluate:

12. Verify that  $2p + p + p + 3p = 7p$  for the given value of  $p$  in the menu above.

If the price of a slice of pepperoni pizza was changed, would this equation still be true?

Follow your teacher's directions to complete the following problems.

13. My order: Expression: Evaluate:	14. _____'s order: Expression: Evaluate:
15. _____'s order: Expression: Evaluate:	16. _____'s order: Expression: Evaluate:

## ESSENTIAL VOCABULARY

Michael wanted to know the cost of a medium drink, three slices of pepperoni pizza, two more medium drinks, another slice of pepperoni pizza, and two more medium drinks.

1. Write an algebraic expression for this order:  $\underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + \underline{\hspace{1cm}}$   
} 5 terms

2. Combine like terms to create a simpler, equivalent expression.  $\underline{\hspace{1cm}} + \underline{\hspace{1cm}}$   
 How many terms are in this expression now?  $\underline{\hspace{1cm}}$

3. Explain what we mean by “like terms” in the context of problems 1 and 2.

Here is an algebraic expression:  $4x + 5$

The coefficient of the variable is 4.



The constant term is 5.



4. In problem 2 above, what is the coefficient of  $p$  in Michael’s order?  $\underline{\hspace{1cm}}$

5. Does Michael’s order have a constant term?  $\underline{\hspace{1cm}}$

Write true or false for each statement below.

6. The coefficient of  $y$  in the expression  $y + 8$  is 1.

7. The expression  $2x + 6 + x + 4$  has two terms.

8. After using the distributive property, the expression  $4(x + 3)$  has two factors and three terms.

9. Michael’s expression above is equivalent to  $2p + 2p + 3m + 2m$ .

10. Choose one of the false statements above and explain why it is false.

## ESSENTIAL VOCABULARY (Continued)

If possible, simplify the given expressions or apply the distributive property. Then complete the table below.

Expression (Simplify first if possible.)	Number of terms	Constant term(s)	Term(s) with variables	Coefficient of the variable(s)
11. $2m + 10n + 1$				
12. $11r$		none		
13. $12$				
14. $a + 2b + c + 4$			$a, 2b, c$	$1, 2, 1$
15. $a + 2b + a + 4b$	2			
16. $y + 2y + y + 6$				
17. $3(x + 2)$				
18. $2(3x + 5)$				

19. Manoj says the expressions  $2m$  and  $2 + m$  are equivalent, because if  $m = 2$ ,  $2m = 4$  and  $2 + m = 4$ . Why is Manoj incorrect?

20. Consider the expression  $5(n + n + 6 + 1)$ .

- a. Simplify the expression in parenthesis. \_\_\_\_\_
- b. Write each factor (use your answer in part a here). \_\_\_\_\_
- c. Write the expression as a sum of two terms. \_\_\_\_\_
- d. For part c above, circle the constant term and box the variable term.
- e. What is the coefficient of  $n$ ? \_\_\_\_\_

## PIZZA SHOP EXPRESSIONS

<b>PIZZA SHOP MENU</b> (The variable represents the cost of an item.)			
<b>Pizza</b>		<b>Drinks</b>	
Cheese slice ( $c$ )	\$1.00	Small drink ( $s$ )	\$0.95
Pepperoni slice ( $p$ )	\$1.25	Medium drink ( $m$ )	\$1.20
		Large drink ( $L$ )	\$1.60

A group of friends decide to go to the Pizza Shop for lunch.

- Abby orders a slice of cheese pizza, a slice of pepperoni, and a medium drink.
- Barry orders two slices of pepperoni pizza and a large drink.
- Connie orders a slice of pepperoni pizza and a medium drink.
- Dee orders two slices of cheese pizza and a large drink.

In the table below, record the variable expressions representing the costs of each order separately, and then the total order.

	Expression for the cost of the order	Evaluate to find the cost
1. Abby		
2. Barry		
3. Connie		
4. Dee		
<b>5. Total</b> (in simplest form)		

6. What are the coefficients of  $p$ ,  $L$ ,  $c$ , and  $m$  in the total expression?

The Pizza Shop owner decides to take \$0.10 off the cost of each slice of pizza.

7. Write an expression for the total cost of the order, including this discount.

8. Find the cost of the order, including this discount.

# BOOM BURGERS EXPRESSIONS

<b>BOOM BURGERS MENU</b> (The variable represents the cost of an item.)			
<b>Burgers</b>		<b>Drinks</b>	
Hamburger ( $h$ )	\$4.00	Small drink ( $s$ )	\$1.00
Cheeseburger ( $c$ )	\$4.25	Medium drink ( $m$ )	\$1.25
Veggie burger ( $v$ )	\$4.75	Large drink ( $L$ )	\$1.50
		Extra-large drink ( $x$ )	\$1.75

Write an expression and evaluate it for each order from the Boom Burgers menu.

<p>1. The cost of one hamburger and one small drink.</p> <p>Expression: _____</p> <p>Evaluate: _____</p>	<p>2. The cost of one hamburger, one cheeseburger, and two large drinks.</p> <p>Expression: _____</p> <p>Evaluate: _____</p>
<p>3. The cost of two veggie burgers and two medium drinks.</p> <p>Expression: _____</p> <p>Evaluate: _____</p>	<p>4. The cost of two cheeseburgers, one veggie burger, three large drinks, and two small drinks.</p> <p>Expression: _____</p> <p>Evaluate: _____</p>
<p>5. The cost of three orders of the following: two hamburgers and one extra-large drink.</p> <p>Expression: _____</p> <p>Evaluate: _____</p>	<p>6. Write your own order using at least three different items from the Boom's menu.</p> <p>Words: _____</p> <p>_____</p> <p>Expression: _____</p> <p>Evaluate: _____</p>

7. Explain why  $2h + 3h$  is equivalent to  $5h$ , regardless of the cost of a hamburger.

**FROM WORDS TO SYMBOLS: EXPRESSIONS**

Write an expression for each verbal statement.

1. The total number of puppies and kittens.
  - a. The number of puppies is 6 and the number of kittens is 8.  
Numerical expression: \_\_\_\_\_
  - b. The number of puppies is  $p$  and the number of kittens is  $k$ .  
Variable expression: \_\_\_\_\_
2. The number of trading cards KC has after giving some away.
  - a. KC had 12 trading cards and gave away 8 of them.  
Numerical expression: \_\_\_\_\_
  - b. KC had  $x$  trading cards and gave away  $y$  of them.  
Variable expression: \_\_\_\_\_
3. The number of Simon's ribbons.
  - a. Sarah has 4 ribbons. Simon has 6 times as many ribbons as Sarah.  
Numerical expression: \_\_\_\_\_
  - b. Sarah has  $n$  ribbons. Simon has 6 times as many ribbons as Sarah.  
Variable expression: \_\_\_\_\_
4. The number of crackers in each group.
  - a. Salim has 20 crackers. He puts them into 5 equal groups.  
Numerical expression: \_\_\_\_\_
  - b. Salim has  $m$  crackers. He puts them into 5 equal groups.  
Variable expression: \_\_\_\_\_

# EQUATIONS

## Summary

We will represent the costs of items on a menu algebraically. We will find values that make equations true. We will translate verbal statements into numerical or variable equations.

## Goals

- Solve problems involving money and decimals.
- Use variables in equations.
- Select values of variables from a specified set that make equations true.
- Write verbal statements numerically and symbolically.

## Warmup

These are expressions:

$$x + 5 \quad 6 - 2 \quad 2n + 3m \quad y \quad 4(z + 1) \quad 17 \quad 3a + 2b + c \quad \frac{3h}{4}$$

These are equations:

$$6 = 10 - 4 \quad \frac{h}{2} = 5 \quad 20 = x + y \quad 10z + 1 = 31 \quad 2(x + 1) = 12 \quad 13 = 13$$

1. From the list below, circle the expressions and box the equations.

$$4x + 7 \quad 8 - 8 = 0 \quad 20 = 5n + 5m \quad \frac{2}{3} \quad 40z = 10 \quad 2(x + y + z) = 18$$

2. In your own words, describe the difference between an expression and an equation.

3. Circle the expressions below that are equivalent to  $2(3 + x) + 4x$ .

- a.  $6 + x + 4$       b.  $6 + 6x$       c.  $5x + 5$       d.  $6(x + 1)$

# PIZZA SHOP EQUATIONS

The owner of the pizza shop added a few items to the menu below.

<b>PIZZA SHOP MENU</b> (The variable represents the cost of an item.)			
<b>Pizza</b>			<b>Drinks</b>
Cheese slice ( $c$ )	\$1.00		Small drink ( $s$ )
Pepperoni slice ( $p$ )	\$1.25		Medium drink ( $m$ )
Daily Special ( $d$ )	\$1.75		Large drink ( $L$ )
			Extra-large drink ( $x$ )

Find a menu item with a cost that makes the following equations true. Within the same problem, the  refers to the same item. In different problems, the  need not represent the same menu item.

1.  $p + \square = 3c$

Menu item: \_\_\_\_\_

Cost of menu item: \_\_\_\_\_

2.  $2s = \square$

Menu item: \_\_\_\_\_

Cost of menu item: \_\_\_\_\_

3.  $4p = 5 \cdot \square$

Menu item: \_\_\_\_\_

Cost of menu item: \_\_\_\_\_

## PIZZA SHOP EQUATIONS (Continued)

4.  $2m + L = p + \square + c$

Menu item: \_\_\_\_\_

Cost of menu item: \_\_\_\_\_

5.  $m + 2 \cdot \square = 4p$

Menu item: \_\_\_\_\_

Cost of menu item: \_\_\_\_\_

6.  $5s + \square = 2 \cdot \square + 2d$

Menu item: \_\_\_\_\_

Cost of menu item: \_\_\_\_\_

Follow these steps to create your own pizza shop equation.

7. Create two different orders from the Pizza Shop that cost the same amount. Write the cost of each order as an expression below.

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8. Write an equation using your two expressions. \_\_\_\_\_ = \_\_\_\_\_

Substitute menu prices into your equation to verify that it is true for these values.

Do you think the expressions would still be equivalent if these menu prices changed?

9. Replace one of the variables with a  $\square$ . Trade equations with a partner. See if you can solve your partner's equation and your partner can solve yours.

# BOOM BURGER EQUATIONS

<b>BOOM BURGERS MENU</b> (The variable represents the cost of an item.)			
<b>Burgers</b>		<b>Drinks</b>	
Hamburger ( $h$ )	\$4.00	Small drink ( $s$ )	\$1.00
Cheeseburger ( $c$ )	\$4.25	Medium drink ( $m$ )	\$1.25
Veggie burger ( $v$ )	\$4.75	Large drink ( $L$ )	\$1.50
		Extra-large drink ( $x$ )	\$1.75

Find a menu item above with a cost that makes the following equations true. Within the same problem below, the  refers to the same item. In different problems, the  need not represent the same menu item. Recall that we defined our variables on a previous page.

<p>1. <math>2h + \square = 2v</math></p>      <p>Menu item: _____</p> <p>Cost of menu item: _____</p>	<p>2. <math>2c = \square + 2m + 2s</math></p>      <p>Menu item: _____</p> <p>Cost of menu item: _____</p>
<p>3. <math>h + s + m + L + x = 2 \cdot \square</math></p>      <p>Menu item: _____</p> <p>Cost of menu item: _____</p>	<p>4. <math>2h = 2 \cdot (\square + m + s)</math></p>      <p>Menu item: _____</p> <p>Cost of menu item: _____</p>

**BOOM BURGER EQUATIONS (Continued)**

$$5. \quad 3(s + m + h) = 4 \cdot \square + x$$

Menu item: \_\_\_\_\_

Cost of menu item: \_\_\_\_\_

$$6. \quad 5L + 4 \cdot \square = 2 \cdot \square + 2v$$

Menu item: \_\_\_\_\_

Cost of menu item: \_\_\_\_\_

Use the Boom Burger menu on page 12 to write variable equations with the criteria given below. Then substitute the prices into your equations to prove that they are true.

7. Use exactly four menu items, any number of constants, more than one mathematical operation, and at least 4 terms.

8. Use more than three menu items, more than two mathematical operations, less than 6 terms, and at least one set of parenthesis.

**FROM WORDS TO SYMBOLS: EQUATIONS**

Write an equation for each verbal statement.

1. The total number of puppies and kittens is 14.

a. The number of puppies is 6 and the number of kittens is 8.

Numerical equation: \_\_\_\_\_

b. The number of puppies is  $p$  and the number of kittens is  $k$ .

Variable equation: \_\_\_\_\_

2. The number of trading cards KC has after giving some away is 4.

a. KC had 12 trading cards and gave away 8 of them.

Numerical equation: \_\_\_\_\_

b. KC had  $x$  trading cards and gave away  $y$  of them.

Variable equation: \_\_\_\_\_

3. Simon has 24 ribbons.

a. Simon has 6 times as many ribbons as Sarah. Sarah has 4 ribbons.

Numerical equation: \_\_\_\_\_

b. Simon has 6 times as many ribbons as Sarah. Sarah has  $n$  ribbons.

Variable equation: \_\_\_\_\_

4. The number of crackers in each group is 4.

a. Salim has 20 crackers. He puts them into 5 equal groups.

Numerical equation: \_\_\_\_\_

b. Salim has  $m$  crackers. He puts them into 5 equal groups.

Variable equation: \_\_\_\_\_

# INEQUALITIES

### Summary

We will write linear inequalities with one variable. We will find values that make inequalities true.

### Goals

- Solve problems involving money and decimals.
- Determine whether inequalities are true or false.
- Select values of variables from a specified set that make inequalities true.
- Find and write solutions to inequalities.

### Warmup

Use the following symbols  $<$ ,  $=$ , or  $>$  to make each statement below true.

1. $3 \underline{\hspace{1cm}}$ 5	2. $9 \underline{\hspace{1cm}}$ 1	3. $0.3 \underline{\hspace{1cm}}$ 3.0
4. $4(2) \underline{\hspace{1cm}}$ $6(2)$	5. $0.5 \underline{\hspace{1cm}}$ $\frac{1}{2}$	6. $0.30 \underline{\hspace{1cm}}$ 0.3
7. $1.20 \underline{\hspace{1cm}}$ 0.75	8. $0.52 \underline{\hspace{1cm}}$ 0.206	9. $\frac{3}{4} \underline{\hspace{1cm}}$ $\frac{4}{5}$

Write the following statements in words.

Symbols	Words
10. $2 < 8$	Two is _____ eight.
11. $7 > 5$	
12. $0.75 = \frac{3}{4}$	
13. $2 > 1.5$	

# PIZZA SHOP INEQUALITIES

<b>PIZZA SHOP MENU</b> (The variable represents the cost of an item.)			
<b>Pizza</b>		<b>Drinks</b>	
Cheese slice ( <i>c</i> )	\$1.00	Small drink ( <i>s</i> )	\$0.95
Pepperoni slice ( <i>p</i> )	\$1.25	Medium drink ( <i>m</i> )	\$1.20
Daily Special ( <i>d</i> )	\$1.75	Large drink ( <i>L</i> )	\$1.60
		Extra-large drink ( <i>x</i> )	\$1.90

Write more than one inequality for each situation below using the menu above.

Situation	Write inequalities with variables (open sentences)	Write inequalities with numbers (closed sentences)	Write the name(s) of the menu item(s)
1. Chris has \$1.10. Represent items from the menu that he can buy using some or all of his money.	$c < 1.10$ _____ $< 1.10$	$1.00 < 1.10$ _____ $< 1.10$	cheese slice ( <i>c</i> ) _____
2. Idris must spend less than \$1.20. Represent items from the menu that he can buy.			
3. Ariella has \$1.55. Represent items from the menu that she can purchase using some or all of her money.			
4. Maricella must spend less than \$2.00. Represent items from the menu that she can purchase.			

## PIZZA SHOP INEQUALITIES (Continued)

Use substitution to determine whether the statements below are true or false.

5. $c + d < 2.00$  $\underline{\quad\quad} + \underline{\quad\quad} < 2.00$  (True or false?)	6. $c + s < 3.00$
7. $3c > 2(c + s)$	8. $3c > p + d$
9. $2c + d = 3p$	10. $4m < 5c$

Let  $\square$  represent the value of one item from the Pizza Shop menu. Determine (if possible) an item that makes the inequality true. There may be more than one answer for  $\square$  or no solution for  $\square$ . In different problems, the  $\square$  need not represent the same menu item.

11. $c + d < c + \square$  $\square$ could be	12. $3 \cdot \square < m + 2p$
13. $\square + x > 2s$	14. $s > d + \square$

## BOOM BURGER INEQUALITIES

<b>BOOM BURGERS MENU</b> (The variable represents the cost of an item.)			
<b>Burgers</b>		<b>Drinks</b>	
Hamburger ( $h$ )	\$4.00	Small drink ( $s$ )	\$1.00
Cheeseburger ( $c$ )	\$4.25	Medium drink ( $m$ )	\$1.25
Veggie burger ( $v$ )	\$4.75	Large drink ( $L$ )	\$1.50
		Extra-large drink ( $x$ )	\$1.75

Use substitution to determine whether the inequalities below are true or false.

1. $5.00 < s + h$	2. $2c + 2L < 11.50$
3. $2(c + x) > 2(v + s)$	4. $2v + L + x > 2c + 4s$

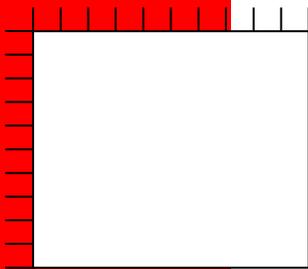
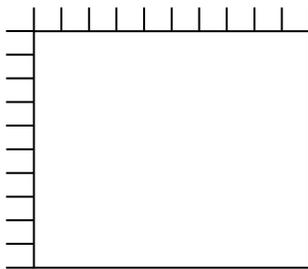
Let  $\square$  represent the value of one item from the Boom Burgers menu. Determine an item that makes the inequality true. There may be more than one answer for  $\square$  or no solution for  $\square$ . In different problems, the  $\square$  need not represent the same menu item.

5. $3.00 < s + \square$	6. $4 + \square > 7.00$
7. $v + 3m > 3L + 3 \cdot \square$	8. $2 \cdot \square + h = 3x + \square$

# SKILL BUILDERS, VOCABULARY, AND REVIEW

## SKILL BUILDER 1

Find the following products as directed below.

Expression	a. $(0.1) \times (0.4)$	b. $(0.3) \times (0.6)$
1. Area Model		
2. Change decimals to fractions.  Then multiply.		
Then change the product back to a decimal.		
3. Use the standard algorithm for decimal multiplication.		

Use the symbols  $<$ ,  $=$ , or  $>$  to make each statement true.

4. $3 \underline{\hspace{1cm}} 4^2 - 9$	5. $\frac{1}{2} \underline{\hspace{1cm}} \frac{1}{3}$	6. $\frac{6}{8} \underline{\hspace{1cm}} 0.75$	7. $4\frac{1}{3} \underline{\hspace{1cm}} 2\frac{2}{3}$
8. $1.99 \underline{\hspace{1cm}} 2$	9. $2.34 \underline{\hspace{1cm}} 2.3$	10. $4.5 \underline{\hspace{1cm}} 4.50$	11. $\frac{2}{7} \underline{\hspace{1cm}} \frac{5}{7}$

## SKILL BUILDER 2

Compute.

1. $1\frac{1}{3} + 2\frac{1}{6} + 4\frac{1}{2}$	2. $8\frac{1}{4} + 7\frac{2}{5}$	3. $20\frac{5}{8} - 10\frac{3}{4}$
4. $3.45 + 6.003 + 40$	5. $78.02 - 18.1$	6. $456 - 7.1$
7. 486 divided by 9	8. 4.86 divided by 0.9	

9. Look at the answers to problems 7 and 8. What is the same and what is different about the answers? Explain.

Rewrite each number below in its equivalent representations.

	Fraction or mixed number	Decimal	Percent
10.	$\frac{9}{10}$		
11.		0.083	
12.			123%

### SKILL BUILDER 3

SUPER SUB SHOP MENU			
(The variable represents the cost of an item.)			
<b>Sandwiches</b>		<b>Drinks</b>	
Veggie ( $v$ )	\$5.25	Small drink ( $s$ )	\$0.85
Chicken ( $c$ )	\$6.75	Medium drink ( $m$ )	\$1.30
Peanut Butter and Jelly ( $p$ )	\$4.15	Large drink ( $L$ )	\$1.60

Use the menu above. Match each statement below to its expression and its value.

	Statement	Expression	Value
Example: D, C	The cost of a veggie sandwich and a small drink	A. $v + c + p$	a. \$19.90
1. ____, ____	The cost of a veggie, chicken, and peanut butter and jelly sandwich.	B. $v + c + p + s + m + L$	b. \$16.15
2. ____, ____	The cost of two chicken sandwiches and two medium drinks.	C. $5L$	c. \$6.10
3. ____, ____	The cost of everything on the menu.	D. $v + s$	d. \$16.40
4. ____, ____	The cost of 5 large drinks.	E. $3(p + s)$	e. \$16.10
5. ____, ____	The cost of 3 orders of peanut butter and jelly sandwiches with small drinks.	F. $2c + L + m$	f. \$8.00
6. ____, ____	The cost of 2 chicken sandwiches, a large drink, and a medium drink.	G. $2c + 2m$	g. \$15.00

7. William sees the expression  $2v + c + m + 2L$ . What does this expression mean in words (in the context of the menu above)?

8. Find the value of the order for problem 8.

## SKILL BUILDER 4

<b>BRONCO BILLY'S BBQ BURGERS</b> (The variable represents the cost of an item.)			
<b>Sandwiches</b>		<b>Fries</b>	
Hamburger ( $h$ )	\$5.25	Regular ( $r$ )	\$1.85
Cheeseburger ( $c$ )	\$6.00	Sweet Potato ( $s$ )	\$2.15
Veggie Patty ( $v$ )	\$4.80	<b>Drink (<math>d</math>)</b>	<b>\$2.05</b>

Use the menu above to complete the missing information in the table below.

Statement	Expression	Value
1. The cost of a hamburger and regular fries.		
2. The cost of a hamburger, sweet potato fries, and a drink.		
3.	$3(c + r + d)$	
4. The cost of 3 cheeseburgers, 2 regular fries, a sweet potato fries, and 3 drinks.		
5.		\$6.45

6. Tran and Ming both order a veggie patty and a drink. Tran calculates the cost of the order using the expression  $2(v + d)$ . Ming calculates the cost of the order using the expression  $2v + 2d$ . Show that both Tran and Ming are correct.

Evaluate each expression using the menu above. Does each food order make sense? Explain.

7. $\frac{1}{2}v$	8. $30d$	9. $c - h$
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### SKILL BUILDER 5

If possible, simplify the given expressions or apply the distributive property. Then complete the table below.

	Expression (Simplify first if possible.)	Number of terms	Constant term(s)	Term(s) with variables	Coefficient of the variable(s)
1.	$4m + 10c + 1$				
2.	$2r + 3 + 14v + 1$				
3.	74				
4.	$4a + 3b + 2c + 1$				
5.	$4a + 3b + 2a + 4b$				
6.	$x + x + x + 6$	2			
7.	$4(2 + x)$				
8.	$3(5x + 2)$				

9. Why is the expression  $3g$  equivalent to the expression  $g + g + g$ ?

10. Consider the expression  $3(p + 4p + 4 + 3)$ .

- Simplify the expression in parentheses. \_\_\_\_\_
- Write each factor (use your answer in part (a) here). \_\_\_\_\_
- Write the expression as a sum of two terms. \_\_\_\_\_
- For part c above, (circle) the constant term and [box] the variable term.
- What is the coefficient of  $p$ ? \_\_\_\_\_

## SKILL BUILDER 6

1. From the list below, circle the expressions and box the equations.

$n + m^2$	$n + m = 20$	$6 - 6 = 0$	$4z = 14$	$3\frac{1}{2}$	$2(x + y + z) = 18$
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<b>BETTY'S BURG-O-RAMA SHACK</b> (The variable represents the cost of an item.)			
<b>Sandwiches</b>			
Hamburger ( $h$ )	\$6.05	<b>Fries</b>	
Cheeseburger ( $c$ )	\$6.30	Regular ( $r$ )	\$1.85
Veggie Patty ( $v$ )	\$4.25	Sweet Potato ( $s$ )	\$2.15
Bison Burger ( $b$ )	\$8.50	<b>Drink (<math>d</math>)</b>	\$2.10

Find a menu item above with a cost that makes the following equations true. Within the same problem, the  refers to the same item. In different problems, the  need not represent the same menu item.

<p>2. <math>d + \span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"&gt; = <math>v</math></math></p> <p>Menu item: _____</p> <p>Cost of menu item: _____</p>	<p>3. <math>c = 3 \cdot \span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"&gt;</math></p> <p>Menu item: _____</p> <p>Cost of menu item: _____</p>
<p>4. <math>h = r + 2 \cdot \span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"&gt;</math></p> <p>Menu item: _____</p> <p>Cost of menu item: _____</p>	<p>5. <span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> + <math>2v = 2(v + s + d)</math></p> <p>Menu item: _____</p> <p>Cost of menu item: _____</p>

## SKILL BUILDER 7

<b>BETTY'S BURG-O-RAMA SHACK</b> (The variable represents the cost of an item.)			
<b>Sandwiches</b> Hamburger ( $h$ )                      \$6.05 Cheeseburger ( $c$ )                      \$6.30 Veggie Patty ( $v$ )                      \$4.25 Bison Burger ( $b$ )                      \$8.50	<b>Fries</b> Regular ( $r$ )                              \$1.85 Sweet Potato ( $s$ )                      \$2.15  <b>Drink (<math>d</math>)</b> \$2.10		

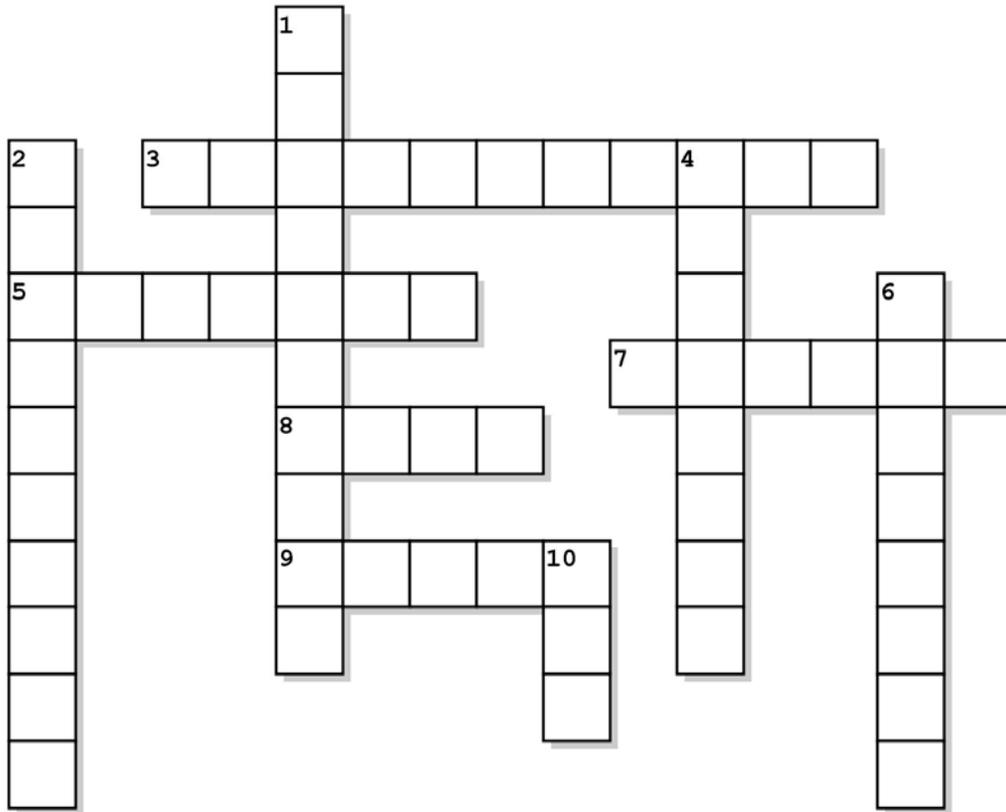
Use substitution to determine whether the inequalities below are true or false.

1. $c + d < 9.00$  _____ + _____ < 9.00  (True or false?)	2. $c + s < 8.25$
3. $3d < c$	4. $2(c + h) > 3b$
5. $v + b < 6s$	6. $c > v + d$

Let  represent the cost of one item from the Betty's Burg-O-Rama menu above. In different problems, the  need not represent the same menu item.

7. <input style="width: 40px; height: 30px;" type="text"/> + $h < b$  <input style="width: 40px; height: 30px;" type="text"/> could be	8. $2v + s > b +$ <input style="width: 40px; height: 30px;" type="text"/>
9. $3 \cdot$ <input style="width: 40px; height: 30px;" type="text"/> $< h + d$	10. $v + d < v +$ <input style="width: 40px; height: 30px;" type="text"/>

## FOCUS ON VOCABULARY



**Across**

- 3. 4 is a(n) \_\_\_\_\_ in the expression:  $4x + 8$
- 5.  $4x + 8$  is the \_\_\_\_\_ of 4 and  $(x + 2)$ .
- 7.  $(x + 2)$  is a(n) \_\_\_\_\_ of  $4x + 8$ .
- 8.  $2x$  and  $3x$  are \_\_\_\_\_ terms in the expression:  $3 + 2x + 5 + 3x$
- 9.  $5p$ ,  $c$ , and  $4$  are called \_\_\_\_\_ in the expression:  $5p + c + 4$

**Down**

- 1. This statement is a(n) \_\_\_\_\_:  $1.01 < 1.1$
- 2.  $5p + c + 4$  is a(n) \_\_\_\_\_.
- 4.  $4x + 8 = 4(x + 2)$  is a(n) \_\_\_\_\_.
- 6. 8 is a(n) \_\_\_\_\_ term in the expression:  $4x + 8$
- 10.  $5p + c + 4$  is the \_\_\_\_\_ of three terms.

(For word hints, see the word bank and other vocabulary used in this packet.)

**SELECTED RESPONSE**

Show your work on a separate sheet of paper and select the best answer(s).

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1. Choose all of the following statements that are true about the expression  $4m + 3n + 7$ .

A. The expression contains 3 terms.

C. 4 and 3 are the coefficients of the variables.

B. The constant term is 7.

D. 4, 3, and 7 are all constant terms.

---

2. If  $a = 5$  and  $b = 2$ , which of the following expressions have a value of 20. Choose all that apply.

A.  $ab + ab$

B.  $2(a \cdot b)$

C.  $2(a + b)$

D.  $a \cdot b^2$

---

3. If  $d$  represents the cost of a drink and  $h$  represents the cost of a hamburger, then which of the following expressions could represent the cost of 3 drinks and 3 hamburgers? Choose all that apply.

A.  $3d + h$

C.  $3d + 3h$

B.  $3(d + h)$

D.  $d + d + d + h + h + h$

---

4. Nathaniel has  $n$  baseball cards. After giving  $k$  cards to Karl, he has 12 cards left over. Which equation(s) represents this situation? Choose all that apply.

A.  $n + k = 12$

B.  $n - k = 12$

C.  $n = 12 - k$

D.  $k - n = 12$

---

5. If  $a = 3$ ,  $b = 8$ , and  $c = 4$ , determine which of the following inequalities are true. Choose all that apply.

A.  $a + b < 2c$

B.  $b + c > a$

C.  $2a + b < c$

D.  $2(a + c) > 2b$

---

6. To be on city council in Smallville, a person must have more than 320 community service hours in the city. If  $h$  represents the number of service hours, which one of the following inequalities best shows the service requirement for people who can be on city council?

A.  $h < 320$

B.  $h < 321$

C.  $h > 321$

D.  $h > 320$

---

## KNOWLEDGE CHECK

Show your work on a separate sheet of paper and write your answers on this page.

### 9.1 Introduction to Variables and Expressions

1. Luna has  $d$  dogs and  $c$  cats. Write an expression that represents the total number of Luna's pets.
2. Write an expression that has the following components:
  - three terms
  - contains the variables  $m$  and  $n$
  - has coefficients of 4 and 5
  - has a constant term of 2
3. Evaluate your expression from problem 2 if  $m = 2$  and  $n = 3$ .

### 9.2 Equations

4. Luna has  $d$  dogs and  $c$  cats. She has 7 pets total. Write an equation to represent this situation.
5. If Luna has 5 dogs, how many cats does she have?

### 9.3 Inequalities

6. Luna has  $d$  dogs and  $c$  cats. Write an inequality to represent this situation if she has less than 12 animals.
7. If Luna has 5 dogs, can she have 4 cats? Explain.
8. If Luna has 8 cats, can she have 4 dogs? Explain.

## HOME SCHOOL CONNECTION

Here are some problems to review with your young mathematician.

<b>BOOM BURGERS MENU</b>			
(The variable represents the cost of an item.)			
<b>Burgers</b>		<b>Drinks</b>	
Hamburger ( <i>h</i> )	\$4.00	Small drink ( <i>s</i> )	\$1.00
Cheeseburger ( <i>c</i> )	\$4.25	Medium drink ( <i>m</i> )	\$1.25
Veggie burger ( <i>v</i> )	\$4.75	Large drink ( <i>L</i> )	\$1.50
		Extra-large drink ( <i>x</i> )	\$1.75

Use the Boom Burger Menu above to answer the problems on this page.

- Write an expression that shows the cost of an order of 2 hamburgers, a veggie burger, and 3 large drinks.

Evaluate your expression above to find the total cost of the order.

- William is trying to read the following equation representing a Boom Burgers order, but something is covered in mustard. Help him figure out the missing menu item (represented by  $\square$ ) in the order.

$$h + c + 2 \bullet \square = 10.25$$

- Ana only has \$5.40 and wants to get one kind of burger and a drink. List all the possible orders that Ana could make.

Parent (or Guardian) Signature \_\_\_\_\_

# COMMON SCORE STATE STANDARDS – MATHEMATICS

## STANDARDS FOR MATHEMATICAL CONTENT

<b>6.NS.B</b>	<b>Compute fluently with multi-digit numbers and find common factors and multiples.</b>
6.NS.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
<b>6.EE.A</b>	<b>Apply and extend previous understandings of arithmetic to algebraic expressions.</b>
6.EE.2a	Write, read, and evaluate expressions in which letters stand for numbers: Write expressions that record operations with numbers and with letters standing for numbers. <i>For example, express the calculation “Subtract <math>y</math> from 5” as <math>5 - y</math>.</i>
6.EE.2b	Write, read, and evaluate expressions in which letters stand for numbers: Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. <i>For example, describe the expression <math>2(8 + 7)</math> as a product of two factors; view <math>(8 + 7)</math> as both a single entity and a sum of two terms.</i>
6.EE.2c	Write, read, and evaluate expressions in which letters stand for numbers: Evaluate expressions at specific values of their variables. <del>Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). <i>For example, use the formulas <math>V = s^3</math> and <math>A = 6s^2</math> to find the volume and surface area of a cube with sides of length <math>s = 1/2</math>.</i></del>
6.EE.3	Apply the properties of operations to generate equivalent expressions. <i>For example, apply the distributive property to the expression <math>3(2 + x)</math> to produce the equivalent expression <math>6 + 3x</math>; apply the distributive property to the expression <math>24x + 18y</math> to produce the equivalent expression <math>6(4x + 3y)</math>; apply properties of operations to <math>y + y + y</math> to produce the equivalent expression <math>3y</math>.</i>
6.EE.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). <i>For example, the expressions <math>y + y + y</math> and <math>3y</math> are equivalent because they name the same number regardless of which number <math>y</math> stands for.</i>
<b>6.EE.B</b>	<b>Reason about and solve one-variable equations and inequalities.</b>
6.EE.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
6.EE.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
6.EE.7	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p$ , $q$ and are all nonnegative rational numbers.
6.EE.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. <del>Recognize that inequalities of the form <math>x &gt; c</math> or <math>x &lt; c</math> have infinitely many solutions; represent solutions of such inequalities on number line diagrams.</del>

## STANDARDS FOR MATHEMATICAL PRACTICE

MP2	Reason abstractly and quantitatively.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.



9 7 8 1 6 1 4 4 5 0 1 4 6