

Name:	Date:
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Topic:	Class:
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Main Ideas/Questions	Notes/Examples
VARIABLE	A symbol, usually a letter, used to represent a number or quantity
Algebraic EXPRESSION	An expression that contains numbers, variables, and/or operations. Example(s): $2x, 5p-1, 9h+4, 3y^2$
EVALUATING Expressions	To evaluate an expression means to substitute the given replacement values for each variable, then simplify to find the numerical value of the expression.
	Directions: Evaluate each expression if $a = 9, b = 5,$ and $c = 28.$
	1. $a - 3$ $9 - 3 = \boxed{6}$
	2. $8b$ $8(5) = \boxed{40}$
	3. $c - a$ $28 - 9 = \boxed{19}$
	4. $c \div 4$ $\frac{28}{4} = \boxed{7}$
	5. a^2 $9^2 = \boxed{81}$
	6. $b + c$ $5 + 28 = \boxed{33}$
	Directions: Evaluate each expression using the variable replacements.
	7. $2x^3$ (if $x = 3$) $2(3)^3$ $2(27) = \boxed{54}$
8. $3v + 17$ (if $v = 9$) $3(9) + 17$ $27 + 17 = \boxed{44}$	
9. $s^2 - 18$ (if $s = 5$) $5^2 - 18$ $25 - 18 = \boxed{7}$	
10. $5q + r$ (if $q = 9$ and $r = 4$) $5(9) + 4$ $45 + 4 = \boxed{49}$	
11. $4a - 7b$ (if $a = 11$ and $b = 2$) $4(11) - 7(2)$ $44 - 14 = \boxed{30}$	
12. $35 - mn$ (if $m = 4$ and $n = 6$) $35 - 4(6)$ $35 - 24 = \boxed{11}$	

	<p>13. $\frac{c}{d} - 1$ (if $c = 21$ and $d = 3$)</p> $\frac{21}{3} - 1$ $7 - 1 = \boxed{6}$	<p>14. $2(f + g^2)$ (if $f = 1$ and $g = 6$)</p> $2(1 + 6^2)$ $2(1 + 36)$ $2(37) = \boxed{74}$
	<p>15. $x^3 + y^2$ (if $x = 4$ and $y = 7$)</p> $4^3 + 7^2$ $64 + 49 = \boxed{113}$	<p>16. $24 - m \div n$ (if $m = 20$ and $n = 4$)</p> $24 - 20 \div 4$ $24 - 5 = \boxed{19}$
	<p>17. $\frac{5}{12}x$ (if $x = \frac{3}{4}$)</p> $\frac{5}{12} \left(\frac{3}{4} \right)$ $\frac{5}{4} \left(\frac{1}{4} \right) = \boxed{\frac{5}{16}}$	<p>18. $y + \frac{3}{8}$ (if $y = \frac{7}{10}$)</p> $\frac{7}{10} + \frac{3}{8}$ $\frac{28}{40} + \frac{15}{40} = \frac{43}{40}$ $= \boxed{1\frac{3}{40}}$
	<p>19. $\frac{4}{9} \div m$ (if $m = \frac{5}{6}$)</p> $\frac{4}{9} \div \frac{5}{6}$ $\frac{4}{9} \cdot \frac{6}{5} = \boxed{\frac{8}{15}}$	<p>20. $\frac{7}{8}a - \frac{1}{4}$ (if $a = \frac{2}{3}$)</p> $\frac{7}{8} \left(\frac{2}{3} \right) - \frac{1}{4}$ $\frac{7}{12} - \frac{1}{4}$ $\frac{7}{12} - \frac{3}{12} = \frac{4}{12} = \boxed{\frac{1}{3}}$
<p>APPLICATION</p>	<p>21. The football team sold pies and cakes at a bake sale. The expression $7p + 12c$ represents the total amount of money they raised where p is the number of pies sold and c is the number of cakes sold. If they sold 32 pies and 15 cakes, how much money did they raise?</p> $7(32) + 12(15)$ $224 + 180 = 404$ $\boxed{\$404}$	

WHAT DID THE FOOTBALL COACH YELL AT THE VENDING MACHINE?

Directions: Evaluate each expression given the variable replacements. Show all work on a separate sheet of paper. After completing each set, find matching answers. One will have a letter and the other a number. Write the letter in the matching numbered box at the bottom of the page.

SET 1 (Evaluate if $x = 8$, $y = 14$, and $z = 3$)					
W.	$y + z$	<u>17</u>	10.	$y - x$	<u>6</u>
E.	$x^2 - y$	<u>50</u>	6.	$z^3 - 4$	<u>23</u>
M.	$x + 2z + 9$	<u>23</u>	2.	$2x + 1$	<u>17</u>
N.	$\frac{y + 42}{z - 1}$	<u>28</u>	18.	$5x + 4$	<u>10</u>
K.	$y - z^2 + 5$	<u>10</u>	13.	$3y + x$	<u>50</u>
A.	$3x - 6z$	<u>6</u>	4.	$4x + y - 6z$	<u>28</u>
SET 2 (Evaluate if $a = 6$, $b = 2$, and $c = 11$)					
T.	$8a + 7b - c$	<u>51</u>	15.	$a^2 - 4a - 4b$	<u>4</u>
B.	$2b^3 \div 4$	<u>4</u>	7.	$\frac{3a + b}{c - 1}$	<u>2</u>
A.	$5c - 9b$	<u>37</u>	12.	$4c - 2a + 19$	<u>51</u>
U.	$\frac{a - 2b + 2c}{3}$	<u>8</u>	3.	$2b^4 + 5$	<u>37</u>
C.	$c^2 - 13a - 1$	<u>42</u>	17.	$7(10 - b^2)$	<u>42</u>
Y.	$ab - c + 1$	<u>2</u>	9.	$c + 3a - 21$	<u>8</u>
SET 3 (Evaluate if $p = 8$, $q = \frac{1}{3}$, $r = 24$, and $s = 5$)					
R.	$15s - 5p$	<u>35</u>	8.	$q(r + s - 2)$	<u>9</u>
T.	$r - \frac{3}{4}p$	<u>18</u>	11.	$p^2 - 2r + 19$	<u>35</u>
A.	$(\frac{1}{4}p)^3 + 19$	<u>27</u>	1.	$\frac{7}{4}p - \frac{1}{8}r$	<u>11</u>
Q.	$s^2 - \frac{p + r}{2}$	<u>9</u>	16.	$(r - 4s - 1)^3$	<u>27</u>
R.	$21q + 7s$	<u>42</u>	14.	$rs - p^2 - 14$	<u>42</u>
I.	$p^2 - 7p + 3$	<u>11</u>	5.	$6pq + 2$	<u>18</u>

ANSWER:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	!
I	W	A	N	T	M	Y	Q	U	A	R	T	E	R	B	A	C	K	!

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Unit 4: Expressions & Properties



Date: _____ Per: _____

Homework 1: Evaluating Expressions

Directions: Evaluate each expression if $w = 2$, $x = 7$, $y = 24$, and $z = 5$.1. $7w$

$$7(2) = \boxed{14}$$

2. $x+16$

$$7+16 = \boxed{23}$$

3. $y \div 3$

$$24 \div 3 = \boxed{8}$$

4. $z^2 + w$

$$5^2 + 2$$

$$25 + 2 = \boxed{27}$$

5. $\frac{y-2z}{x}$

$$\frac{24-2(5)}{7} = \frac{24-10}{7}$$

$$= \frac{14}{7} = \boxed{2}$$

6. $16w+3z$

$$16(2) + 3(5)$$

$$32 + 15$$

$$\boxed{47}$$

7. $x^2 + 2y$

$$7^2 + 2(24)$$

$$49 + 48 = \boxed{97}$$

8. $8(3+w^2)$

$$8(3+2^2)$$

$$8(3+4)$$

$$8(7) = \boxed{56}$$

9. $y-5w+7x$

$$24-5(2)+7(7)$$

$$24-10+49$$

$$14+49 = \boxed{63}$$

10. $\frac{1}{2}w^5$

$$\frac{1}{2}(2)^5$$

$$\frac{1}{2}(32) = \boxed{16}$$

11. $\frac{3}{4}y+10$

$$\frac{3}{4}(24)+10$$

$$18+10 = \boxed{28}$$

12. $20-\frac{1}{3}(x+2)$

$$20-\frac{1}{3}(7+2)$$

$$20-\frac{1}{3}(9)$$

$$20-3 = \boxed{17}$$

13. $\frac{8}{9}k^2 - 2k$ (if $k = 6$)

$$\frac{8}{9}(6)^2 - 2(6)$$

$$\frac{8}{9}(36) - 12$$

$$32 - 12 = \boxed{20}$$

14. $2a+b$ (if $a = \frac{5}{12}$ and $b = \frac{1}{8}$)

$$2\left(\frac{5}{12}\right) + \frac{1}{8}$$

$$\frac{5}{6} + \frac{1}{8} = \frac{20}{24} + \frac{3}{24} = \boxed{\frac{23}{24}}$$

15. Grant bought strawberries and bananas from the grocery store to make smoothies. The total amount he spent can be represented by the expression $1.8s + 0.65b$, where s is the number of pounds of strawberries and b is the number of pounds of bananas. If Grant bought 2.7 pounds of strawberries and 1.4 pounds of bananas, how much did he spend?

$$1.8(2.7) + 0.65(1.4)$$

$$4.86 + 0.91$$

$$= 5.77$$

$$\boxed{\$5.77}$$

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Main Ideas/Questions	Notes/Examples		
WARM-UP: <i>Integer Operations</i>	Evaluate each expression.		
	1. $17 + (-5)$ 12	2. $-11 + 4$ -7	3. $-1 + (-3)$ -4
	4. $-2 - 7$ -9	5. $12 - (-1)$ 13	6. $-2 - (-8)$ 6
	7. $-4 \cdot 3$ -12	8. $-5(-9)$ 45	9. $7 \cdot (-8)$ -56
	10. $-21 \div (-7)$ 3	11. $\frac{-16}{2}$ -8	12. $\frac{30}{-6}$ -5
EVALUATING EXPRESSIONS <i>with Integers</i>	Evaluate each expression if $a = 12$, $b = -5$, and $c = -18$.		
	13. $9a$ $9(12) = \boxed{108}$	14. $c - b$ $-18 - (-5) = \boxed{-13}$	
	15. $a + 4b$ $12 + 4(-5)$ $12 - 20 = \boxed{-8}$	16. $\frac{c}{-9} + b$ $\frac{-18}{-9} + (-5)$ $2 + (-5) = \boxed{-3}$	
	17. $a - 2b + c$ $12 - 2(-5) + (-18)$ $12 + 10 + (-18)$ $22 + (-18) = \boxed{4}$	18. $-8 + b^2$ $-8 + (-5)^2$ $-8 + 25 = \boxed{17}$	
	19. $\frac{-4a}{3} - c$ $\frac{-4(12)}{3} - (-18) = -16 + 18$ $= \boxed{2}$	20. $-13 + (b - a)$ $-13 + (-5 - 12)$ $-13 + (-17) = \boxed{-30}$	

Evaluate each expression using the given variable replacements.

21. $-9x + 4y$ (if $x = -2$ and $y = 2$)

$$\begin{aligned} & -9(-2) + 4(2) \\ & 18 + 8 \\ & = \boxed{26} \end{aligned}$$

22. $\frac{p}{q} + 5q$ (if $p = -36$ and $q = -9$)

$$\begin{aligned} & \frac{-36}{-9} + 5(-9) \\ & 4 + (-45) = \boxed{-41} \end{aligned}$$

23. $k^2 - k + 1$ (if $k = -4$)

$$\begin{aligned} & (-4)^2 - (-4) + 1 \\ & 16 + 4 + 1 \\ & = \boxed{21} \end{aligned}$$

24. $-1 - 2a + b$ (if $a = -7$ and $b = 2$)

$$\begin{aligned} & -1 - 2(-7) + 2 \\ & -1 + 14 + 2 \\ & = \boxed{15} \end{aligned}$$

25. $(-2+r)^2 + 7r$ (if $r = -2$)

$$\begin{aligned} & (-2 + -2)^2 + 7(-2) \\ & (-4)^2 + (-14) \\ & 16 - 14 \\ & = \boxed{2} \end{aligned}$$

26. $\frac{-7x-3y}{x+y}$ (if $x = 3$ and $y = -4$)

$$\begin{aligned} & \frac{-7(3) - 3(-4)}{3 + (-4)} \\ & \frac{-21 + 12}{3 - 4} = \frac{-9}{-1} = \boxed{9} \end{aligned}$$

27. $\frac{m - (-2)}{-4} - 6$ (if $m = 18$)

$$\begin{aligned} & \frac{18 - (-2)}{-4} - 6 \\ & \frac{20}{-4} - 6 = -5 - 6 \\ & = \boxed{-11} \end{aligned}$$

28. $\frac{d^3 - cd}{3}$ (if $c = 11$ and $d = -2$)

$$\begin{aligned} & \frac{(-2)^3 - (11)(-2)}{3} \\ & \frac{-8 + 22}{3} = \frac{14}{3} = \boxed{4\frac{2}{3}} \end{aligned}$$

APPLICATION

29. Avery dropped a coin off the top of a tall building towards the ground. The height of the coin, in feet, each second after she dropped it can be represented by the expression $-16t^2 + 195$. Find the height of the coin 3 seconds after it was dropped.

$$\begin{aligned} & -16(3)^2 + 195 \\ & -16(9) + 195 \\ & -144 + 95 = 51 \end{aligned}$$

51 feet

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Unit 4: Expressions & Properties



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Homework 2: Evaluating Expressions (with Integers)

Directions: Evaluate each expression if $p = -3$, $q = -8$, $r = 7$, and $s = -2$.

$$1. \frac{q}{s} = \frac{-8}{-2} = \boxed{4}$$

$$2. -9r = -9(7) = \boxed{-63}$$

$$3. p - q = -3 - (-8) = \boxed{5}$$

$$4. -7s - r = -7(-2) - 7 = 14 - 7 = \boxed{7}$$

$$5. -19 + ps = -19 + (-3)(-2) = -19 + 6 = \boxed{-13}$$

$$6. -3r + 2q = -3(7) + 2(-8) = -21 + (-16) = \boxed{-37}$$

$$7. -8(q - s) = -8(-8 - (-2)) = -8(-6) = \boxed{48}$$

$$8. \frac{r - 9}{-4} = \frac{7 - 9}{-4} = \frac{-2}{-4} = \boxed{\frac{1}{2}}$$

$$9. p^2 - q^2 = (-3)^2 - (-8)^2 = 9 - 64 = \boxed{-55}$$

Directions: Evaluate each expression for the given replacement values.

$$10. 7a - 3b \quad (\text{if } a = -2 \text{ and } b = 6)$$

$$7(-2) - 3(6) = -14 - 18 = \boxed{-32}$$

$$11. mn - n^2 \quad (\text{if } m = -5 \text{ and } n = -4)$$

$$(-5)(-4) - (-4)^2 = 20 - 16 = \boxed{4}$$

$$12. 4y - (x + xy) \quad (\text{if } x = 7 \text{ and } y = -2)$$

$$4(-2) - (7 + 7(-2)) = -8 - (7 - 14) = -8 - (-7) = \boxed{-1}$$

$$13. -5p^3 - p \quad (\text{if } p = -2)$$

$$-5(-2)^3 - (-2) = -5(-8) + 2 = 40 + 2 = \boxed{42}$$

$$14. \frac{4c + 9d}{-3} \quad (\text{if } c = -3 \text{ and } d = -1)$$

$$\frac{4(-3) + 9(-1)}{-3} = \frac{-12 - 9}{-3} = \frac{-21}{-3} = \boxed{7}$$

$$15. (-1 - a)^2 + 7a \quad (\text{if } a = -5)$$

$$(-1 - (-5))^2 + 7(-5) = (-1 + 5)^2 - 35 = 4^2 - 35 = 16 - 35 = \boxed{-19}$$

16. A submarine located 75 feet below the surface of the water begins to descend further at a rate of 8 feet per minute. The expression $-75 - 8m$ represents the depth of the submarine after each minute, m . Find the depth of the submarine after 5 minutes.

$$-75 - 8(5) = -75 - 40 = \boxed{-115 \text{ feet}}$$

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Main Ideas/Questions	Notes/Examples					
<p>TRANSLATING Expressions</p>	<p>There are many ways to translate an expression into words. The examples below give two different ways to write each expression.</p>					
	OPERATION	EXPRESSION	WORDS			
	ADDITION	$n + 5$	<ul style="list-style-type: none"> • "the sum of a number and 5" • "5 more than a number" 			
	SUBTRACTION	$n - 11$	<ul style="list-style-type: none"> • "a number minus 11" • "11 subtracted from a number" 			
	MULTIPLICATION	$-8n$	<ul style="list-style-type: none"> • "-8 times a number" • "the product of a number and -8" 			
	DIVISION	$\frac{n}{3}$	<ul style="list-style-type: none"> • "a number divided by 3" • "the quotient of a number and 3" 			
<p>KEY WORDS & Phrases</p>	ADDITION		+	SUBTRACTION		-
	<ul style="list-style-type: none"> • <u>sum</u> • <u>more than</u> • <u>increased by</u> • <u>total</u> • <u>plus</u> • <u>all together</u> 			<ul style="list-style-type: none"> • <u>difference</u> • <u>less than</u> • <u>decreased by</u> • <u>subtracted from</u> • <u>minus</u> • _____ 		
	MULTIPLICATION		•	DIVISION		/
	<ul style="list-style-type: none"> • <u>product</u> • <u>twice</u> • <u>times</u> • <u>double / triple</u> • <u>of</u> • <u>per</u> 			<ul style="list-style-type: none"> • <u>divided by</u> • <u>quotient</u> • <u>half / third</u> • <u>separate</u> • _____ • _____ 		
 <p>"TURN-AROUND" Phrases</p>	<p>Watch out for subtraction! The phrases below indicate a reversal in the order: <u>less than</u> _____ <u>fewer than</u> _____ and <u>subtracted from</u> _____.</p>					

WRITING EXPRESSIONS

Translate each expression.

	Words	Expression
1.	"twelve increased by a number"	$12 + n$
2.	"the quotient of a number and negative seven"	$\frac{n}{-7}$
3.	"a number decreased by four"	$n - 4$
4.	"the product of a number and nine"	$9n$
5.	"three less than a number"	$n - 3$
6.	"four-fifths of a number"	$\frac{4}{5}n$
7.	"the sum of a number and negative six"	$n + (-6)$
8.	"forty-two subtracted from a number"	$n - 42$
9.	"twice a number"	$2n$
10.	"the difference of a number and negative seventeen"	$n - (-17)$
11.	"one more than a number squared"	$n^2 + 1$
12.	"two fewer than three times a number"	$3n - 2$

GOING BACKWARDS (Writing Words)

Write each expression in TWO ways.

13. $x + 13$	a) the sum of a number and 13
	b) a number increased by 13
14. $c - 9$	a) 9 less than a number
	b) the difference of a number and 9
15. $10p$	a) the product of 10 and a number
	b) 10 times a number
16. $-2r + 7$	a) 7 more than negative two times a number
	b) Negative two times a number increased by 7
17. $\frac{w}{-4}$	a) the quotient of a number and -4
	b) a number divided by negative four
18. $26 - k$	a) k subtracted from 26
	b) The difference of 26 and a number

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Unit 4: Expressions & Properties



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Homework 3: Translating Expressions

Directions: Translate each expression.	
1. "the quotient of a number and negative 3" $\frac{n}{-3}$	2. "a number subtracted from 16" $16 - n$
3. "seven increased by a number" $7 + n$	4. "five times a number" $5n$
5. "negative ten less than a number" $n - (-10)$	6. "twenty split evenly into n groups" $\frac{20}{n}$
7. "negative fourteen more than a number" $n + (-14)$	8. "a number minus six" $n - 6$
9. "a number divided by 8" $\frac{n}{8}$	10. "two-thirds of a number" $\frac{2}{3}n$
11. "the difference of 40 and a number" $40 - n$	12. "the product of five and a number" $5n$
13. "a number decreased by 15" $n - 15$	14. "the sum of 17 and twice a number" $17 + 2n$
15. "negative nine plus a number squared" $-9 + n^2$	16. "a number cubed" n^3

Directions: Give two different ways to write each expression in words.	
17. $a + 7$	a) the total of a number and 7 b) a number increased by 7
18. $m - (-12)$	a) Negative 12 subtracted from a number b) The difference of a number and negative 12
19. $9r$	a) 9 times a number b) The product of a number and 9
20. $\frac{-60}{x}$	a) -60 split equally into x -groups b) The quotient of -60 and a number
21. $19 - c$	a) A number fewer than 19 b) 19 decreased by a number
22. $\frac{1}{4}k$	a) one-fourth of a number b) the product of $\frac{1}{4}$ and a number

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Main Ideas/Questions	Notes/Examples																
<p>WRITING & EVALUATING Expressions</p>	<p>Directions: Translate each verbal description into an algebraic expression, then evaluate for the given variable(s).</p> <table border="1"> <thead> <tr> <th>TRANSLATE IT</th> <th>EVALUATE IT</th> </tr> </thead> <tbody> <tr> <td> <p>1. "the sum of 16 and x"</p> $16 + x$ </td> <td> <p>(when $x = 12$)</p> $16 + 12 = \boxed{28}$ </td> </tr> <tr> <td> <p>2. "the quotient of negative 48 and n"</p> $\frac{-48}{n}$ </td> <td> <p>(when $n = -8$)</p> $\frac{-48}{-8} = \boxed{6}$ </td> </tr> <tr> <td> <p>3. "seven subtracted from k"</p> $k - 7$ </td> <td> <p>(when $k = 18$)</p> $18 - 7 = \boxed{11}$ </td> </tr> <tr> <td> <p>4. "four more than one-third a"</p> $\frac{1}{3}a + 4$ </td> <td> <p>(when $a = 15$)</p> $\frac{1}{3}(15) + 4 = 5 + 4 = \boxed{9}$ </td> </tr> <tr> <td> <p>5. "the difference of twice r and five"</p> $2r - 5$ </td> <td> <p>(when $r = 23$)</p> $2(23) - 5 = 46 - 5 = \boxed{41}$ </td> </tr> <tr> <td> <p>6. "the product of negative four and x, increased by y"</p> $-4x + y$ </td> <td> <p>(when $x = 9$ and $y = 4$)</p> $-4(9) + 4 = -36 + 4 = \boxed{-32}$ </td> </tr> <tr> <td> <p>7. "v squared less than 42"</p> $42 - v^2$ </td> <td> <p>(when $v = 5$)</p> $42 - 5^2 = 42 - 25 = \boxed{17}$ </td> </tr> </tbody> </table>	TRANSLATE IT	EVALUATE IT	<p>1. "the sum of 16 and x"</p> $16 + x$	<p>(when $x = 12$)</p> $16 + 12 = \boxed{28}$	<p>2. "the quotient of negative 48 and n"</p> $\frac{-48}{n}$	<p>(when $n = -8$)</p> $\frac{-48}{-8} = \boxed{6}$	<p>3. "seven subtracted from k"</p> $k - 7$	<p>(when $k = 18$)</p> $18 - 7 = \boxed{11}$	<p>4. "four more than one-third a"</p> $\frac{1}{3}a + 4$	<p>(when $a = 15$)</p> $\frac{1}{3}(15) + 4 = 5 + 4 = \boxed{9}$	<p>5. "the difference of twice r and five"</p> $2r - 5$	<p>(when $r = 23$)</p> $2(23) - 5 = 46 - 5 = \boxed{41}$	<p>6. "the product of negative four and x, increased by y"</p> $-4x + y$	<p>(when $x = 9$ and $y = 4$)</p> $-4(9) + 4 = -36 + 4 = \boxed{-32}$	<p>7. "v squared less than 42"</p> $42 - v^2$	<p>(when $v = 5$)</p> $42 - 5^2 = 42 - 25 = \boxed{17}$
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	<p>6. "the product of negative four and x, increased by y"</p> $-4x + y$	<p>(when $x = 9$ and $y = 4$)</p> $-4(9) + 4 = -36 + 4 = \boxed{-32}$															
<p>7. "v squared less than 42"</p> $42 - v^2$	<p>(when $v = 5$)</p> $42 - 5^2 = 42 - 25 = \boxed{17}$																
<p>REAL WORLD Examples</p>	<p>8. Jack weighs 13 more pounds than his brother Andy.</p> <table border="1"> <tbody> <tr> <td>a) If a represents Andy's weight, write an expression to represent Jack's weight.</td> <td>a) $a + 13$</td> </tr> <tr> <td>b) Find Jack's weight if Andy weighs 78 pounds.</td> <td>b) $78 + 13 = \boxed{91 \text{ lb}}$</td> </tr> </tbody> </table>	a) If a represents Andy's weight, write an expression to represent Jack's weight.	a) $a + 13$	b) Find Jack's weight if Andy weighs 78 pounds.	b) $78 + 13 = \boxed{91 \text{ lb}}$												
	a) If a represents Andy's weight, write an expression to represent Jack's weight.	a) $a + 13$															
	b) Find Jack's weight if Andy weighs 78 pounds.	b) $78 + 13 = \boxed{91 \text{ lb}}$															
	<p>9. Ebony is selling wreaths for a holiday fundraiser for \$9 each.</p> <table border="1"> <tbody> <tr> <td>a) Write an expression to represent the total amount she will raise if she sells w wreaths.</td> <td>a) $9w$</td> </tr> <tr> <td>b) Find the total amount Ebony will raise if she sells 28 wreaths.</td> <td>b) $9(28) = \boxed{\\$252}$</td> </tr> </tbody> </table>	a) Write an expression to represent the total amount she will raise if she sells w wreaths.	a) $9w$	b) Find the total amount Ebony will raise if she sells 28 wreaths.	b) $9(28) = \boxed{\$252}$												
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b) Find the total amount Ebony will raise if she sells 28 wreaths.	b) $9(28) = \boxed{\$252}$																

10. There are four students absent from Mrs. Malla's homeroom.	
a) Write an expression to represent the number of students present if there are s students on Mrs. Malla's homeroom roster.	a) $s - 4$
b) How many students are present if there are 23 students on Mrs. Malla's homeroom roster?	b) $23 - 4$ $= 19 \text{ students}$
11. Carl ran 8 miles last Saturday as part of his marathon training plan.	
a) Write an expression to represent the average number of minutes that it took Carl to run each mile if he completed the run in m minutes.	a) $\frac{m}{8}$
b) Find his average number of minutes per mile if he completed the run in 72 minutes.	b) $\frac{72}{8} = 9 \text{ min}$
12. Two-thirds of the six-graders are going on an upcoming field trip.	
a) Write an expression to represent the number of sixth graders attending the field trip there there are n students in sixth grade.	a) $\frac{2}{3}n$
b) If there are 291 sixth grade students, how many are going on the field trip?	b) $\frac{2}{3}(291)$ $= 194 \text{ students}$
13. The sequel to a movie is 16 minutes longer than the first movie.	
a) Write an expression to represent the number of minutes in the first movie if the sequel is m minutes long.	a) $m - 16$
b) Find the length of the first movie if the sequel is 112 minutes long.	b) $112 - 16$ $= 96 \text{ min}$
14. A group of five friends went out to dinner and evenly split the bill.	
a) Write an expression for the amount each person paid if d represents the dinner bill.	a) $\frac{d}{5}$
b) If the bill came to \$78.10, how much did each person pay?	b) $\frac{78.10}{5}$ $= \$15.62$

Name: _____

Unit 4: Expressions & Properties



Date: _____ Per: _____

Homework 4: Writing & Evaluating Expressions

Directions: Translate into an algebraic expression, then evaluate for the given variable(s).		
WORDS	EXPRESSION	EVALUATE
1. "seven subtracted from p "	$p - 7$	(when $p = 22$) $22 - 7 = \boxed{15}$
2. "the product of negative three and x "	$-3x$	(when $x = -8$) $-3(-8) = \boxed{24}$
3. "one decreased by twice k "	$1 - 2k$	(when $k = 7$) $1 - 2(7) = 1 - 14 = \boxed{-13}$
4. "the quotient of fifty-four and m "	$\frac{54}{m}$	(when $m = -6$) $\frac{54}{-6} = \boxed{-9}$
5. "the sum of fourteen and r squared"	$14 + r^2$	(when $r = -3$) $14 + (-3)^2 = 14 + 9 = \boxed{23}$
6. " b subtracted five-sixths a "	$\frac{5}{6}a - b$	(when $a = 12$ and $b = 2$) $\frac{5}{6}(12) - 2 = 10 - 2 = \boxed{8}$
7a. The toll to cross a bridge costs d dollars. If 95 vehicles crossed the bridge in one hour, write an expression to represent the amount of money collected. $95d$	7b. If the bridge toll is \$3, how much money was collected? $95(3) = \boxed{\$285}$	
8a. Mitch and Zach went on a hike. Zach hiked f feet fewer than Mitch hiked. If Mitch hiked 3,000 feet, write an expression for how far Zach hiked. $3000 - f$	8b. If Zach hiked 280 feet fewer than Mitch, how far did Zach hike? $3000 - 280 = \boxed{2720 \text{ feet}}$	
9a. The running back on a football team has ran for 572 yards so far this season. If he runs y yards in the next game, write an expression for his new season total. $572 + y$	9b. If he runs 85 yards in his next game, find his new season total. $572 + 85 = \boxed{657 \text{ yd}}$	
10a. A snowstorm brought 32 inches of snow over the course of h hours. Write an expression to represent the average hourly snowfall. $\frac{32}{h}$	10b. If it snowed 32 inches in 10 hours, find the average hourly snowfall. $\frac{32}{10} = \boxed{3.2 \text{ in}}$	

Name: _____

Math 6

Date: _____ Per: _____

Unit 4: Algebraic Expressions & Properties

Quiz 4-1: Evaluating & Translating Expressions

Evaluate each expression given the variable replacements.

1. $5x - 12$ (if $x = 9$)

$$5(9) - 12$$

$$45 - 12$$

2. $b + a \div 4$ (if $a = 8$ and $b = 20$)

$$20 + 8 \div 4$$

$$20 + 2$$

3. $\frac{n^2}{m-1}$ (if $m = 6$ and $n = 5$)

$$\frac{5^2}{6-1} = \frac{25}{5}$$

4. $pq + (11 - p^2)$ (if $p = 3$ and $q = 7$)

$$3(7) + (11 - 3^2)$$

$$21 + (11 - 9)$$

$$21 + 2$$

5. $s + \frac{5}{6}r$ (if $r = \frac{4}{15}$ and $s = \frac{2}{3}$)

$$\frac{2}{3} + \frac{5}{6} \left(\frac{4}{15} \right)$$

$$\frac{2}{3} + \frac{2}{9}$$

$$\frac{6}{9} + \frac{2}{9}$$

7. $2a^2 + 3b$ (if $a = -4$ and $b = -7$)

$$2(-4)^2 + 3(-7)$$

$$2(16) + (-21)$$

$$32 - 21$$

8. $\frac{-8k}{j-k}$ (if $j = 9$ and $k = -3$)

$$\frac{-8(-3)}{9 - (-3)} = \frac{24}{12}$$

1. 33

2. 22

3. 5

4. 23

5. $\frac{8}{9}$

6. 73

7. 11

8. 2

Translate the words into an algebraic expression.

9. "the difference of fourteen and a number"

9. $14 - n$

10. "the product of a number and negative five"

10. $-5n$

11. "the quotient of a number and nine"
12. "twenty-seven more than a number squared"
13. "three-fourths of a number"
14. "twenty subtracted from a number"
15. "the sum of twice a number and eleven"
16. "one less than three times a number"
17. Mr. Livingston drove 375 miles using g gallons of gas. Write an expression to find the number of miles he drove on average per gallon of gas.
18. Colin's bank account balance is d dollars. If he deposits a check for \$50, write an expression to represent his new balance.
19. Jarrod pays \$0.12 per text message as part of his cell phone plan.
- a) If he sent m messages last month, write an expression to represent the total cost on his bill for text messaging.
- b) If he sent 92 text messages, what was he charged for texts?
20. Alisa ran on the treadmill then lifted weights. She burned 85 fewer calories lifting weights than she did on the treadmill.
- a) If she burned c calories on the treadmill, write an expression to represent the number of calories she burned while lifting weights.
- b) If she burned 376 calories on the treadmill, how many calories did she burn from lifting weights?

$$0.12(92) = 11.04$$

$$376 - 85 = 291$$

11. $\frac{n}{9}$
12. $n^2 + 27$
13. $\frac{3}{4}n$
14. $n - 20$
15. $2n + 11$
16. $3n - 1$
17. $\frac{375}{g}$
18. $d + 50$
19. a) $0.12m$
b) \$11.04
20. a) $c - 85$
b) 291 calories

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Main Ideas/Questions	Notes/Examples
<p><i>Parts of an</i> EXPRESSION</p> <p>NOTE: If there is a subtraction sign before a term, it is NEGATIVE!</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> $8x + 1 - 5x - 12x + 23 - 7$ </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: 45%;"> <p style="text-align: center;">Variable Terms (Terms WITH a variable)</p> <p style="text-align: center;">$8x, -5x, -12x$</p> </div> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: 45%;"> <p style="text-align: center;">Constant Terms (Terms WITHOUT a variable)</p> <p style="text-align: center;">$1, 23, -7$</p> </div> </div> <div style="margin-top: 10px;"> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: fit-content; margin: 0 auto;"> <p style="text-align: center;">Coefficients (Number NEXT TO a variable)</p> <p style="text-align: center;">$8, -5, -12$</p> </div> </div>

EXAMPLES	Directions: Identify the variable terms, constant terms, and coefficients.			
	Expression	Variable Terms	Coefficients	Constant Terms
1.	$4x + 9 - 7x$	$4x, -7x$	$4, -7$	9
2.	$-7a - 1 + 16$	$-7a$	-7	$-1, 16$
3.	$9 - 6k + 8k + 1$	$-6k, 8k$	$-6, 8$	$9, 1$
4.	$r - 14 - 5 + 2r$	$r, 2r$	$1, 2$	$-14, -5$
5.	$-6 + 7w - w - 13$	$7w, -w$	$7, -1$	$-6, -13$
6.	$\frac{1}{2}p + 14 - 2 - 9p$	$\frac{1}{2}p, -9p$	$\frac{1}{2}, -9$	$14, -2$
7.	$8x + 3y + 15y$	$8x, 3y, 15y$	$8, 3, 15$	$-$
8.	$-3m + 7n - 14 + 8m$	$-3m, 7n, 8m$	$-3, 7, 8$	-14
9.	$-7w + 2v - 11 - 4 + 6w$	$-7w, 2v, 6w$	$-7, 2, 6$	$-11, -4$
10.	$\frac{2}{3}p - \frac{5}{6}q + \frac{1}{4}$	$\frac{2}{3}p, -\frac{5}{6}q$	$\frac{2}{3}, -\frac{5}{6}$	$\frac{1}{4}$

Combining LIKE TERMS

You can simplify an algebraic expression by **combining like terms**. This means to combine common variable terms and constant terms.

Example: Simplify the expression below:

$$12x + 1 - 7x - 10 = \underline{5x - 9}$$

EXAMPLES

Directions: Simplify each expression.

11. $7x + 4 + 2x$

$$9x + 4$$

12. $-4r + 9r + 11$

$$5r + 11$$

13. $9 + 2k + 14 - 10k$

$$-8k + 23$$

14. $n - 1 - 2n + 17$

$$-n + 16$$

15. $-1 - 8 - 2w + 6w$

$$4w - 9$$

16. $10 - 2p - 3p + 2$

$$-5p + 12$$

17. $n - 1 + 6 - 2n + 10$

$$-n + 15$$

18. $9c - 4 - 5c + 3 + 2c$

$$6c - 1$$

19. $\frac{3}{4}y - 7 + \frac{1}{2}y$

$$\frac{3}{4}y - 7 + \frac{2}{4}y$$

$$\frac{5}{4}y - 7$$

$$\boxed{1\frac{1}{4}y - 7}$$

20. $\frac{1}{8} + \frac{5}{6}w + \frac{7}{12}$

$$\frac{3}{24} + \frac{5}{6}w + \frac{14}{24}$$

$$\boxed{\frac{5}{6}w + \frac{17}{24}}$$

21. $9x + 7y - 3y + 2x$

$$11x + 4y$$

22. $3b - 8a + 11b - a$

$$-9a + 14b$$

23. $2m - m + 8n - 14$

$$m + 8n - 14$$

24. $-3r - 2s + 5s - 8r$

$$-11r + 3s$$

25. $8p - 1 + 3q - 5q$

$$8p - 2q - 1$$

26. $-c - 4d + 7c - 11d$

$$6c - 15d$$

WHY DID THE TRAFFIC LIGHT SAY "Close your Eyes!" ?

Directions: Simplify each expression. After completing each set, find matching answers. One will have a letter and the other a number. Write the letter in the matching numbered box at the bottom of the page.

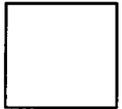
SET 1					
N.	$11a+2-4a-5$	<u>$7a-3$</u>	7.	$8a+6+5-6a$	<u>$2a+11$</u>
A.	$-3a-3-13+4a$	<u>$a-16$</u>	16.	$1-2a+9a-4$	<u>$7a-3$</u>
U.	$-7a-4+2a-5$	<u>$-5a-9$</u>	2.	$-3a+15-a-2$	<u>$-4a+13$</u>
B.	$8+6a-4a+3$	<u>$2a+11$</u>	9.	$a-10+1-6a$	<u>$-5a-9$</u>
O.	$1-8a-4a+4$	<u>$-12a+5$</u>	4.	$7a-6a-14-2$	<u>$a-16$</u>
T.	$10-2a+3-2a$	<u>$-4a+13$</u>	8.	$7-2-9a-3a$	<u>$-12a+5$</u>
SET 2					
W.	$-6k+9+8+10k$	<u>$4k+17$</u>	5.	$14k+6-8-3k$	<u>$11k-2$</u>
A.	$2k+8-7k+4k$	<u>$-k+8$</u>	18.	$-8k+5k-20+6$	<u>$-3k-14$</u>
T.	$-6k-3-3-11k$	<u>$-17k-6$</u>	3.	$12+5+k+3k$	<u>$4k+17$</u>
E.	$-9+7k-k-9k-5$	<u>$-3k-14$</u>	12.	$-2+16-7k+9k+11$	<u>$2k+25$</u>
O.	$k+19+8k+6-7k$	<u>$2k+25$</u>	6.	$5k-1-10k+4k+9$	<u>$-k+8$</u>
S.	$-7+9k+8+2k-3$	<u>$11k-2$</u>	10.	$5-13k-9-4k-2$	<u>$-17k-6$</u>
SET 3					
I.	$1+3y-5y+3x+7$	<u>$3x-2y+8$</u>	1.	$9-4y+3x+2y-1$	<u>$3x-2y+8$</u>
H.	$5x-9-4-4x-y$	<u>$x-y-13$</u>	13.	$7y+9-y-x-14$	<u>$-x+6y-5$</u>
G.	$6x-4+2x+4-9y$	<u>$8x-9y$</u>	11.	$1+11y+6x+3y-x$	<u>$5x+14y+1$</u>
T.	$2-4x+10y+9x-1+4y$	<u>$5x+14y+1$</u>	15.	$9y-25-2x+5-2y$	<u>$-2x+7y-20$</u>
A.	$7y-15-6x+4x-5$	<u>$-2x+7y-20$</u>	14.	$-2-2y+4x-11+y-3x$	<u>$x-y-13$</u>
C.	$-1+3y+7x-8x+3y-4$	<u>$-x+6y-5$</u>	17.	$8x-6-7y+4-2y+2$	<u>$8x-9y$</u>

ANSWER:

I T W A S A B O U T T O C H A N G E !

Name: _____

Unit 4: Expressions & Properties



Date: _____ Per: _____

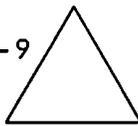
Homework 5: Combining Like Terms

Directions: Identify the variable terms, constant terms, and coefficients for each expression.				
	EXPRESSION	VARIABLE TERMS	COEFFICIENTS	CONSTANT TERMS
1.	$4x + 15x$	$4x, 15x$	$4, 15$	—
2.	$8r + 7 - 2r$	$8r, -2r$	$8, -2$	7
3.	$-6n - 25 + 7n - 4$	$-6n, 7n$	$-6, 7$	$-25, -4$
4.	$3a - 4a + 17 + a - 1$	$3a, -4a, a$	$3, -4, 1$	$17, -1$
5.	$11c - 4d + c - 9d - 2c$	$11c, -4d, c, -9d, -2c$	$11, -4, 1, -9, -2$	—
6.	$-5x + 3 + 2y - y + 8x - 14$	$-5x, 2y, -y, 8x$	$-5, 2, -1, 8$	$3, -14$
Directions: Simplify each expression by combining like terms.				
7.	$8w + 4w$		8.	$-6c + 4c$
	$12w$			$-2c$
9.	$4x - 7x + 28$		10.	$13 + 9p - 20$
	$-3x + 28$			$9p - 7$
11.	$7 + \frac{4}{5}a - \frac{2}{3}a + 2$		12.	$12k - 2 - 1 + 2k$
	$\frac{12}{15}a - \frac{10}{15}a + 9 = \frac{2}{15}a + 9$			$14k - 3$
13.	$-3n - 2n + 18 + 12n$		14.	$v - 14 + 9v - 5$
	$7n + 18$			$10v - 19$
15.	$20 + 17z - 16z - 12$		16.	$-2 - j + 15 + 8j - 11$
	$z + 8$			$7j + 2$
17.	$5r + 16s - 7s - 2r + r$		18.	$-n + 8n - 7m + 4n + m$
	$4r + 9s$			$-6m + 11n$
19.	$5x - 9 - 4 + y - 12x$		20.	$-2a + 9 - b - 4b + 7a - 1$
	$-7x + y - 13$			$5a - 5b + 8$

Name:	Date:
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Topic:	Class:
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Main Ideas/Questions	Notes/Examples		
DISTRIBUTIVE <i>Property</i>	We can use the distributive property to multiply a sum or difference by a value. The distributive property is defined by the two rules below:		
	$a(b+c) = ab+ac$	$a(b-c) = ab-ac$	
NUMERICAL <i>Examples</i>	Simplify each expression using the distributive property.		
	1. $6(2+4)$ $12+24$ $= \boxed{36}$	2. $-3(8+1)$ $-24-3$ $= \boxed{-27}$	3. $\frac{1}{2}(28+10)$ $14+5$ $= \boxed{19}$
	4. $7(8-2)$ $56-14$ $= \boxed{42}$	5. $-12(5-3)$ $-60+36$ $= \boxed{-24}$	6. $4(9+2-8)$ $36+8-32$ $44-32$ $= \boxed{12}$
ALGEBRAIC <i>Examples</i>	Simplify each expression using the distributive property.		
	7. $2(x+5)$ $2x+10$	8. $-10(k+1)$ $-10k-10$	9. $7(a+b)$ $7a+7b$
	10. $9(w-4)$ $9w-36$	11. $2(p-7)$ $2p-14$	12. $-3(r-s)$ $-3r+3s$
	13. $2(2x+3)$ $4x+6$	14. $-6(3y-7)$ $-18y+42$	15. $-(5a-1)$ $-5a+1$
	16. $5(3m+n)$ $15m+5n$	17. $7(2c-5d)$ $14c-35d$	18. $-8(x-4y)$ $-8x+32y$
	19. $9(w+4v-7)$ $9w+36v-63$	20. $-2(5a-b+2c)$ $-10a+2b-4c$	21. $\frac{1}{3}(6r+15s-12)$ $2r+5s-4$

TRANSLATING	Translate each verbal expression into an algebraic expression, then simplify.		
	Words	Expression	Simplified Expression
	22. "three times the sum of a number and eight"	$3(n+8)$	$3n+24$
	23. "negative nine times the difference of a number and four"	$-9(n-4)$	$-9n+36$
	24. "two less than a number, times four"	$4(n-2)$	$4n-8$
	25. "negative six times the sum of twice a number and seven"	$-6(2n+7)$	$-12n-42$
	26. "one-half the difference of four times a number and eighteen"	$\frac{1}{2}(4n-18)$	$2n-9$
	27. "a number subtracted from twenty, multiplied by five"	$5(20-n)$	$100-5n$
APPLICATIONS	<p>28. If the figure below is an equilateral triangle, use parentheses to write an expression to represent its perimeter, then simplify the expression.</p> <div style="display: flex; align-items: center; justify-content: space-around;"> <div style="text-align: center;"> $5x-9$  </div> <div style="text-align: center;"> $3(5x-9)$ $= \boxed{15x-27}$ </div> </div>		
	<p>29. A city averages r inches of rainfall each month. This January, they had two inches less rain than average. If they continue to have the same amount of rain each month as they did in January, write an expression to represent the amount of rain they will have for the year. Then, simplify the expression.</p> $12(r-2) = \boxed{12r-24}$		
	<p>Use for questions 30-31: A club is selling tubs of cookie dough for a fundraiser. The tubs cost the club c dollars each but they are selling them for \$12 each. The difference in cost is their profit per tub.</p>		
	<p>30. Use parentheses to write an expression to represent the amount they profited if they sold 60 tubs. Then, simplify the expression.</p> $60(12-c)$ $= \boxed{720-60c}$	<p>31. If the tubs cost the club \$7 each, how much did they profit?</p> $720 - 60(7)$ $720 - 420$ $= \boxed{\$300}$	
	<p>Use for questions 32-33: This past Sunday, the Giants scored seven more points than the Eagles. The Patriots scored twice as many points as the Giants.</p>		
<p>32. Use parentheses to write an expression to represent the number of points scored by the Patriots, then simplify the expression.</p> $2(e+7)$ $= \boxed{2e+14}$	<p>33. If the Eagles scored 16 points, how many points did the Patriots score?</p> $2(16) + 14$ $32 + 14$ $= \boxed{46 \text{ pts}}$		

SIMPLIFYING & EVALUATING EXPRESSIONS Relay!

Directions: Using the distributive property, simplify the expression in column 1. Pass your expression to the box in column 2. Simplify by combining like terms. Pass your simplified expression to the box in column 3. Evaluate for the given variable replacement(s). Write your answer in the circle. **Find the sum of your final answers in the column 3 and record at the bottom.**

	COLUMN 1 (DISTRIBUTE!)	↑	COLUMN 2 (COMBINE LIKE TERMS!)	↑	COLUMN 3 (EVALUATE!)
1	$2(x + 8)$	↑	$8x - 2x + 16$	↑	$6x + 5$ (for $x = -3$) -13
2	$-7(k - 1)$	↑	$-7k + 7$	↑	$-8k + 11$ (for $k = 5$) -29
3	$-6(v + 3)$	↑	$-6v - 18$	↑	$2v - 19$ (for $v = 12$) 5
4	$10(c + 5)$	↑	$2c - 21 + 10c + 50$	↑	$12c + 29$ (for $c = -1$) 17
5	$-3(8y - 2)$	↑	$-24y + 6$	↑	$-7n - 13$ (for $y = -8$) 43
6	$\frac{1}{3}(15 - 6n)$	↑	$11n + 1 - 5 - 2n$	↑	$9n - 4$ (for $n = -2$) -22
7	$5(2x + y)$	↑	$10x + 5y$	↑	$-3x + 8y$ (for $x = 5$ and $y = 9$) 57
8	$-9(r - 3s)$	↑	$-9r + 27s$	↑	$4r + 13s$ (for $r = -10$ and $s = -3$) -79
9	$-(7a - 4b)$	↑	$-7a + 4b$	↑	$-10a + 3b$ (for $a = 7$ and $b = 11$) -37
10	$4(m - 3n + 7)$	↑	$4m - 12n + 28$	↑	$6m - 12n + 7$ (for $m = -4$ and $n = -1$) -5

SUM OF THE NUMBERS IN COLUMN 3: -63

Name: _____

Unit 4: Expressions & Properties



Date: _____ Per: _____

Homework 6: The Distributive Property

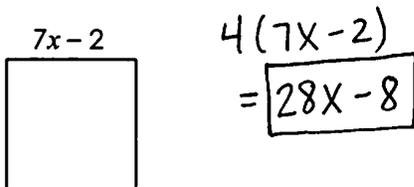
Directions: Simplify each expression using the distributive property.

1. $4(9+3)$ $36 + 12$ $= \boxed{48}$	2. $8(2-7)$ $16 - 56$ $= \boxed{-40}$	3. $-6(11-1+4)$ $-66 + 6 - 24$ $-60 - 24 = \boxed{-84}$
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Directions: Simplify each expression using the distributive property.

4. $3(x+5)$ $3x + 15$	5. $7(w-4)$ $7w - 28$	6. $-5(p+2)$ $-5p - 10$
7. $4(8-k)$ $32 - 4k$	8. $9(r+7)$ $9r + 63$	9. $-12(m-1)$ $-12m + 12$
10. $10(a+b)$ $10a + 10b$	11. $-3(x-2y)$ $-3x + 6y$	12. $-(4k+1)$ $-4k - 1$
13. $-9(2a-5)$ $-18a + 45$	14. $5(3-2m)$ $15 - 10m$	15. $\frac{1}{5}(20m+5)$ $4m + 1$
16. $\frac{4}{3}(6v-27)$ $8v - 36$	17. $2(7m+2n+1)$ $14m + 4n + 2$	18. $-5(2a-b+3)$ $-10a + 5b - 15$

19. If the figure below is a square, write an expression using parentheses to represent its perimeter. Then, simplify the expression.



20. Each day, Eliza runs and walks the same number of minutes. If she runs for m minutes and walks for 5 minutes, write an expression using parentheses for the total number of minutes she will spend running and walking for 14 days. Then, simplify the expression.

$$14(m+5) = \boxed{14m+70}$$

Review: Simplify the expressions below by combining like terms.

21. $12a - 3 + 5a$ $17a - 3$	22. $6w - 21 - w + 3$ $5w - 18$
23. $1 + 14x - 16x + 14$ $-2x + 15$	24. $-7r + r + 23 - 16$ $-6r + 7$
25. $-41 - 2c + 13c - 7$ $11c - 48$	26. $28 + 10p - 11p + 2$ $-p + 30$
27. $9x - x + 4y - 23 - 15y$ $8x - 11y - 23$	28. $-2 - 13m - 4n - m + n + 7$ $-14m - 3n + 5$

Name:	Date:
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Topic:	Class:
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Main Ideas/Questions	Notes/Examples
WARM-UP	Directions: Simplify each expression by combining like terms . 1. $8x - 2x$ $6x$
	2. $7a - 19 - 10a + a$ $-2a - 19$
	3. $15p - 1 - 8p + 2$ $7p + 1$
	4. $2r - 14 + 5s - 1r - s + 2$ $-9r + 4s - 12$
	Directions: Simplify each expression by distributing . 5. $4(x + 2)$ $4x + 8$
	6. $-9(2k - 1)$ $-18k + 9$
	7. $\frac{1}{2}(24 - 10c)$ $12 - 5c$
	8. $-3(6m + 2n - 7)$ $-18m - 6n + 21$
SIMPLIFYING EXPRESSIONS	<p>An algebraic expression is in simplest form when it has <u>no like terms</u> and <u>no parenthesis</u>.</p> <p>To simplify an algebraic expression completely:</p> <p>1. Distribute → 2. Combine Like Terms</p>
EXAMPLES	Directions: Simplify each expression. 9. $5(x + 4) + 9$ $5x + 20 + 9$ $5x + 29$
	10. $7 + 9(2 + k)$ $7 + 18 + 9k$ $9k + 25$
	11. $-4(w + 9) - w$ $-4w - 36 - w$ $-5w - 36$
	12. $8a - 2(a - 7)$ $8a - 2a + 14$ $6a + 14$

	<p>13. $9(3c-4)+2c$ $27c-36+2c$ $29c-36$</p>	<p>14. $-6(1+2n)-5$ $-6-12n-5$ $-12n-11$</p>
	<p>15. $-16+\frac{1}{3}(15r-9)$ $-16+5r-3$ $5r-19$</p>	<p>16. $\frac{2}{5}y+\frac{1}{4}(y-8)$ $\frac{2}{5}y+\frac{1}{4}y-2$ $\frac{8}{20}y+\frac{5}{20}y-2 = \frac{13}{20}y-2$</p>
	<p>17. $2v-5(3v+4)$ $2v-15v-20$ $-13v-20$</p>	<p>18. $8(2m-3)-m+3$ $16m-24-m+3$ $15m-21$</p>
	<p>19. $15p-2p-8(p+1)$ $15p-2p-8p-8$ $5p-8$</p>	<p>20. $25+9(z-2)+2z$ $25+9z-18+2z$ $11z+7$</p>
	<p>21. $8(2a-b)-4a+9b$ $16a-8b-4a+9b$ $12a+b$</p>	<p>22. $-17x+12(y-x)-3y$ $-17x+12y-12x-3y$ $-29x+9y$</p>
	<p>23. $3(d+5)-2(d+8)$ $3d+15-2d-16$ $d-1$</p>	<p>24. $7(k-2)+6(-1-3k)$ $7k-14-6-18k$ $-11k-20$</p>
<p>APPLICATION</p>	<p>25. Ariana, Ben, and Khloe played a video game. Ariana scored p points. Ben scored seven more points than Ariana scored. Khloe scored twice the number of points that Ben scored. Write an expression to represent the total number of points scored by Ariana, Ben, and Khloe in simplest form.</p> <p>$p+p+7+2(p+7)$ $p+p+7+2p+14 = 4p+21$</p>	

Name: _____

Unit 4: Expressions & Properties



Date: _____ Per: _____

Homework 7: Simplifying Expressions

Directions: Simplify each expression by combining like terms.			
1. $-x+9+7x$ $6x+9$	2. $5k-14-1+11k$ $16k-15$	3. $-10r-2r+4-7r+3$ $-19r+7$	
4. $8m-20-6m-m+7$ $m-13$	5. $2b+a-4a-2-12b$ $-3a-10b-2$	6. $\frac{1}{3}c+\frac{5}{6}c+c$ $\frac{2}{6}c+\frac{5}{6}c+\frac{6}{6}c = \frac{13}{6}c = 2\frac{1}{6}c$	
Directions: Simplify each expression using the distributive property.			
7. $8(x+2)$ $8x+16$	8. $-3(w-7)$ $-3w+21$	9. $5(7-n)$ $35-5n$	10. $-4(2r+9s-1)$ $-8r-36s+4$
Directions: Simplify each expression completely.			
11. $4(x-5)+2x$ $4x-20+2x$ $6x-20$	12. $-5+4(3+p)$ $-5+12+4p$ $4p+7$	13. $20+7(a-2)$ $20+7a-14$ $7a+6$	
14. $-2(k+4)+k+5$ $-2k-8+k+5$ $-k-3$	15. $3(8+5y)-2$ $24+15y-2$ $15y+22$	16. $6(7m-1)-10m$ $42m-6-10m$ $32m-6$	
17. $13c-11c-5(c-4)$ $13c-11c-5c+20$ $-3c+20$	18. $18z+2(4-3z)+1$ $18z+8-6z+1$ $12z+9$	19. $20-4+4(3d-7)$ $20-4+12d-28$ $12d-12$	
20. $\frac{2}{3}(24k-6)-2k$ $16k-4-2k$ $14k-4$	21. $7(2n-10)+2(4n-1)$ $14n-70+8n-2$ $22n-72$	22. $10+3(5a-2b-3)-4b$ $10+15a-6b-9-4b$ $15a-10b+1$	
23. Laura bought y yards of fabric on Saturday. The next day, she went back and bought 3 more yards than she did on Saturday. If each yard of fabric costs \$5, write an expression in simplest form for the total amount of money she spent on both days. $5(y+y+3)$ $5y+5y+15 = 10y+15$		24. Jonas is a runner. He ran m miles last week. His goal this week was to run one mile less than twice the miles he ran last week. If he tripled his goal, write an expression in simplest form to show how many more miles he ran this week compared to last. $3(2m-1)-m$ $6m-3-m = 5m-3$	

Name:

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Main Ideas/Questions	Notes/Examples						
WARM-UP	<p>Use the distributive property to simplify each expression.</p> <table border="1"> <tr> <td> <p>1. $4(2+5)$ $8+20$ $= \boxed{28}$</p> </td> <td> <p>2. $10(7-3)$ $70-30$ $= \boxed{40}$</p> </td> <td> <p>3. $6(1+8)$ $6+48$ $= \boxed{54}$</p> </td> </tr> <tr> <td> <p>4. $2(p+3)$ $2p+6$</p> </td> <td> <p>5. $8(3k-1)$ $24k-8$</p> </td> <td> <p>6. $5(2x-9y)$ $10x-45y$</p> </td> </tr> </table>	<p>1. $4(2+5)$ $8+20$ $= \boxed{28}$</p>	<p>2. $10(7-3)$ $70-30$ $= \boxed{40}$</p>	<p>3. $6(1+8)$ $6+48$ $= \boxed{54}$</p>	<p>4. $2(p+3)$ $2p+6$</p>	<p>5. $8(3k-1)$ $24k-8$</p>	<p>6. $5(2x-9y)$ $10x-45y$</p>
	<p>1. $4(2+5)$ $8+20$ $= \boxed{28}$</p>	<p>2. $10(7-3)$ $70-30$ $= \boxed{40}$</p>	<p>3. $6(1+8)$ $6+48$ $= \boxed{54}$</p>				
<p>4. $2(p+3)$ $2p+6$</p>	<p>5. $8(3k-1)$ $24k-8$</p>	<p>6. $5(2x-9y)$ $10x-45y$</p>					
FACTORING <i>Expressions</i>	<p>Separating an expression back into a product is called factoring.</p> <div style="text-align: center;"> $\boxed{2x + 8} \rightarrow \boxed{2(x + 4)}$ <p>(Simplest Form) (Factored Form)</p> </div> <p>Think of factoring like the distributive property in reverse!</p>						
<i>How do you</i> FACTOR?	<p>① First find the greatest common factor (GCF) of each term.</p>						
	<p>② Draw a set of parentheses and place the GCF outside the parentheses.</p>						
	<p>③ Divide each term by the GCF and drop down the factors inside the parentheses.</p>						
	<p>④ Check your work by distributing!</p>						
<i>Numerical</i> EXAMPLES	<p>Factor each expression using the GCF.</p> <table border="1"> <tr> <td> <p>7. $8+16$ GCF: 8 $8(1+2)$</p> </td> <td> <p>8. $15-27$ GCF: 3 $3(5-9)$</p> </td> </tr> <tr> <td> <p>9. $36-4$ GCF: 4 $4(9-1)$</p> </td> <td> <p>10. $24-18$ GCF: 6 $6(4-3)$</p> </td> </tr> <tr> <td> <p>11. $32+80$ GCF: 16 $16(2+5)$</p> </td> <td> <p>12. $54-28$ GCF: 2 $2(27-14)$</p> </td> </tr> </table>	<p>7. $8+16$ GCF: 8 $8(1+2)$</p>	<p>8. $15-27$ GCF: 3 $3(5-9)$</p>	<p>9. $36-4$ GCF: 4 $4(9-1)$</p>	<p>10. $24-18$ GCF: 6 $6(4-3)$</p>	<p>11. $32+80$ GCF: 16 $16(2+5)$</p>	<p>12. $54-28$ GCF: 2 $2(27-14)$</p>
	<p>7. $8+16$ GCF: 8 $8(1+2)$</p>	<p>8. $15-27$ GCF: 3 $3(5-9)$</p>					
	<p>9. $36-4$ GCF: 4 $4(9-1)$</p>	<p>10. $24-18$ GCF: 6 $6(4-3)$</p>					
	<p>11. $32+80$ GCF: 16 $16(2+5)$</p>	<p>12. $54-28$ GCF: 2 $2(27-14)$</p>					

Algebraic EXAMPLES	13. $2x+14$ $2(x+7)$	14. $8x-24$ $8(x-3)$
	15. $6k+6$ $6(k+1)$	16. $9w-45$ $9(w-5)$
	17. $10m+15$ $5(2m+3)$	18. $12a-6$ $6(2a-1)$
	19. $6r+27s$ $3(2r+9s)$	20. $32a-24b$ $8(4a-3b)$
	21. $4x+18y$ $2(2x+9y)$	22. $60a-48b$ $12(5a-4b)$
	23. $6p-3q$ $3(2p-q)$	24. $36c-45d$ $9(4c-5d)$

EQUIVALENT Expressions	Algebraic expressions are equivalent if they simplify to the same expression. For example, the three expressions below are equivalent:		
	$2x+8$	$2(x+4)$	$3x+8-x$
	Write three expressions that are equivalent to the given expression. Give the factored form as one of the expressions.		
25. $4m+20$ \bullet <u>$4(m+5)$</u> \bullet <u>$5(m+4) - m$</u> \bullet <u>$6m + 18 + 2 - 2m$</u>	26. $8k+36$ \bullet <u>$4(2k+9)$</u> \bullet <u>$8(k+4) + 4$</u> \bullet <u>$7k + 45 + k - 9$</u>		

FACTORIZING

challenge!

Name: _____

Date: _____ Per: _____

Directions: Fill in the boxes below with the numbers 1-15 to correctly factor each expression. Each number is only used once!

① $77x + 56 \rightarrow \boxed{7} (\boxed{11}x + \boxed{8})$

② $45x - 15 \rightarrow \boxed{15} (\boxed{3}x - \boxed{1})$

③ $24x + 60 \rightarrow \boxed{12} (\boxed{2}x + \boxed{5})$

④ $40 - 52x \rightarrow \boxed{4} (\boxed{10} - \boxed{13}x)$

⑤ $84x + 54y \rightarrow \boxed{6} (\boxed{14}x + \boxed{9}y)$

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FACTORIZING

challenge!

Name: _____

Date: _____ Per: _____

Directions: Fill in the boxes below with the numbers 1-15 to correctly factor each expression. Each number is only used once!

① $77x + 56 \rightarrow \boxed{} (\boxed{}x + \boxed{})$

② $45x - 15 \rightarrow \boxed{} (\boxed{}x - \boxed{})$

③ $24x + 60 \rightarrow \boxed{} (\boxed{}x + \boxed{})$

④ $40 - 52x \rightarrow \boxed{} (\boxed{} - \boxed{}x)$

⑤ $84x + 54y \rightarrow \boxed{} (\boxed{}x + \boxed{}y)$

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Name: _____

Unit 4: Expressions & Properties

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Homework 8: Factoring Expressions;
Equivalent Expressions**Directions:** Factor each expression using the GCF. Check your answer by distributing.

1. $7 + 28$ $7(1+4)$	2. $16 - 2$ $2(8-1)$	3. $72 - 45$ $9(8-5)$
4. $3x + 15$ $3(x+5)$	5. $9y - 9$ $9(y-1)$	6. $5m + 60$ $5(m+12)$
7. $35c - 28$ $7(5c-4)$	8. $4r + 22$ $2(2r+11)$	9. $20a + 12b$ $4(5a + 3b)$
10. $7w - 63v$ $7(w-9v)$	11. $12 - 2k$ $2(6-k)$	12. $40 + 16n$ $8(5+2n)$
13. $30 - 54a$ $6(5-9a)$	14. $12p + 18q$ $6(2p+3q)$	15. $28a - 60b + 20$ $4(7a - 15b + 5)$

Directions: Translate each expression, then write the expression in **factored form**.

16. "the sum of four times a number and twenty-four" $4n + 24 = \boxed{4(n+6)}$	17. "the difference between nine times a number and seventy-two" $9n - 72 = \boxed{9(n-8)}$
18. "ten times a number, subtracted from eighteen" $18 - 10n = \boxed{2(9-5n)}$	19. "thirty more than the product of six and a number" $6n + 30 = \boxed{6(n+5)}$

Directions: Write three expressions that are equivalent to the given expression.

20. $7a + 21$ <ul style="list-style-type: none"> • <u>$7(a+3)$</u> • <u>$4a + 20 + 3a + 1$</u> • <u>$6(a+3) + a + 3$</u> 	21. $24x + 20y$ <ul style="list-style-type: none"> • <u>$4(6x + 5y)$</u> • <u>$26x - 2x + 18y + 2y$</u> • <u>$5(5x + 4y) - x$</u>
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Math 6

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Unit 4: Expressions & Properties

Quiz 4-2: Simplifying & Factoring Expressions; Equivalent Expressions

Identify the variable terms, coefficients, and constant terms of each expression.

1. $17m - 8 + 3m - m - 2$

Variable Terms: $17m, 3m, -m$

Coefficients: $17, 3, -1$

Constant Terms: $-8, -2$

Simplify each expression by combining like terms.

2. $4r + 9r$

3. $8a + 7 - 12a$

4. $-3 + 17p + 2 - p$

5. $-13y + x - 12y - 6 + x$

2. $\underline{13r}$

3. $\underline{-4r + 7}$

4. $\underline{16p - 1}$

5. $\underline{2x - 25y - 6}$

6. $\underline{120}$

7. $\underline{-51}$

8. $\underline{5p + 5}$

9. $\underline{-10p + 2b}$

10. $\underline{6n - 1}$

11. $\underline{-35c - 7d}$

Simplify each expression using the distributive property.

6. $8(11 + 4)$

$88 + 32$

7. $3(-5 - 12)$

$-15 - 36$

-51

8. $5(p + 9)$

9. $-2(5m - 13)$

10. $\frac{1}{4}(24n - 4)$

11. $-7(5c + d)$

Simplify each expression completely.

12. $10(2x+1) - 13x$

$$20x + 10 - 13x$$

13. $3 + \frac{1}{2}(2 - 18k)$

$$3 + 1 - 9k$$

14. $16 - 2(7w - 1) + 16w$

$$16 - 14w + 2 + 16w$$

15. $-2(5p + 6) + 3(7 - p)$

$$-10p - 12 + 21 - 3p$$

12. $\underline{7x + 10}$

13. $\underline{-9k + 4}$

14. $\underline{2w + 18}$

15. $\underline{-13p + 9}$

Factor each expression using a GCF.

16. $36 + 84$

17. $63 - 18$

18. $3a + 27$

19. $54m - 24n$

16. $\underline{12(3 + 7)}$

17. $\underline{9(7 - 2)}$

18. $\underline{3(a + 9)}$

19. $\underline{6(9m - 4n)}$

20. Give three expressions equivalent to the expression $12x + 30$.

20. $\underline{6(2x + 5)}$

$$\underline{10(x + 3) + 2x}$$

$$\underline{11x + 40 + x - 10}$$

BONUS: It took Kate eight less minutes to complete her homework on Tuesday than it took her on Monday. It took her four times longer to complete her Wednesday homework than it took to complete her Tuesday homework. If m represents the number of minutes it took her to complete her Monday homework, **(a)** write an expression for the number of minutes she spent on the three days combined in simplest form, then **(b)** give the factored form of the expression.

$$m + m + 8 + 4(m + 8)$$

$$m + m + 8 + 4m + 32$$

$$6m + 40$$

a) Simplest Form: $6m + 40$

b) Factored Form: $2(3m + 20)$

Name:

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Main Ideas/Questions	Notes/Examples	
<p>COMMUTATIVE <i>property</i></p>	<p>Recall that equivalent expressions are expressions with the same value. We can use certain properties to write equivalent expressions.</p>	
	<p>COMMUTATIVE PROPERTY OF ADDITION</p>	<p>Numerical Example: $17 + 2 = 2 + 17$</p>
	<p>ORDER of terms does not affect sum</p>	<p>Algebraic Example: $a + b = b + a$</p>
	<p>COMMUTATIVE PROPERTY OF MULTIPLICATION</p>	<p>Numerical Example: $5 \cdot 4 = 4 \cdot 5$</p>
	<p>ORDER of factors does not affect product</p>	<p>Algebraic Example: $a \cdot b = b \cdot a$</p>
	<p>Use the commutative property to write an equivalent expression.</p>	
	<p>1. $18 + 60$ $60 + 18$</p>	<p>2. $-15a + 7b$ $7b + (-15a)$</p>
	<p>3. $12 \cdot (-7)$ $-7 \cdot 12$</p>	<p>4. $4x \cdot 9$ $9 \cdot 4x$</p>
<p>ASSOCIATIVE <i>property</i></p>	<p>ASSOCIATIVE PROPERTY OF ADDITION</p>	<p>Numerical Example: $(9 + 1) + 6 = 9 + (1 + 6)$</p>
	<p>GROUPING of terms does not affect sum</p>	<p>Algebraic Example: $x + (y + z) = (x + y) + z$</p>
	<p>ASSOCIATIVE PROPERTY OF MULTIPLICATION</p>	<p>Numerical Example: $8 \cdot (7 \cdot 2) = (8 \cdot 7) \cdot 2$</p>
	<p>GROUPING of factors does not affect product</p>	<p>Algebraic Example: $x \cdot (y \cdot z) = (x \cdot y) \cdot z$</p>
	<p>Use the associative property to write an equivalent expression.</p>	
	<p>5. $(-16 + 9) + 24$ $-16 + (9 + 24)$</p>	<p>6. $2x + (1 + 4x)$ $(2x + 1) + 4x$</p>
	<p>7. $-7 \cdot (-16 \cdot 5)$ $(-7 \cdot -16) \cdot 5$</p>	<p>8. $(\frac{1}{3}^p)^q$ $\frac{1}{3}(pq)$</p>

DISTRIBUTIVE <i>property</i>	DISTRIBUTIVE PROPERTY		Numerical Example:
	Recall the distributive property rules: <ul style="list-style-type: none"> $a(b+c) = a \cdot b + a \cdot c$ $a(b-c) = a \cdot b - a \cdot c$ 		$7(5+1) = 7 \cdot 5 + 7 \cdot 1$
			Algebraic Example:
			$p(q+r) = pq+pr$
	Use the distributive property to write an equivalent expression.		
	9. $6(8-5)$ $48-30$	10. $2(x+7)$ $2x+14$	
	11. $-9(3k-1)$ $-27k+9$	12. $27+45$ $9(3+5)$	
	13. $6y-30$ $6(y-5)$	14. $16c+72d$ $8(2c+9d)$	
IDENTITY <i>property</i>	IDENTITY PROPERTY OF ADDITION		Numerical Example:
	The sum of 0 and a number is itself.		$5+0=5$
			Algebraic Example:
			$k+0=k$
	IDENTITY PROPERTY OF MULTIPLICATION		Numerical Example:
	The product of 1 and a number is itself.		$6 \cdot 1 = 6$
			Algebraic Example:
			$g \cdot 1 = g$
<i>multiplication</i> PROPERTY OF ZERO	MULTIPLICATION PROPERTY OF ZERO		Numerical Example:
	Anything multiplied by 0 is equal to 0.		$7 \cdot 0 = 0$
			Algebraic Example:
			$a \cdot 0 = 0$
INVERSE <i>property</i>	INVERSE PROPERTY OF ADDITION		Numerical Example:
	The sum of a number and its opposite is 0.		$12 + (-12) = 0$
			Algebraic Example:
			$w + (-w) = 0$
	INVERSE PROPERTY OF MULTIPLICATION		Numerical Example:
	The product of a number and its reciprocal is 1.		$\frac{3}{4} \cdot \frac{4}{3} = 1$
			Algebraic Example:
			$\frac{r}{s} \cdot \frac{s}{r} = 1$

NAME THAT MATH PROPERTY!

Name the property that justifies each statement. Properties can be used more than once.

1	$7 \cdot (-4 \cdot 2) = (7 \cdot -4) \cdot 2$	Associative Prop of Multiplication
2	$64 + 0 = 64$	Identity Prop of Addition
3	$5(12 - 3) = 5 \cdot 12 - 5 \cdot 3$	Distributive Property
4	$(-15w) \cdot 0 = 0$	Multiplication Prop. of Zero
5	$-23 + 9 = 9 + (-23)$	Commutative Prop. of Addition
6	$3 \cdot \frac{1}{3} = 1$	Inverse Prop. of Multiplication
7	$-8 + (3 + x) = (-8 + 3) + x$	Associative Prop. of Addition
8	$11 + (-11) = 0$	Inverse Prop. of Addition
9	$-6 \cdot y = y \cdot -6$	Commutative Prop. of Multiplication
10	$0 \cdot (7r - 4) = 0$	Multiplication Property of Zero
11	$9 + (2k \cdot 1) = 9 + 2k$	Identity Property of Multiplication
12	$\frac{4}{5} \cdot \frac{5}{4} = 1$	Inverse Prop. of Multiplication
13	$17 \cdot (-3n) = -3n \cdot 17$	Commutative Prop. of Multiplication
14	$(a + 8) + 0 = a + 8$	Identity Prop. of Addition
15	$3p + 6 = 3(p + 2)$	Distributive Property
16	$-48 + 48 = 0$	Inverse Prop. of Addition

Properties Bank:

Commutative Property of Addition
 Commutative Property of Multiplication
 Associative Property of Addition
 Associative Property of Multiplication
 Distributive Property

Identity Property of Addition
 Identity Property of Multiplication
 Inverse Property of Addition
 Inverse Property of Multiplication
 Multiplication Property of Zero

Name: _____

Unit 4: Expressions & Properties



Date: _____ Per: _____

Homework 9: Properties

Directions: Use the commutative property to write an equivalent expression.		
1. $43 \cdot 9$ $9 \cdot 43$	2. $-2 + 15m$ $15 + (-2)$	3. $-8r \cdot \frac{1}{4}$ $\frac{1}{4} \cdot -8r$
Directions: Use the associative property to write an equivalent expression.		
4. $(-11 + 3) + 17$ $-11 + (3 + 17)$	5. $(xy)z$ $x(yz)$	6. $14c + (2c + 5)$ $(14c + 2c) + 5$
Directions: Use the distributive property to write an equivalent expression.		
7. $4(5 + 19)$ $20 + 76$	8. $-6(k - 3)$ $-6k + 18$	9. $\frac{1}{2}(18v - 8)$ $9v - 4$
10. $81 + 63$ $9(9 + 7)$	11. $4a + 28$ $4(a + 7)$	12. $15r - 12$ $3(5r - 4)$
Directions: Name the property that justifies the statement.		
13. $14x \cdot 0 = 0$ Mult. Prop. of Zero	14. $7p + p = p + 7p$ Commutative Prop. of Add.	
15. $\frac{1}{6} \cdot 6 = 1$ Inverse Prop. of Mult.	16. $(\frac{1}{2} \cdot 5) \cdot 8 = \frac{1}{2} \cdot (5 \cdot 8)$ Associative Prop. of Mult.	
17. $2k \cdot (-3 \cdot 9) = 2k \cdot (9 \cdot -3)$ Commutative Prop. of Mult.	18. $-5(2a + 7) = -10a - 35$ Distributive Property	
19. $-9 + 9 = 0$ Inverse Prop. of Addition	20. $14(p + q) = 14(q + p)$ Commutative Prop. of Add.	
21. $3(25 - 2) = 3(25) - 3(2)$ Distributive Property	22. $(\frac{2}{3}v) \cdot 1 = \frac{2}{3}v$ Identity Prop. of Mult.	
23. $(17 + 2y) + y = 17 + (2y + y)$ Associative Prop. of Add.	24. $4m - 4 = 4(m - 1)$ Distributive Property	
25. $(0 + 12m) \cdot (-4) = 12m \cdot (-4)$ Identity Prop. of Addition	26. $24 + (-24) = 0$ Inverse Prop. of Addition	
27. $r(16 - 9) = 16r - 9r$ Distributive Property	28. $8 \cdot (-5p + 1) = (-5p + 1) \cdot 8$ Commutative Prop. of Mult.	

Unit 4 Test Study Guide

(Expressions & Properties)

Name: _____

Date: _____ Per: _____

Topic 1: Evaluating Expressions

Directions: Evaluate each expression given the variable replacements.		
<p>1. $9r + 5$ (if $r = -7$)</p> $9(-7) + 5$ $-63 + 5$ $= \boxed{-58}$	<p>2. $2c - 7 + d$ (if $c = -4, d = -9$)</p> $2(-4) - 7 + (-9)$ $-8 - 7 - 9$ $= \boxed{-24}$	<p>3. $\frac{k^2}{k-2}$ (if $k = 6$)</p> $\frac{6^2}{6-2} = \frac{36}{4}$ $= \boxed{9}$
<p>4. $-14 - 15m$ (if $m = \frac{2}{3}$)</p> $-14 - 15\left(\frac{2}{3}\right)$ $-14 - 10$ $= \boxed{-24}$	<p>5. $(x + y^2) \cdot 4$ (if $x = -1, y = 3$)</p> $(-1 + 3^2) \cdot 4$ $(-1 + 9) \cdot 4$ $8 \cdot 4 = \boxed{32}$	<p>6. $\frac{1}{2} + \frac{4}{3}w$ (if $w = \frac{9}{10}$)</p> $\frac{1}{2} + \frac{4}{3}\left(\frac{9}{10}\right)$ $\frac{1}{2} + \frac{6}{5}$ $\frac{5}{10} + \frac{12}{10} = \frac{17}{10} = \boxed{\frac{17}{10}}$

Topic 2: Translating & Writing Expressions

Directions: Translate each expression.	
<p>7. "the product of a number and seventeen"</p> $17n$	<p>8. "the sum of a number and negative nine"</p> $n + (-9)$
<p>9. "one-fourth of a number"</p> $\frac{1}{4}n$	<p>10. "a number subtracted from thirty-two"</p> $32 - n$
<p>11. "the difference of twice a number and one"</p> $2n - 1$	<p>12. "three fewer than the quotient of a number and negative eight"</p> $\frac{n}{-8} - 3$
<p>13. Nate and Calvin went bowling. Nate scored 24 points less than Calvin. If c represents Calvin's score, write an expression to represent Nate's score.</p> $c - 24$	<p>14. The tire on a bicycle made 380 full rotations in m minutes. Write an expression to represent the average number of revolutions the tire made each minute.</p> $\frac{380}{m}$
<p>15. Savannah's bank account balance was \$193.60. If her paycheck is deposited in the amount of p dollars, write an expression to represent her new balance.</p> $193.60 + p$	<p>16. Five-sixths of the workers at a company got a raise. If w represents the number workers, write an expression to represent how many workers got a raise.</p> $\frac{5}{6}w$

Topic 3: Identify Parts of an Expression

Directions: Identify the variable terms, coefficients, and constant terms of each expression.			
Expression	Variable Terms	Coefficients	Constant Terms
17. $18r - 5 + 16 - 2r$	$18r, -2r$	$18, -2$	$-5, 16$
18. $-7 - 3a + b - 18 - 11b + 2a$	$-3a, b, -11b, 2a$	$-3, 1, -11, 2$	$-7, -18$

Topic 4: Simplifying Expressions

Directions: Simplify each expression by combining like terms.		
19. $5h - 14 + 3h$ $8h - 14$	20. $-3 + 18y - y + 20$ $17y + 17$	21. $2n - 10 + m - 3 - 5m + 9n$ $-4m + 11n - 13$

Directions: Simplify each expression using the distributive property.		
22. $7(9 - 4)$ $63 - 28 = \boxed{35}$	23. $-3(17 + 3)$ $-51 + (-9)$ $= \boxed{-60}$	24. $6(x + 3)$ $\boxed{6x + 18}$
25. $-7(2n - 1)$ $\boxed{-14n + 7}$	26. $8(3a + 5b)$ $\boxed{24a + 40b}$	27. $\frac{1}{3}(27y + 6)$ $\boxed{9y + 2}$

Directions: Simplify each expression completely.		
28. $9(a + 4) - 2a$ $9a + 36 - 2a$ $\boxed{7a + 36}$	29. $-17 + 5(4n - 2)$ $-17 + 20n - 10$ $\boxed{20n - 27}$	30. $-8(2x + y) + 4y - 3x$ $-16x - 8y + 4y - 3x$ $\boxed{-19x - 4y}$
31. $8k - 2(9 - k) - 1$ $8k - 18 + 2k - 1$ $\boxed{10k - 19}$	32. $\frac{3}{4}(8w - 28) - 10 + w$ $6w - 21 - 10 + w$ $\boxed{7w - 31}$	33. $-9(z + 3) + 4(1 - 2z)$ $-9z - 27 + 4 - 8z$ $\boxed{-17z - 23}$

Topic 5: Factoring Expressions

Directions: Factor each expression using a GCF.		
34. $16 + 56$ $8(2 + 7)$	35. $60 - 24$ $12(5 - 2)$	36. $30 + 75$ $15(2 + 5)$

37. $5k + 40$ $5(k+8)$	38. $12x - 21$ $3(4x-7)$	39. $32a + 20b$ $4(8a+5b)$
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Topic 6: Simplifying & Factoring Expressions Applications

<p>40. Levi played in a golf tournament with three rounds. His final score is the sum of his scores from each round. He scored seven more in the second round than he did in the first round. If his third round score was 77, write an expression to represent his total score if f represents his first round score. Give your answer in simplest form.</p> $f + f + 7 + 77$ $= \boxed{2f + 84}$	<p>41. In his second year, a football player scored two less than twice the number of touchdowns he scored in his rookie year. If t represents the number of touchdowns he scored in his rookie year, write an expression for the number of touchdowns he scored in his second year in factored form.</p> $2t - 2$ $= \boxed{2(t-1)}$
<p>42. Tickets to the aquarium cost \$6 each for children and \$16 each for adults. A large group purchased a combination of both tickets. If they purchased c child tickets and a adult tickets, write an expression for the total amount they paid in factored form.</p> $6c + 16a$ $= \boxed{2(3c + 8a)}$	<p>43. The Smith family took three days to drive to Florida for a vacation. They drove m miles on the first day. On the second day, they drove five less miles than they did on the first day. If they drove three times as many miles on the third day as they did on the second day, write an expression to represent the total miles they drove in simplest form.</p> $m + m - 5 + 3(m - 5)$ $m + m - 5 + 3m - 15$ $= \boxed{5m - 20}$

Topic 7: Equivalent Expressions

Directions: Write three expressions that are equivalent to the given expression.	
<p>44. $24a + 10$</p> <ul style="list-style-type: none"> • <u>$2(12a + 5)$</u> • <u>$5(5a + 2) - a$</u> • <u>$13a + 6 + 11a + 4$</u> 	<p>45. $6(2r + 3s)$</p> <ul style="list-style-type: none"> • <u>$12r + 18s$</u> • <u>$10r + 10s + 2r + 8s$</u> • <u>$15r + 18s - 3r$</u>

Topic 8: Properties

Directions: Use the indicated property to write an equivalent expression.	
46. $(9k \cdot 7) \cdot -5$ (Associative Property of Multiplication)	47. $17r + 11$ (Commutative Property of Addition)
$9k \cdot (7 \cdot -5)$	$11 + 17r$
48. $-8(1 - 3m)$ (Distributive Property)	49. $-2 + (15 + 7)$ (Associative Property of Addition)
$-8 + 24m$	$(-2 + 15) + 7$
50. $-6(2v + 1)$ (Commutative Property of Multiplication)	51. $7m - 63$ (Distributive Property)
$(2v + 1) \cdot -6$	$7(m - 9)$

Directions: Fill in the box with a value that makes the statement true. Justify with a property name.	
Statement	Property Name
52. $27 + (-27) = \boxed{0}$	Inverse Prop. of Addition
53. $(p + q) \cdot \boxed{0} = 0$	Multiplication Prop. of Zero
54. $\boxed{18x} \cdot 1 = 18x$	Identity Prop. of Multiplication
55. $v^2 + 0 = \boxed{v^2}$	Identity Prop. of Addition
56. $\boxed{\frac{4}{9}} \cdot \frac{9}{4} = 1$	Inverse Prop. of Multiplication

Directions: Name the property that justifies each statement.	
57. $6 \cdot 1 = 6$ Identity Prop of Mult.	58. $12w + (-9) = -9 + 12w$ Commutative Prop of Addition
59. $-2 + 7 \cdot 0 = -2 + 0$ Multiplication Prop of Zero	60. $16(12) - 16(5) = 16(12 - 5)$ Distributive Property
61. $-20 + 20 = 0$ Inverse Prop. of Addition	62. $(-3y \cdot 8) \cdot 2 = -3y \cdot (8 \cdot 2)$ Associative Prop. of Mult.
63. $-6(p - 7) = -6p + 42$ Distributive Property	64. $\frac{1}{8} \cdot 8 = 1$ Inverse Prop. of Multiplication
65. $(7 \cdot 4) \cdot 3r = (4 \cdot 7) \cdot 3r$ Commutative Prop. of Mult.	66. $-12v + 0 = -12v$ Identity Prop. of Addition

Name: _____

Date: _____ Per: _____

Unit 4 Test

Expressions & Properties

Evaluate each expression using the given variable replacements.

1. $7x - 4$ (if $x = -2$)

$$7(-2) - 4$$

$$-14 - 4$$

-18

2. $(p + q^2) + pq$ (if $p = 7$ and $q = -5$)

$$(7 + (-5)^2) + 7(-5)$$

$$(7 + 25) + (-35)$$

$$32 - 35$$

-3

3. $\frac{ab}{a-b}$ (if $a = -12$ and $b = 4$)

$$\frac{-12(4)}{-12 - 4} = \frac{-48}{-16}$$

3

4. $\frac{3}{4}(c+d)$ (if $c = \frac{1}{4}$ and $d = \frac{3}{20}$)

$$\frac{3}{4} \left(\frac{1}{4} + \frac{3}{20} \right)$$

$$\frac{3}{4} \left(\frac{5}{20} + \frac{3}{20} \right)$$

$$\frac{3}{4} \left(\frac{8}{20} \right) = \frac{6}{20}$$

$\frac{3}{10}$

Translate each expression.

5. "the quotient of 50 and a number w "

$\frac{50}{w}$

6. "negative nine more than twice a number r "

$2r + (-9)$

7. "fourteen fewer than a number k "

$k - 14$

8. "the product of negative four and a number a "

$-4a$

9. "the difference between three times x and y "

$3x - y$

10. "the sum of one-third c and ten"

$\frac{1}{3}c + 10$

11. Jill is running a marathon, which is 26.2 miles. So far, she has completed m miles.

a) Write an expression for the number of miles she has left.

b) If she has completed 8.9 miles so far, how many miles does she have left?

$$26.2 - 8.9$$

a) $26.2 - m$

b) 17.3 miles

12. An airplane can hold at most p passengers on a flight. A certain flight has seven passengers less than four-fifths of its maximum capacity on board

a) Write an expression for the number of passengers on the flight.

b) If the plane can seat 440 passengers at most, how many passengers are on the flight?

$$\frac{4}{5}(440) - 7 = 352 - 7$$

a) $\frac{4}{5}p - 7$

b) 345 passengers

13. Which best describes the circled part of the following expression?

$$\textcircled{14}x + 5$$

- A. term
- B. variable
- C. constant
- D. coefficient

D

14. Which list includes like terms in the expression below?

$$7x + 4 + 4x + 7y + 7$$

- A. $7x, 4x$
- B. $7x, 7y$
- C. $4x, 4$
- D. $7x, 4x, 7y$

A

Simplify each expression by combining like terms.

15. $2a + 16 - 5a$

$$-3a + 16$$

16. $11 + 5w - 8w - 24 + w$

$$-2w - 13$$

Simplify each expression using the distributive property.

17. $2(3 - 16)$

$$6 - 32$$

$$-26$$

18. $7(m + 6)$

$$7m + 42$$

19. $-3(2k + 1)$

$$-6k - 3$$

Simplify each expression completely.

20. $-6(r-4)+5r$

$$-6r + 24 + 5r$$

$$-r + 24$$

21. $-17p+2(5-3p)$

$$-17p + 10 - 6p$$

$$-23p + 10$$

22. $2(-8a+b)+3(b-a)$

$$-16a + 2b + 3b - 3a$$

$$-19a + 5b$$

Factor each expression using a GCF.

23. $72+40$

$$8(9+5)$$

24. $14n+14$

$$14(n+1)$$

25. $48r-18s$

$$6(8r-3s)$$

26. Noah, Mia, and Jay went fishing. Mia caught one more fish than Noah. Jay caught three times as many fish as Mia. If f represents the number of fish that Noah caught, which expression represents the total number of fish they caught?

$$f + f + 1 + 3(f + 1)$$

$$f + f + 1 + 3f + 3$$

A. $3f + 5$

B. $4f + 3$

C. $5f + 4$

D. $4f + 4$

C

27. Felix bought a baseball card twenty years ago that is now worth \$40 less than six times the original amount he paid. If x represents the original amount he paid, write an expression for the current value of the card in **factored form**.

$$6x - 40$$

$$2(3x - 20)$$

Use the following expression for 28-30: $32 + \frac{2}{3}(21y - 6)$

28. Write the expression in simplest form.

$$32 + 14y - 4$$

$$14y + 28$$

29. Write the expression in factored form.

$$14(y + 2)$$

30. Write any other equivalent expression.

$$6(2y + 5) + 2y - 2$$

31. Use the **commutative property of addition** to write an equivalent expression.

$$-8 \cdot (p + q) = \boxed{-8 \cdot (q + p)}$$

32. Which property is illustrated by the statement below?

$$(-3x + 0) + 1 = -3x + (0 + 1)$$

- A. Associative Property of Addition
- B. Distributive Property
- C. Identity Property of Addition
- D. Commutative Property of Addition

A

33. Write values in the two boxes below to create a statement that illustrates the **inverse property of addition**.

$$6 + \boxed{-6} = \boxed{0}$$

34. Which property is illustrated by the statement below?

$$(x + 1) \cdot 0 = 0$$

- A. Distributive Property
- B. Multiplication Property of Zero
- C. Inverse Property of Multiplication
- D. Identity Property of Addition

B

35. Which statement illustrates the inverse property of multiplication?

A. $\frac{1}{5} \cdot 1 = 1 \cdot \frac{1}{5}$

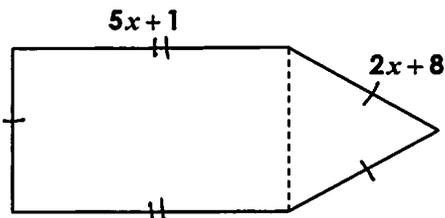
B. $\frac{1}{5} \cdot 1 = \frac{1}{5}$

C. $5 \cdot \frac{1}{5} = 1$

D. $\frac{1}{5} \cdot 0 = 0$

C

BONUS: The figure below is created with a rectangle and an equilateral triangle. Write an expression to represent the perimeter of the figure in **factored form**.

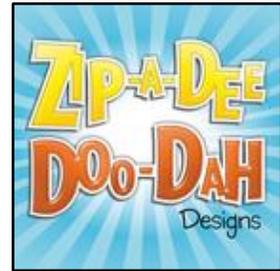


$$\begin{aligned} &3(2x+8) + 2(5x+1) \\ &6x+24 + 10x + 2 \\ &16x + 26 \end{aligned}$$

$2(8x+13)$

CREDITS

I use clipart and fonts in my products by:



Art with Jenny K



Many thanks to these talented artists!