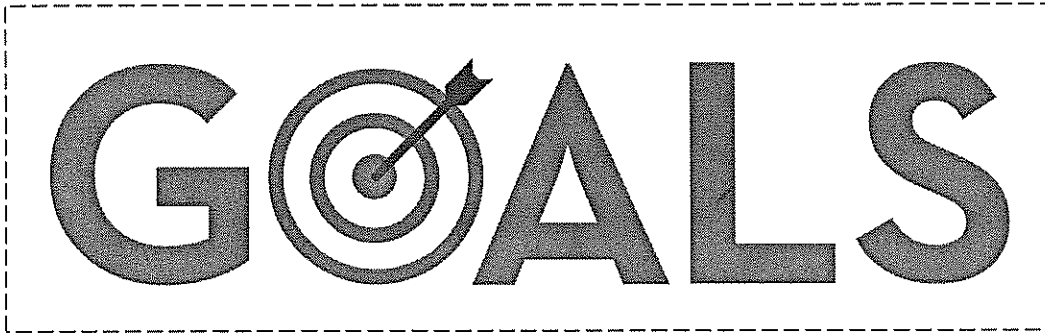


Learning Goals
7th Grade Math
Pre-Algebra Unit L1



By the end of the unit students will be able to:

- Simplify and factor expressions using the distributive property
- Simplify expressions by combining like terms and using the order of operations.
- Use formulas to show relationships among quantities
- Extend and represent patterns found in function tables
- Translate words and phrases into algebraic expressions and vice versa
- Use the inverse relationships of addition and subtraction, and multiplication and division to solve problems
- Solve addition and subtraction equations
- Solve multiplication and division equations
- Solve two-step equations
- Solve multi-step equations including the distributive property and combining like terms
- Solve equations with variables on both sides
- Solve daily life problems by writing an algebraic equation and then solving it

Name _____

Factor Worksheet and Spiral Review

Factor by dividing by the greatest common factor.

1. $8x + 8$

2. $20n - 15$

3. $12a + 16$

4. $24g - 9$

5. $20 - 5r$

6. $26p - 18$

7. $45g - 54$

8. $35k + 105$

Spiral Review

Simplify using the distributive property.

9. $8(3m + 4)$

10. $7(2x - 6)$

11. $(54 + 10g)5$

12. $2(12x + 16)$

Simplify by combining like terms.

13. $11r + 7r + 6r$

14. $v + 8 + 12v$

15. $8x + 3 + 11x + 4$

16. $n + 14 - 9 + 5n$

Insert parentheses to make each statement true.

17. $18 + 12 \div 3 + 1 = 11$

18. $18 + 12 \div 3 + 1 = 21$

19. $7 * 2 + 3 * 6 = 102$

20. $7 * 2 + 3 * 6 = 140$

Simplify using the order of operations.

21. $15 \cdot 6 - 6 + 4 * 2$

22. $7^2 + 3 \cdot 2^2$

23. $11 - 11 + 4(3 + 5)$

24. $3^2 + (2 \cdot 4) - 5$

Name _____

Formulas and Variables

Use the formula $A = L * W$. Don't forget the proper labels!

1. $L = 15 \text{ cm}$ $W = 5 \text{ cm}$

2. $L = 10 \text{ m}$ $W = 23 \text{ m}$

3. $L = 8 \text{ in}$ $W = 14 \text{ in}$

4. $L = 12 \text{ ft}$ $W = 20 \text{ ft}$

Use the formula $P = 2L + 2W$. Don't forget the proper labels!

5. $L = 6 \text{ cm}$ $W = 4 \text{ cm}$

6. $L = 10 \text{ in}$ $W = 2 \text{ in}$

Use the formula $D = R * T$. Don't forget the proper labels!

7. $R = 25 \text{ mi/hr}$ $T = 3 \text{ hr}$

8. $R = 60 \text{ mi/hr}$ $T = 6 \text{ hr}$

Use the formula $R = D/T$. Don't forget the proper labels!

9. $D = 800 \text{ mi}$ $T = 5 \text{ hr}$

10. $D = 150 \text{ mi}$ $T = 3 \text{ hr}$

11. $D = 10 \text{ km}$ $T = 20 \text{ hr}$

12. $D = 12 \text{ km}$ $T = 5 \text{ hr}$

13. The formula $C=13m$ related to calories burned (C) and minutes of running (m). Find the number of calories can be burned in 30 minutes of running?

Animal	Cheetah	Lion	Zebra	Giraffe	Elephant	Chicken
Maximum Speed (mi/hr)	70	50	40	32	25	9

Use the table above to answer the following questions.

14. At these speeds, how far would a cheetah travel in 4 hours?

15. How far would an elephant travel in 8 hours?

16. How much farther than a giraffe can a lion travel in 3 hours?

Name _____

Formulas and Tables Worksheet

Use the formulas shown to solve each problem. Be sure to write the formula and show all required steps and work.

When bowling on a league, bowlers who have an average score under 200 are often given handicaps. A handicap raises a bowler's score to make it possible for bowlers with a range of abilities to compete. A bowler's handicap is calculated using the following formula:

$$H = 0.8(200 - A)$$

H = bowler's handicap

A = bowler's average score

1. If a bowler's average score is 165, what is the bowler's handicap?
2. How much does a bowler's handicap change if his or her average changes from 165 to 180?
3. A bowler with an average score of 150 bowls a game with a score of 185. A bowler's handicap is added onto his or her score. Using the average score to calculate handicap, what is this bowler's final score?

The formula $r = \frac{d}{t}$ is used to find rate or average speed when you know d(distance) and t(time). Substitute the values for d and t into the formula. Then use the formula to find r.

4. $d = 150$ mi, $t = 3$ hrs

5. $d = 10$ km, $t = 23$ hrs

6. $d = 12$ km, $t = 2$ hrs

7. You have to get your car stereo fixed. The repair shop charges \$10 per hour, plus \$30 for the visit. Use the formula $C = 10h + 30$, where C is cost and h is hours.

a. How much will it cost if the repairs take 3 hours?

b. Is this the same amount you would pay if you brought the stereo in once for 1 hour and once for 2 hours? Explain your reasoning.

Find two formulas relating the variables.

8.

H	5	6	7	8	9
K	8	9	10	11	12

9.

X	28	35	42	49	56
Y	21	28	35	42	49

10.

A	6	11	16	21	26
B	12	22	32	42	52

11.

D	8	12	16	20	24
C	2	3	4	5	6

12.

X	9	11	13	15	17
Y	4	5	6	7	8

13.

A	5	7	9	11	13
B	13	19	25	31	37

Use the rule given to complete each table.

14. $k = 4h$

H	5	6	7	8	9
K					

15. $x = y - 13$

x					
y	21	23	25	27	29

16. $b = 3d + 1$

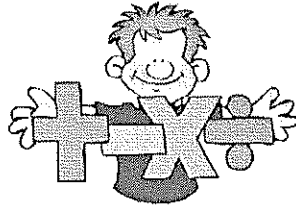
b					
d	8	9	10	11	12

17. $x = y + 7$

x					
y	9	15	21	27	33

Name _____

Translating Phrases and Expressions



Write an algebraic expression for each phrase.

1. Five more than a number x

2. Triple a number h

3. Half of a number d

4. Three less than a number y

5. The product of a number w and four

5. Six more than twice a number p

7. A number r decreased by ten

8. Four times the sum of a number k and nine

9. Two times the difference of a number f and 7

Write a phrase for each algebraic expression.

10. $3m$

11. $6 - x$

12. $f/2$

13. $2(b - 5)$

14. $2r + 3$

15. $3(d + 3)$

Name _____

Addition and Subtraction Equations

One Step Addition Example	
The Opposite of Addition is Subtraction	
$y + 14 = 20$	
-14	-14
y	$= 6 \checkmark$
The value which makes the equation true is 6.	

Solve. Be sure to show all of your work and balance both sides of your equations.

1. $r + 83 = 92$

2. $R - 77 = 99$

3. $45 = 36 + p$

4. $102 = v - 66$

5. $x - 22 = 66$

6. $987 = 16 + b$

7. $w - 56 = 560$

8. $K - 15 = 55$

9. $g + 33 = 63$

10. $54 + g = 100$

11. $2098 = y - 536$

12. $651 + c = 800$

13. $48 = p + 23$

14. $0 = r - 99$

15. $138 + n = 150$

16. $937 = d - 63$

17. How would you explain the concept of inverse operations?

18. Why do the operations need to be done to both sides of the equation?

Name _____

Multiplication and Division Equations

Step 1: $6h = 18$

Step 2: $6h = 18$
 $\div 6 \quad \div 6$

Step 3: $\cancel{6}h = 18 \div 6$
 $\div 6 \quad 3$

Step 4: $h = 3$

Solve. Be sure to show all of your work and balance both sides of your equations.

1. $m * 45 = 90$

2. $36p = 36$

3. $\frac{g}{77} = 11$

4. $\frac{m}{17} = 16$

5. $33j = 198$

6. $216 = p \div 2$

7. $7y = 147$

8. $4r = 64$

9. $d \div 41 = 7$

10. $100 = w \div 66$

Write and solve the equations for each problem.

11. At a restaurant, Olivia and her three friends decided to divide the bill evenly. If each person paid \$13 then what was the total bill?

12. How many packages of diapers can you buy with \$40 if one package costs \$8?

13. How many boxes of envelopes can you buy with \$12 if one box costs \$3?

14. Amanda and her best friend found some money buried in a field. They split the money evenly, each getting \$24.28. How much money did they find?

Name _____

Two Step Equations Worksheet

Two Step Equations

$$\begin{array}{r} 2x + 3 = 15 \\ -3 \quad -3 \\ \hline 2x = 12 \\ \frac{2x}{2} = \frac{12}{2} \\ x = 6 \end{array}$$

Solve. Be sure to show all of your work and balance both sides of your equations.

1. $45m + 45 = 90$

2. $k/7 + 11 = 11$

3. $\frac{g}{2} + 214 = 216$

4. $\frac{m}{66} + 9 = 10$

5. $12k - 10 = 50$

6. $10 = 15b - 5$

7. $14 = 6w + 2$

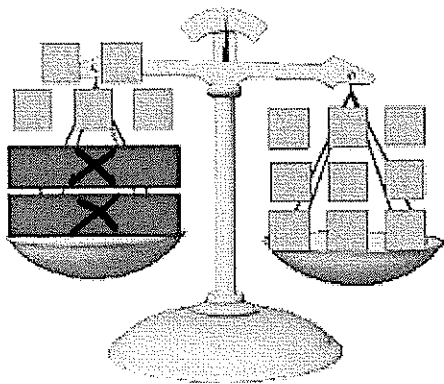
8. $8y + 7 = 23$

9. $7x + 2 = 51$

10. $H/4 + 11 = 15$

11. Please explain the sock and shoe method in your own words.

12. Explain in words how to get one x alone on one side of the scale.



Name: _____

Writing About Equations

Solve the following problems showing all of the steps to your work. Then, explain how and why you solved the problem the way you did. (*Hint: Remember the explanation of why we need to solve two - step algebraic equations the way we do. Don't forget the key vocabulary words*). Refer to the grading rubric on the back.

Steps

Reasoning

1. $x - 15 = 72$

2. $3m + 42 = 87$

3. $\frac{p}{4} - 29 = 3$

Equation Question Rubric
Rough Draft

6	<p>An easy-to-follow, correct response that includes the following phrases:</p> <ul style="list-style-type: none"> • isolate the variable • inverse operation (i.e. "because the operation was addition, I used subtraction to 'undo' it") • the idea that whatever you do last, you undo first, • balance the equation ("whatever you do to one side of the equation, you do to the other")
5	An easy-to-follow, correct response that includes all but one of the give phrases and all algebraic work is shown correctly.
4	A correct response that includes all but one of the given phrases and all algebraic work is shown correctly
3	A correct response that includes all but two of the given phrases and all algebraic work is shown correctly
2	A correct response that includes all but three of the given phrases and all algebraic work is shown correctly
1	A correct response only and all algebraic work is shown correctly

Name: _____

Solving Equations using the Distributive Property

Solve for x

$$\begin{array}{r|l} \textcircled{x} & \\ \hline -3(-3x + 5) = -2 & \\ 9x - \cancel{15} = -2 & \\ \quad \quad \quad +15 & +15 \\ \hline 9x & = 13 \\ \frac{9x}{9} & \frac{13}{9} \end{array}$$

1. $3(x - 8) = 6$

2. $6\left(\frac{x}{6} - 2\right) = 1$

3. $75 = 5(a + 5)$

4. $36 = 6(y - 2)$

5. $8(y - 6) = 16$

6. $7(r + 8) = 147$

7. $20 = 4\left(\frac{t}{4} - 2\right)$

8. $3(m + 5) = 42$

$$9. 17(x - 2) = 34$$

$$10. 51 = 3(2 + 5m)$$

$$11. 384 = 12(5p - 8)$$

$$12. 3(2k + 4) = 48$$

Name: _____

Solve Equations by Combining Like Terms Worksheet

Examples:

$$\begin{aligned} 3x + 12 + x &= 48 && \text{(add } 3x + x) \\ 4x + 12 &= 48 && \text{(subtract 12 from both sides)} \\ 4x &= 36 && \text{(divide both sides by 4)} \\ x &= 9 \end{aligned}$$

$$\begin{aligned} 3x + 12 + 2 &= 25 && \text{(add } 12 + 2) \\ 3x + 13 &= 25 && \text{(subtract 13 from both sides)} \\ 3x &= 12 && \text{(divide both sides by 3)} \\ x &= 4 \end{aligned}$$

Directions: Solve for x in each equation below. Your first step should be to combine any like terms. Then use inverse operations to get the variable all by itself on one side of the equation. Make sure to show all your work.

1. $3x + 10 + 2x = 50$

2. $6x + 10 + 2x = 42$

3. $2x + 20 + 2x = 60$

4. $x + 12 + x = 18$

5. $7x + 10 + 3x = 120$

6. $x + 20 + 2x = 56$

7. $2x + 16 + 2x = 28$

8. $3x + 12 + 9x = 72$

9. $3 + 6x + 2 = 29$

10. $7 + 7x + 2 = 72$

11. $2x + 20 + 2 = 60$

12. $x + 4x + 1 = 26$

Name: _____

Solve Equations with Variables On Both Sides Worksheet

Examples:

$$5x = 2x + 48 \quad (\text{subtract } 2x \text{ from both sides})$$

$$3x = 48 \quad (\text{divide both sides by } 3)$$

$$x = 16$$

$$5x + 12 = 2x + 36 \quad (\text{subtract } 2x \text{ from both sides})$$

$$3x + 12 = 36 \quad (\text{subtract } 12 \text{ from both sides})$$

$$3x = 24 \quad (\text{divide both sides by } 3)$$

$$x = 8$$

Directions: Solve for x in each equation below. Use inverse operations to get the variable all by itself on one side of the equation, and then get the integers alone on the other side of the equation. Make sure to show all your work.

1. $3x = 2x + 50$

2. $6x = 2x + 44$

3. $8x = 2x + 36$

4. $4x = x + 18$

5. $7x + 10 = 3x + 120$

6. $20 + 2x = x + 56$

7. $6x + 16 = 2x + 28$

8. $12x + 12 = 3x + 84$

9. $3 + 6x = 2x + 27$

10. $8x + 2 = 72 + x$

11. $2x + 20 = x + 60$

12. $4x + 1 = 25 + 2x$

Name _____

Solving Equations Review Worksheet

Solve the following equations. Be sure to show all work and balance both sides!

1. $15 + k = 120$

2. $50 = d - 28$

3. $3m = 138$

4. $15 = \frac{x}{4}$

5. $3x + 5 = 35$

6. $9m - 10 = 80$

7. $154 = \frac{x}{8} + 152$

8. $\frac{w}{7} - 15 = 3$

9. $2y + 12 + 3y = 37$

10. $r + 20 + 3r = 60$

11. $5(x - 5) = 35$

12. $84 = 2(5p - 8)$

13. $6k = 4k + 16$

14. $25 + 4x = x + 52$

15. What are the key words that are necessary in explaining solving equations.

A.)

B.)

C.)

D.)

Name _____

Pre-Algebra Unit Practice Test

Use the order of operations to evaluate the expressions.

1. $15 * 3^2 + (2 + 2 * 5)$

2. $8 + 4(6 + 2)$

3. $14 + (12 \div 4) + 1$

4. $\frac{20+4}{1+3}$

Evaluate the formula for the given values.

Formula $A = l * w$

Formula $A = \frac{1}{2} * l * w$

5. $l = 12$ in.

6. $l = 15$ cm.

$w = 14$ in.

$w = 6$ cm.

Use the tables to find the two formulas relating the variables.

7.

x	15	27	39	51	63
y	18	30	42	54	66

8.

a	16	28	40	60	400
b	4	7	10	15	100

Simplify using the distributive property.

9. $4(2k - 5)$

10. $(7 + 8x)3$

Factor by using the greatest common factor.

11. $42 + 21x$

12. $12x - 18$

Write an algebraic expression for each phrase:

13. the product of a number y and 8

14. 4 times the difference of a number x and 2

Write a phrase for each algebraic expression.

15. $2r - 5$

16. $2(x + 7)$

Solve each equation. Show ALL work. Be sure to show work on both sides of the equation.

17. $x + 12 = 28$

18. $y - 17 = 22$

19. $32 = 4x$

20. $\frac{h}{2} = 9$

21. $\frac{x}{4} + 12 = 20$

22. $10x - 2 = 52$

23. $15 = 3 + 3x$

24. $9(x + 3) = 99$