NAME -

New Rochelle High School

Algebra
Summer Assignment

To all Algebra students,

This assignment will help you refresh some of the necessary math skills you will need to be successful in Algebra and it is meant to be a bridge between 8th grade Math and Algebra. The model problems provide a detailed explanation of the required concepts needed to be successful. As you look and work through this packet you will become familiar with its format. Read through the model problems thoroughly before answering the accompanying problems. Also, make sure you read and follow the directions. Pace yourself, do not attempt to complete the entire packet all at once. Your Algebra teacher will be looking forward to meeting you.

Do the math and *show* all of your work! Good luck!

Have a great summer and a very successful upcoming Algebra school year.

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Order of Operations

Evaluate Numerical Expressions - Numerical expressions often contain more than one operation. To evaluate them, use the rules for order of operations shown below.

Order of Operations	**Step 1** Evaluate expressions inside grouping symbols. **Step 2** Evaluate all powers. **Step 3** Do all multiplication and/or division from left to right. **Step 4** Do all addition and/or subtraction from left to right.

MODEL PROBLEMS

Simplify each expression.

SOLUTIONS

1 $10 + 8 \div 2$

Division comes first: $10 + 8 \div 2 = 10 + 4$
Addition comes next: $10 + 4 = 14$

Answer: 14

2 $4^2 + 10 \bullet 3 \div 5 - 10$

Evaluate exponents: $4^2 + 10 \bullet 3 \div 5 - 10 = 16 + 10 \bullet 3 \div 5 - 10$
Multiply and divide in order from left to right:
$16 + 10 \bullet 3 \div 5 - 10 = 16 + 30 \div 5 - 10 = 16 + 6 - 10$
Add and subtract in order from left to right: $16 + 6 - 10 = 22 - 10 = 12$

Answer: 12

Directions – Show all work here and place all final choices/answers on the answer page.

1. Evaluate the expression $(21-7)\times(15-7)-4\times3$

(1) 50 (2) 75 (3) 100 (4) 125

2. What is the first step in evaluating the expression $(15-12)\div3$?

(1) Subtract 12 from 15 (2) Divide 12 by 3
(3) Subtract 3 from 15 (4) Divide 15 by 3

3. Evaluate the expression $-2 \bullet 3^2 + 20$.

4. Evaluate the expression $15-10\div5 \bullet 2+4$.

5. Evaluate the expression $28\div(5-1) \bullet 3$.

Evaluating Algebraic Expressions

Evaluate Algebraic Expressions - Algebraic expressions may contain more than one operation. Algebraic expressions can be evaluated if the values of the variables are known.

- First, replace the variables with their values.
- Then use the order of operations to calculate the value of the resulting numerical expression.

Evaluate Numerical Expressions

Evaluate $x + 5(y - 3)$ if $x = 2$ and $y = 12$.

$x + 5(y - 3)$	
$2 + 5(12 - 3)$	Replace x with 2 and y with 12.
$2 + 5(9)$	Subtract 3 from 12.
$2 + 45$	Multiply 5 and 9.
47	Add 2 and 45.

The solution is 47.

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Directions – Show all work here and place all final choices/answers on the answer page.

6. What is the value of $x + y^2$ when $x = 3$ and $y = 5$?

(1) 64 (2) 34 (3) 28 (4) 13

7. Find the value of $a - (b - c)$ when $a = -3$, $b = 4$, and $c = -5$.

(1) -12 (2) -2 (3) -4 (4) 6

8. Evaluate the expression $(x + 1)^2 - y$ when $x = 4$ and $y = 6$.

9. Evaluate the expression $x(y + z)$ when $x = -2$, $y = 3$ and $z = -6$.

10. Evaluate the expression $\frac{w + x}{2}$ when $w = 4$ and $x = -2$.

Simplifying Algebraic Expressions

KEY IDEAS

Terms such as $4x$ and $5x$ are called **like terms** since they differ *only* in their numerical coefficients, in this case, 4 and 5. To combine like terms, use the reverse of the distributive property. For example:

$$5x + 3x = (5 + 3)\,x = 8x$$

and

$$7x - x = 7x - 1 \cdot x = (7 - 1)\,x = 6x$$

Directions – Show all work here and place all final choices/answers on the answer page.

11. Simplify $(7x+6x)-12x$.

(1) x (2) $2x$ (3) x^2 (4) 1

12. Which expression is equivalent to $5a+8-2(a+4)$?

(1) $3a$ (2) $3a+4$ (3) $3a+12$ (4) $3a+15$

13. Simplify $5x-3y-7x+y$

14. Simplify $4(x+1)+2x+5$

15. Simplify $8x-2(7x-3)$

Solving Equations

Multi-Step Equations - To solve equations with more than one operation, often called **multi-step equations**, undo operations by working backward. Reverse the usual order of operations as you work.

Equations With Variables on the Same Side - To solve an equation with the same variable on the same side, first combine like terms. Then solve the equation.

Equations With Variables on Each Side - To solve an equation with the same variable on each side, first use the Addition or the Subtraction Property of Equality to write an equivalent equation that has the variable on just one side of the equation. Then solve the equation.

Multi-Step Equations

Solve $5x + 3 = 23$.

$5x + 3 - 3 = 23 - 3$	Subtract 3 from each side.
$5x = 20$	Simplify.
$\frac{5x}{5} = \frac{20}{5}$	Divide each side by 5.
$x = 4$	Simplify.

Equations With Variables on the Same Side

Solve $5y - 3y - 8 = 12$.

$2y - 8 = 12$	Combine like terms.
$2y - 8 + 8 = 12 + 8$	Add 8 from each side.
$2y = 20$	Simplify.
$\frac{2y}{2} = \frac{20}{2}$	Divide each side by 2.
$y = 10$	Simplify.

Equations With Variables on Each Side

Solve $13y - 45 = 36 + 4y$.

$13y - 45 - 4y = 36 + 4y - 4y$	Subtract 4y from each side.
$9y - 45 = 36$	Simplify.
$9y - 45 + 45 = 36 + 45$	Add 45 from each side.
$9y = 81$	Simplify.
$\frac{9y}{9} = \frac{81}{9}$	Divide each side by 9.
$y = 9$	Simplify.

//

Directions – Show all work here and place all final choices/answers on the answer page.

16. What is the solution of $2x + 7 = 25$?

(1) –16 (2) –9 (3) 9 (4) 16

17. What is the solution of $3y - 5y + 10 = 36$?

(1) –13 (2) 2 (3) 4.5 (4) 13

18. Solve $7x - 5 = 58$.

19. Solve $5y - 9 - 2y = 6$.

20. Solve $2x - 6 = -8x + 14$.

Solving Proportions

Solving Proportions - If a proportion involves a variable, you can use cross products to solve the proportion. In the proportion $\frac{x}{6} = \frac{10}{12}$, x and 12 are called **extremes.** They are the first and last terms of the proportion. 5 and 10 are called **means**. They are the middle terms of the proportion. In a proportion, the product of the extremes is equal to the product of the means.

Means-Extremes Property of Proportions	For any numbers a, b, c, and d, if $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$.

Example: Solve $\frac{x}{6} = \frac{10}{12}$.

$\frac{x}{6} = \frac{10}{12}$	Original proportion
$12(x) = 6(10)$	Cross products
$12x = 60$	Simplify.
$\frac{12x}{12} = \frac{60}{12}$	Divide each side by 12.
$x = 5$	Simplify.

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Directions – Show all work here and place all final choices/answers on the answer page.

21. What is the solution of $\frac{x}{5} = \frac{16}{20}$?

(1) 2 (2) 4 (3) 6 (4) 8

22. What is the solution of $\frac{2.4}{4} = \frac{3}{y}$?

(1) 0.2 (2) 0.5 (3) 2 (4) 5

23. Solve $\frac{5}{12} = \frac{x}{36}$.

24. Solve $\frac{y}{54} = \frac{12}{18}$.

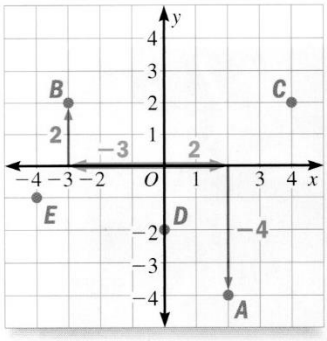
25. Solve $\frac{8}{x} = \frac{1.2}{3}$.

Coordinate Pairs

Naming Points in a Coordinate Plane

Give the coordinates of the point.

a. A **b.** B



Solution

a. Point A is 2 units to the right of the origin and 4 units down. The x-coordinate is 2, and the y-coordinate is -4. The coordinates are $(2, -4)$.

b. Point B is 3 units to the left of the origin and 2 units up. The x-coordinate is -3, and the y-coordinate is 2. The coordinates are $(-3, 2)$.

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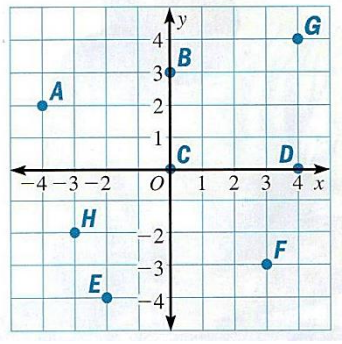
Directions – Show all work here and place all final choices/answers on the answer page.

For questions 26-30, refer to the picture below.



26. What are the coordinates of point B?

(1) $(0,3)$ (2) $(1,3)$ (3) $(3,0)$ (4) $(3,1)$

27. Which point has the coordinates $(-3,-2)$?

(1) E (2) H (3) F (4) A

28. What are the coordinates of point A ?

29. What are the coordinates of point D ?

30. What are the coordinates of point F ?

Slope

Find Slope - The **slope** of a line is the ratio of change in the *y*-coordinates (rise) to the change in the *x*-coordinates (run) as you move in the positive direction.

Find the slope of the line that passes through (–3, 5) and (4, –2).
Let (–3, 5) = (x_1, y_1) and (4, –2) = (x_2, y_2).

$m = \frac{y_2 - y_1}{x_2 - x_1}$ Slope formula

$= \frac{-2 - 5}{4 - (-3)}$ $y_2 = -2$, $y_1 = 5$, $x_2 = 4$, $x_1 = -3$

$= \frac{-7}{7}$ Simplify.

$= -1$

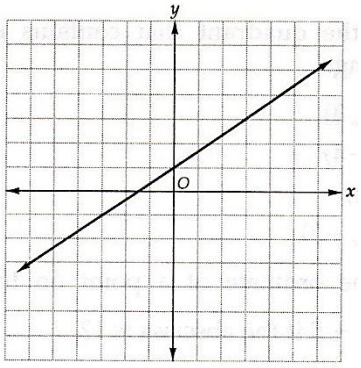
//

Directions – Show all work here and place all final choices/answers on the answer page.

31. What is the slope of a line through the points $(-4, 2)$ and $(6, 8)$?

(1) $-\frac{3}{5}$ (2) $\frac{3}{5}$ (3) $\frac{5}{3}$ (4) $-\frac{5}{3}$

32. What is the slope of the line in the graph?



(1) $\frac{3}{2}$ (2) 1

(3) $\frac{2}{3}$ (4) $-\frac{2}{3}$

Find the slope of the line through the given points.

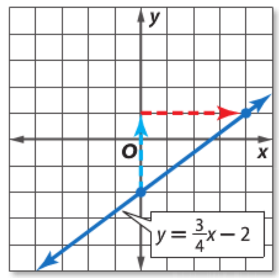
33. $(8, -3)$ and $(10, 7)$ **34.** $(4, 2)$ and $(0, 3)$ **35.** $(3, 4)$ and $(7, -12)$

Graphing Lines

Slope-Intercept Form	$y = mx + b$, where m is the slope and b is the y-intercept

Graph $y = \frac{3}{4}x - 2$.

- The y-intercept of $y = \frac{3}{4}x - 2$ is –2 and the slope is $\frac{3}{4}$.
- So graph the point (0, –2).
- From this point, move up 3 units and right 4 units.
- Draw a line passing through both points.



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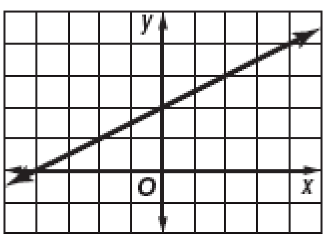
Directions – Show all work here and place all final choices/answers on the answer page.

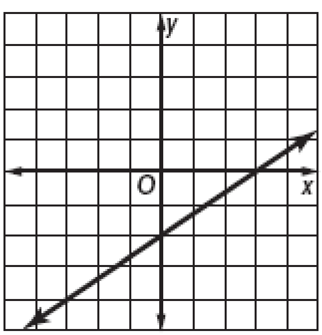
36. Which function is graphed below?



(1) $y = \frac{1}{2}x + 2$ (2) $y = \frac{1}{2}x - 2$

(3) $y = -\frac{1}{2}x + 2$ (4) $y = -2x + 2$

37. Which function is graphed below?



(1) $y = \frac{2}{3}x + 2$ (2) $y = \frac{3}{2}x - 2$

(3) $y = -\frac{2}{3}x - 2$ (4) $y = \frac{2}{3}x - 2$

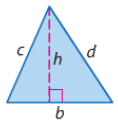
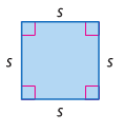
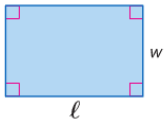
38. Graph $y = 2x - 5$ on the answer page.

39. Graph $y = -2x + 7$ on the answer page.

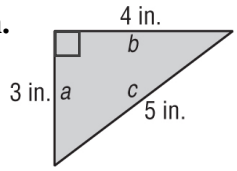
40. Graph $y = \frac{3}{4}x + 2$ on the answer page.

Perimeter

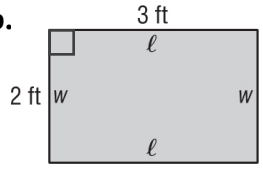
Perimeter and Circumference – The distance around a figure. Perimeter is measured in linear units.

Triangle	Square	Rectangle
		
$P = b + c + d$	$P = s + s + s + s$ $= 4s$	$P = \ell + w + \ell + w$ $= 2\ell + 2w$
$A = \frac{1}{2}bh$	$A = s^2$	$A = \ell w$
P = perimeter of polygon		A = area of figure
b = base, h = height		ℓ = length, w = width

Find the perimeter.

a. 

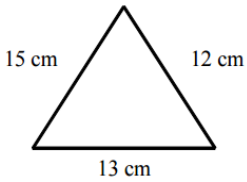
$P = a + b + c$
$= 3 + 4 + 5$
$= 12$ in.

b. 

$P = 2\ell + 2w$
$= 2(3) + 2(2)$
$= 10$ ft.

Directions – Show all work here and place all final choices/answers on the answer page.

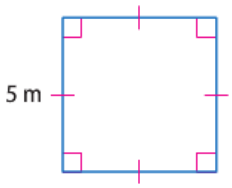
41. What is the perimeter of the triangle?

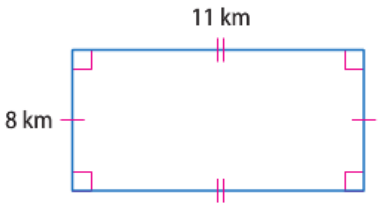


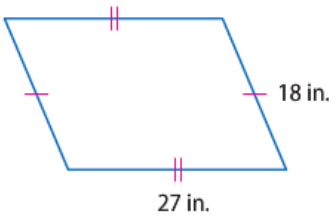
(1) 156 (2) 195 (3) 40 (4) 30

42. A rectangle is 6.2 inches long and 1.7 inches wide. Find its perimeter.
(1) 7.9 (2) 105.4 (3) 15.8 (4) 10.54

Find the perimeter of each figure.

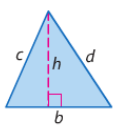
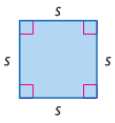
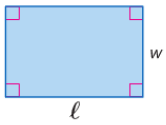
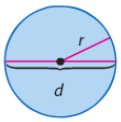
43. 

44. 

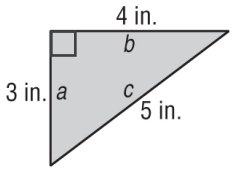
45. 

Area

Area – The number of square units needed to cover a surface. Area is measured in square units.

Triangle	Square	Rectangle	Circle
			
$P = b + c + d$	$P = s + s + s + s$ $= 4s$	$P = \ell + w + \ell + w$ $= 2\ell + 2w$	$C = 2\pi r$ or $C = \pi d$
$A = \frac{1}{2}bh$	$A = s^2$	$A = \ell w$	$A = \pi r^2$
P = perimeter of polygon	A = area of figure		C = circumference
b = base, h = height	ℓ = length, w = width		r = radius, d = diameter

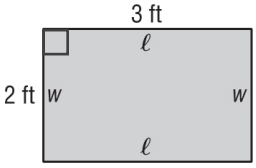
Find the area. Round to the nearest tenth.

a. 

$A = \frac{1}{2}bh$

$= \frac{1}{2}(4)(3)$

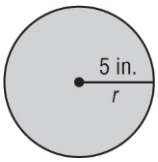
$= 6 \text{ in}^2$

b. 

$A = lw$

$= (3)(2)$

$= 6 \text{ ft}^2$

c. 

$A = \pi r^2$

$= \pi(5)^2$

$= 25\pi = 78.5 \text{ in}^2$

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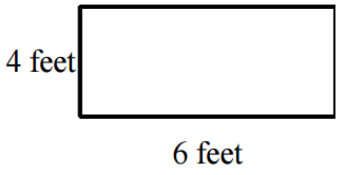
Directions – Show all work here and place all final choices/answers on the answer page.

46. What is the area of this rectangle?



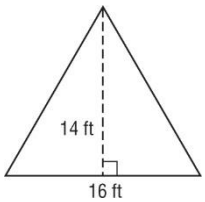
(1) 24 square feet (2) 10 square feet

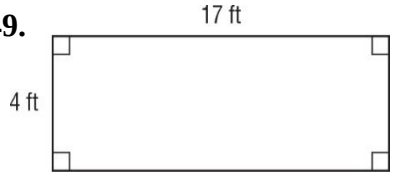
(3) 23 feet (4) 24 feet

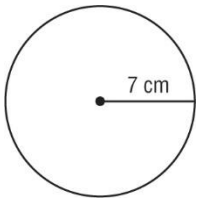
47. What is the number of square units in the area of a square whose side is 8 inches?

(1) 16 in^2 (2) 32 in^2 (3) 64 in^2 (4) 512 in^2

Find the area of each figure.

48. 

49. 

50. 

NAME – _____ points out of _____ | **Score -** _____

Algebra Summer Assignment
Answer Page

Directions - For **Multiple Choice** questions, place the choice number in the corresponding provided space. For **Short Answer** questions, leave the work in the previous pages and just place the final answer in the corresponding space.

Order of Operations Page 2

1. _____ **2.** _____ **3.** _____ **4.** _____ **5.** _____

Evaluate Algebraic Expressions Page 3

6. _____ **7.** _____ **8.** _____ **9.** _____ **10.** _____

Simplifying Expressions Page 4

11. _____ **12.** _____ **13.** _____ **14.** _____ **15.** _____

Solving Equations Page 5

16. _____ **17.** _____ **18.** _____ **19.** _____ **20.** _____

Solving Proportions Page 6

21. _____ **22.** _____ **23.** _____ **24.** _____ **25.** _____

Coordinate Pairs Page 7

26. _____ **27.** _____ **28.** _____ **29.** _____ **30.** _____

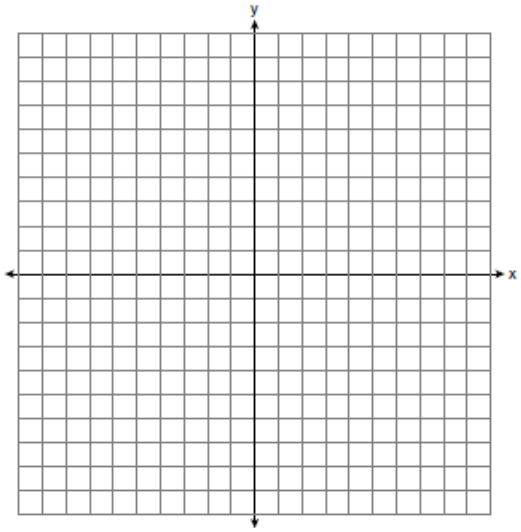
Slope Page 8

31. _____ **32.** _____ **33.** _____ **34.** _____ **35.** _____

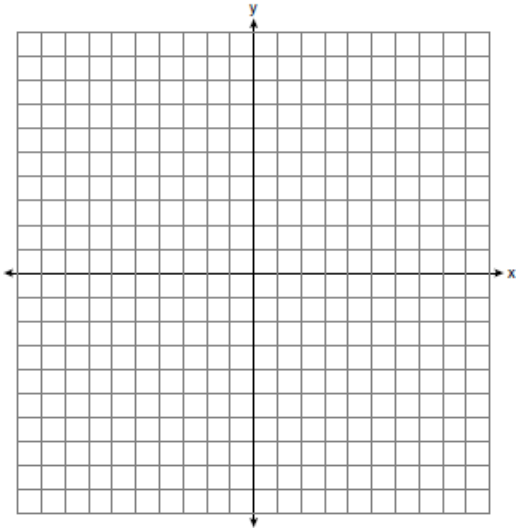
Graphing Lines Page 9

36. _____ **37.** _____

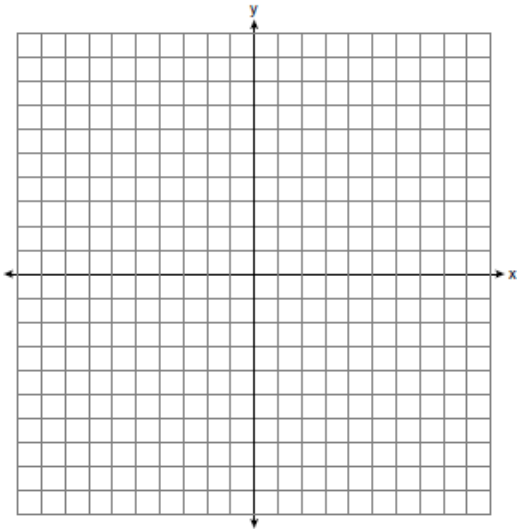
38.



39.



40.



Perimeter Page 10

41. _____ **42.** _____ **43.** _____ **44.** _____ **45.** _____

Area Page 11

46. _____ **47.** _____ **48.** _____ **49.** _____ **50.** _____