

Monroe Township Middle School

Monroe Township, New Jersey

Preparing for Middle School Geometry

PREPARATION PACKET

Middle School Geometry is a fast-paced, rigorous course that will provide you with the fundamental tools of geometric understanding that will support you in all future advanced mathematics courses. Since you will be taking *Middle School Geometry* after successful completion of Algebra I, the **Monroe Township Middle School GEOMETRY PREPARATION PACKET** contains review material of the algebraic concepts, skills, and procedures that should be mastered BEFORE entering Geometry in the fall. Essentially, this packet provides a review of the major algebra topics as well as a preview of geometric topics. The sections are based on the NJ 2016 Student Learning Standards.

Below are some online resources that you might find useful for extra review:

- <http://www.khanacademy.org/>
- <http://www.ixl.com/math/geometry> (free version)
- Study Island (use Clever)

This practice problem packet is the only formal review of the concepts, procedures, and skills that you will have before beginning your Middle School Geometry course. Your teacher will expect you to have mastered all topics included here. This collection of problems will identify those concepts that you have mastered as well as those you will need to practice and review. You are expected to seek extra help immediately on those concepts with which you have not demonstrated proficiency. Be resourceful – use the online resources! You may need to reconsider your placement in the course if you are unable to demonstrate proficiency in these algebra concepts – your Geometry teacher will be introducing new material immediately in September.

*****SOLVE THESE PROBLEMS WITHOUT THE USE OF A CALCULATOR AND SHOW ALL WORK*****

You will be responsible for handing in the completed packet with all work shown during the FIRST WEEK OF SCHOOL. The problems here are very representative of the types of items you will need to have mastered BEFORE Geometry... so we strongly encourage that you include this packet in your summer festivities! Good luck and enjoy! ☺

NJ 2016 Student Learning Standards **Geometry**

- **CONGRUENCE**
 - Experiment with transformations in the plane
 - Understand congruence in terms of rigid motions
 - Prove geometric theorems
 - Make geometric constructions
- **SIMILARITY, RIGHT TRIANGLES, & TRIGONOMETRY**
 - Understand similarity in terms of similarity transformations
 - Prove theorems involving similarity
 - Define trigonometric ratios and solve problems involving right triangles
 - Apply trigonometry to general triangles
- **CIRCLES**
 - Understand and apply theorems about circles
 - Find arc length and areas of sectors of circles
- **EXPRESSING GEOMETRIC PROPERTIES WITH EQUATIONS**
 - Translate between the geometric description and the equation for a conic section
 - Use coordinates to prove simple geometric theorems algebraically
- **GEOMETRIC MEASUREMENT & DIMENSION**
 - Explain volume formulas and use them to solve problems
 - Visualize relationships between two-dimensional and three-dimensional objects
- **MODELING WITH GEOMETRY**
 - Apply geometric concepts in modeling situations



"All this 'plane geometry' stuff is great, Euclid, but what if the Earth turns out to be round?"

OPERATIONS ON NUMBERS AND EXPRESSIONS

Simplify each expression. **SHOW WORK!!!**

1. $\sqrt{27}$

ANSWER: _____

2. $\sqrt{175}$

ANSWER: _____

3. $\sqrt{27} + \sqrt{24} + \sqrt{45} + \sqrt{80}$

ANSWER: _____

4. $2\sqrt{5}(4 + \sqrt{5})$

ANSWER: _____

5. $(3 - \sqrt{7})^2$

ANSWER: _____

6. $\frac{4}{\sqrt{3}}$

ANSWER: _____

7. $(3\sqrt{5})^2 + (2\sqrt{2})^2$

ANSWER: _____

8. $(x^3)(x^5)$

ANSWER: _____

9. $(-5x^2y^{-3})^{-3}$

ANSWER: _____

10. $\frac{12x^5y^2z^4}{4x^9y^2z^3}$

ANSWER: _____

Determine the area and perimeter of each figure described:

11. RECTANGLE with length $5\frac{1}{3}$ cm and width $3\frac{2}{3}$ cm

AREA: _____

PERIMETER: _____

12. SQUARE with sides of length 7 mm

AREA: _____

PERIMETER: _____

Using the given information, determine each answer

13. Area and circumference of a circle with diameter 6 in

AREA: _____

CIRCUMFERENCE: _____

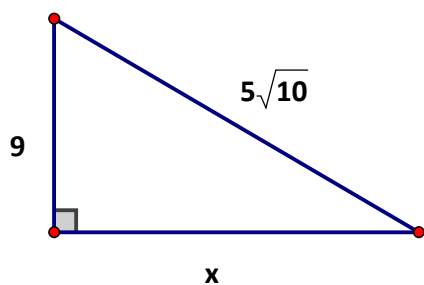
14. Circumference of a circle with area = 49π square centimeters CIRCUMFERENCE: _____

15. The diagonal length of a square with side length 10 mm. DIAGONAL: _____

16. The volume of a cone is given by $V = \frac{1}{3}\pi r^2 h$ where “r” is the radius of the base, “h” is the height, and “V” is the volume. Write an expression for the volume of a cone with a height of 15 units and a radius of $3b$ units. (Leave your answer in terms of pi and “b”).

VOLUME: _____

16. Use the Pythagorean Theorem to determine the length of the missing side of the right triangle given below.

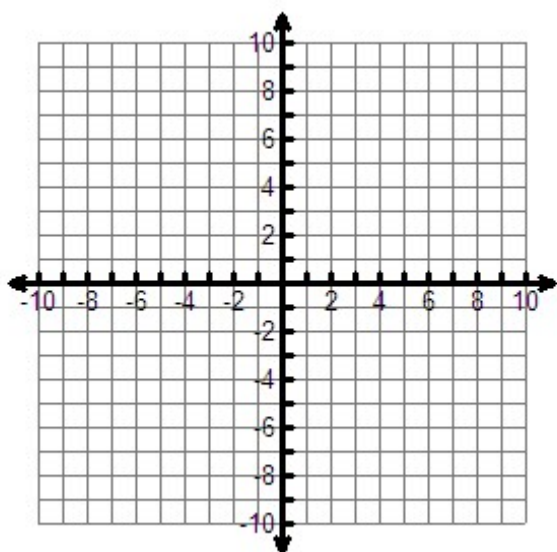


$x =$ _____

Use for #17 – 20: Quadrilateral FGHI has vertices **F**(0, 9), **G**(-2, 1), **H**(2, 0), and **I**(4, 8).

17. **Graph** the quadrilateral below.

A “rectangle” is a quadrilateral with four right angles and both pairs of opposite sides parallel and congruent to each other. You will determine whether FGHI is a rectangle.



18. Find the **slopes** of all four sides and explain their significance in terms of the definition of rectangle.

Slope \overline{FI} =

Slope \overline{IH} =

Slope \overline{GH} =

Slope \overline{FG} =

19. Finding the **lengths** of all four sides and explain their significance.

$FI =$

$IH =$

$GH =$

$FG =$

20. Do you think FGHI is a rectangle? Explain why or why not.

LINEAR RELATIONSHIPS

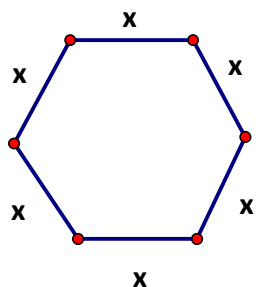
21. Solve the equation $\frac{1}{3}(45x + 15) = 11 + 6(x - 4)$ $x =$ _____

22. The Pythagorean Theorem is $a^2 + b^2 = c^2$. Solve the formula for **b**. ANSWER: _____

23. Name the x- and y-intercepts for the graph of the equation $6x - 5y = 36$

X-Intercept: _____

Y-Intercept: _____



24. Write an equation for the perimeter of the regular hexagon at left. Does your equation model “direct variation”?

PERIMETER EQUATION: _____

DIRECT VARIATION? (Yes or No)

25. Write the equation of the line that passes through (3, -9) and is **parallel** to $y = -4x + 2$

EQUATION: _____

26. Write the equation of the line that passes through (-6, 7) and is **perpendicular** to $y = -3x + 5$

EQUATION: _____

27. Write the equation of the line that passes through (-5, -12) and (7, 4) in **SLOPE-INTERCEPT FORM**.

EQUATION: _____

28. Write the equation of the line that passes through (2, -12) and (-6, 4) in **STANDARD FORM**.

EQUATION: _____

29. Write the equation of the line that passes through (-3, 8) and (9, -2) in **POINT-SLOPE FORM**.

EQUATION: _____

30. Solve for x: $\frac{x}{3} - \frac{x-2}{8} = 2$

x = _____

31. Solve the inequality and show the steps of your work: $|3x - 6| \leq 18$

32. Solve the system:
$$\begin{aligned} 4x + 2y &= -2 \\ y &= 3x + 4 \end{aligned}$$

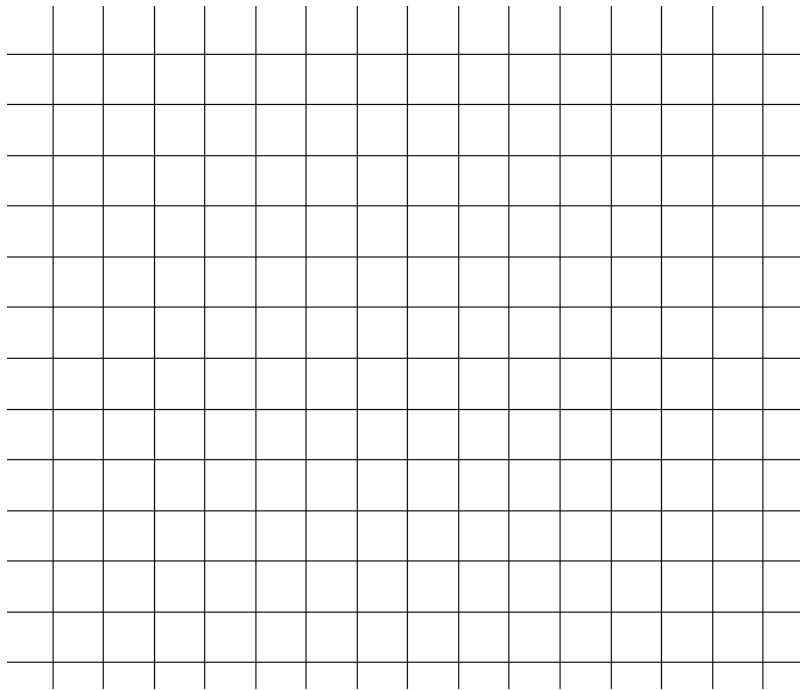
33. Solve the system:
$$\begin{aligned} 5x - 8y &= 10 \\ \frac{15}{2}x - 12y &= 15 \end{aligned}$$

34. The total cost of 15 gallons of regular gasoline and 10 gallons of premium gasoline is \$65.75. Premium gasoline costs \$0.30 more per gallon than regular. What is the cost per gallon of each type of gasoline?

35. Explain how a system of linear equations could have “no solution.”

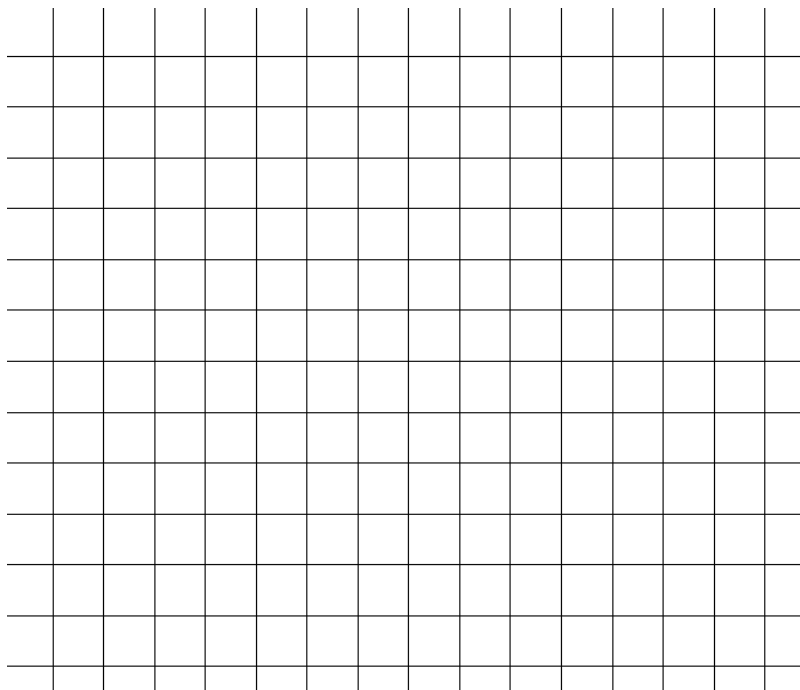
36. Solve: $9 < 7x - 5 < 16$

37. Graph the system of linear inequalities: $3x + y \geq -6$
 $x - 2y < 5$



38. What is the **AREA** of the region described by the system of linear inequalities:

$$x \leq 5, y \leq -1, \text{ and } x + y \geq 0?$$



NON-LINEAR RELATIONSHIPS

39. The surface area S of a cube is 294 square feet. What is the length (in feet) of each edge of the cube? ($S = 6s^2$)

40. Solve the proportion: $\frac{4\sqrt{5}}{x} = \frac{x}{5\sqrt{5}}$

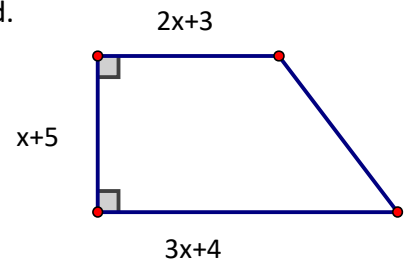
41. What are the x-intercepts of the graph of $y = -x^2 - 3x + 18$?

42. What are the coordinates for the VERTEX of the equation $y = -\frac{1}{2}x^2 - 4x + 16$?

43. Recall the vertical motion model for when an object is dropped: $h = -16t^2 + s$ where h = the height (feet), t = time in motion (seconds), and s = initial height (feet). If you drop a water balloon from a window 20 feet above the ground, then how long will it take for the balloon to hit the ground?

44. Write a trinomial to represent the AREA of the trapezoid represented.

Recall that the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$.



45. Solve each equation below:

A. $x^2 + 20 - 7x = 2x$

B. $8x^2 - 16x = 0$

C. $10x^2 - 5x = 105$

46. Factor each expression:

A. $x^2 + 15x + 50$

B. $9x^2 + 30x + 25$

C. $4x^3 + 36x^2 + 72x$

47. Multiply:

A. $(d - 7)(d + 2)$

B. $(4x - 6)^2$

C. $(x^2 + 3x - 5)(x - 2)$

48. Is it possible for a rectangle with a perimeter of 48 centimeters to have an area of 96.57 square centimeters? Show why or why not.

49. In 1980 the population, A , of Arizona was 2,718,000. Since then, the average annual percent of increase has been about 4.13%. Which model best fits this situation: linear, exponential, quadratic, or absolute value? Explain. Write a model that fits the situation.

50. Evaluate the DISCRIMINANT of $5x^2 - 11x + 6 = 0$ and explain what it means. Then solve the equation with the quadratic formula.