

Geometry and Measurement

The student will be able to:

1. Demonstrate an understanding of the principles of geometry and measurement and operations using measurements

- Use the US system of measurement for distance, area, volume, time, temperature and weight with understanding, and use them to complete basic operations of addition, subtraction, multiplication and division
- Develop acquaintance with the metric system of measurement in basic operations
- Apply the principles of geometry for finding perimeter and area of any figure using US and metric measurement
- Identify vertical, parallel, perpendicular and intersecting lines
- Identify right, obtuse, acute, and straight angles
- Recognize complementary and supplementary angles
- Identify right, equilateral, isosceles and scalene triangles
- Find circumference and area of a circle
- Find area, height and base of a triangle
- Find area, height and base of a parallelogram
- Determine volume of a cube, cylinder, rectangular solid, cone or pyramid
- Use hypotenuse, height and base of a triangle to find unknown sides (Pythagorean theorem)
- Recognize that corresponding angles of similar figures are equal
- Recognize that corresponding sides of similar figures are proportional
- Recognize that congruent figures have equal angles and equal sides
- Locate a point on a coordinate graph
- Find the distance between two points on a graph using the distance formula or the hypotenuse of a right triangle
- Use an equation to create a line on a graph
- Find the slope of a line on a graph using 2 points on a line.

2. Apply appropriate strategies to solve word problems using measurement, lines, angles, solid figures and graph coordinates

- Personalize the problem
- Draw a picture or diagram to help solve the problem
- Eliminate extraneous information
- Use estimation to solve problems and assess the reasonableness of the answer
- Determine the number of steps and operations needed to solve the problem
- *All formulas must be understood in algebra form.*

Recommendations for teaching geometry:

- Include geometric concepts and figures in other math topics.
 - ~ When discussing percents, use a circle graph and mention terms like diameter and radius.
 - ~ When reinforcing the *times tables*, use an example like buying a 3 by 5 area rug
- Use everyday situations to create a mental picture of geometric concepts such as the size of angles.
 - ~ When we see a moose on our path, we may do a 180 degree turn, or when we lose our grip on the road, we may do a 360 degree turn.
 - ~ When explaining similar triangles, use real life examples like, “Honey I shrunk the kids.”
 - ~ When a chicken crosses a road, it makes a transverse across two parallel lines with matching angles at both sides.
 - ~ When using a map, we are dealing with the ‘plus, plus’ quadrant in coordinate geometry, and we can show the x and y coordinates for our destination.
 - ~ When we do physical exercises, we often demonstrate straight, right or acute angles. It is also possible for two people to demonstrate complementary and supplementary angles.
- Use manipulative devices such as a geo-board to reinforce concepts and provide understanding.
- Special Notes:
 - ~ Be sure to teach the number of degrees in a triangle, and the properties of an equilateral and isosceles triangle.
 - ~ Be sure to teach how to label an angle by itself or in a shape such as a triangle.
 - ~ If possible demonstrate the Pythagorean principle through manipulatives, and show how it applies to the coordinate graph.

ESSENTIAL GEOMETRY & MEASUREMENT VOCABULARY

Angles:

Acute – an angle of less than 90

Complementary angles – two angles whose sum measures 90

Corresponding angles – angles that are in the same position in the intersections formed when a transversal intersects parallel lines

Obtuse angle – an angle greater than 90, but less than 180

Straight angle - an angle of 180

Supplementary angle – the two angles whose sum measures 180

Right angle - an angle of 90

Vertical angle – either of two angles with the same measure that lie on opposite sides of two intersecting lines

Area: the measure of the surface of a flat figure

Base: a number that appears with an exponent; the base is multiplied by itself the number of times indicated by the exponent; for example, in 3 to the second power, 3 is the base and 2 is the exponent

Circle:

Diameter – the distance (through the center) across a circle

Pi – the ratio of the circumference of a circle to its diameter (rounded to 3.14)

Radius – the distance from the center of the circle to any point on the circle

Circumference – the distance around a circle

Congruent figures: two shapes with identical measures of sides and angles

Coordinate plane grid: a flat surface divided by a horizontal number line and a vertical number line in order to form four quadrants or sections; the number lines intersect at right angles at the point of origin

Linear functions- (linear equations) an equation with two variables and multiple solutions

Point of origin – the point where the x axis and y axis cross on a coordinate plane; the coordinates of the point are (0,0)

Ordered pair – the pair of coordinates needed to locate a point on the coordinate plane. The coordinates are given in parenthesis in the order (x,y)

Y intercept – the point at which the graph of a line crosses the y axis on a coordinate plane

Cube: a two dimensional figure in which the length, width and height are all equal, and each face is a square

Diagram: a picture representation

Dimensions: measurements

Equation: a mathematical sentence in which two expressions or numbers are equal

Equivalent: equal to

Function: a constant relationship between quantities

Inequality: a mathematical statement that two expressions or numbers are not equal

Parallel: lines on the same flat surface that never meet or intersect

Parallelogram: a closed figure with four straight sides; each pair of opposite sides is parallel

Perimeter: the distance around a flat figure

Perpendicular: two lines crossing at right angles

Proportion: a mathematical statement that two ratios are equal

Slope: the measure of the steepness or incline of a line

Ratio: a way to compare two numbers or quantities

Rectangle: a four sided figure in which all angles are rt. angles

Triangle: a closed figure with three straight sides

Equilateral triangle - a triangle with 3 equal sides and angles

Hypotenuse - the opposite side of a right angle in a right angled triangle.

Isosceles triangle – a triangle having two sides with the same length and two angles with the same measure

Right triangle – a triangle having a right angle

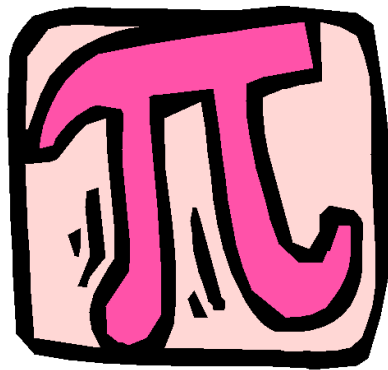
Scalene triangle – a triangle with no sides or angles that are equal

Similar triangle - two shapes with identical angles whose corresponding sides are in proportion.

Transversal: the line that intersects two or more parallel lines

Vertex, Vertices: the end point shared by the lines or segments that form an angle

Volume: the amount a three dimensional object holds



Name _____

Date _____

Student Assessment Geometry

1. Show an example of intersecting lines.	2. Draw two lines that are perpendicular to one another.
3. Draw an example of parallel lines.	4. Show an example of vertical angles.
5. Which of the following angles has the fewest degrees: obtuse _____, acute _____ or straight _____? (check)	6. Which of the following angles has the greatest number of degrees: obtuse _____ straight _____ or right _____? (check)
7. If two angles are complementary, they add up to _____ degrees.	8. Two supplementary angles add up to _____ degrees.
9. Which triangle has two equal sides? Scalene _____ Isosceles _____ (check)	10. Which triangle has three equal sides? Right _____ Equilateral _____ (check)

<p>11. What is the perimeter of a rectangle when the length is 5 and the width is 6? _____</p>	<p>12. Find the perimeter of a triangle when $a=3$, $b=6$ and $c=3$. _____</p>
<p>13. What is the circumference of a circle when the diameter is 10? _____</p>	<p>14. Find the area of a circle with a radius of 10? _____</p>
<p>15. If the height of a parallelogram is 6 and the base is 8, what is the area? _____</p>	<p>16. Determine the base of a triangle if the area is 24 and the height is 8. _____</p>
<p>17. If one leg of a right angle triangle is 6 and the hypotenuse is 10, what is the length of the other leg? _____</p>	<p>18. Find the volume of a cube if one side is equal to 3. _____</p>
<p>19. When the radius of a cylinder is 2, and the height is 10, what is the volume? _____</p>	<p>20. What are two triangles with equal angles and proportional sides called? congruent _____ similar _____ (check)</p>
<p>21. What are two triangles with equal sides and equal angles called? congruent ___ similar ___ (check)</p>	<p>22. The coordinates (2, -4) are found in which quadrant on a coordinate graph? top left __, top right __, bottom left __, bottom right __ (check)</p>

Geometry Problems

1. Two railway tracks cross making four angles, none of which are right angles. If the angles are listed in clockwise order a, b, c and d, which statement will be true?

- 1) $a = c$
- 2) $b = a$
- 3) $a = d$
- 4) $b = c$

2. If a wall is built perpendicular to the ground, what angle is formed where the wall and ground meet?

- 1) 90°
- 2) 150°
- 3) 180°
- 4) 120°

3. If Gerry is sitting on the floor and his body makes an acute angle, will he be sitting straight up or leaning forward?

- 1) straight up
- 2) leaning forward

4. If Gerry is lying down flat on his back, will his body make a right angle or a straight angle?

- 1) right angle
- 2) straight angle

5. Gerry and Joe are sitting back to back to make supplementary angles. If Gerry leans forward to make an angle that measures 70 degrees, what is the measure of the angle that Joe makes?

- 1) 20 degrees
- 2) 90 degrees
- 3) 100 degrees
- 4) 110 degrees

6. Sally starts at point A and walks 4 miles south to point B, then 4 miles west to point C. If she then takes a shortcut diagonally back to point A, what type of triangle will she have formed by her path?

- 1) scalene
- 2) isosceles
- 3) right

7. You have a square piece of cardboard that has a perimeter of 12 centimeters. What is the area of the cardboard?

- 1) 144 square centimeters
- 2) 9 square centimeters
- 3) 16 square centimeters
- 4) 24 square centimeters

8. A rectangle is 5 inches wide. The area of the rectangle is 35 square inches. What is the perimeter of the rectangle?

- 1) 24 inches
- 2) 40 inches
- 3) 30 inches
- 4) There is not enough information to know.

9. John was building a circular patio with a radius of 150 feet. He was using bender board to build forms around the edge. How many feet of bender board did he need to go around the outside edge?

- 1)300
- 2)654
- 3)942
- 4)620

10. John has placed a circular tent over his patio. If the diameter of the tent is 20 ft, what is the area of the floor of the tent?

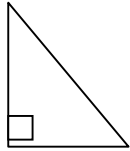
- 1)40
- 2)400
- 3)314
- 4)628

11. Lily wants to place a border around her triangular pond. If the base of the pond is 4 feet, and the other two sides are 2 feet longer than the base but equal to each other, then how many feet of border will she need?

- 1)12
- 2)10
- 3)16
- 4)20

12. Lilly is making another triangular pond in her back yard. The base of the triangle is 4 feet and the height of the triangle is 6 feet. What is the area of the triangular pond?

- 1) 6 square feet
- 2) 7 square feet
- 3) 10 square feet
- 4) 12 square feet



13. In the late afternoon, a parking meter casts a shadow that is 3 feet in length. At the same time a street lamp casts a shadow that is 18 feet in length. If the parking meter is 4 feet high, how high is the street lamp?

- 1) 21
- 2) 24
- 3) 22
- 4) 25

14. Alberto walked to school every day by walking east 60 yards and then north 80 yards. In the afternoon he took a shortcut and walked straight through a field from school to home. How long was the shortcut?

- 1) 140
- 2) 70
- 3) 100
- 4) 120

