Name_____

Honors Geometry **Ch 12 Notes Packet**

Sec 12.1: Representation of 3D Figures

After this section you will have completed the following Common Core State Standard(s):

- **G.GMD.4: Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.**
- And will be improving your skills in the following Mathematical Practice(s):
  1. Make sense of problems and persevere in solving them
  5. Use appropriate tools strategically

Specifically, you should be able to:

- **Draw isometric vies of 3D figures**
- **Investigate cross sections of 3D figures**

An _____ is a two dimensional drawing of a three dimensional object viewing it at one of its _____.

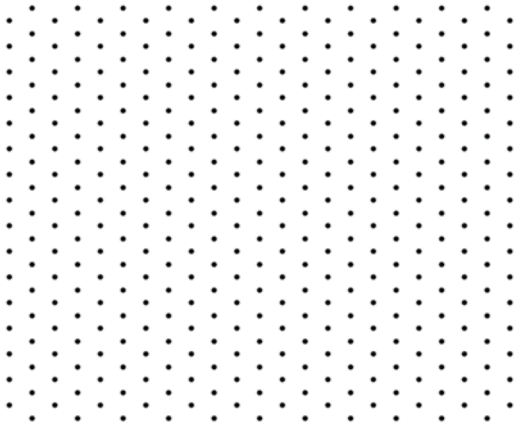
An _____ is a drawing of a three dimensional object from its top, left, front, and right views, (sometimes its back and bottom also).
Lines that represent different layers should be _____ than other lines in the drawing.

A _____ is the shape formed by the intersection of a _____ and a _____.

EULER'S THEOREM tells us about the relationship between faces (F), vertices (V), and edges (E) of a polyhedron. Faces, vertices and edges are related with the following formula:

Examples:

1.



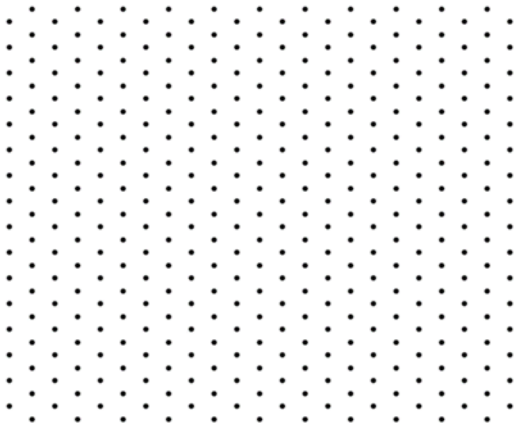
top left

front right

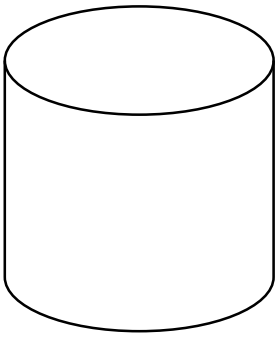
2.

top left

front right



3. What kind of shapes would the cross sections of a cylinder be?



4. A polyhedron has 7 faces, 10 vertices and 15 edges. Verify Euler's Thm.

5. A solid has 10 faces and 7 vertices. Use Euler's Thm to find the number of edges.

6. A solid has 11 faces: 5 quadrilaterals and 6 pentagons. How many vertices does the solid have?

Sec 12.2 & 4: Surface Area and Volume of Prisms and Cylinders

After this section you will have completed the following Common Core State Standard(s):

- **G.MG.3: Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).★**
- **G.GMD.1: Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.**
- **G.GMD.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★**

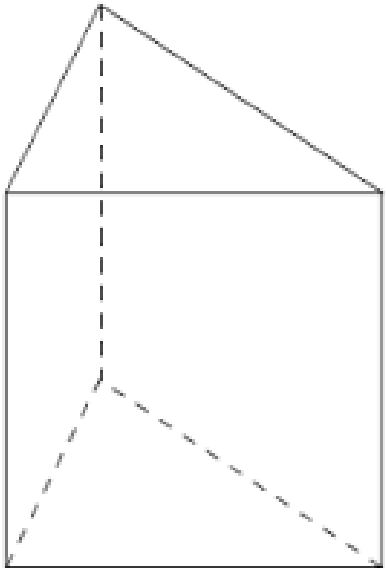
And will be improving your skills in the following Mathematical Practice(s):

1. Make sense of problems and persevere in solving them
6. Attend to precision
7. Look for and make use of structure

Specifically, you should be able to:

- **Find lateral areas, surface areas and volumes of prisms and cylinders**

A _____ is a polyhedron (a solid with polygons for faces) with a pair of parallel polygons for bases and quadrilaterals for _____.



Prisms are named after the shape of their _____.

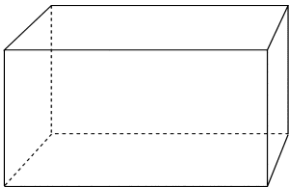
Surface area of a <u>right</u> prism:

B:
p:
h:

An _____ prism has at least one lateral face that is not a _____. To find the surface area of an _____ prism you must find the areas of all the faces and _____.

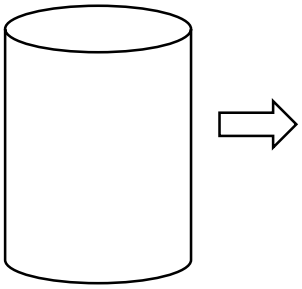
<u>Cavalieri's Principle:</u> If two solids have equal _____ and cross sections with equal _____, then they have equal _____.

Volume of <u>any</u> prism:



A _____ is like a prism, with _____ for its bases.

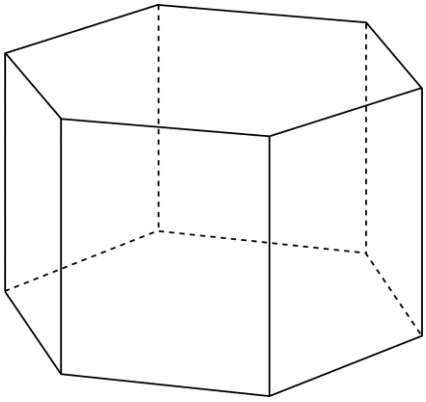
The surface area of a _____cylinder with radius r and height h:



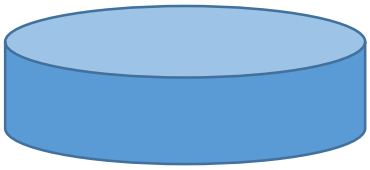
The volume of _____ cylinder:

Examples:

1. Find the surface area and volume of the right hexagonal prism.



2. Find the surface area and volume of the right cylinder.



Sec 12.3 & 5: Surface Area and Volume of Pyramids and Cones

After this section you will have completed the following Common Core State Standard(s):

- **G.MG.1: Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★**
- **G.GMD.1: Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.**
- **G.GMD.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★**

And will be improving your skills in the following Mathematical Practice(s):

1. Make sense of problems and persevere in solving them
4. Model with mathematics
6. Attend to precision
7. Look for and make use of structure

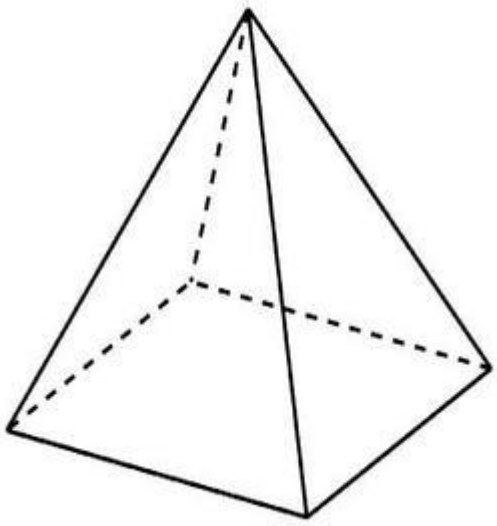
Specifically, you should be able to:

- **Find lateral areas, surface areas and volumes of cones and pyramids**

A _____ is a polyhedron with a _____ for a base and _____ for lateral faces.

A _____ has a _____ polygon for a base and congruent _____ triangles for lateral faces.

Surface area of a <u>regular</u> pyramid:



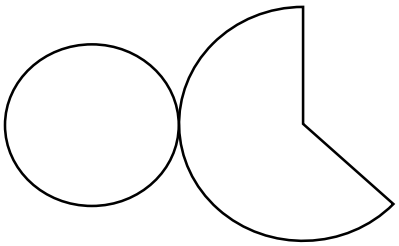
B: p: ℓ:

Volume of <u>any</u> pyramid:

h:

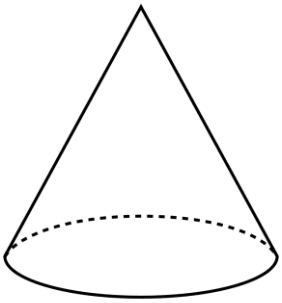
A _____ is like a pyramid except is has a _____ for its base.

The net of a right cone is made from a _____and a _____ of a circle.

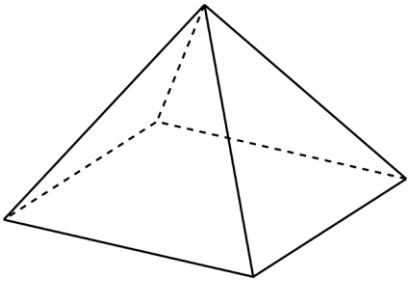


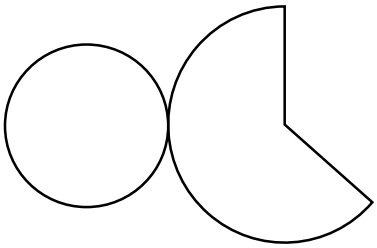
Surface area of a _____cone:
(with radius r and slant height ℓ)

Volume of _____ cone:



<u>Examples</u>:
Find the surface area and volume.





Sec 12.6: Surface Area and Volume of Spheres

After this section you will have completed the following Common Core State Standard(s):

- **G.MG.3: Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).★**
- **G.GMD.1: Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.**
- **G.GMD.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★**

And will be improving your skills in the following Mathematical Practice(s):

1. Make sense of problems and persevere in solving them

6. Attend to precision

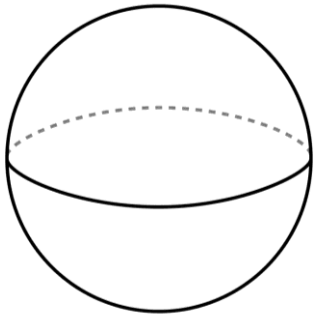
Specifically, you should be able to:

- **Find surface areas and volumes of spheres**

A _____ is the set of all points in _____ that are equidistant from a given point.

When a plane intersects a circle its intersection is always either a _____ or a _____.

A _____ is a circle on the surface of a sphere that _____, separates the sphere into 2 congruent _____ and whose diameter's endpoints are called _____.



Surface area of a sphere:
(with a radius of r)

Volume of a sphere:

Examples:

Sec 12.7: Spherical Geometry

After this section you will have completed the following Common Core State Standard(s):

- **G.CO.1: Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.**
- And will be improving your skills in the following Mathematical Practice(s):
  1. Make sense of problems and persevere in solving them
  2. Reason abstractly and quantitatively

Specifically, you should be able to:

- **Describe sets of points on a sphere**
- **Compare and contrast Euclidean and spherical geometries, identifying how geometric figures are represented in each geometric system.**

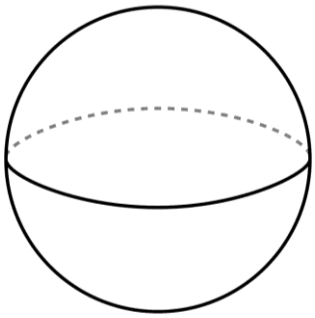
Parallel Postulate:

Systems of geometry in which the Parallel Postulate does not hold are examples of _____ geometries.

Spherical Geometry: is a type of non-Euclidean geometry on the _____.

The only straight lines in spherical geometry are _____, and since all _____ intersect, there are no _____ in spherical geometry.

The measures of the angles of a triangle in spherical geometry always add up to _____, but _____.



Examples:

Sec 12.8: Congruent and Similar Solids

After this section you will have completed the following Common Core State Standard(s):

- **G.CO.6: Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.**
- **G.SRT.2: Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.**

And will be improving your skills in the following Mathematical Practice(s):

1. Make sense of problems and persevere in solving them

8. Look for and express regularity in repeated reasoning

Specifically, you should be able to:

- **Identify congruent and similar solids**
- **Use properties of similar solids to solve problems**

If two similar solids have a scale factor/ ratio of lengths of a:b or $\frac{a}{b}$, then the ratio of their surface areas (or any other corresponding areas) would be:

and the ratio of their volumes (or weights) would be:

Examples: