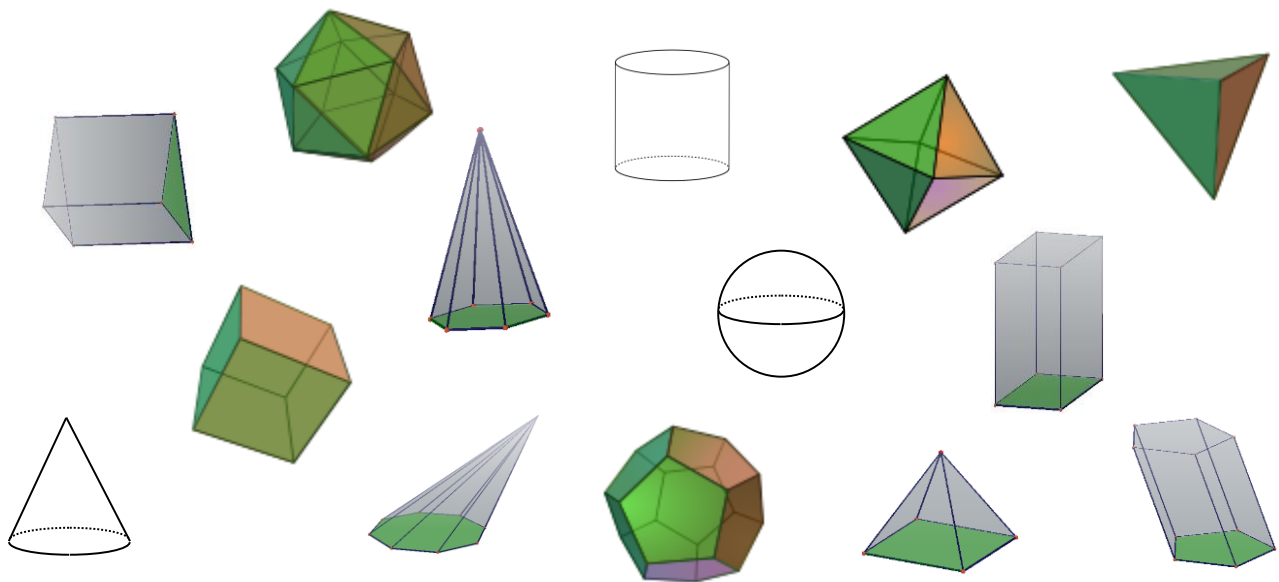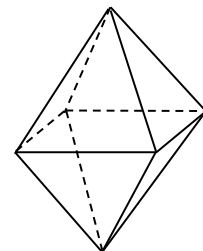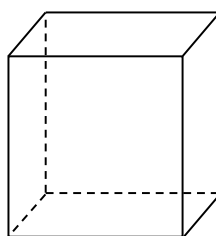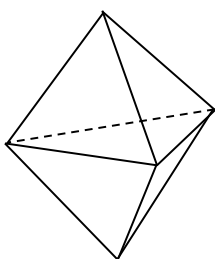# Solids

Classification of solids

You should be familiar with the basic terminology and names: *Vertex, Edge, Face; Solid, Polyhedron, Prism, Pyramid, Platonic Solid/Regular Polyhedron, Archimedean Solid/Semiregular Polyhedron, Sphere, Cone, and Cylinder*.

1. Name the solids depicted in the following picture. Be as specific as you can (don't just state "pyramid"; specify what kind of pyramid it is). Sort out the solids using categories *polyhedron*, *prism*, *pyramid* and *platonic solid*. (Note: Some do not belong to any category and some may belong to more than one group).

2. Sketch a cube. Sketch a triangular prism. Sketch a square pyramid. Sketch a cone and cylinder.

3. Name all Platonic Solids and describe them (give number of faces and their shape). (Pg 333, #1)

4. Are the depicted solids regular, semiregular, or none of the above? Explain. (All faces in the depicted solids are regular polygons: equilateral triangles and squares)

5. Solid in the picture has 32 faces and 60 vertices. How many edges does it have? (Make sure to use a property we discovered in class (pg. 334, #3), don't try to count edges).

Volume and Surface Area

3	1	3
1		1
3	1	3
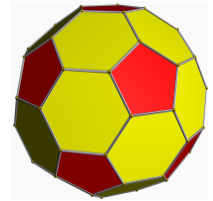
6. You should be able to build a "block building" based on a "block diagram".

Build a "block building" and find its volume (A cube is the volume unit).

7. You should be familiar with basic formulas for the volume and surface area.

The focus is on understanding how these formulas are developed (not on memorizing them).

- Explain why the volume of a prism can be calculated as the area of the base x height. (you may draw block buildings, cubes, etc.)

- Based on the above, explain why the volume of a rectangular prism can be calculated as length x width x height

- Use the above to reason about the volume of a cylinder.

- How is the volume of a pyramid related to the volume of a prism with the same base and height?

- Use the above to reason about the volume of a cone.

- Show how the formula for the surface area of the cylinder can be derived.

8. Find the volume and surface area of the following solids. Answers are given under each applet.

https://www.geogebra.org/m/zYyzFC8n

https://www.geogebra.org/m/SoeYq9xX

https://www.geogebra.org/m/q1QJSbbq

For the following solids, calculate their volume (you do not have to find the surface area):

https://www.geogebra.org/m/r1yEzrBp

https://www.geogebra.org/m/O1LxLka2

9. What is a net of a polyhedron? How many different nets does a cube have? Draw 8 of them. (Pg. 335, #4)

10. Draw a net of a tetrahedron and a square pyramid. (You may use paper and scissors or Polydron pieces to verify that your pattern is actually a net of that polyhedron.)

Probability

11. Flipping a Coin
 i.   List the sample space for flipping a coin. What is the probability of getting a head?
 ii. List the sample space for flipping a coin twice. What is the probability of getting 1 head and 1 tail? What is the probability of getting 2 tails? What is the probability of getting a tail followed by head?
 iii. List the sample space for flipping 3 coins and find the probability of getting 1 head, two heads, three heads.
 iv. Four coins – page 243, #2.

12. Rolling a die
 i.   List the sample space for rolling a die. What is the probability of getting 6? What is the probability of getting an odd number? What is the probability of getting an odd number OR a multiple of 3? What is the probability of getting a multiple of 3 AND an odd number?

13. Drawing cubes from a container
    See Page 242, #1; pg 245, #3 and 4.

    Four red and four green cubes are placed in a container and 2 cubes are selected at random at once. What is the probability of getting 2 cubes of different colors?

    Cubes are now selected one by one.
    What is the probability of getting 2 cubes of different colors if you put the first cube you drew back to the container?
    What is the probability if the cube is not replaced?

14. What is the Pascal's Triangle? Generate a few rows and use it to answer the following questions. Use complementary events to simplify your solution when appropriate.
    - What is the probability of getting all heads when flipping 7 coins? Getting exactly 3 tails? Getting at least 5 heads? Getting at least 1 tail?
    - What is the probability of getting at least 80% on a true/false test with 10 questions if you select answers randomly? What is the probability of getting 100% on a test with 15 questions? You may use the Pascal's triangle (you may print one from my website).
    - What is the probability that in a family with 5 children all will be girls? 3 girls and 2 boys? Assume that the probability of having a boy is the same as having a girl.

15. You spin a coin on a "two-penny" grid (see problem #2 on page 232). What is the probability that it lands inside of a square?

16. You spin a coin on a "four-penny" grid (see picture). What is the probability that it lands inside of a square?