

Geometry:

Mrs. Henderson
Flexible Instruction Days



Instructions: Please do an enclosed lesson for each day that we do not have school. Each lesson builds upon the previous so make sure to review notes, if needed. This packet is posted on the district website.

Name _____

Geometry: Emergency Lesson – Day 1

LESSON 12.1:

GOAL: Identify solids. *For use with pages 792–801*

Vocabulary: (Study the following vocabulary words.)

A **polyhedron** is a solid that is bounded by polygons, called **faces** which enclose a single region of space.

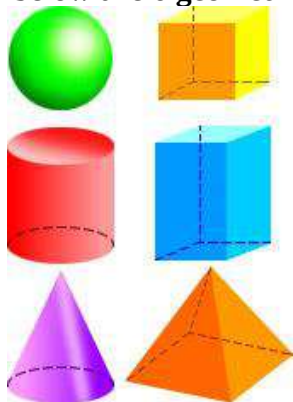
A polyhedron is **regular** if all of its faces are congruent regular polygons.

A polyhedron is **convex** if any two points on its surface can be connected by a segment that lies entirely inside or on the polyhedron.

A polyhedron is *concave* if any two points on its surface can be connected by a segment that goes on the outside of the polyhedron.

Prisms and Pyramids: Both prisms and pyramids are types of polyhedron. Each pyramid or prism is named for its base. Prisms have 2 identical bases and pyramids only have one base.

Shown below are 6 geometric solids.

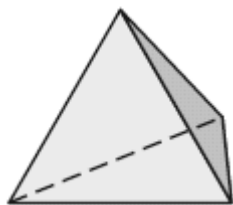


1. By reading the definition of polyhedron, please determine which solids pictured above are polyhedron.
2. Please name each prism or pyramid.

EXAMPLE 1: Identify and name polyhedral:

Tell whether the solid is a polyhedron. If it is, name the polyhedron and count the number of faces, vertices, and edges.

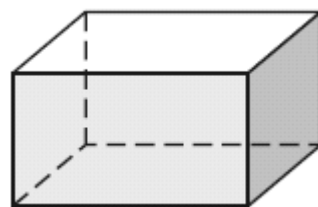
a.



b.

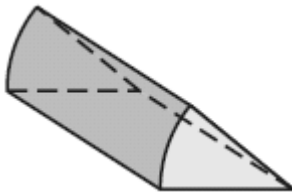
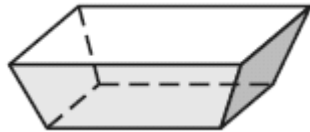
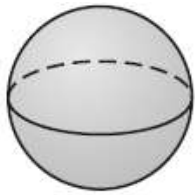


c.



Practice 12.1A:

Determine whether the solid is a polyhedron. If it is, name the polyhedron. *Explain*-your reasoning.



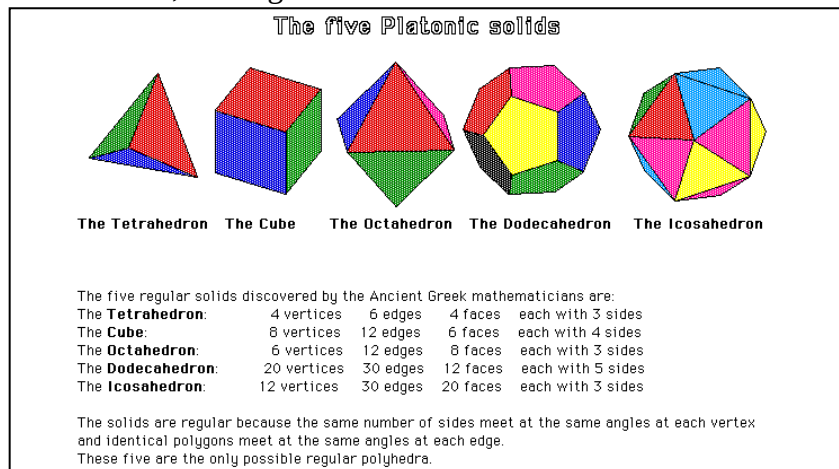
Sketch the polyhedron.

4. Triangular pyramid

5. Rectangular pyramid

6. Pentagonal prism

Platonic solids are five regular polyhedra that include the regular tetrahedron, cube, regular octahedron, regular dodecahedron, and regular icosahedron.



Describe in your own words each of the figures above:

a. tetrahedron:

b. cube

c. octahedron

d. dodecahedron

e. icosahedron

Name _____

Geometry: Emergency Lesson – Day 2

LESSON 12.1:

GOAL: Identify solids.

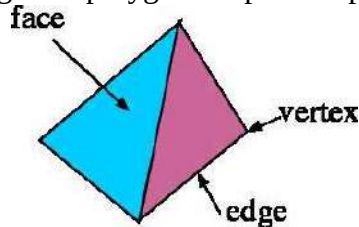
Vocabulary:

A **cross section** is the intersection of a plane and a solid.

An **edge** of a polyhedron is a line segment formed by the intersection of two faces.

A **vertex** of a polyhedron is a point where three or more edges meet.

The **bases** of a prism are congruent polygons in parallel planes. The **base** of a pyramid is a polygon.

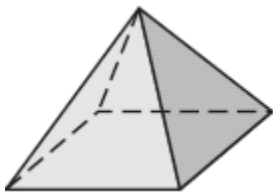


Theorem 12.1 Euler's Theorem: The number of faces (F), vertices (V), and edges (E) of a polyhedron are related by the formula $F + V = E + 2$.

How to Use Euler's Theorem with Platonic solids:

Find the number of faces, vertices, and edges of the polyhedron.

Check your answer using Euler's Theorem.



Solution: By counting on the diagram, the tetrahedron has 5 faces, 5 vertices, and 8 edges. Use Euler's Theorem to check.

$$F + V = E + 2$$

Euler's Theorem

$$5 + 5 = 8 + 2$$

Substitute.

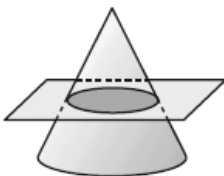
$$10 = 10$$

This is a true statement. So, the solution checks.

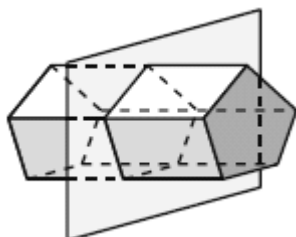
EXAMPLE 3: Describe cross sections.

Describe the shape formed by the intersection of the plane and the solid.

a.



b.

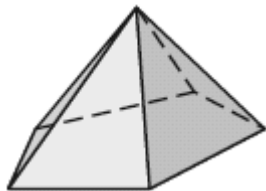


Solution: a. The cross section is a circle. b. The cross section is a pentagon.

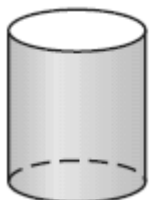
Exercises for Examples 1, 2, and 3

Tell whether the solid is a polyhedron. If it is, name the polyhedron and find the number of faces, vertices, and edges. Check your answer using Euler's Theorem.

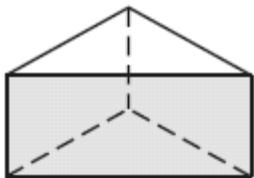
1.



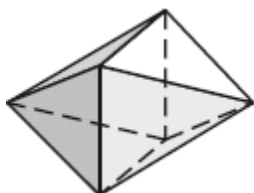
2.



3.

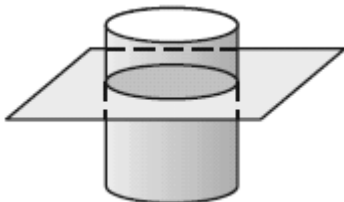


4. Find the number of faces, vertices, and edges of the polyhedron. Check your answer using Euler's Theorem.

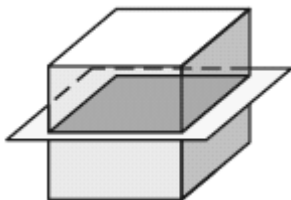


Describe the shape formed by the intersection of the plane and solid.

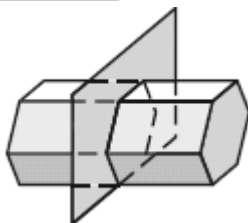
5.



6.



7.



Name _____

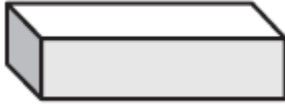
Geometry: Emergency Lesson – Day 3

LESSON 12.1:

GOAL: Identify solids.

Determine whether the solid is a polyhedron. If it is, name the polyhedron. *Explain* your reasoning.

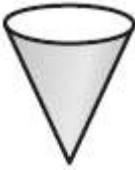
1.



2.



3.



Use Euler's Theorem to find the value of n .

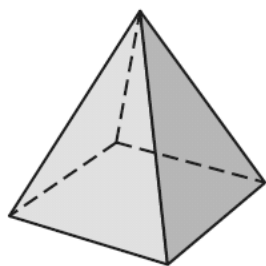
4. Faces: n
Vertices: 4
Edges: 6
5. Faces: 10
Vertices: n
Edges: 24
6. Faces: 14
Vertices: 24
Edges: n

Sketch the polyhedron.

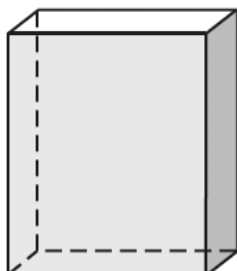
7. Triangular pyramid
8. Pentagonal pyramid
9. Hexagonal prism

Find the number of faces, vertices, and edges of the polyhedron. Check your answer using Euler's Theorem.

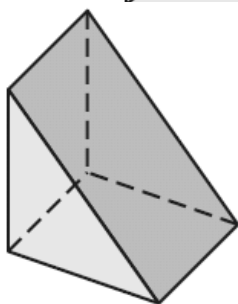
10.



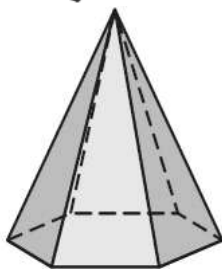
11.



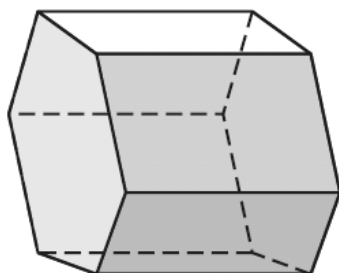
12.



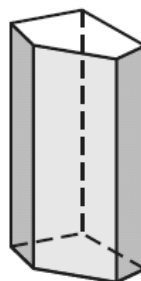
13.



14.



15.



16. Visual Thinking An architect is designing a contemporary office building in the shape of a pyramid. The building will have eight sides. What is the shape of the base of the building?

Name _____

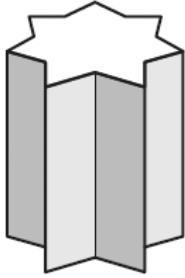
Geometry: Emergency Lesson – Day 4

LESSON 12.1:

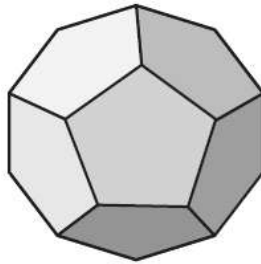
GOAL: Identify solids.

Determine whether the solid is *convex* or *concave*.

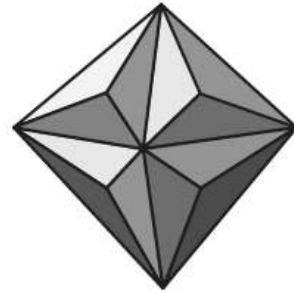
1.



2.

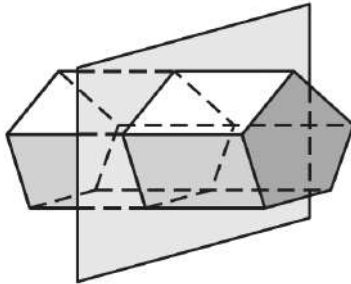


3.

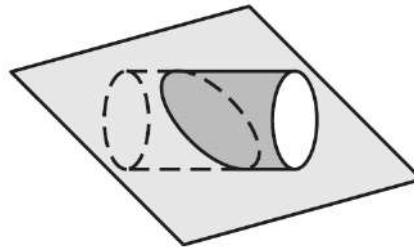


Describe the cross section formed by the intersection of the plane and the solid.

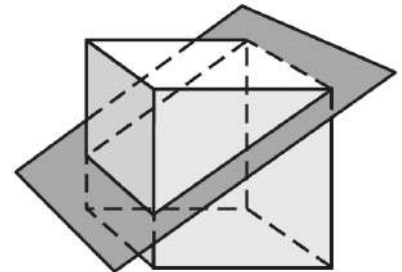
4.



5.



6.



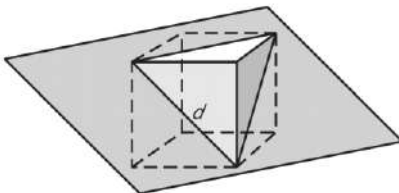
7. **Multiple Choice** Assume at least one face of a solid is congruent to at least one face of another solid. Which two solids can be adjoined by congruent faces to form a hexahedron?

- A. A rectangular prism and a rectangular pyramid
- B. A triangular pyramid and a triangular pyramid
- C. A triangular prism and a triangular pyramid
- D. A cube and a triangular prism

8. **Reasoning** Of the four possible solid combinations in Exercise 23, which combination has the most faces? How many faces are there?

In Exercises 9-11, use the following information.

Cross Section The figure at the right shows a cube that is intersected by a diagonal plane. The cross section passes through three vertices of the cube.



- 9. What type of triangle is the shape of the cross section?
- 10. If the edge length of the cube is 1, what is the length of the line segment d ?
- 11. If the edge length of the cube is $4\sqrt{2}$, what is the perimeter of the cross section?

Name _____

Geometry: Emergency Lesson – Day 5

LESSON 12.1:

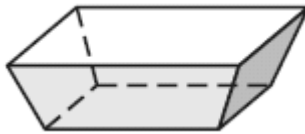
GOAL: Identify solids.

Determine whether the solid is a polyhedron. If it is, name the polyhedron. *Explain*-your reasoning.

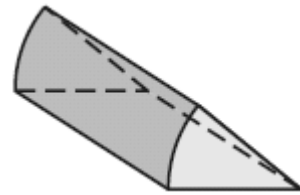
1.



2.



3.



Use Euler's Theorem to find the value of n .

4. Faces: n
Vertices: 8
Edges: 12

5. Faces: 5
Vertices: 6
Edges: n

6. Faces: 8
Vertices: n
Edges: 18

Sketch the polyhedron.

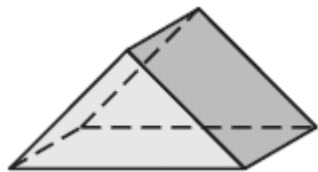
7. Cube

8. Rectangular prism

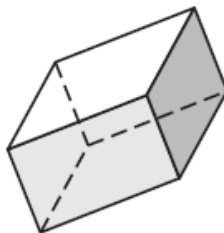
9. Trapezoidal pyramid

Find the number of faces, vertices, and edges of the polyhedron. Check your answer using Euler's Theorem.

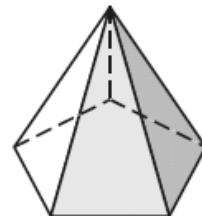
10.



11.

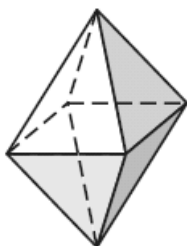


12.

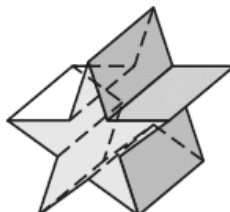


Determine whether the solid is *convex* or *concave*.

13.

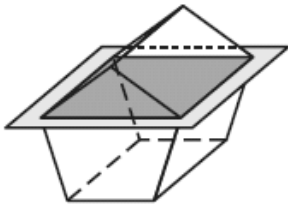


14.

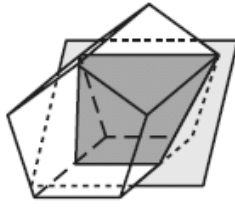


Describe the cross section formed by the intersection of the plane and the pentagonal prism.

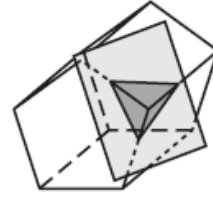
15.



16.



17.



In Exercises 18-22, determine whether the statement is *true* or *false*

- 18.** A polyhedron can have a circular face.
- 19.** A polyhedron can have an equal number of faces and vertices.
- 20.** The cross section of a cube could be an equilateral triangle.
- 21.** The cross section of a square pyramid could be a triangle.

- 22.** Sketch an example of a solid that is not a polyhedron. Do not use a cone, cylinder, or sphere.