Monday, May 18, 2020

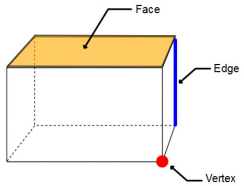
Sec 11-1: Space Figures and Cross Sections

Space Figure: a figure in 3-dimensions .

Polyhedron: a 3-D figure whose surfaces are polygons.

Polygon: a closed figure whose sides are segments (straight).

Vocabulary:



Face: each polygonal surface.

The figure at the left has 6 faces.

Edge: segment formed by the intersection of faces.

The lines used to draw the figure at the left are edges.
This polyhedron has 12 edges.

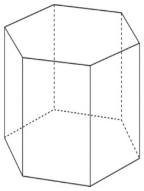
Vertex: point where two or more edges intersect.

The "corners" on the drawing.
This polyhedron has 8 vertices.

Leonhard Euler, a Swiss mathematician, discovered a relationship among the numbers of faces, vertices, and edges of any polyhedron. The result is known as Euler's Formula.

Formula **Euler's Formula**

The numbers of faces (F), vertices (V), and edges (E) of a polyhedron are related by the formula $F + V = E + 2$



F + V = E + 2

8 + 12 = 18 + 2

20 = 20 ✓

Faces = 8

2 hexagons (top and bottom)
6 rectangles (around the sides)

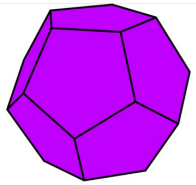
Vertices = 12

12 for the two hexagons (6 each).

Edges = 18

12 for the two hexagons (6 each).
6 vertical edges connecting the vertices in the two hexagons.

A regular Dodecahedron has 12 Faces that are all regular pentagons. There are a total of 30 Edges. Find the number of Vertices.



Using Euler's Formula: F + V = E +2

12 + V = 30 + 2

12 + V = 32

-12 -12

V = 20

Cross Section: The surface created when a plane slices through a 3-D figure.

What is the shape of the surface created when slicing an orange?

The cross section created when slicing an orange is

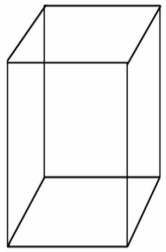
A Circle

You can get circles of different sizes but all cross sections will be circular.

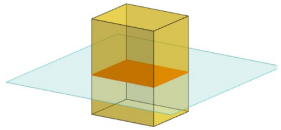
Demonstrations of cross sections

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

Draw or describe the cross section formed by the following planes intersection of the rectanglular solid.

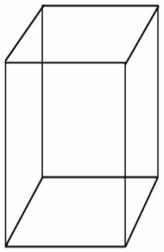


1. Horizontal Cross Section.

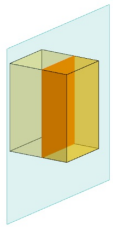


Rectangle same shape as the bottom

Draw or describe the cross section formed by the following planes intersection of the rectanglular solid.

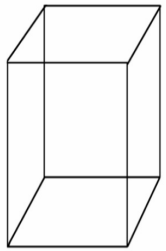


2. Vertical Cross Section.

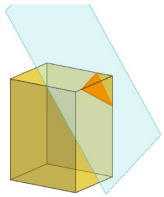


Rectangle same shape as the side.

Draw or describe the cross section formed by the following planes intersection of the rectanglular solid.

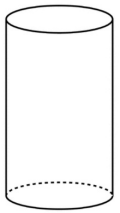


3. Cut off a corner.

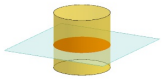


Triangular shape.

Draw or describe the cross section formed by the following planes intersection of the cylinder.

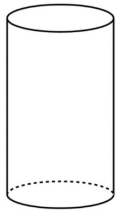


1. Horizontal Cross Section.

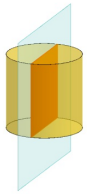


Circle same size as the bottom and the top.

Draw or describe the cross section formed by the following planes intersection of the cyliner.

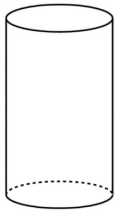


2. Vertical Cross Section.

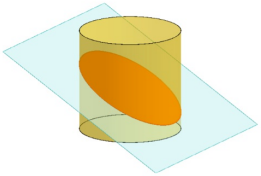


Rectangle.

Draw or describe the cross section formed by the following planes intersection of the cyliner.



3. Cross section at an angle through the middle.



an Ellipse (oval).

You can now do the first few problems of Practice #25.

We'll continue with this material tomorrow.

Due date for Practice #25 is still to be determined.