Geometry

Chapter 11

Section 11-1

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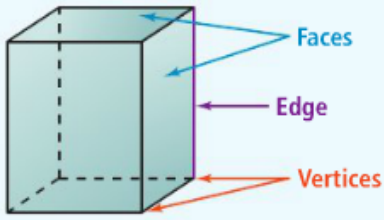
A **polyhedron** is a space figure, or three-dimensional figure, whose surfaces are polygons. Each polygon is a **face** of the polyhedron. An **edge** is a segment that is formed by the intersection of two faces. A **vertex** is a point where three or more edges intersect.



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take note

Key Concept Euler's Formula

The sum of the number of faces (F) and vertices (V) of a polyhedron is two more than the number of its edges (E).

$F + V = E + 2$

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Fill in the number of faces, vertices and edges of the polyhedron.

f = 7

v =

e = 12

$F+V=E+2$

$7+V=12+2$

$-7 \quad -7$

$V=7$

f = 8

v = 7

e = 13

$8+7=e+2$

$-2 \quad -2$

$13=e$

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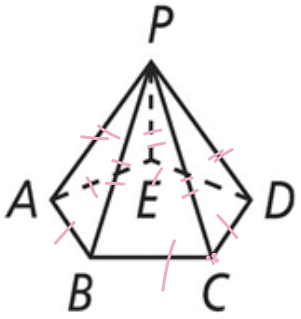
Name the faces and edges of the polyhedron

ABCDE

△ABP
△BCP
△DCP
△PEP
△EAP

$\overline{AB}$ $\overline{AP}$
$\overline{BC}$ $\overline{BP}$
$\overline{CD}$ $\overline{CP}$
$\overline{DE}$ $\overline{DP}$
$\overline{EA}$ $\overline{EP}$



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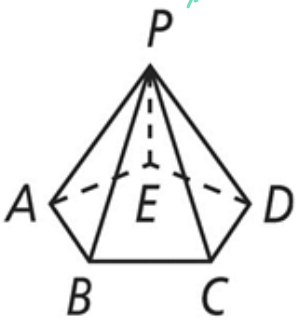
Find the number of faces, vertices and edges of the polyhedron.

*Verify your answer using Euler's Formula.

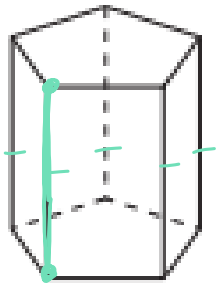


F: 6
E: 10
V: 6

$6+6 \stackrel{?}{=} 10+2$

$12 \stackrel{\checkmark}{=} 12$

F: 7
E: 15
V: 10



$7+10 \stackrel{?}{=} 15+2$

$17 \stackrel{\checkmark}{=} 17$

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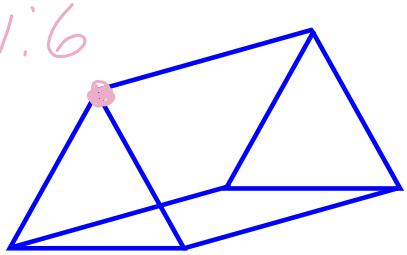
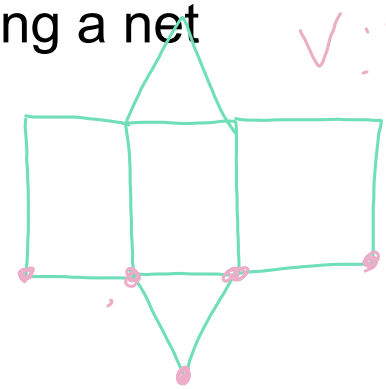
Review: Drawing a net

V: 6



V: 10



In two dimensions, Euler's Formula reduces to $F + V = E + 1$, where F is the number of regions formed by V vertices linked by E segments.

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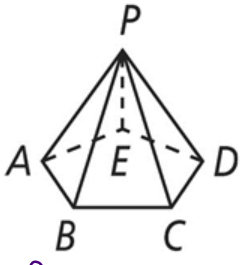
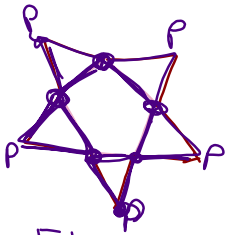
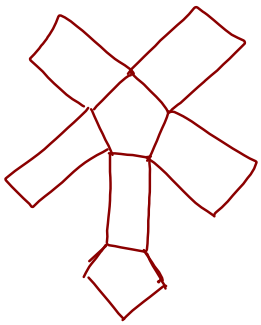
Draw a net diagram of each figure. Find the number of faces, vertices and edges of the polyhedron. Verify your answer using Euler's Formula.

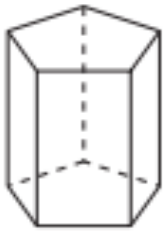




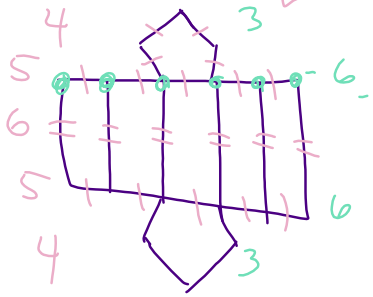
F: 6
V: 10
E: 15

6+10=15+1
16=16





V=18
F=7
E=24



7+18=24+1
25=25

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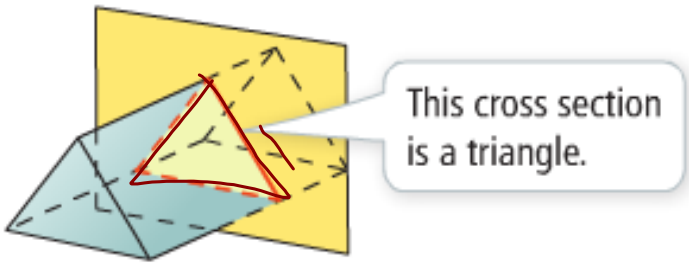
A **cross section** is the intersection of a solid and a plane. You can think of a cross section as a very thin slice of the solid.



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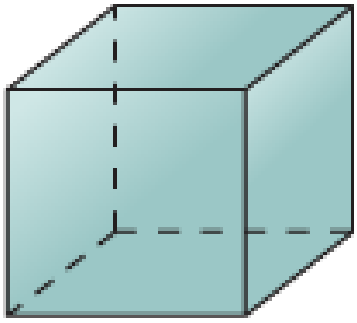
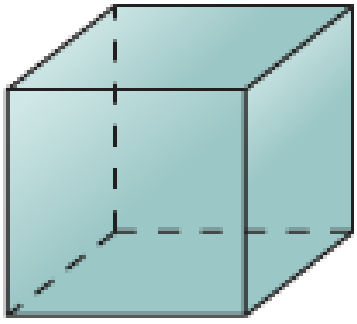
Describe the cross section made by a plane intersecting the diagonal of the top face and one corner of the bottom face of a cube.



Describe the cross section made by a plane intersecting four corners (not all on the same side) of the cube.



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Homework

Pages 692 - 693

6 - 14 even, 15 - 23 all, 31 - 33 all

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