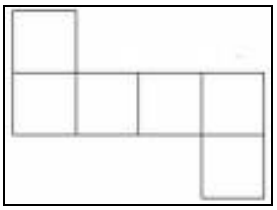
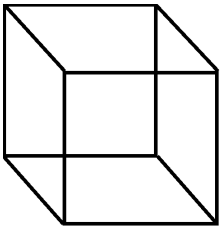
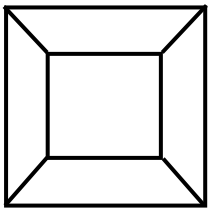
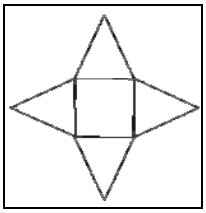
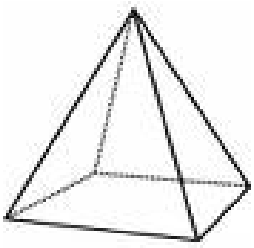
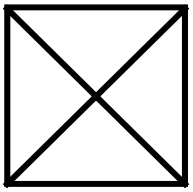
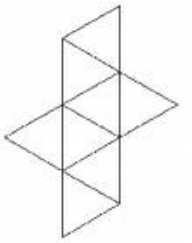
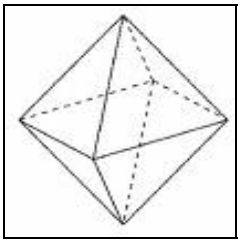
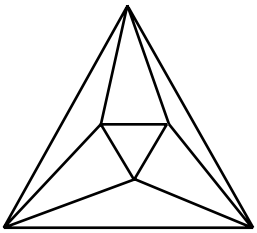
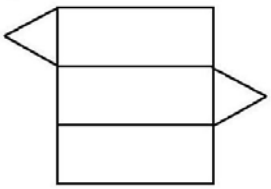
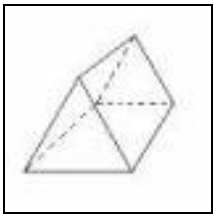
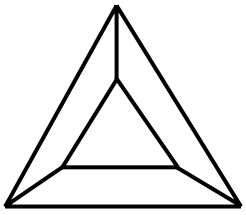
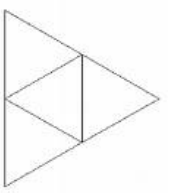
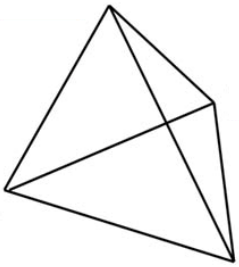
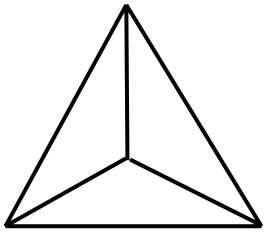
Eastern Region Final Challenge 2010

Round 3 Nets, Polyhedra and Schlegel Diagrams (15 minutes)

REMINDER: Euler's Relation V + F = E + 2

1. Complete the following table of information:

	Net	3-D View	Name	Schlegel Diagram
F= 6 E=12 V= 8	 or any correct net		Cube	
F= 5 E= 8 V= 5	 or any correct net		Square based pyramid	
F= 8 E=12 V= 6			Octahedron	
F= 5 E= 9 V= 6		 or similar	Triangular Prism	
F= 4 E= 6 V= 4			Regular Tetrahedron	

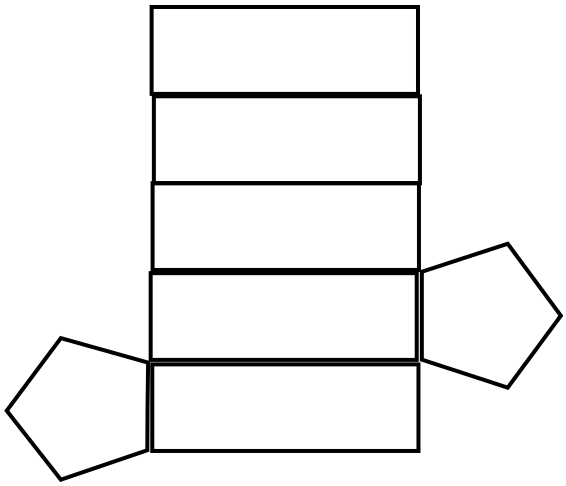
	or any correct net			

2. A prism has 7 faces and 15 edges.

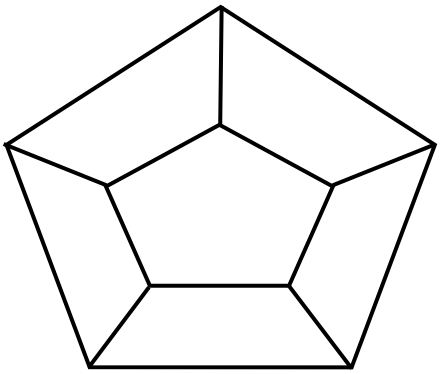
How many vertices does the prism have? **10**

Name the prism? Pentagonal based prism

Draw a possible net of the prism?



Draw a Schlegel diagram of the prism?

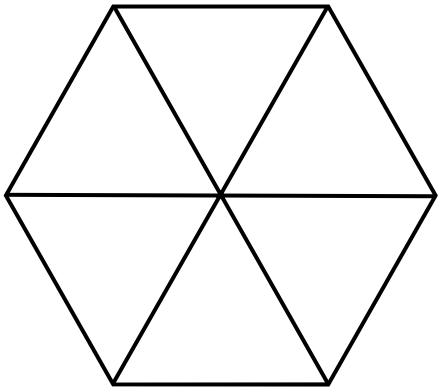


3. A polyhedron has 7 vertices and 12 edges.

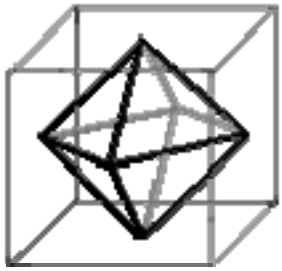
How many faces does the prism have? **7**

Name the polyhedron? **Hexagonal based pyramid**

Draw a Schlegel diagram of the prism?



4. If a vertex is placed at the centre of each square face of a cube and each adjacent vertex is joined, an octahedron is created inside the cube. The octahedron is said to be the dual of the cube (and vice a versa).



How many faces, edges and vertices does a cube have?

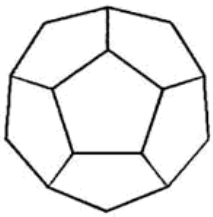
F = 6 V= 8 E =12

How many faces, edges and vertices does an octahedron have?

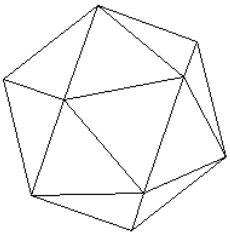
F = 8 V= 6 E = 12

Explain how this shows that an octahedron is the dual of a cube.

Vertices on the cube = Faces on the Octohedron
Vertices on the Octahedron = Faces on the Cube
Edges are the same on both .



How many faces, edges and vertices does a dodecahedron have?



F = 12 V= 20 E = 30

How many faces, edges and vertices does icosahedron have?

F = 20 V= 12 E = 30

Explain how this shows that a dodecahedron is the dual of a icosahedron.

Vertices on the dodecahedron = Faces on the icosahedron
Vertices on the icosahedron = Faces on the dodecahedron
Edges are the same on both .

What is the dual of a tetrahedron? Explain why?

It is the dual of itself because:
Number of vertices = Number of faces