

9.3

(30) Euler's formula $F + V - 2 = E$

a) 6 faces, _____ vertices, 9 edges

$$F + V - 2 = E$$

$$6 + V - 2 = 9$$

$$V - 2 = 3$$

$$V = 5$$

5 vertices

Polyhedron # 9 has 6 faces, 5 vertices, and 9 edges.

b) _____ faces, 8 vertices, 12 edges

$$F + V - 2 = E$$

$$F + 8 - 2 = 12$$

$$F - 2 = 4$$

$$F = 6$$

6 faces

Polyhedron # 15 has 6 faces, 8 vertices, and 12 edges.

c) 14 faces, 24 vertices, _____ edges

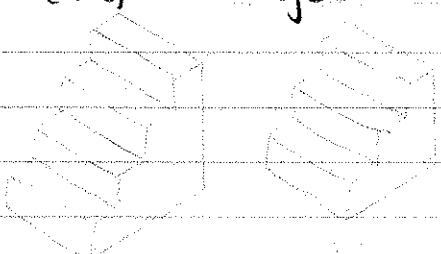
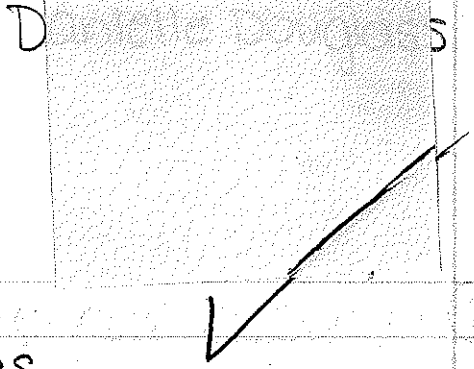
$$F + V - 2 = E$$

$$14 + 24 - 2 = E$$

$$36 = E$$

36 edges

Polyhedron # 21 has 14 faces, 24 vertices, and 36 edges.



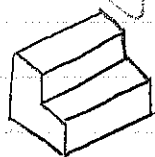
34) Understanding the problem

I must figure out how many faces, edges and vertices there are in the 35th polyhedron figure.

Devising a plan

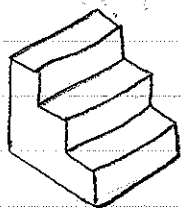
I will figure this out by continuing the pattern (drawing pictures) and looking for patterns relating to the number of faces, edges, and vertices.

Carrying Out the Plan



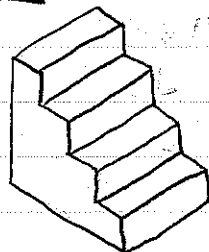
1st

Faces - 8
Edges - 18
Vertices - 12



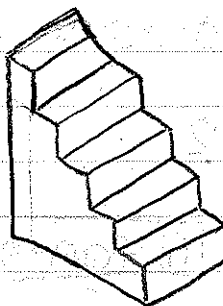
2nd

Faces - 10
Edges - 24
Vertices - 16



3rd

Faces - 12
Edges - 30
Vertices - 20



4th

Faces - 14
Edges - 36
Vertices - 24

Faces increase by 2
Edges increase by 6
Vertices increase by 4

	increase by $\frac{1}{2}$	increase by $\frac{1}{6}$	increase by $\frac{1}{4}$
	FACES	Edges	vertices
5 th	16	42	28
6 th	18	48	32
7 th	20	54	36
8 th	22	60	40
9 th	24	66	44
10 th	26	72	48
11 th	28	78	52
12 th	30	84	56
13 th	32	90	60
14 th	34	96	64
15 th	36	102	68
16 th	38	108	72
17 th	40	114	76
18 th	42	120	80
19 th	44	126	84
20 th	46	132	88
21 st	48	138	92
22 nd	50	144	96
23 rd	52	150	100
24 th	54	156	104
25 th	56	162	108
26 th	58	168	112
27 th	60	174	116
28 th	62	180	120
29 th	64	186	124
30 th	66	192	128
31 st	68	198	132
32 nd	70	204	136
33 rd	72	210	140
34 th	74	216	144
35 th	76	222	148

Looking Back

- There are 76 faces for the polyhedron in the 35th figure.
- There are 222 edges for the polyhedron in the 35th figure.
- There are 148 vertices for the polyhedron in the 35th figure.

I know there is probably a formula I could have used to solve this problem, but I could not figure it out. Drawing pictures and looking for a pattern worked, but took a lot of time.

Excellent work