

Three Dimensional Shapes

Ex 19B

Q1.

Answer :

The Euler's relation for a three dimensional figure can be expressed in the following manner:

$$F - E + V = 2$$

Here,

F – Number of faces

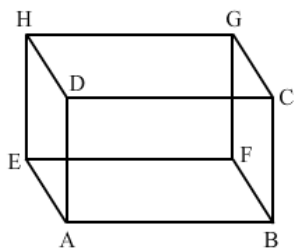
E – Number of edges

V – Number of vertices

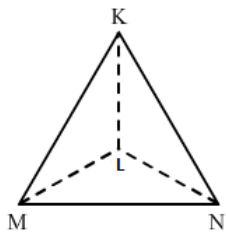
Q2.

Answer :

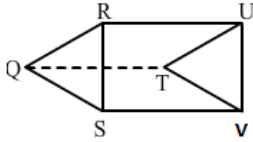
(i) A cuboid has 12 edges, namely $AD, DC, CB, BA, EA, FB, HD, DC, CG, GH, HE,$ and GF .



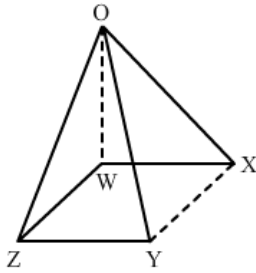
(ii) A tetrahedron has 6 edges, namely KL, LM, MN, NL, KM and KN .



(iii) A triangular prism has 9 edges, namely $QR, RS, SQ, TU, UV, VT, RU, SV$ and QT .



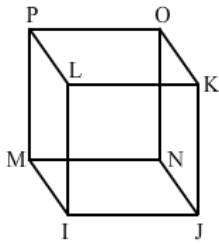
(iv) A square pyramid has 8 edges, namely $OW, OX, OY, OZ, WX, XY, YZ$ and ZW .



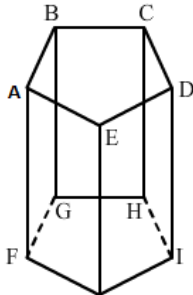
Q3.

Answer :

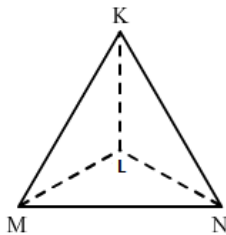
(i) A cube has 6 faces, namely $IJKL, MNOP, PLIM, OKJN, POKL$ and $MNJI$.



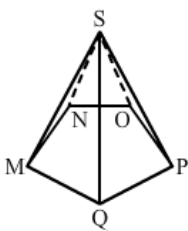
(ii) A pentagonal prism has 7 faces, i.e. 2 pentagons and 5 rectangles, namely $ABCDE, FGHIJ, ABGF, AEJF, EDIJ, DCHI$ and $CBGH$.



(iii) A tetrahedron has 4 faces, namely KLM, KLN, LMN and KMN .



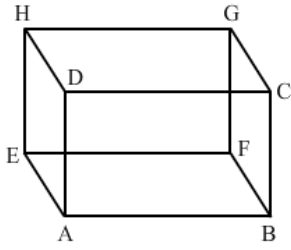
(iv) A pentagonal pyramid has 6 faces, i.e. 1 pentagon and 5 triangles, namely $NOPQM, SNM, SOP, SNO, SMQ$ and SQP .



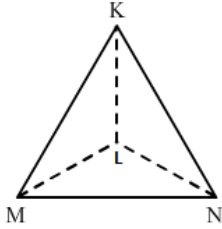
Q4.

Answer :

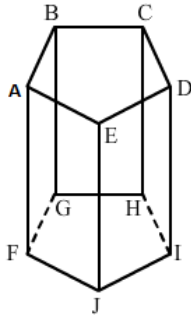
(i) A cuboid has 8 vertices, namely A, B, C, D, E, F, G and H .



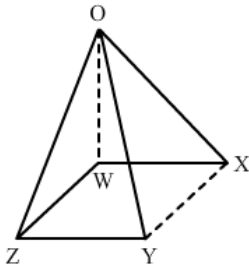
(ii) A tetrahedron has 4 vertices, namely K, L, M and N .



(iii) A pentagonal prism has 10 vertices, namely $A, B, C, D, E, F, G, H, I$ and J .



(iv) A square pyramid has 5 vertices, namely O, W, X, Y and Z .



Q5.

Answer :

Euler's relation is:

$$F - E + V = 2$$

Here :

F – Number of faces

E – Number of edges

V – Number of vertices

(i) A square prism

(There is an error in this question. It should have been a square prism rather than square.)

$$\text{Number of faces} = F = 2 \text{ squares} + 4 \text{ rectangular} = 6$$

$$\text{Number of edges} = E = 12$$

$$\text{Number of vertices} = V = 8$$

$$\Rightarrow (F - E + V) = 6 - 12 + 8 = 2$$

(ii) A tetrahedron

$$\text{Number of faces} = F = 4$$

$$\text{Number of edges} = E = 6$$

$$\text{Number of vertices} = V = 4$$

$$\Rightarrow (F - E + V) = 4 - 6 + 4 = 2$$

(iii) A triangular prism

$$\text{Number of faces} = F = 2 \text{ triangular} + 3 \text{ rectangular} = 5$$

$$\text{Number of edges} = E = 9$$

$$\text{Number of vertices} = V = 6$$

$$\Rightarrow (F - E + V) = 5 - 9 + 6 = 2$$

(iv) A square pyramid

$$\text{Number of faces} = F = 2 \text{ triangular} + 3 \text{ rectangular} = 5$$

$$\text{Number of edges} = E = 8$$

$$\text{Number of vertices} = V = 5$$

$$\Rightarrow (F - E + V) = 5 - 8 + 5 = 2$$