19. Three-Dimensional Figures

Exercise 19A

1. Question

Write down the number of faces of each of the following figures:

A. Cuboid

B. Cube

C. Triangular prism

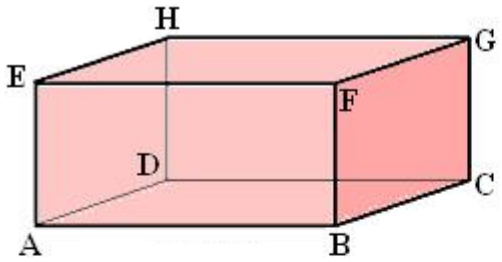
D. Square pyramid

E. Tetrahedron

Answer

A. 6

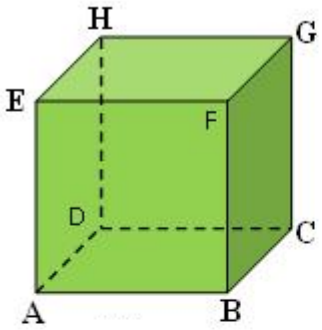
Face is also known as sides. A Cuboid has six faces.

	<u>The six faces of the cuboid are:</u> 1) ABFE 2) BFGC 3) GHDC 4) HEAD 5) DCBA 6) HGFE

Book, Matchbox, Brick etc. are examples of Cuboid.

B.6

A Cube has six faces and all faces are equal in length.



The six faces of the cube are:

1) ABFE

2) BCGF

3) CDHG

4) ADHE

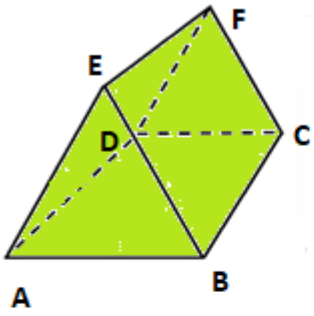
5) GHFE

6) ABCD

Sugar Cubes, Dice etc. are examples of Cube.

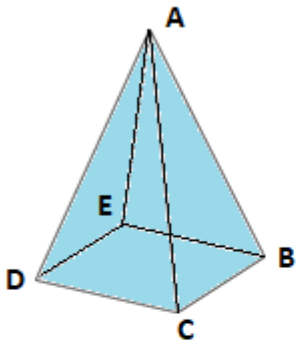
C. 5

A Triangular prism has two triangular faces and three rectangular faces.

	The five faces of the triangular prism are: 1) ABE 2) ABCD 3) BCFE 4) AEFD 5) FDC

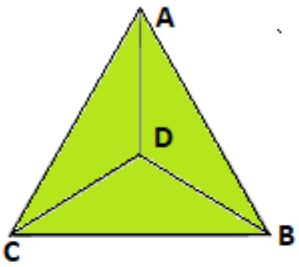
D. 5

A Square pyramid has one square face as a base and four triangular faces as the sides. So, Square pyramid has total five faces.

	The five faces of the square pyramid are: 1) ABC 2) ACD 3) ABE 4) AED 5) BEDC

E. 4

A Tetrahedron (Triangular Pyramid) has one triangular face as a base and three triangular faces as the sides. So, Tetrahedron has total four faces.



The five faces of the tetrahedron are:

1) ABC

2) ACD

3) ABE

4) AED

5) BEDC

2. Question

Write down the number of edges of each of the following figures:

A. Tetrahedron

B. Rectangular pyramid

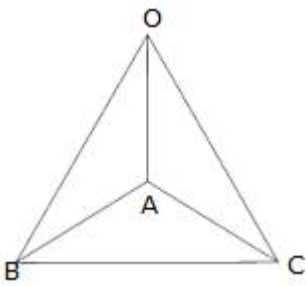
C. Cube

D. Triangular prism

Answer

A. 6

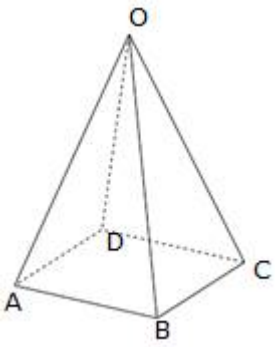
A Tetrahedron has six edges.



OA, OB, OC, AB, AC, BC are the 6 edges.

B. 8

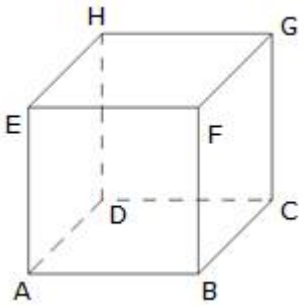
A Rectangular Pyramid has eight edges.



AB, BC, CD, DA, OA, OB, DC, OD are the 8 edges.

C. 12

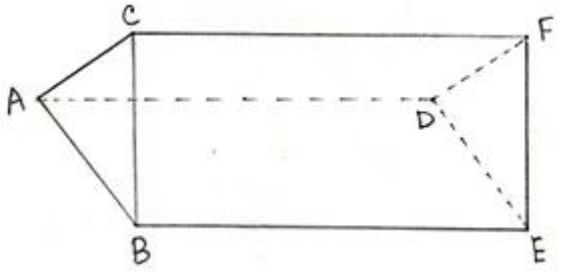
A Cube has twelve edges.



AB, BC, CD, DA, EF, FG, GH, HE, AE, DH, BF, CG are the edges.

D. 9

A Triangular prism has nine edges.



AB, BC, CA, DE, EF, FD, AD, BE, CF are the9 edges.

3. Question

Write down the number of vertices of each of the following figures:

A. Cuboid

B. Square pyramid

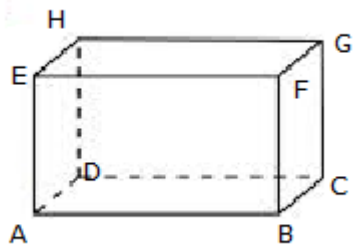
C. Tetrahedron

D. Triangular prism

Answer

A. 8

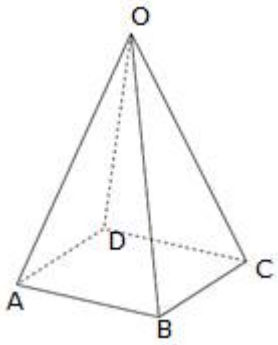
A Cuboid has eight vertices.



A, B, C, D, E, F, G, H are the 8 vertices.

B. 5

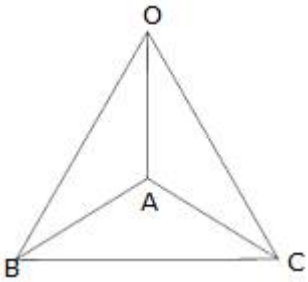
A Square Pyramid has five vertices.



O, A, B, C, D are the 5 vertices.

C. 4

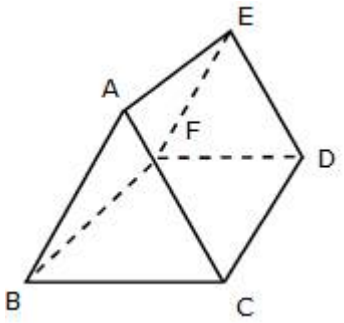
A Tetrahedron has four vertices.



O, A, B, C are the vertices.

D. 6

A Triangular prism has six vertices.



A, B, C, D, E, F are the vertices.

4. Question

Fill in the blanks:

A. A cube has…… vertices, ……..edges and ……..faces.

B. The point at which three faces of a figure meet is known as its……

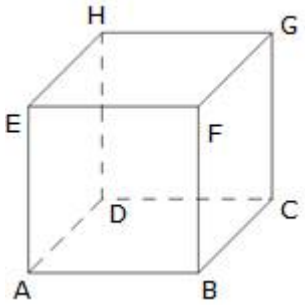
C. A cuboid is also known as a rectangular……..

D. A triangular pyramid is called a..…….

Answer

A. 8, 12, 6

A Cube has 8 vertices, 12 edges and 6 faces.



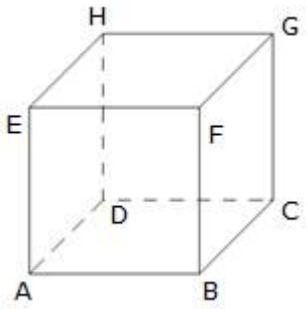
A, B, C, D, E, F, G, H are the 8 vertices.

AB, BC, CD, DA, EF, FG, GH, HE, AE, DH, BF, CG are the 12 edges.

ABCD, EFGH, ADHE, BCGF, ABFE and DCGH are the 6 faces

B. vertex

Vertex is the point where faces meets.



A is the vertex for AB, AD and EA.

C. Prism

A cuboid is also known as rectangular prism because a rectangular prism has six rectangular shaped sides with all sides at an angle 90° to each other.

Therefore, it can also be called a cuboid.

D. Tetrahedron

The tetrahedron is a polyhedron with a flat polygon base and the triangular faces that connect the base to a common point. Therefore, it is called a triangular pyramid.

Exercise 19B

1. Question

Define Euler's relation between the number of faces, number of edges and number of vertices for various 3-dimensional figures.

Answer

Leonhard Euler has defined the relation between the number of faces, number of edges and number of vertices for various 3-dimensional figures is called as Euler's formula. This formula works with shapes called Polyhedron. A Polyhedron is a closed solid shape which has flat faces and straight edges like cube.

According to him

$F + V - E = 2$

Where F denotes the number of face

V denotes the number of vertices

E denotes the number of edges.

Shape	Faces	Vertices	Edges	F + V – E
Cube	6	8	12	2
Octahedron	8	6	12	2

2. Question

How many edges are there in a

A. cuboid

B. tetrahedron

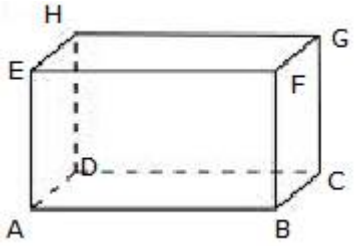
C. triangular prism

D. square pyramid?

Answer

A. 12

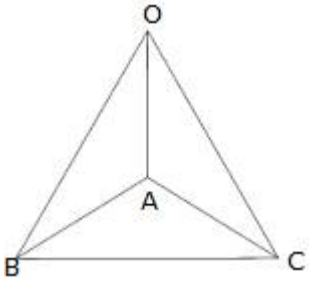
A Cuboid has twelve edges.



AB, BC, CD, DA, EF, FG, GH, HE, AE, DH, BF, CG are the 12 edges.

B. 6

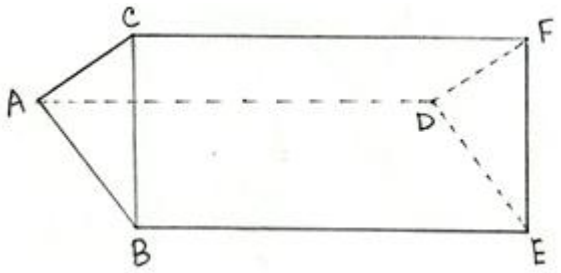
A Tetrahedron has six edges.



OA, OB, OC, AB, AC, BC are the 6 edges.

C. 9

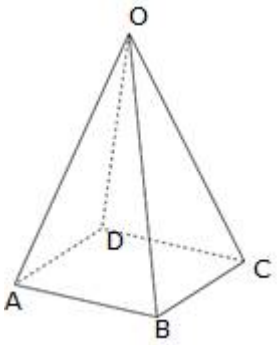
A Triangular prism has nine edges.



AB, BC, CA, DE, EF, FD, AD, BE, CF are the edges.

D. 8

A Square Pyramid has eight edges.



AB, BC, CD, DA, OA, OB, DC, OD are the edges.

3. Question

How many faces are there in a

A. cube

B. pentagonal prism

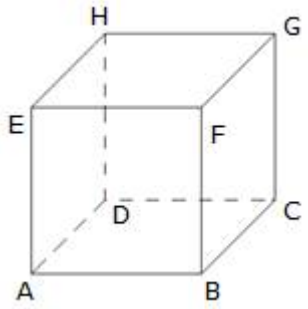
C. tetrahedron

D. pentagonal pyramid?

Answer

A. 6

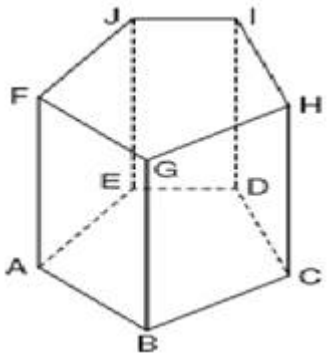
A Cube has six faces.



ABCD, EFGH, ADHE, BCGF, ABFE and DCGH are the 6 faces

B. 7

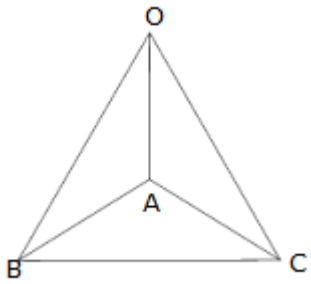
A pentagonal prism has seven faces.



ABGF, AEJF, EDIJ, CDIH, BCGH, ABCDE and FGHIJ are the faces.

C. 4

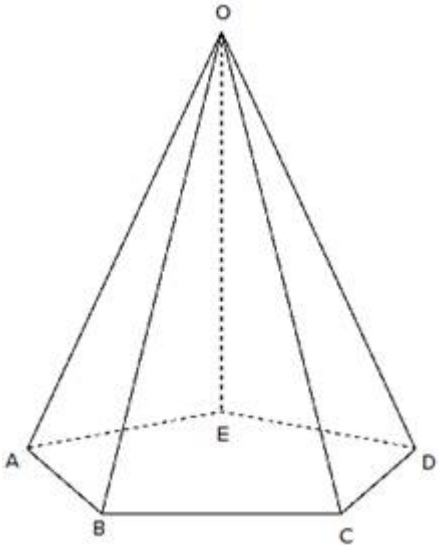
A Tetrahedron has four faces



OAB, OAC, OBC and ABC are the faces.

D. 6

A pentagonal pyramid has six faces.



OAB, OBC, OCD, OAE, ODE and ABCDE are the faces.

4. Question

How many vertices are there in a

A. cuboid

B. tetrahedron

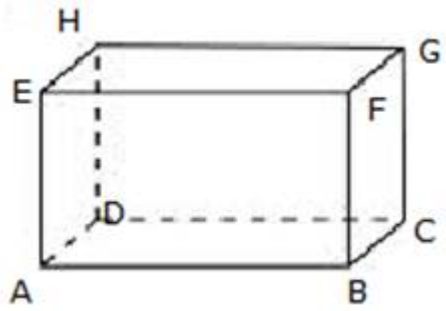
C. pentagonal prism

D. square pyramid?

Answer

A. 8

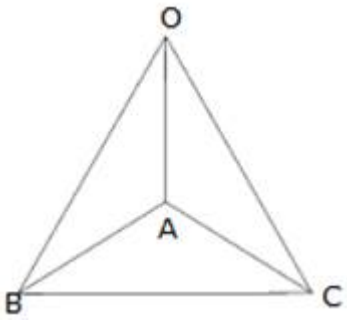
A Cuboid has eight vertices.



A, B, C, D, E, F, G, H are the vertices.

B. 4

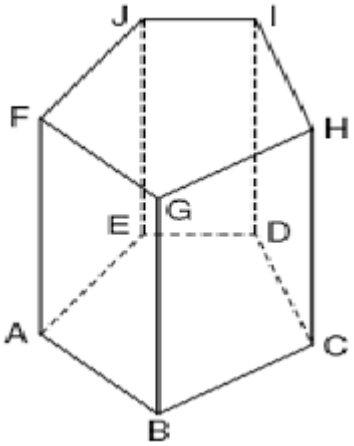
A Tetrahedron has four vertices.



O, A, B, C are 4 the vertices.

C. 10

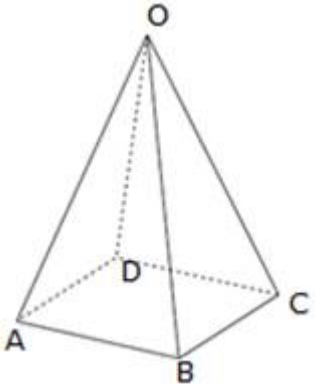
A pentagonal prism has ten vertices.



A, B, C, D, E, F, G, H, I, J are the 10 vertices.

D. 5

A Square Pyramid has five vertices.



O, A, B, C, D are the vertices.

5. Question

Verify Euler's relation for each of the following:

A. A cube

B. A tetrahedron

C. A triangular prism

D. A square pyramid

Answer

A.

According to Euler’s Formula

F + V –E = 2

Where F denotes the number of face

V denotes the number of vertices

E denotes the number of edges.

Shape	Faces	Vertices	Edges	F + V – E
Cube	6	8	12	2

B.

According to Euler’s Formula

F + V –E = 2

Where F denotes the number of face

V denotes the number of vertices

E denotes the number of edges.

Shape	Faces	Vertices	Edges	F + V – E
Tetrahedron	4	4	8	2

C.

According to Euler’s Formula

F + V –E = 2

Where F denotes the number of face

V denotes the number of vertices

E denotes the number of edges.

Shape	Faces	Vertices	Edges	F + V – E
Triangular Prism	5	6	9	2

D.

According to Euler’s Formula

F + V –E = 2

Where F denotes the number of face

V denotes the number of vertices

E denotes the number of edges.

Shape	Faces	Vertices	Edges	F + V – E
Square Pyramid	5	5	8	2