Chapter 15

Visualising Solid Shapes

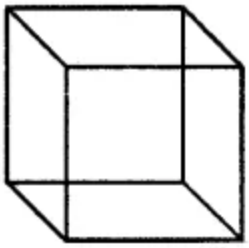
Question 1.
Match the following shapes with their names:

(*i*) 

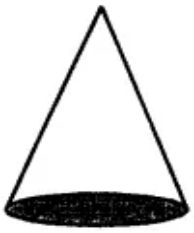
(a) Cone

(*ii*) 

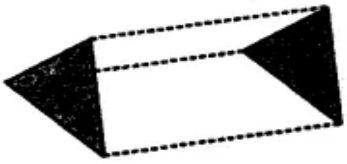
(b) Cube

(*iii*) 

(c) Prism

(*iv*) 

(d) Sphere

(*v*) 

(e) Cylinder

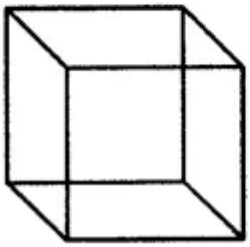
(*vi*) 

(f) Pyramid

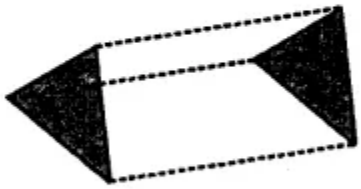
Solution:

(*i*)  (f) Pyramid

(*ii*)  (e) Cylinder

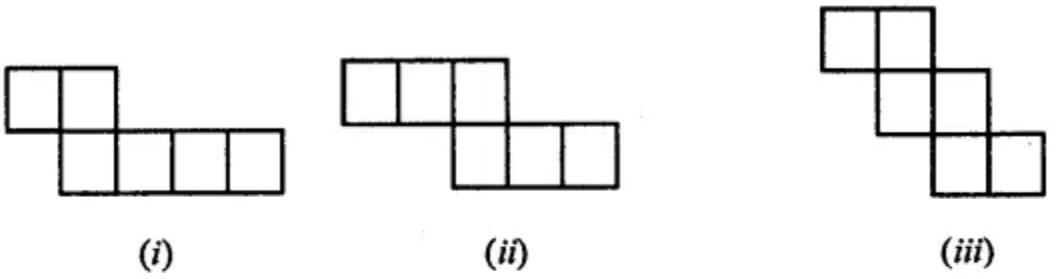
(*iii*)  (b) Cube

(*iv*)  (a) Cone

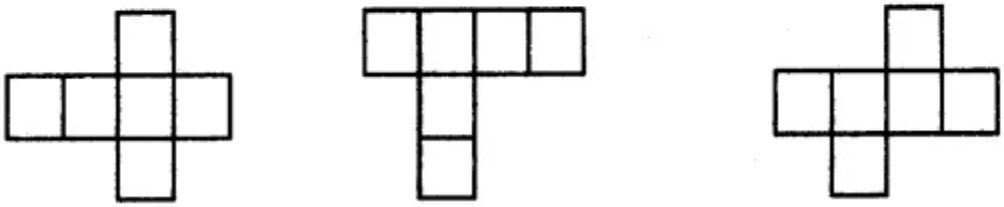
(*v*)  (c) Prism

(*vi*)  (d) Sphere

Question 2.
Identify the nets which can be folded to form a cube (cut out copies of the nets and try it):



(*i*) (*ii*) (*iii*)

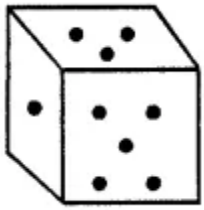


(*iv*) (*v*) (*vi*)

Solution:

Nets (ii), (in), (iv) and (vi) form a cube.

Question 3.
Dice are cubes with dots on each face. Opposite faces of a die always have a total of sevend dots on them.



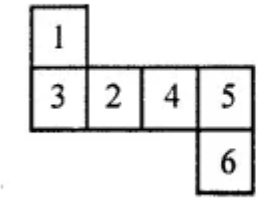
Here are two nets to make dice (cubes); the numbers inserted in each square indicate the number of dots in that box.

(*i*) (*ii*)

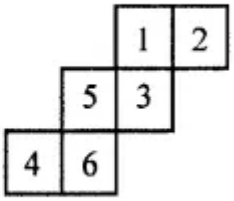
Insert suitable numbers in the blanks, remembering that the number on the opposite faces should total to 7.

Solution:

The suitable numbers have been inserted in the boxes.

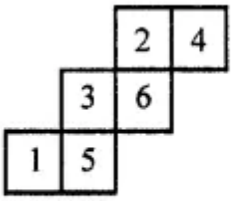


(*i*)

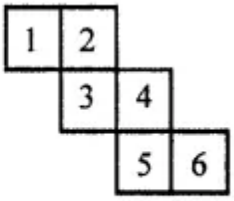


(*ii*)

Question 4.
Can any of the following be a net for a die? If no, explain your answer:



(*i*)



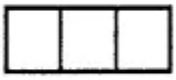
(*ii*)

Solution:

(i) Yes.

(ii) No, because one pair of opposite faces will have 1 and 4 on them whose total not 7, and another pair of opposite faces will have 3 and 6 on them whose total is also not 7.

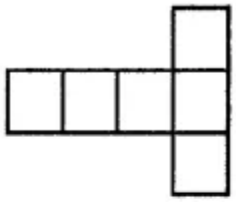
Question 5.
Here is an incomplete net for making a cube. Complete it in at least two different ways. Remember that a cube has six faces. How many are there in the net here? (You may use a squared paper for easy manipulation.)



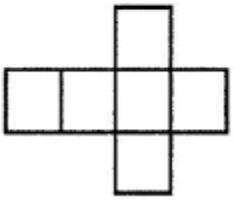
Solution:

The given incomplete net of a cube has been completed in two ways as given under:

(*i*)



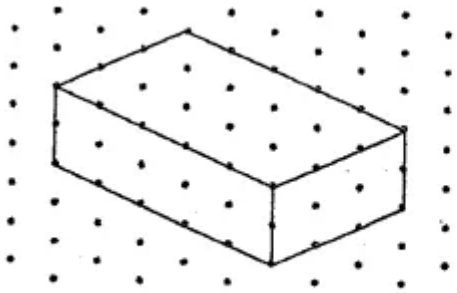
(*ii*)



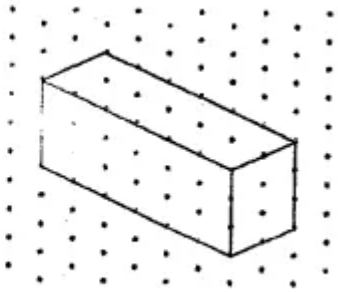
(iii) Three faces out of 6 faces are given.

Exercise 15.2

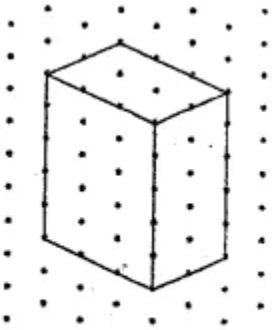
Question 1.
The dimensions of a cuboid are 5 cm, 3 cm, and 2 cm. Draw three different isometric sketches of this cuboid with height
(i) 2 cm
(ii) 3 cm
(iii) 5 cm
Solution:



(i)



(ii)

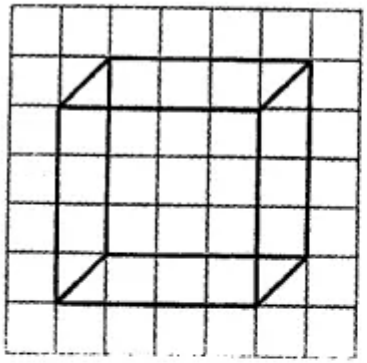


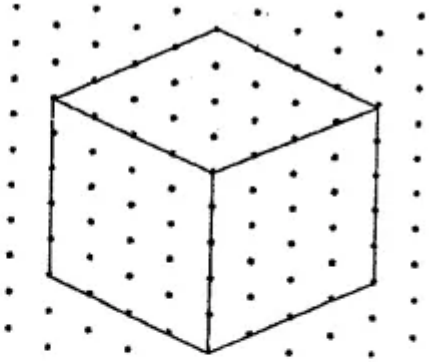
(iii)

Question 2.
Give (i) an oblique sketch (ii) an isometric sketch for each of the following:
(a) A cube is with an edge 4 cm long.
(b) A cuboid of length 6 cm, breadth 4 cm, and height 3 cm.

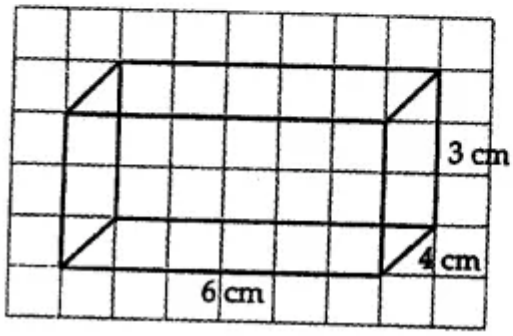
Solution:

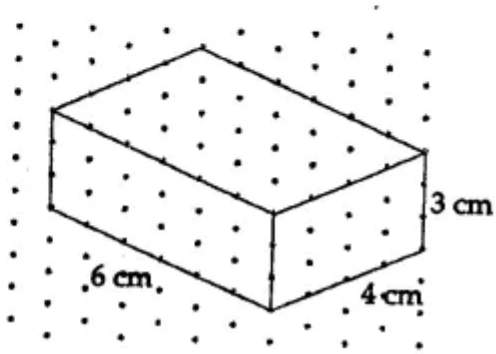
(a) Cube



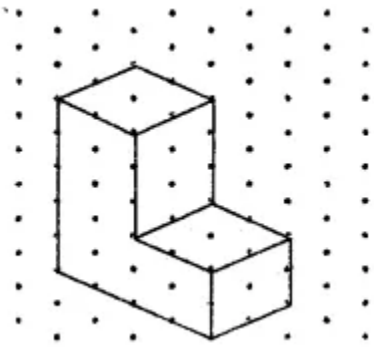


(b) Cuboid



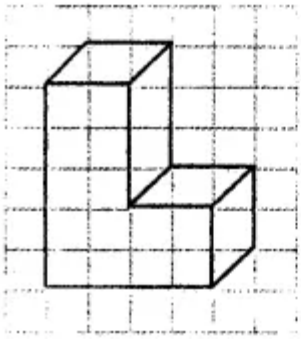


Question 3.
The adjoining figure shows an isometric sketch of a 3-D shape. Draw an oblique sketch that matches this sketch.

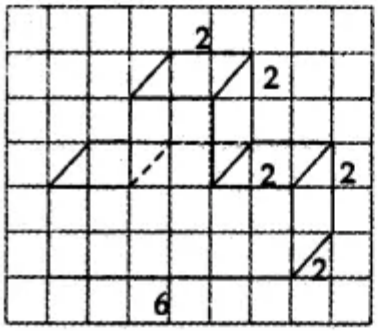


Solution:

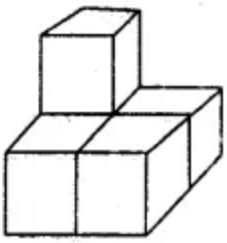
The oblique sketch of the given isometric sketch of a 3-D shape has been given below:



Question 4.
Draw an isometric sketch of each of the following oblique shapes:



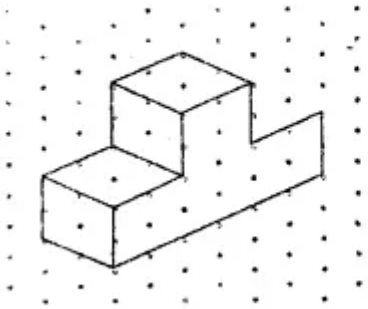
(i)



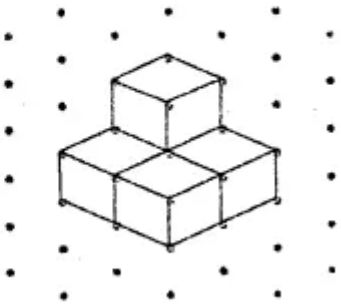
(ii)

Solution:

Isometric sketch of each of the given oblique shapes have been given below:



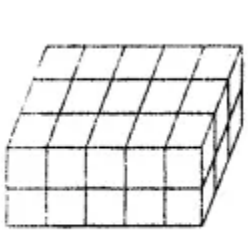
(i)



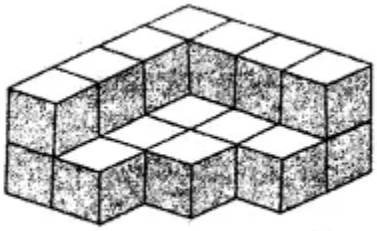
(ii)

Exercise 15.3

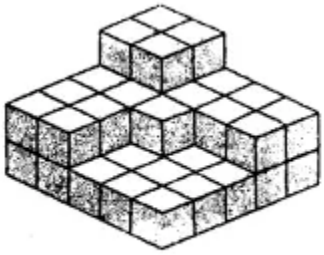
Question 1.
Count the number of cubes in the following structures:



(i)



(ii)



(iii)

Solution:

Number of cubes in the given structure havebeen given below:

(i) $5 \times 3 \times 2 = 30$

(ii) $7 \times 2 + 6 = 14 + 6 = 20$

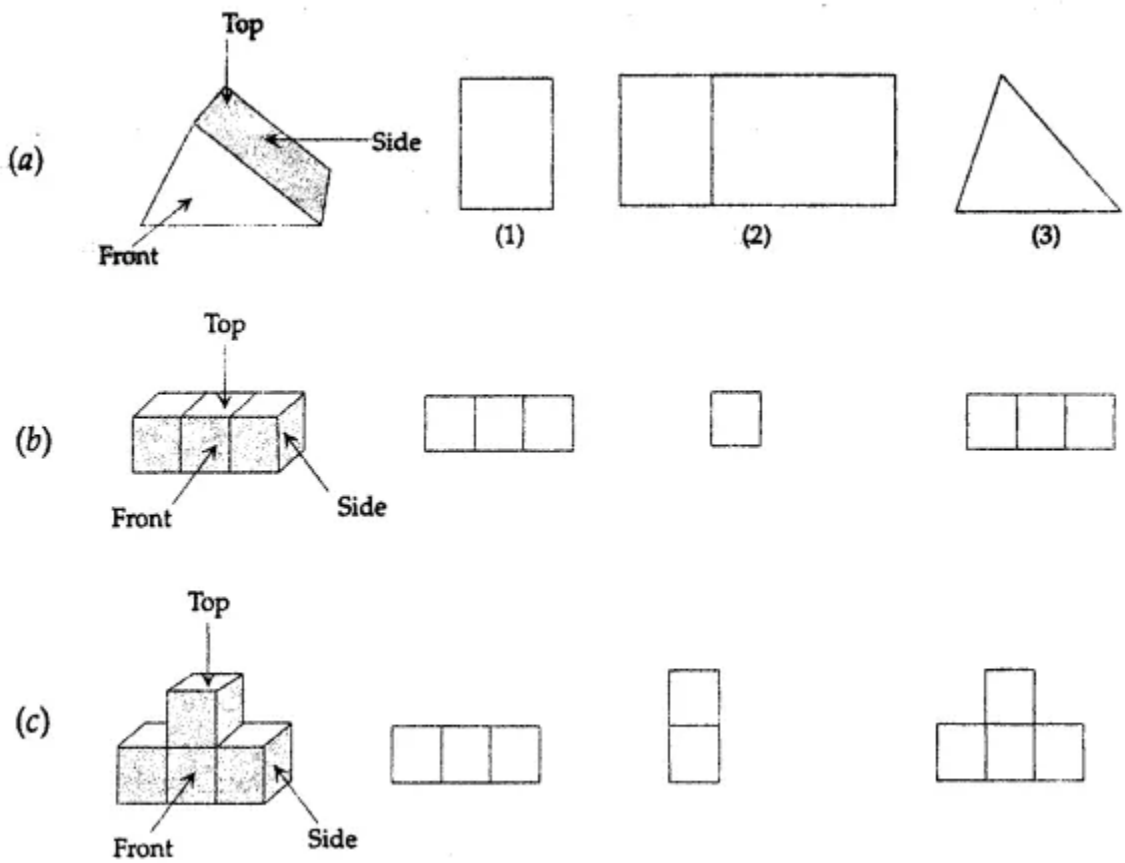
(iii) $5 \times 5 + 17 + 4 = 25 + 17 + 4 = 46$

Question 2.
What cross-section is made in the following
(i) vertical cut (ii) horizontal cut?
(a) A brick
(b) A round apple
(c) A die
(d) A circular pipe
(e) An ice cream cone
(f) A square pyramid

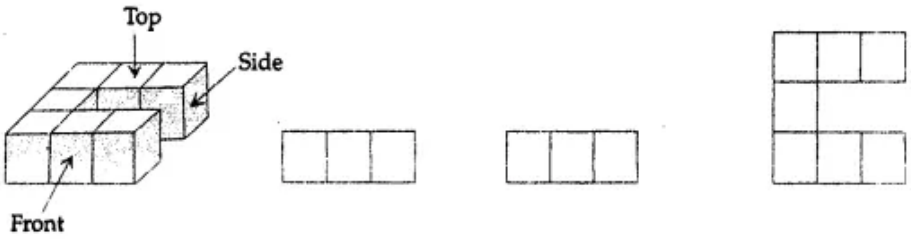
Solution:

	Vertical cut	Horizontal cut
(a) A brick	Rectangle	Rectangle
(b) A round apple	Circle	Circle
(c) A die	Square	Square
(d) A circular pipe	Rectangle	Circle
(e) An ice cream cone	Triangle	Circle
(f) A square pyramid	Triangle	Square

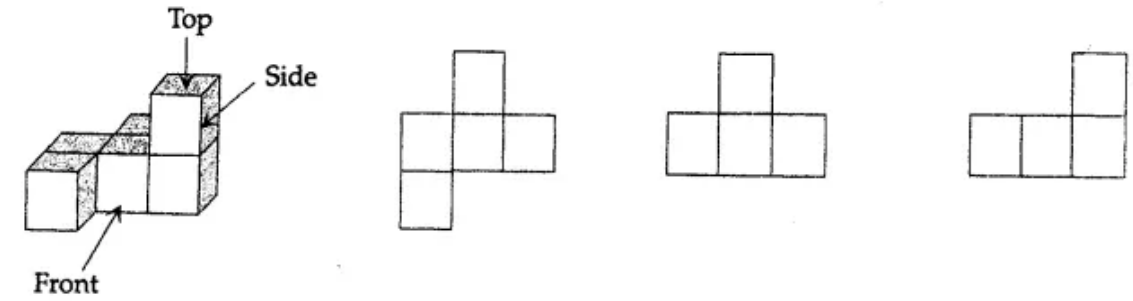
Question 3.
For each solid given below, the three views (1), (2) and (3) are given. Identify for each solid the corresponding top, front and side views:



(d)



(e)



Solution:

(a) (1) Side (2) Top (3) Front

(b) (1) Front (Top) (2) Side (3) Top (Front)

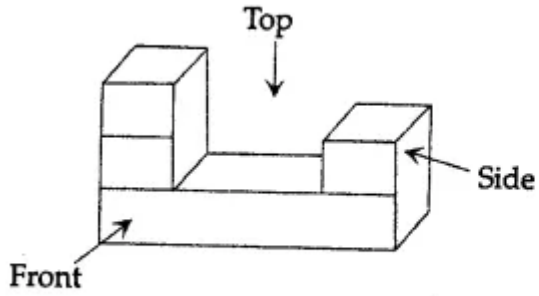
(c) (1) Top (2) Side (3) Front

(d) (1) Front (Side) (2) Side (Front) (3) Top

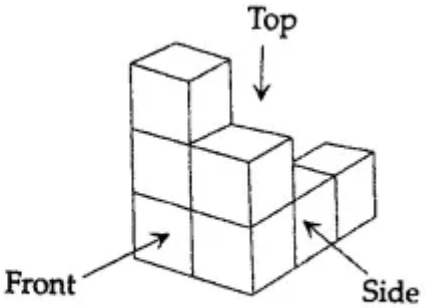
(e) (1) Top (2) Side (3) Front

Question 4.

For the solids given below sketch the front, side and top view:



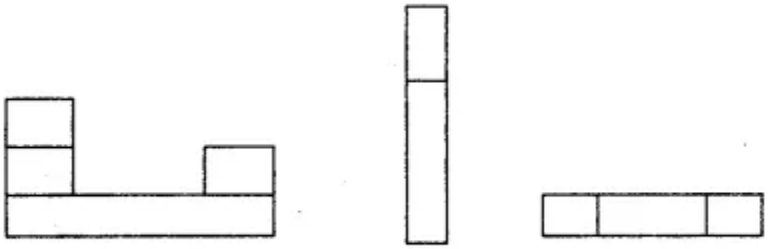
(i)



(ii)

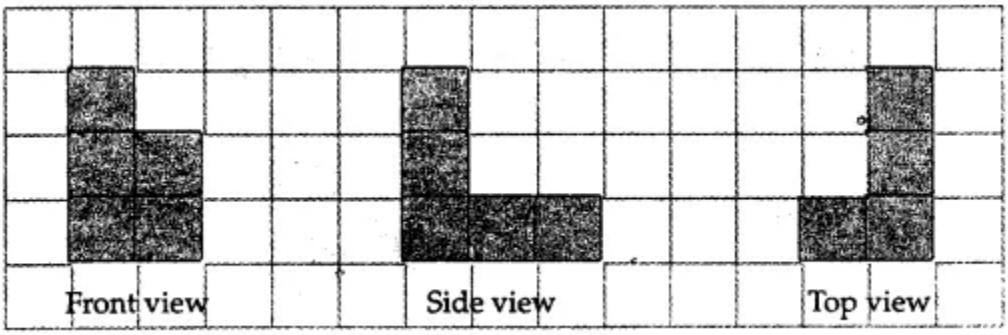
Solution:

(*i*)



Front view Side view Top view

(*ii*)



Objective Type Questions

Question 1.
Fill in the blanks:
(i) A solid having no vertex and no edge is a ……..
(ii) A solid that has congruent and parallel polygons as top and bottom faces and all other faces rectangular is known as ……
(iii) A pyramid having 4 equilateral triangles as its faces is known as ……
(iv) A solid having 3 faces (one curved and two circulars), no vertex and two curved edges are known as ……..
(v) A solid having a circular base and one vertex is called a ……
(vi) A triangular prism has …… faces, …… edges and ……. vertices.
(vii) A triangular pyramid has …… faces, ……. edges and …… vertices.
(viii) A square pyramid has …… faces, …….. edges and …… vertices.
(ix) The base of a triangular pyramid is a ……
(x) Out of …….. faces of a triangular prism, …… are rectangle and …….. are triangles.
(xi) Out of …….. faces of a square pyramid, ……. are a triangle and ……. is/are squares.
(xii) Out of ……. faces of a rectangular pyramid, ……. are triangles and the base is a …….
(xiii) A …….. is a sort of skeleton – outline in 2-D, which on folding results in a 3-D shape.
(xiv) If the sum of numbers on the two dice thrown together is 9, then the sum of the numbers opposite to these faces is …….

Solution:

(i) A solid having no vertex and no edge is a sphere.
(ii) A solid that has congruent and parallel polygons as top and bottom faces and all other faces rectangular is known as a prism.
(iii) A pyramid having 4 equilateral triangles as its faces is known as a tetrahedron.
(iv) A solid having 3 faces (one curved and two circulars), no vertex and two curved edges are known as a cylinder.
(v) A Solis'having a circular base and one vertex is called a cone.
(vi) A triangular prism has 5 faces, 9 edges, and 6 vertices.
(vii) A triangular pyramid has 4 faces, 6 edges, and 4 vertices.
(viii) A square pyramid has 5 faces, 8 edges, and 5 vertices.
(ix) The base of a triangular pyramid is a triangle.
(x) Out of 5 faces of a triangular prism, 3 are rectangle and 2 are triangles.
(xi) Out of 5 faces of a square pyramid, 4 are triangle and 1 is/are squares.
(xii) Out of 5 faces of a rectangular pyramid, 4 are triangles and the base is a rectangle.
(xiii) A net is a sort of skeleton – outline in 2-D, which on folding results in a 3-D shape.
(xiv) If the sum of numbers on the two dice thrown together is 9, then the sum of the numbers opposite to these faces is 5.

Question 2.
State whether the following statements are true (T) or false (F):
(i) The faces of a prism are triangular.
(ii) A cube can be treated as a prism.
(iii) A pyramid has only one vertex.
(iv) All the faces, except the base, of a square pyramid are triangular.
(v) A tetrahedron has 3 rectangular faces and 1 rectangle face.
(vi) A square pyramid has 5 faces and one vertex.
(vii) A cone has one vertex, two faces, and one curved edge.
(viii)The shadow of a 3-D object is a 2-D figure.
(ix) A cube can cast a shadow in the shape of a rectangle.
(x) A cube can cast a shadow in the shape of a hexagon.
(xi) In an isometric sketch, the line segments of different lengths can represent the sides of a cube.
(xii) In an oblique sketch of a cuboid, the size of the opposite faces must be different.
(xiii) The top, front and side views of a sphere are different.
(xiv) The adjoining net is of a hexagonal pyramid.

Solution:

(i) The faces of a prism are triangular. (False)

Correct:

Faces are rectangular.

(ii) A cube can be treated as a prism. (True)

(iii) A pyramid has only one vertex. (False)

Correct:

It has three or more than three.

(iv) All the faces, except the base, of a square pyramid are triangular. (True)

(v) A tetrahedron has 3 rectangular faces and 1 rectangle face. (False)

Correct:

It has triangular faces.

(vi) A square pyramid has 5 faces and one vertex. (False)

Correct:

It has five vertices, not one.

(vii) A cone has one vertex, two faces, and one curved edge. (True)

(viii) The shadow of a 3-D object is a 2-D figure. (True)

(ix) A cube can cast a shadow in the shape of a rectangle. (True)

(x) A cube can cast a shadow in the shape of a hexagon. (False)

(xi) In an isometric sketch, the line segments of different lengths can represent the sides of a cube. (False)

Correct:

A cube has equal length.

(xii) In an oblique sketch of a cuboid, the size of the opposite faces must be different. (False)

(xiii) The top, front and side views of a sphere are different. (False)

Correct:

All are equal.

(xiv) The adjoining net is of a hexagonal pyramid. (True)

Multiple Choice Questions

Choose the correct answer from the given four options (3 to 11):
Question 3.
A triangular prism has
(a) 4 vertices and 6 edges
(b) 6 vertices and 9 edges
(c) 6 vertices and 6 edges
(d) 9 vertices and 6 edges
Solution:

A triangular prism has 6 vertices and 9 edges. (b)

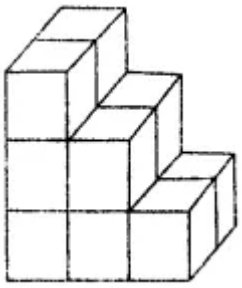
Question 4.
A square pyramid has
(a) 4 vertices and 4 faces
(b) 4 vertices and 5 faces
(c) 5 vertices and 4 faces
(d) 5 vertices and 5 faces
Solution:

A square pyramid has 5 vertices and 5 faces. (d)

Question 5.
A solid having 4 (plane) faces, 4 vertices and 6 edges is called a
(a) triangular prims
(b) rectangular prism
(c) triangular pyramid
(d) rectangular pyramid
Solution:

A solid having 4 (plane) faces,
4 vertices and 6 edges is called rectangular pyramid. (c)

Question 6.
The number of cubes in the given structure is
(a) 12
(b) 10
(c) 9
(d) 8



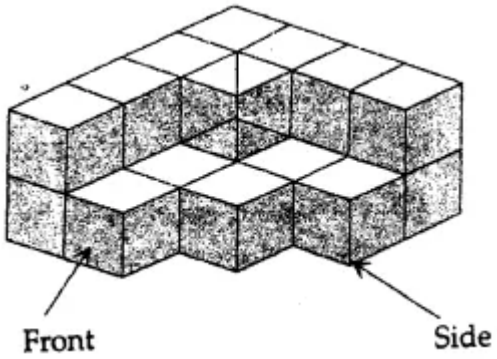
Solution:

The number of cubes in the given structure is 12. (a)

Question 7.
An isometric sheet is made up of dots forming
(a) squares
(b) rectangles
(c) right-angled triangles
(d) equilateral triangles
Solution:

An isometric sheet is made up of dots forming equilateral triangles. (d)

Question numbers 8 to 11 are based on the given figure in which unit cubes are put together to form a structure as shown:



Question 8.
The number of unit cubes in the given structure is
(a) 13
(b) 20
(c) 21
(d) 22
Solution:

The number of unit cubes in the given structure is 21. (c)

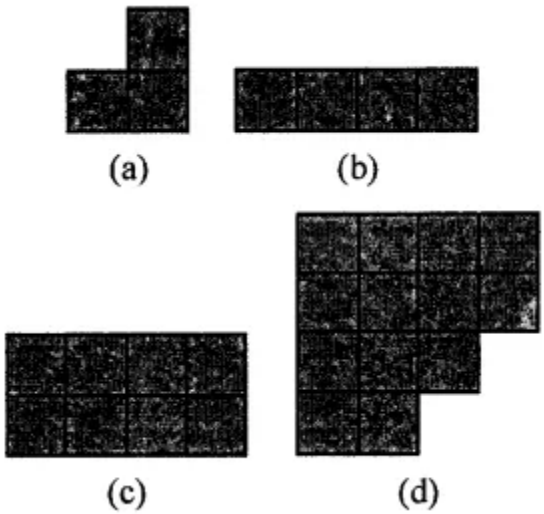
Question 9.
The number of unit cubes to be added to make a cuboid of dimensions 4 unit × 4 unit × 2 unit is
(a) 11
(b) 12
(c) 13
(d) 14
Solution:

The number of unit cubes to be added to make a cuboid of dimensions 4 unit × 4 unit × 2 unit is $4 \times 4 \times 2 = 32 - 21 = 11$ (a)

Question 10.
If the structure is painted on the surface everywhere, then the number of unit cubes having no face painted is
(a) 0
(b) 1
(c) 2
(d) 11
Solution:

If the structure is painted on the surface everywhere,
then the number of unit cubes ' having no face painted is 1. (b)

Question 11.
The side view of the given structure is

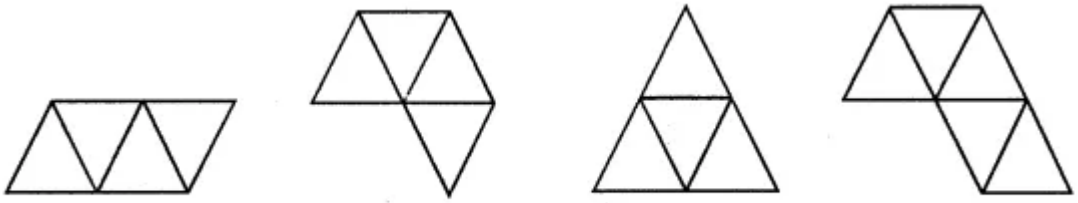


Solution:

The side view of the given structure is (c).

Check Your Progress

Question 1.
Identify the nets which can be used to make a tetrahedron (cut out copies of the nets and try it):



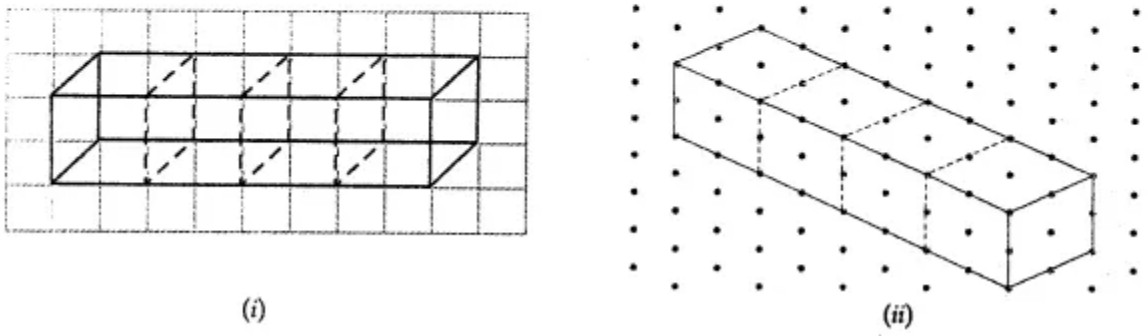
(*i*) (*ii*) (*iii*) (*iv*)

Solution:

The net/nets for a tetrahedron is (i) and (iii).

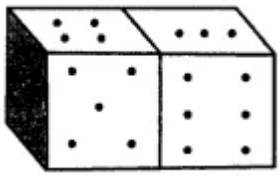
Question 2.
If four cubes each with 2 cm edge are placed side by side, what would the dimensions of the resultant cuboid be?
Solution:

Four cubes with 2 cm edge are placed side by side,
then the dimensions of the resulting cuboid will be
Length = 4 × 2 = 8 cm, breadth = 2 cm and height = 2 cm
An isometric sketch and oblique sketches are given below:



(*i*) (*ii*)

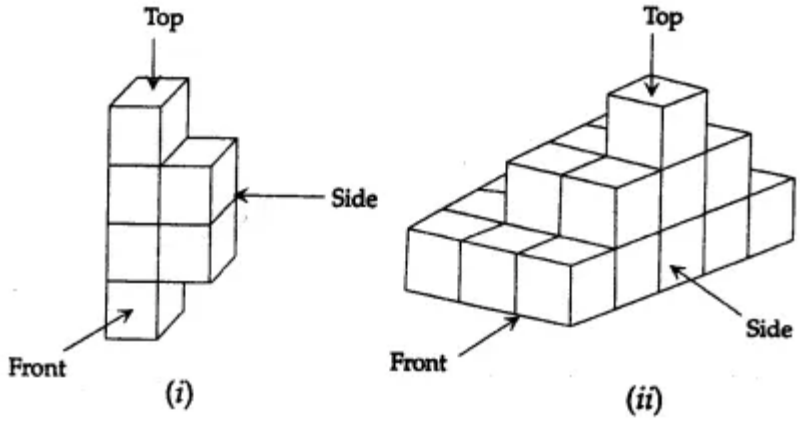
Question 3.
Two dice are placed side by side as shown in the given figure. What would be the total on the face opposite to
(i) 5 + 6
(b) 4 + 3?



Solution:

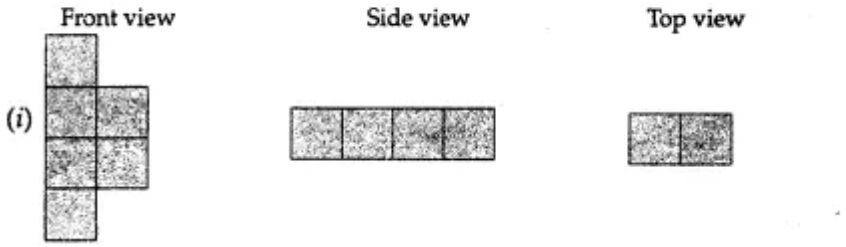
When two dice are placed side by side
as shown in the given figure,
the total would be on face opposite to
(i) 5 + 6 is 3
(ii) 4 + 7 is 7

Question 4.
For the structures given below sketch the front, side, and top view:



Solution:

The front view side view and top view of the given two sketches are given below:



(*ii*)