GEOMETRY

July 28, 2023

1. What is the total surface area of a solid hemisphere of diameter $'d'$?

   (a) $3\pi d^2$

   (b) $2\pi d^2$

   (c) $\frac{1}{2}\pi d^2$

   (d) $\frac{3}{4}\pi d^2$

2. In the given Figure 1, $DE \parallel BC$. If AD=2 units, $DB = AE = 3$ units and $EC = x$ units, then the value of x is:

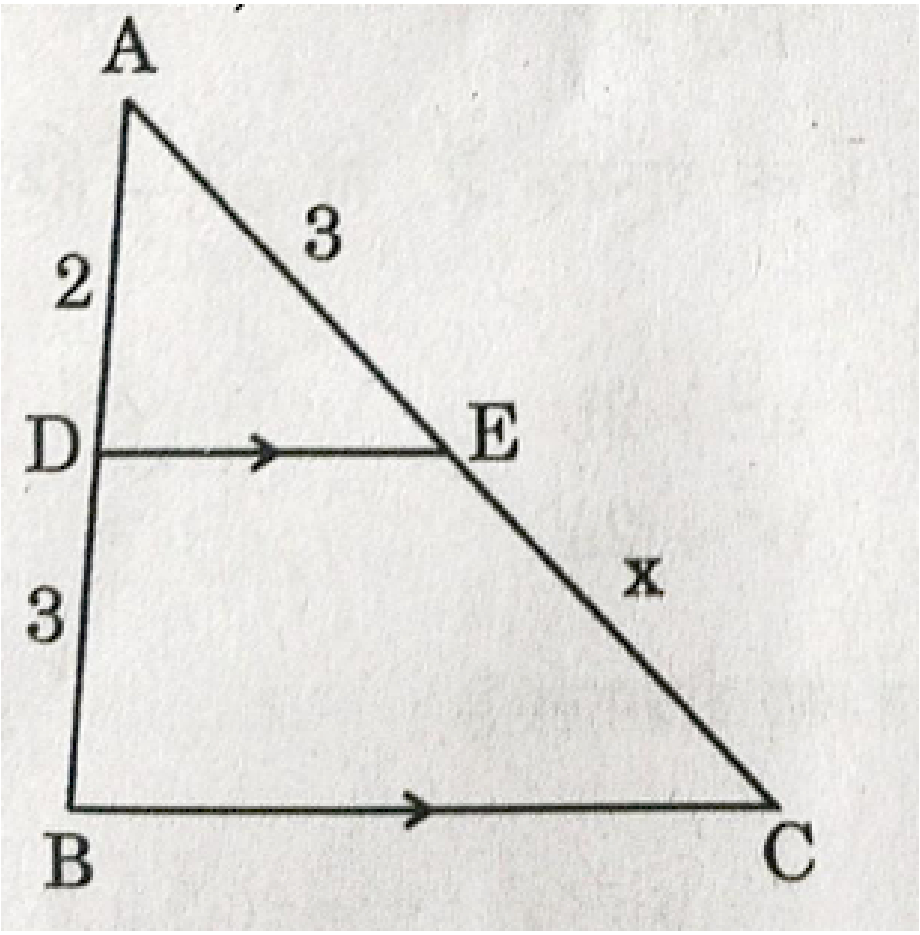

Figure 1

(a) 2

(b) 3

(c) 5

(d) $\frac{9}{2}$

3. In the given Figure 2, XZ is parallel to BC. $AZ = 3$ cm, $ZC = 2$ cm, $BM = 3$ cm, and $MC = 5$ cm. Find the length of XY.

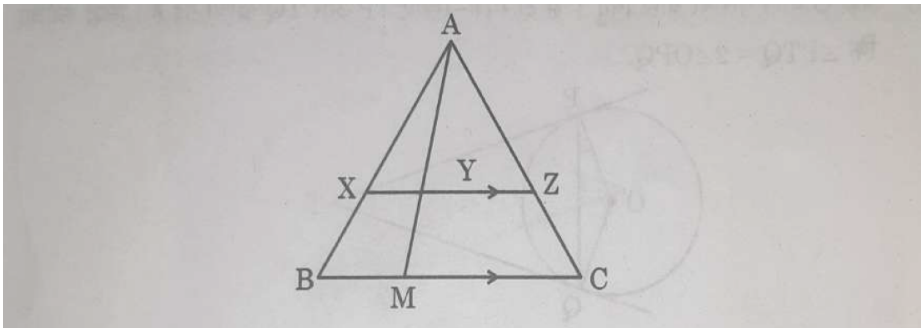

Figure 2

4. A room is in the form of a cylinder surmounted by a hemi-spherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find total height of the room if it contains $\left(\frac{1408}{21}\right) m^3$ of air.Take $\left(\pi = \frac{22}{7}\right)$

5. In the given Figure 3, An empty cone is of radius 3 cm and height 12 cm. Ice-cream is filled so that lower part of the cone which is $\left(\frac{1}{6}\right)$th of the volume of the cone is unfilled but hemisphere is formed on the top. Find volume of the ice-cream.Take($\pi = 3.14$)

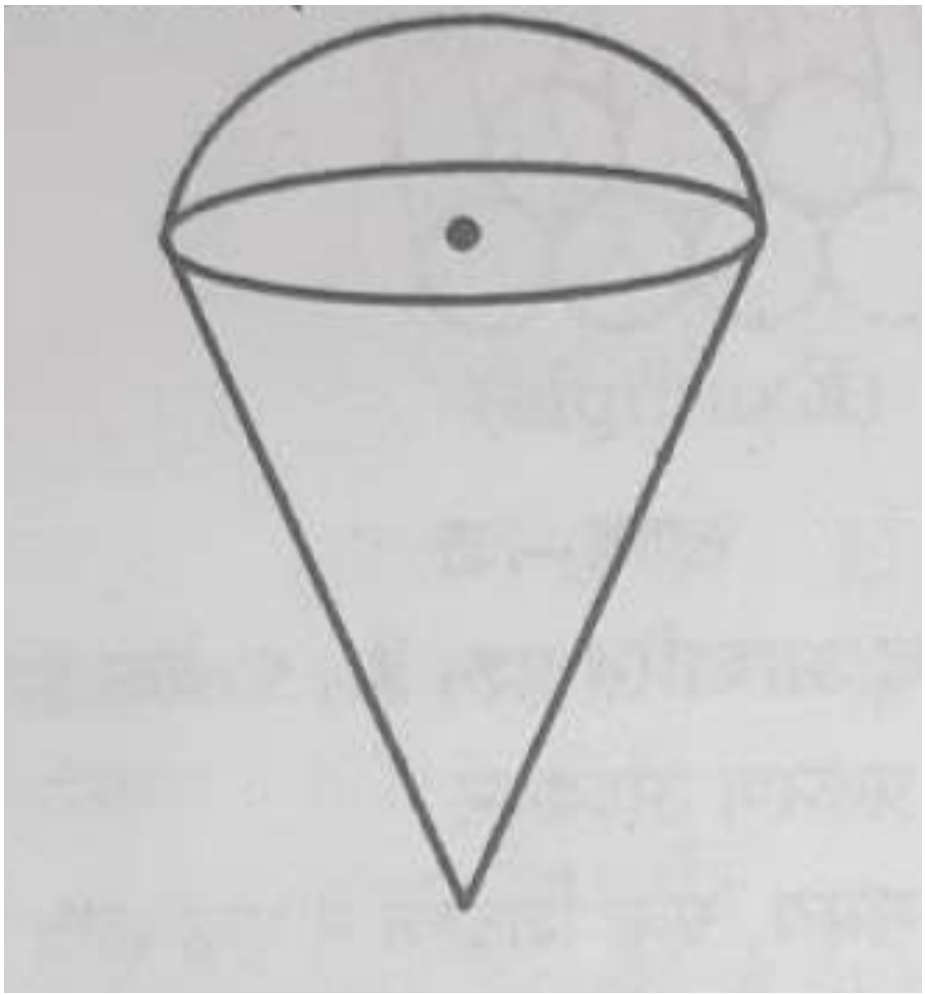

Figure 3

6. If a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, prove that the other two sides are divided in the same ratio.

7. The angle of elevation of the top of a tower 24 m high from the foot of another tower in the same plane is 60°. The angle of elevation of the top of second tower from the foot of the first tower is 30°. Find the distance between two towers and the height of the other tower. Also, find the length of the wire attached to the tops of both the towers.

8. A spherical balloon of radius r subtends an angle of 60° at the eye of an observer. If the angle of elevation of its centre is 45° from the same point, then prove that height of the centre of the balloon is $\sqrt{2}$ times its radius.

9. A chord of a circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle. Also find the area of the major segment of the circle.