

# Geometry

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1. The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower is  $45^\circ$ . What is the height of the tower ?
2. Find the sun's altitude if the shadow of a 15 m high tower is  $15\sqrt{3}$  m.
3. A circular piece of land is 40 m in diameter. A well of diameter 16 m has been dug to a depth of 28 m and the earth taken out has been spread evenly over the remaining area. How much has the level of ground been raised ?
4. From a point on the ground, 20 m away from the foot of vertical tower, the angle of elevation of the top of the tower is  $60^\circ$ . Find the height of the tower.
5. (a) In a right triangle  $ABC$ , right-angled at  $B$ ,  $BC = 6\text{ cm}$  and  $AB = 8\text{ cm}$ . A circle is inscribed in the  $\triangle ABC$ . Find the radius of the incircle.  
(b) Two circles touch externally at  $P$  and  $AB$  is a common tangent, touching one circle at  $A$  and the other at  $B$ . Find the measure of  $\angle APB$ .
6. A solid sphere of radius  $r$  is melted and cast into the shape of a solid cone of height  $r$ . What is the radius of the base of the cone in terms of  $r$  ?
7. Answer any four of the following questions :
  - (i)  $ABC$  and  $BDE$  are two equilateral triangles such that  $D$  is the mid-point of  $BC$ . The ratio of the areas of the triangles  $ABC$  and  $BDE$  is

- (A) 2 : 1
  - (B) 1 : 2
  - (C) 4 : 1
  - (D) 1 : 4
- (ii) In  $\triangle ABC$ ,  $AB = 4\sqrt{3}$  cm,  $AC = 8$  cm and  $BC = 4$  cm. The angle  $B$  is
- (A)  $120^\circ$
  - (B)  $90^\circ$
  - (C)  $60^\circ$
  - (D)  $45^\circ$
- (iii) The perimeters of two similar triangles are  $35$  cm and  $21$  cm respectively. If one side of the first triangle is  $9$  cm, then the corresponding side of the second triangle is
- (A)  $5.4$  cm
  - (B)  $4.5$  cm
  - (C)  $5.6$  cm
  - (D)  $15$  cm
- (iv) In a  $\triangle ABC$ ,  $D$  and  $E$  are points on the sides  $AB$  and  $AC$  respectively such that  $DE \parallel BC$  and  $AD : DB = 3 : 1$ . If  $AE = 3.3$  cm, then  $AC$  is equal to
- (A)  $4$  cm
  - (B)  $1.1$  cm
  - (C)  $4.4$  cm
  - (D)  $5.5$  cm
- (v) In an isosceles triangle  $ABC$ , if  $AC = BC$  and  $AB^2 = 2AC^2$ , then  $\angle C$  is equal to
- (A)  $30^\circ$
  - (B)  $45^\circ$
  - (C)  $60^\circ$
  - (D)  $90^\circ$
8. To explain how trigonometry can be used to measure the height of an inaccessible object, a teacher gave the following example to students :  
A TV tower stands vertically on the bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of

the top of the tower is  $60^\circ$ . From another point 20 m away from this point to the foot of the tower, the angle of elevation of the top of the tower is  $30^\circ$  (as shown in Figure 1).

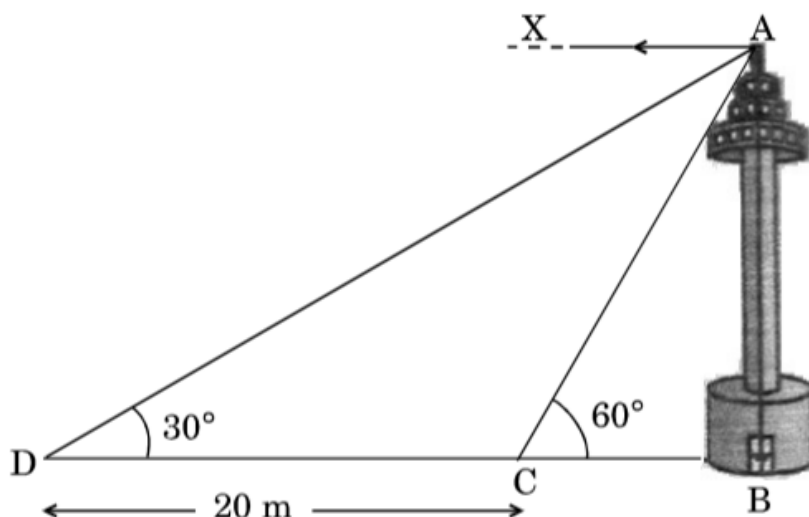


Figure 1: Projection of Tower

Based on the above, answer the following questions :

- (i) The width of the canal is
  - (A)  $10\sqrt{3}$  m
  - (B)  $20\sqrt{3}$  m
  - (C)  $10m$
  - (D)  $20m$
- (ii) Height of the tower is
  - (A)  $10\sqrt{3}$  m
  - (B)  $10m$
  - (C)  $20\sqrt{3}$  m
  - (D)  $20m$
- (iii) Distance of the foot of the tower from the point  $D$  is
  - (A)  $20m$
  - (B)  $30m$

- (C)  $10m$
  - (D)  $20\sqrt{3}$  m
- (iv) The angle formed by the line of sight with the horizontal when it is above the horizontal line is known as
- (A) angle of depression
  - (B) line of sight
  - (C) angle of elevation
  - (D) obtuse angle
- (v) In above figure, measure of angle  $XAC$  is
- (A)  $30^\circ$
  - (B)  $60^\circ$
  - (C)  $90^\circ$
  - (D)  $45^\circ$
9. A children's park is in the triangular shape as shown in the below figure. In the middle of the park, there is a circular region for younger children to play. It is fenced with three layers of wire. The radius of the circular region is  $3m$ . Based on the above, answer the following questions:
- (i) The perimeter (or circumference) of the circular region is
    - (A)  $3\pi$  m
    - (B)  $18\pi$  m
    - (C)  $6\pi$  m
    - (D)  $9\pi$  m
  - (ii) The Total length of wire used is
    - (A)  $9\pi$  m
    - (B)  $18\pi$  m
    - (C)  $54\pi$  m
    - (D)  $27\pi$  m
  - (iii) The area of the circular region is
    - (A)  $54\pi$   $m^2$
    - (B)  $3\pi$   $m^2$
    - (C)  $18\pi$   $m^2$
    - (D)  $9\pi$   $m^2$

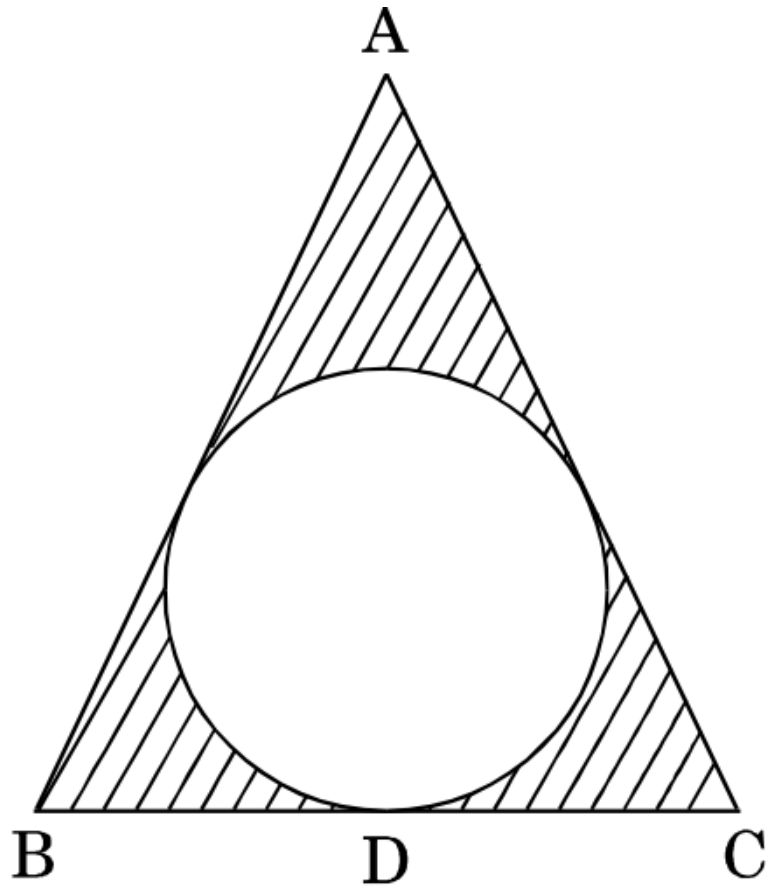


Figure 2: Children's Park in triangular shape

- (iv) If  $BD = 6m$ ,  $DC = 9m$  and  $\text{ar}(\triangle ABC) = 54 m^2$ , then the length of sides  $AB$  and  $AC$ , respectively, are)
- (A)  $9m, 12m$
  - (B)  $12m, 9m$
  - (C)  $10m, 12m$
  - (D)  $12m, 10m$
- (v) The perimeter of  $\triangle ABC$  is
- (A)  $28m$
  - (B)  $37m$

(C)  $36m$

(D)  $38m$