Q1 (25 July 2021 Shift 1)

A spherical gas balloon of radius 16 meter subtends an angle 60° at the eye of the observer A while the angle of elevation of its center from the eye of A is 75°. Then the height (in meter) of the top most point of the balloon from the level of the observer's eye is:

(1) $8(2+2\sqrt{3}+\sqrt{2})$

(2) $8(\sqrt{6}+\sqrt{2}+2)$

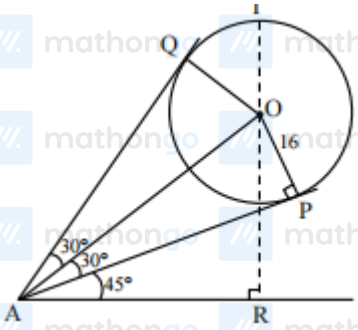
(3) $8(\sqrt{2}+2+\sqrt{3})$

(4) $8(\sqrt{6}-\sqrt{2}+2)$

Answer Key

Q1 (2)

Q1



$O \rightarrow$ centre of sphere

$P, Q \rightarrow$ point of contact of tangents from A

Let T be top most point of balloon &R be foot of perpendicular from O to ground.

From triangle $OAP, OA = 16 \operatorname{cosec} 30^\circ = 32$

From triangle $ABO, OR = OA \sin 75^\circ = 32\frac{(\sqrt{3}+1)}{2\sqrt{2}}$

So level of top most point $= OR + OT$

$= 8(\sqrt{6} + \sqrt{2} + 2)$