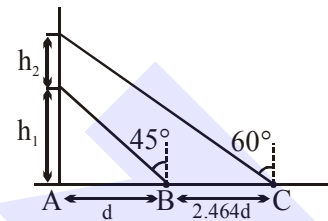


**BASIC MATHS & VECTOR**

1. The sum of two forces  $\vec{P}$  and  $\vec{Q}$  is  $\vec{R}$  such that  $|\vec{R}| = |\vec{P}|$ . The angle  $\theta$  (in degrees) that the resultant of  $2\vec{P}$  and  $\vec{Q}$  will make with  $\vec{Q}$  is, \_\_\_\_ .

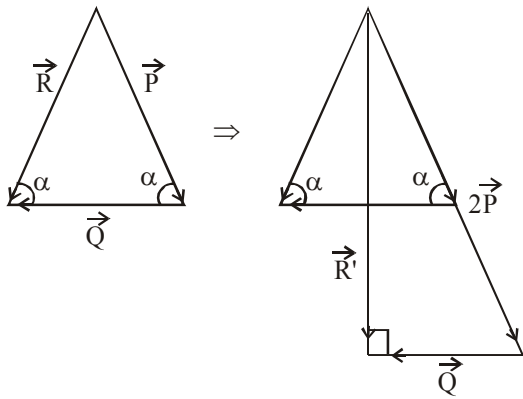
2. A balloon is moving up in air vertically above a point A on the ground. When it is at a height  $h_1$ , a girl standing at a distance  $d$  (point B) from A (see figure) sees it at an angle  $45^\circ$  with respect to the vertical. When the balloon climbs up a further height  $h_2$ , it is seen at an angle  $60^\circ$  with respect to the vertical if the girl moves further by a distance  $2.464 d$  (point C). Then the height  $h_2$  is (given  $\tan 30^\circ = 0.5774$ ) :



- (1)  $d$  (2)  $0.732d$   
 (3)  $1.464d$  (4)  $0.464d$

## SOLUTION

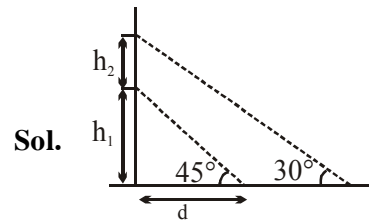
1. NTA Ans. (90)



Sol.

Hence angle  $90^\circ$ 

2. Official Ans. by NTA (1)



Sol.

$$\frac{h_1}{d} = \tan 45^\circ \Rightarrow h_1 = d \dots (1)$$

$$\frac{h_1 + h_2}{d + 2.464d} = \tan 30^\circ$$

$$\Rightarrow (h_1 + h_2) \times \sqrt{3} = 3.46d$$

$$(h_1 + h_2) = \frac{3.46d}{\sqrt{3}}$$

$$\Rightarrow d + h_2 = \frac{3.46d}{\sqrt{3}}$$

$$h_2 = d$$