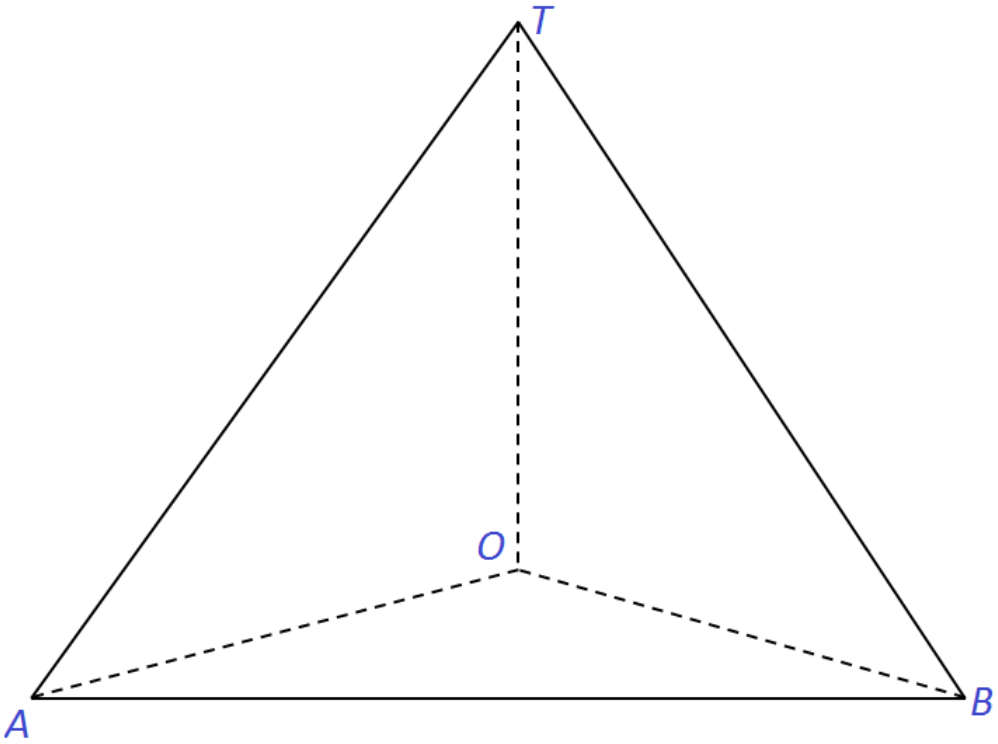
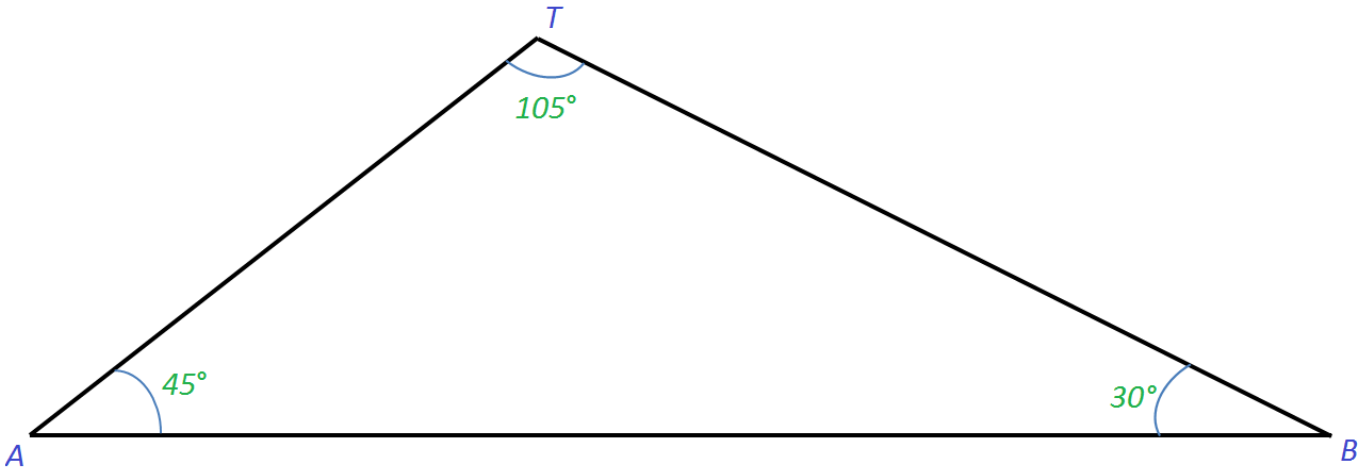
Solution.



Let bearing required is from base of the tower to point B. Let T is a top of the tower.

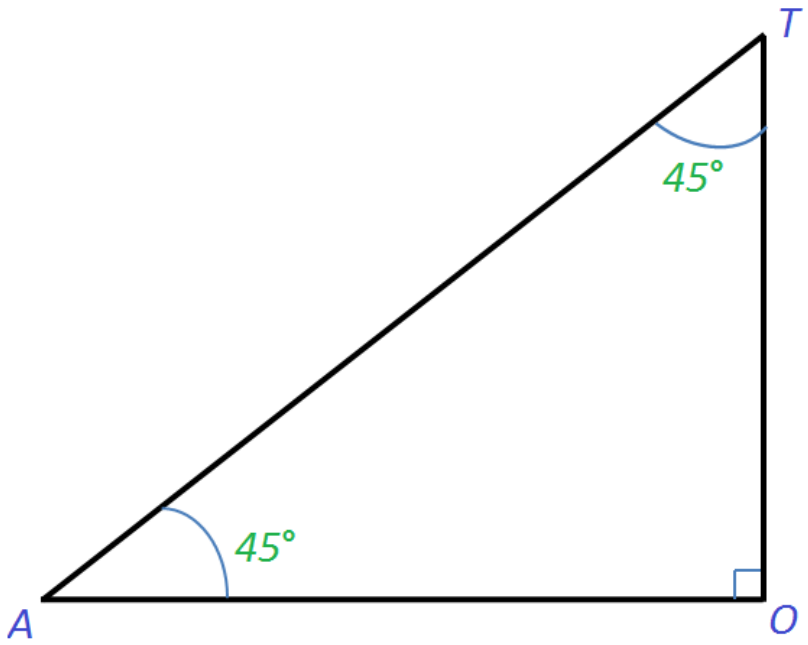


At first consider the triangle made by points A, B and T with $A = 45°$, $B = 30°$ and $T = 105°$.

Then apply the law of sines to calculate b (distance of T to point A), also note that the distance from A to B is 100 meters:

$$\frac{b}{\sin 30°} = \frac{100}{\sin 105°}$$

$$b = \frac{100 \sin 30°}{\sin 105°} \approx 51.76\ m$$



Then consider the flat triangle AOB where O is the base of the tower. We know that the length of AO is the height of the tower because triangle AOT is an isosceles right triangle with two $45°$ angles and one $90°$ angle and b is its hypotenuse, so

$$51.76^2 = 2h^2$$

$$2679.1 = 2h^2$$

$$h^2 = 1339.55\ m^2$$

$$h = \sqrt{1339.55} \approx 36.6\ m$$

In right triangle AOB we have:

$$\tan \angle O = \frac{100}{36.6} = 2.7 \Rightarrow \angle O = 70°$$

Due south bearing is $180°$ so $180° - 70° = 110°$ bearing to B.

Answer: $110°$.