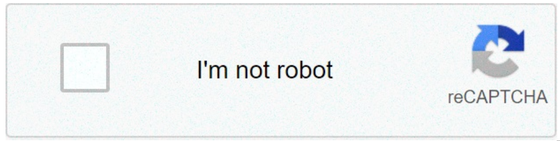

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The angle of elevation of the top of a building from the foot of the tower is 30

Try our Mini CourseMaster Important Topics in 7 DaysLearn from IITians, NITians, Doctors & Academic ExpertsDedicated counsellor for each studentDetailed Performance Evaluationview all courses Let's begin this problem by looking at the triangle that connects the building to the top of the antenna. That's an obtuse triangle. Well, there are three angles here. The first is the angle that's formed at the base of the building. And that's going to be the supplement of the given angle 29 degrees, 30 minutes. So if I find the supplement of that angle, that gives me an angle of 60 degrees, 30 minutes. That is our first angle at the base of our building at the top of our building. The angle that connects the building to the top of the antenna is going to be 15 degrees 20 minutes, plus 90 degrees. As you can see from the picture, we have a right angle plus that angle of elevation. So that gives me a second angle off 105 degrees, 20 minutes. Now, I want to use the law signs. I'm going to find the distance between the top of the building to the top of the antenna. Okay. And I'm gonna call that side a just wife, something Aiken reference to it. So I want to find that distance. I'm gonna put that on top saseidx a divided by the ANC sine of the angle opposite it, that is, sign of angle. 60 degrees, 30 minutes? Yeah, now I need another pair that I know well, I'm told at the height of the building is 45 feet, so I can use that as my other side. That's 45.0 feet. What is the angle opposite that? Well, that's that very small acute angle at the top of the antenna. To find that I can go back to the two angles I know and I can add. Subtract them from 180 degrees. That gives me an angle equal to 14 degrees, 10 minutes. That's the angle that's opposite the building. By plugging these values into a calculator and solving for a I get a value of 6 160.0 feet. That is the distance from the top of the building to the top of the antenna. Now what I really want to know, though, is how tall the antenna is. Well, the antenna is going to be the height of the building, which is 45.0 feet, plus that extra height the height above the building. We're gonna call that extra distance X to find X. I can use the definition of sign. Take a look at that right triangle that starts that has its base at the very top of the building. The angle there is 15 degrees, 20 minutes and ah, the definition of sign says it is opposite. In this case, that's X. That's that height above the building, divided by high pot news. What we found that already that's 100 60 feet. That's that distance between the top of the building and the top of the antenna. Solving for X gives me a value of 42.3 feet, adding back to it the height of the building, which is 45 feet. That gives me a grand total of 87.3 feet. That is the height of the entire antenna. Answer : Let AB be the tower of height h metres and let C be a point at a distance of 30 m from the foot of the tower. The angle of elevation of the top of the tower from point C is given as 30º. In \(\Delta \ CAB \), we have \(\frac{AB}{CA} \ = \ tan30º \) \(\frac{h}{30} \ = \ \frac{1}{ \sqrt{3}} \ => \ h \ = \ \frac{30}{ \sqrt{3}} \ = \ 10 \sqrt{3} \) Hence, the height of the tower is \(10 \sqrt{3} \) metres. Distribute the referral code to your friends and ask them to register with Tutorix using this referral code. Once we get 15 subscriptions with your referral code, we will activate your 1 year subscription absolutely free. Your subscribed friend will also get 1 month subscription absolutely free. Answer Verified Hint:We will solve this question by using the trigonometric function $\tan \theta = \dfrac{{{\text{perpendicular}}}}{{{\text{base}}}}$ in the right triangles, one by one, obtained by sketching the given conditions. We will calculate the value of the base common to both the triangles and then we will put the value of base to calculate the value of the height of the second tower.Complete step by step solution:We are given that the angle of elevation of the top of a tower whose height is 30m from the foot of the other tower is ${60^ \circ }$. The angle of elevation of the top of the second tower from the foot of the other tower is ${30^ \circ }$.We need to find the height of the second tower.The figure of this given question will be:Let AB be the first tower and PQ be the second tower with height h. The angle of elevation of the first tower AB from the foot of the second tower PQ is $\angle AQB = {60^ \circ }$. The angle of elevation of the second tower PQ from the foot of the first tower AB is$\angle PBQ = {30^ \circ }$ .Applying the trigonometric identity $\tan \theta = \dfrac{{{\text{perpendicular}}}}{{{\text{base}}}}$ in $\vartriangle ABQ$, $ \Rightarrow \tan {60^ \circ } = \dfrac{{30}}{x} \\ \Rightarrow \sqrt 3 = \dfrac{{30}}{x} \\ \Rightarrow x = \dfrac{{30}}{{\sqrt 3 }} \\ $ Applying $\tan \theta = \dfrac{{{\text{perpendicular}}}}{{{\text{base}}}}$ in the $\vartriangle PBQ$,$ \Rightarrow \tan {30^ \circ } = \dfrac{h}{x}$ Substituting the value of x in the above equation, we get$ \Rightarrow \tan {30^ \circ } = \dfrac{h}{{\left({\dfrac{{30}}{{\sqrt 3 }}} \right)}} \\ \Rightarrow \dfrac{1}{{\sqrt 3 }} = \dfrac{{h\sqrt 3 }}{{30}} \\ \Rightarrow h = \dfrac{{30}}{3} = 10m \\ $ Therefore, the height of the second tower is 10m. Note:In this question, you may go wrong in understanding the setup and hence constructing the diagram to get a clear view and also in the use of the calculation of the x to calculate the value of the height of the tower. This question is a part of a major concept, Trigonometry, of mathematics which is widely used in real – life. We measure heights of big monuments and buildings, depth of the sea and many more other spaces of life where heights and distances are involved. You are one step away from your answer! Sign up for FREE! By signing up you also gain access to lakhs of solved questions, quizzes and downloadable PDFs for FREE!