

Golden Gate Bridge Trigonometry

If you stand in the middle of Golden Gate bridge and aim a telescope towards the top of one of the towers, the telescope would be angled at 13.4° above the horizontal. The height of each tower above the roadway is 152 metres.



1. Draw a right angled triangle on the diagram below and use the information above to estimate the length of the cable running from the centre of the bridge to the top of the tower. Is your answer likely to be an underestimate or an overestimate?

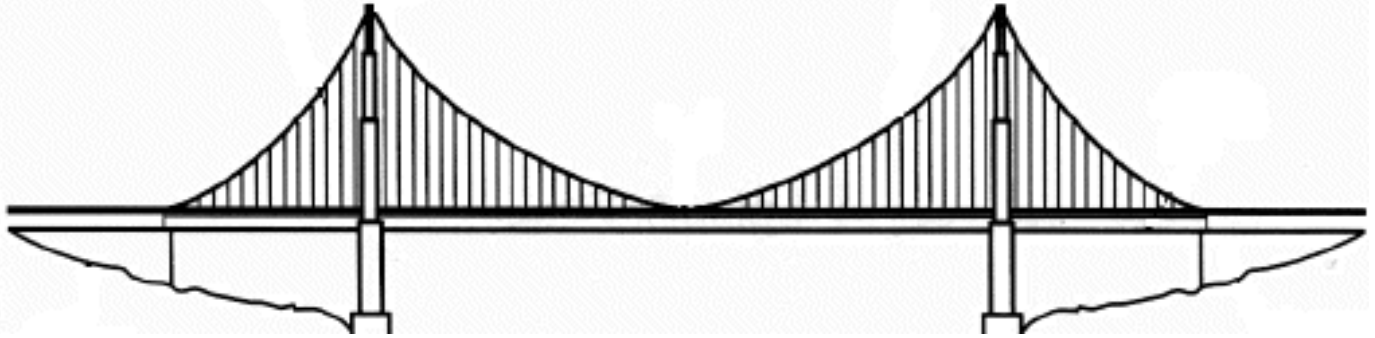


Diagram **not** drawn accurately

2. Calculate the distance between the two towers.

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Golden Gate Bridge Trigonometry SOLUTIONS

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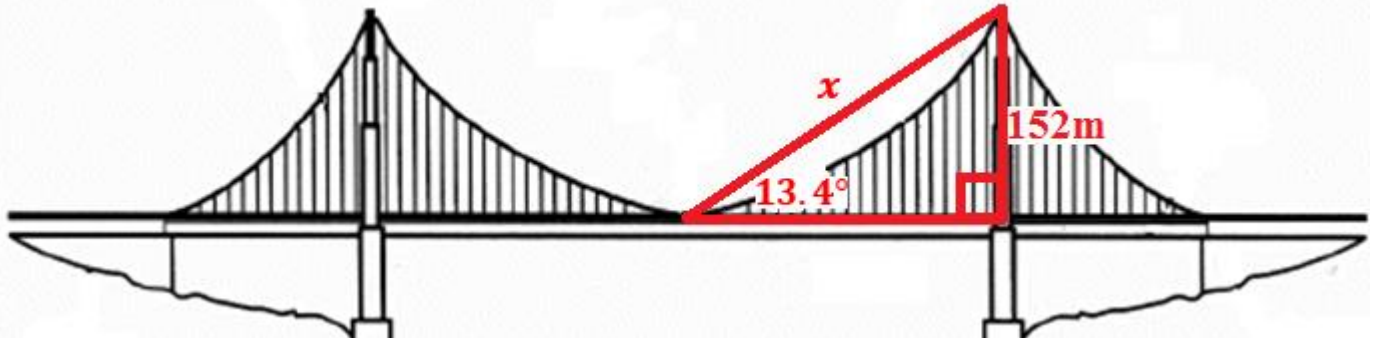
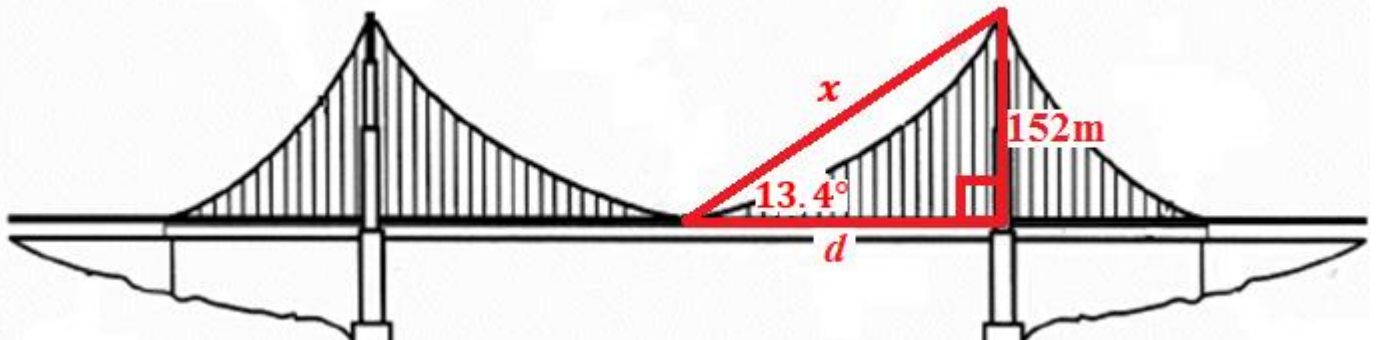


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$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \Rightarrow \sin 13.4 = \frac{152}{x} \Rightarrow 0.2317 = \frac{152}{x} \Rightarrow 0.2317x = 152 \Rightarrow x = \frac{152}{0.2317} = 656\text{m}$$

*This will be an underestimate, since the cable does not follow a straight path, but a parabolic curve, so will be longer.
In reality, the length is roughly 750 metres.*

2. Calculate the distance between the two towers.



Method 1: Pythagoras

$$d = \sqrt{656^2 - 152^2} = 638$$

Method 2: Trigonometry

$$\tan \theta = \frac{\text{opp}}{\text{adj}} \Rightarrow \tan 13.4 = \frac{152}{d} \Rightarrow d = \frac{152}{\tan 13.4} = 638$$

$$d = 638 \Rightarrow \text{total distance} = 2d = 1276\text{m to the nearest metre}$$