1. The tiered sides of a stadium will have an angle of elevation equal to $32^\circ$. The length of the tiered side will be 120 feet. How high will the tiered end be above the ground?

2. The angle of elevation of a cable that supports a tower is $68^\circ$. If the bottom of the cable is anchored to the ground at a distance of 4 meters from the bottom of the tower, determine the height of the tower and also the length of the cable that will be needed.
Solutions

1. The tiered sides of a stadium will have an angle of elevation equal to $32^\circ$. The length of the tiered side will be 120 feet. How high will the tiered end be above the ground?

Label the height as $x$.

\[
\sin 32^\circ = \frac{x}{120}
\]

\[0.529919264 = \frac{x}{120}\] (Now multiply both sides by 120)

\[x = 63.59031171 \text{ feet} \rightarrow 63.6 \text{ feet (height of the tier)}\]

2. The angle of elevation of a cable that supports a tower is $68^\circ$. If the bottom of the cable is anchored to the ground at a distance of 4 meters from the bottom of the tower, determine the height of the tower and also the length of the cable that will be needed.

Label the height as $h$ and the cable length as $c$.

\[\tan 68^\circ = \frac{h}{4}\]

\[2.475086853 = \frac{h}{4}\] (Now multiply both sides by 4)

\[h = 9.900347414 \text{ meters} \rightarrow 9.9 \text{ meters (height of tower)}\]

Using the Pythagorean Theorem we can write:

\[h^2 + 4^2 = c^2\]

\[9.9^2 + 4^2 = c^2\]

\[98.01 + 16 = c^2\]

\[114.01 = c^2\]

\[c = 10.7\]

So, the length of the cable is $10.7$ meters.