Topic: Angles of elevation and depression

Question: Two cats, Fluffy and Muffy, each have their own cat tree and their favorite spot in their tree. The horizontal distance between their favorite spots is 4.8 feet and the angle of elevation of Fluffy's favorite spot to Muffy's is $35°$. How far is Fluffy from Muffy?

Answer choices:

A 7.75 feet

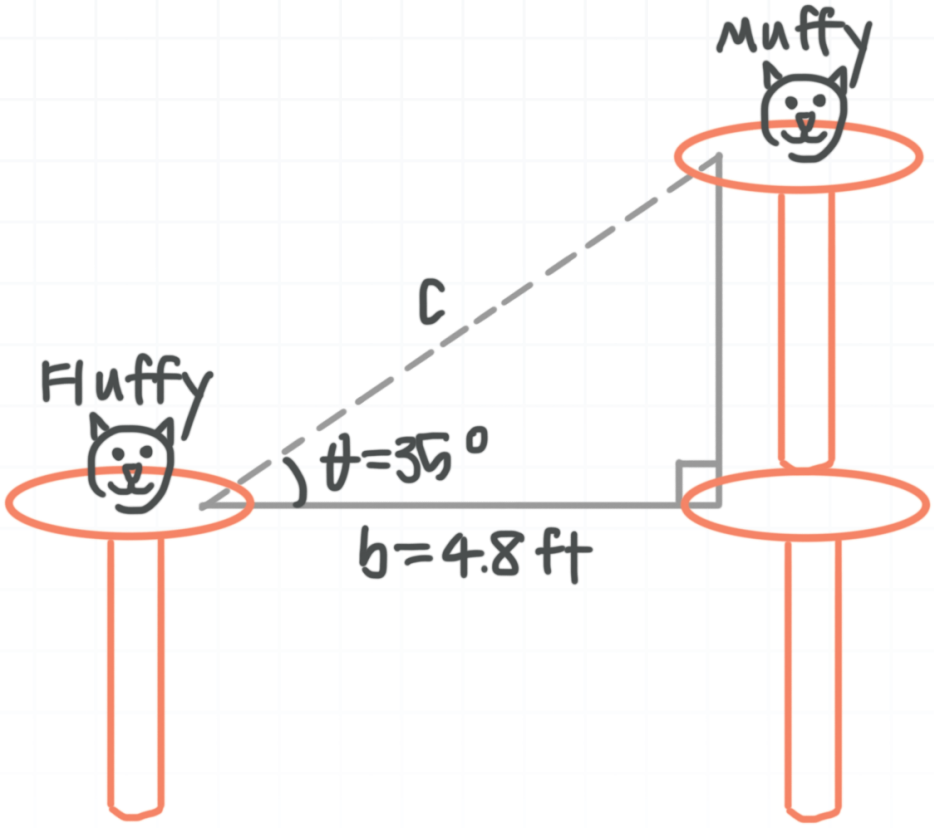
B 5.86 feet

C 8.37 feet

D 6.93 feet

Solution: B

Let b be the horizontal distance between the cat trees and c be the distance from one cat directly to the other.



We need to find c using $b = 4.8$ ft and the angle of elevation $\theta = 35°$. Side b of the right triangle is the adjacent side, and side c is the hypotenuse, so

$$\cos 35° = \frac{b}{c}$$

$$c \cos 35° = b$$

$$c = \frac{b}{\cos 35°}$$

Substitute $b = 4.8$ ft.

$$c = \frac{4.8 \text{ ft}}{\cos 35°} \approx \frac{4.8 \text{ ft}}{0.819} \approx 5.86 \text{ ft}$$

Topic: Angles of elevation and depression

Question: A drone is 750 feet above the ground. A piece of tracking apparatus on a stand 25 feet above ground has an angle of elevation to the drone of $49°$. What is the horizontal distance between the drone and the tracking apparatus?

Answer choices:

A 863 feet

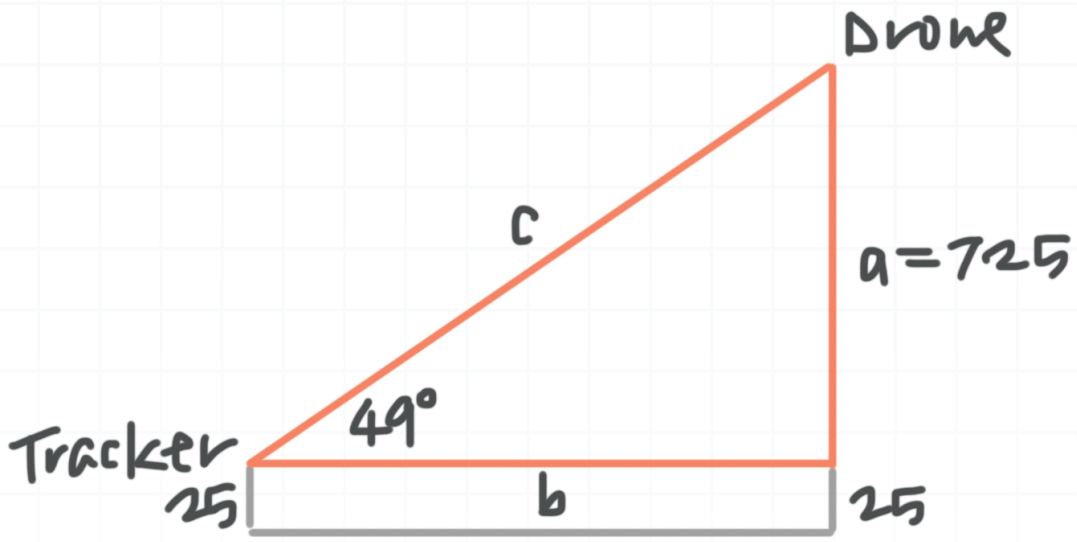
B 630 feet

C 652 feet

D 834 feet

Solution: B

Sketch a diagram of the situation.



Then we can say sine and cosine of the angle are given by

$$\sin 49° = \frac{725}{c} \text{ and } \cos 49° = \frac{b}{c}$$

Solve both equations for c.

$$\sin 49° = \frac{725}{c}$$

$$c \sin 49° = 725$$

$$c = \frac{725}{\sin 49°}$$

and

$$\cos 49° = \frac{b}{c}$$

$$c \cos 49° = b$$

$$c = \frac{b}{\cos 49^\circ}$$

Because both equations are equal to c, they're equal to each other.

$$\frac{725}{\sin 49^\circ} = \frac{b}{\cos 49^\circ}$$

$$b = \left(\frac{725}{\sin 49^\circ}\right)(\cos 49^\circ)$$

$$b \approx \left(\frac{725}{0.755}\right)(0.656)$$

$$b \approx 630 \text{ feet}$$

Topic: Angles of elevation and depression

Question: A man is trying to catch some fish and spots one with an angle of depression of $51°$ with respect to the end of his fishing rod. The fish is located 8.2 feet lower than the end of the fishing rod. How far away is the fish?

Answer choices:

A 13.0 feet

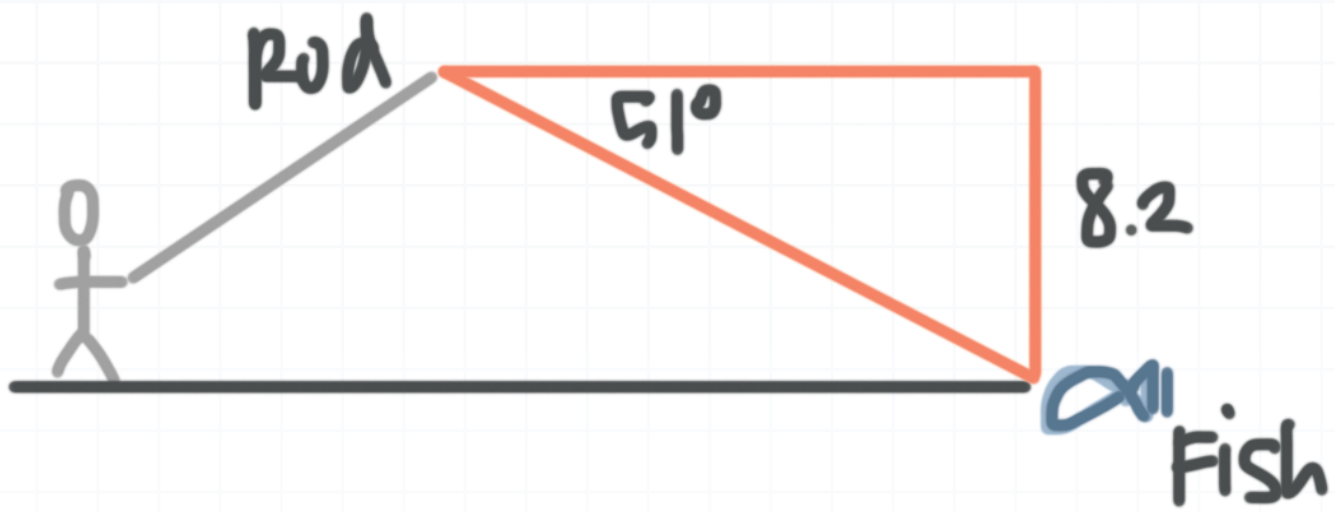
B 19.1 feet

C 9.16 feet

D 10.6 feet

Solution: D

Sketch a diagram of the situation.



Let a be the vertical distance between the fish and the end of the rod, and c be the direct distance between them.

$$\frac{a}{\sin 51°} = \frac{c}{1}$$

$$c = \frac{a}{\sin 51°}$$

Substituting $a = 8.2$ ft.

$$c = \frac{8.2}{\sin 51°}$$

$$c \approx \frac{8.2}{0.777}$$

$$c \approx 10.6 \text{ feet}$$