

In this problem we are asked the following:

1. Use the properties of right triangles and triangle ABC to prove the Law of Sines.
2. Find the length of BC, rounded to the nearest tenth of a unit.

We can first start by looking at the two right triangles given to us ABD and BDC. The side opposite to the 46° can be found using sine. Similarly, the side opposite to the 31° in the other triangle can be found using sine.

$$\sin(46) = \frac{x}{17} \quad (1)$$

$$\sin(31) = \frac{x}{a} \quad (2)$$

$$x = 17\sin(46) \quad (3)$$

$$\sin(31) = \frac{17\sin(46)}{a} \quad (4)$$

$$a\sin(31) = 17\sin(46) \quad (5)$$

$$\frac{\sin(31)}{17} = \frac{\sin(46)}{a} \quad (6)$$

To find the length of BC, we use the law of sines.

$$a = \frac{17\sin(46)}{\sin(31)} \quad (7)$$

$$a \approx 24^\circ \quad (8)$$