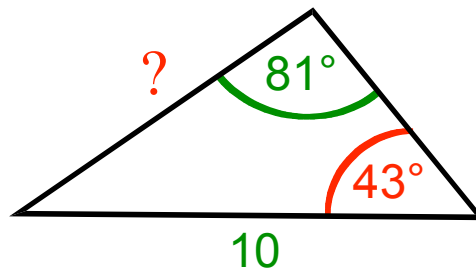


# Using the sine rule

**Example question:** find the length of the side marked ?



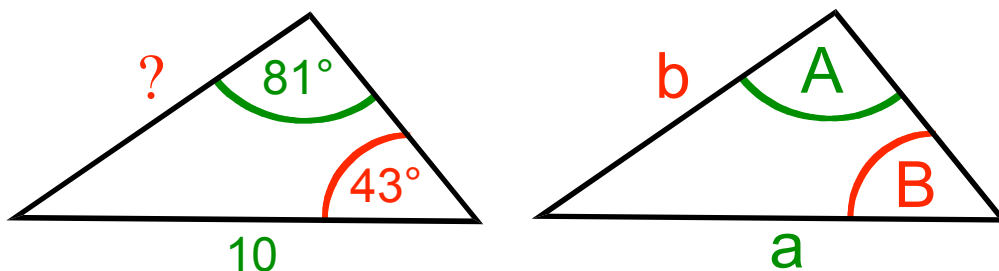
In this example, we know one side and two angles. We want to find the side opposite the red 43° angle.

We only need two parts of the sine rule:

$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

## Step 1: Give each side and angle a symbol

Let's label the side we know as  $a$ . This is the green side, whose length is 10. That means the green angle opposite is angle  $A$ . Therefore we'll label the red 43° angle as  $B$ . We are trying to find side  $b$ , represented in the diagram by a red question mark.



## Step 2: Write down the value of each symbol

Using our labelling conventions from Step 1:

$$a = 10$$

$$A = 81^\circ$$

$$B = 43^\circ$$

## Step 3: Substitute values into the sine rule

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \text{therefore} \quad \frac{\sin 81^\circ}{10} = \frac{\sin 43^\circ}{b}$$

**Step 4: Rearrange the sine rule to make  $b$  the subject**

$$\frac{\sin 81^\circ}{10} = \frac{\sin 43^\circ}{b}$$

$$\frac{10}{\sin 81^\circ} = \frac{b}{\sin 43^\circ}$$

$$\sin 43^\circ \left( \frac{10}{\sin 81^\circ} \right) = b$$

$$\frac{10 \sin 43^\circ}{\sin 81^\circ} = b$$

**Step 5: Calculate the value of  $b$**

$$\frac{10 \sin 43^\circ}{\sin 81^\circ} = \frac{10 \times 0.682}{0.988} = \frac{6.82}{0.988} = 6.9 = b$$

The length of side  $b$  is therefore

$$b = 6.9$$