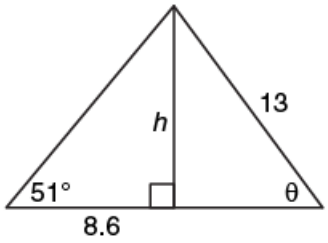
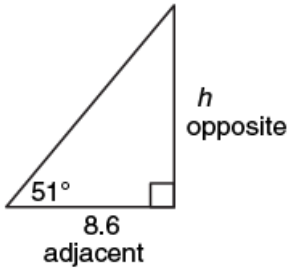
Multiple Step Problems

1. Determine the measure of angle θ, to the nearest degree.



Step 1: Create a plan.
To solve for θ, find h first.

Step 2: Solve for side length h.



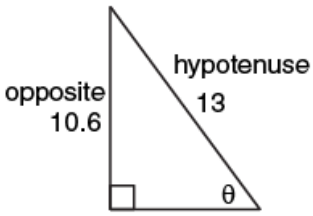
$$\tan\theta = \frac{opp}{adj}$$

$$\tan 51° = \frac{h}{8.6}$$

$$8.6 \times \tan 51° = \frac{h}{\cancel{8.6}} \times \cancel{8.6}$$

$$10.6 = h$$

Step 3: Solve for θ.



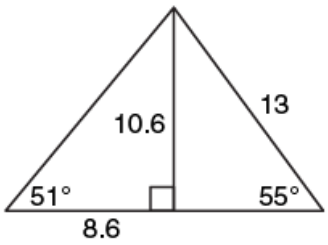
$$\sin\theta = \frac{opp}{hyp}$$

$$\sin\theta = \frac{10.6}{13}$$

$$\theta = \sin^{-1}\left(\frac{10.6}{13}\right)$$

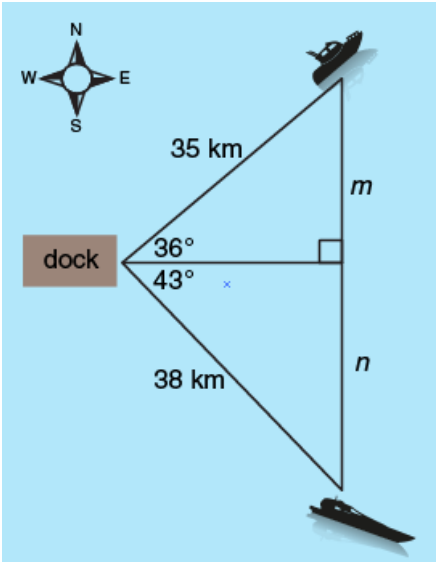
$$\theta = 55°$$

The measure of angle θ is 55°.



2. Two boats leave the dock at the same time. One boat travels 35 km at an angle of 36° north of east. The other boat travels 38 km at an angle of 43° south of east. How far apart are the boats?

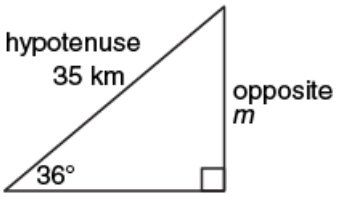
Step 1: Begin by sketching a diagram to represent the situation.



Step 2: Create a plan.

Let m represent the distance from boat 1 to the horizontal and let n represent the distance from boat 2 to the horizontal. The distance between the boats will be the sum of m and n. Both m and n can be determined using the sine ratio.

Step 3: Solve for m.



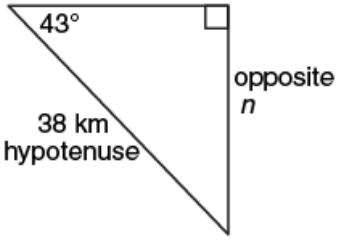
$$\sin\theta = \frac{opp}{hyp}$$

$$\sin 36° = \frac{m}{35\ km}$$

$$35\ km \times \sin 36° = \frac{m}{\cancel{35\ km}} \times \cancel{35\ km}$$

$$20.6\ km = m$$

Step 4: Solve for n.



$$\sin\theta = \frac{opp}{hyp}$$

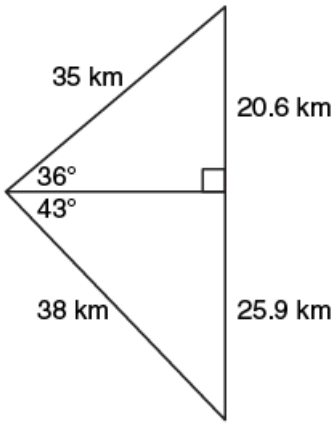
$$\sin 43° = \frac{n}{38\ km}$$

$$38\ km \times \sin 43° = \frac{n}{\cancel{38\ km}} \times \cancel{38\ km}$$

$$25.9\ km = n$$

Step 5: Complete the calculation required to answer the question asked.

The total distance between the boats can be calculated by adding m and n.



distance = m + n
= 20.6 km + 25.9 km
= 46.5 km

The two boats are 46.5 km apart.