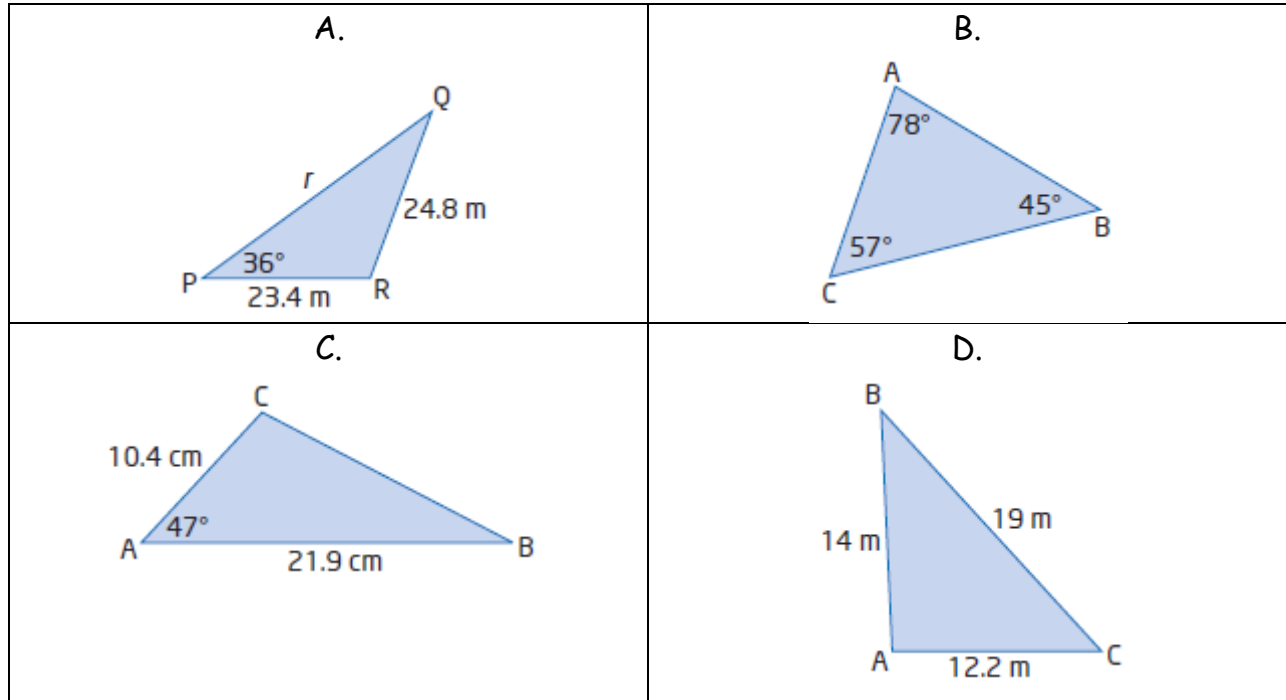


### Cosine Law Practice

Use the following information to answer the first question.



1. The Cosine Law could be applied in diagrams

A) A and B

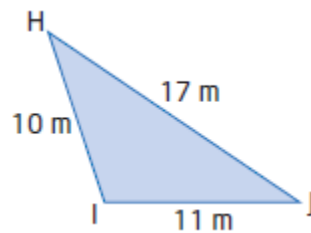
B) C and D

C) A and C

D) B and D

Use the following information to answer the next question

Suppose you are asked to determine the measure of angle H in the diagram below.



2. Which of the following equations would correctly lead to finding angle H?

A)  $\cos H = \frac{11^2 + 10^2 - 17^2}{2(11)(10)}$

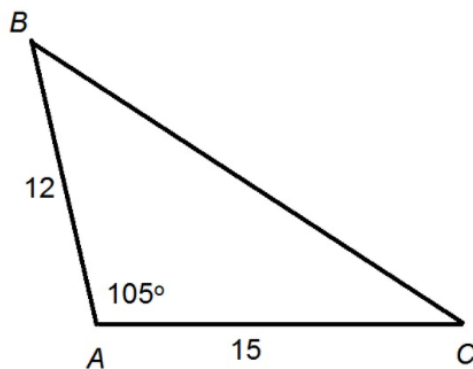
B)  $\cos H = \frac{11^2 + 17^2 - 10^2}{2(11)(17)(10)}$

C)  $\cos H = \frac{10^2 + 17^2 - 11^2}{2(10)(17)}$

D)  $\cos H = \frac{10^2 + 17^2 - 11^2}{2(10)(17)(11)}$

Use the following information to answer the next question.

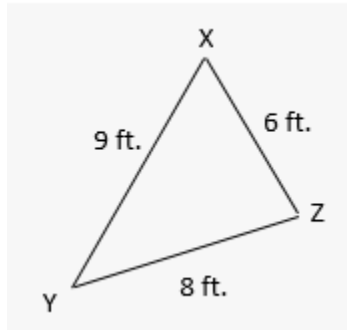
When Jenny was asked to determine the third side in the triangle below.



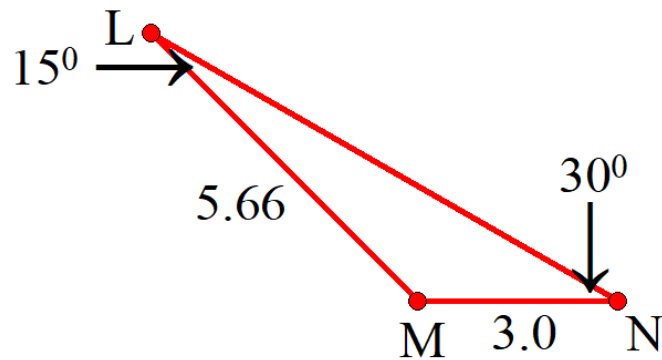
3. To the nearest tenth, her answer could be written in the form MN.K , where M, N, and K are integers. The values for M, N, and K, respectively, are \_\_\_\_, \_\_\_\_, and \_\_\_\_.

Use the following information to answer the next question.

Consider the triangle below.



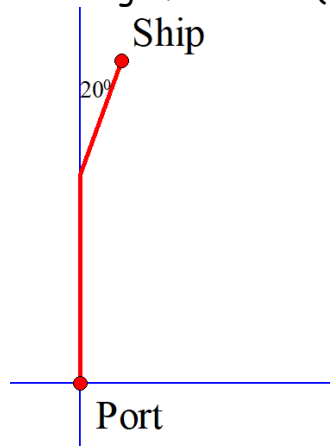
4. The measure of angle X, to the nearest degree, is  
A)  $52^\circ$       B)  $56^\circ$       C)  $61^\circ$       D)  $65^\circ$
5. Determine the length of LN, to the nearest  $10^{\text{th}}$ .



6. If  $AC = 10$  cm,  $BC = 9$  cm and  $\angle C = 48^\circ$ , solve triangle  $ABC$ . Give angles to the nearest degree and sides to the nearest tenth.

Use the following information to answer the next question.

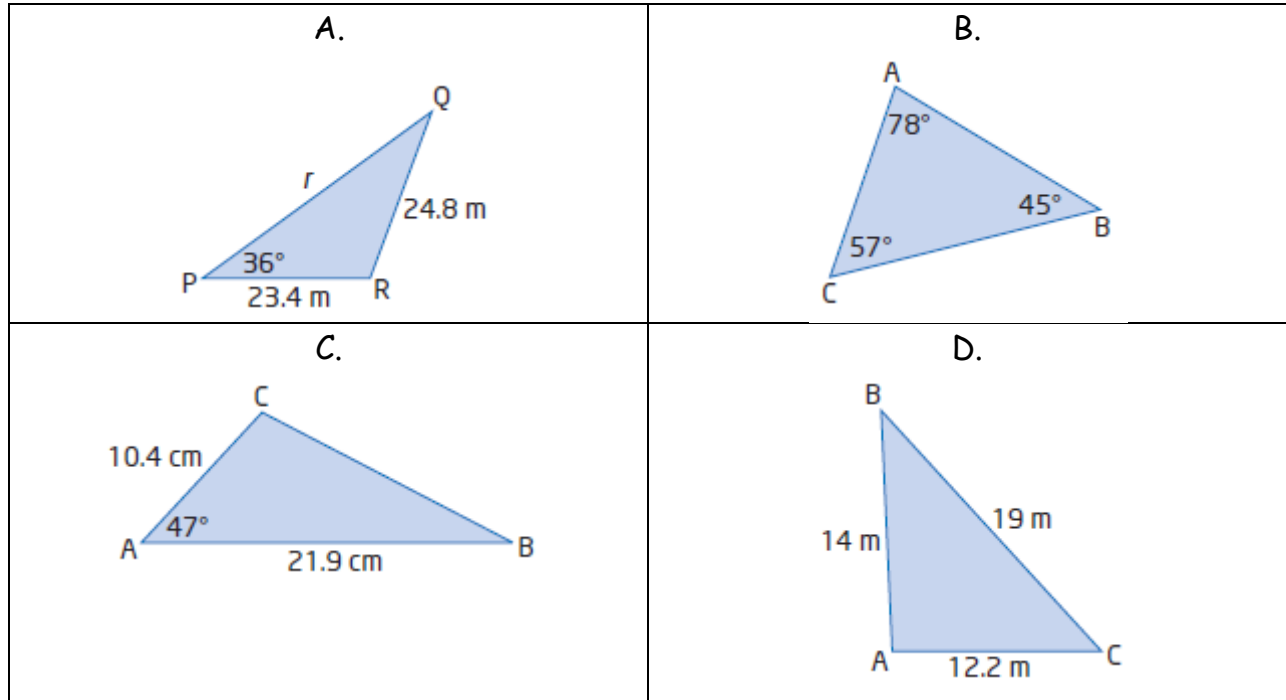
A ship leaves port at 1 pm travelling north at a speed of 30 miles/hour. At 3 pm, the ship adjusts its course on a bearing of  $N 20^\circ E$  (as shown below).



7. How far is the ship, to the nearest tenth of a mile, from the port at 4 pm?

## Cosine Law Practice Solutions

Use the following information to answer the first question.



1. The Cosine Law could be applied in diagrams

A) A and B

B) C and D

C) A and C

D) B and D

### Solution

The cosine is useful when an angle and the two contained sides are given, and when all 3 sides are given.

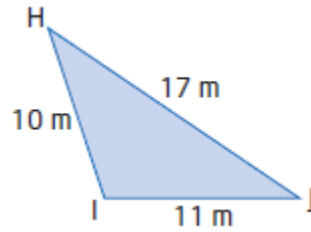
In diagram C, there is an angle of  $47^\circ$  and the two contained sides of 10.4 cm and 21.9 cm. With this information, it is possible to solve for the length of side CB.

In diagram D, all 3 sides are given. With this information, any one of the angles can be determined.

The correct answer is B.

Use the following information to answer the next question

Suppose you are asked to determine the measure of angle H in the diagram below.



2. Which of the following equations would correctly lead to finding angle H?

- A)  $\cos H = \frac{11^2 + 10^2 - 17^2}{2(11)(10)}$
- B)  $\cos H = \frac{11^2 + 17^2 - 10^2}{2(11)(17)(10)}$
- C)  $\cos H = \frac{10^2 + 17^2 - 11^2}{2(10)(17)}$  **Answer**
- D)  $\cos H = \frac{10^2 + 17^2 - 11^2}{2(10)(17)(11)}$

### Solution

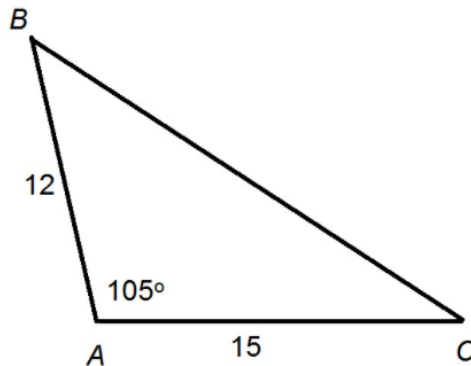
Be mindful of the relationship between an angle and the side **opposite** the angle. The squared side that is *subtracted* in the formula, is opposite the angle we are trying to find. The side opposite angle H is 11 m.

The denominator in the formula has 2 multiplied by the two sides between angle H.

The correct answer is C.

Use the following information to answer the next question.

When Jenny was asked to determine the third side in the triangle below.



3. To the nearest tenth, her answer could be written in the form MN.K , where M, N, and K are integers. The values for M, N, and K, respectively, are 2, 1, and 5.

**Solution**

$$(BC)^2 = (12)^2 + (15)^2 - 2(12)(15)\cos 105^\circ$$

$$(BC)^2 = 144 + 225 - (-93.1748\dots)$$

$$(BC)^2 = 462.1748\dots$$

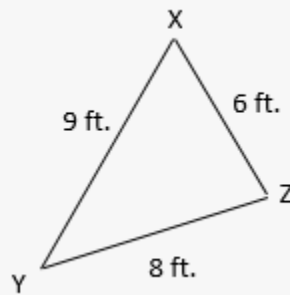
Take the square root of both sides.

$$BC = 21.5$$

The values for M, N, and K, respectively, are 2, 1, and 5.

Use the following information to answer the next question.

Consider the triangle below.



4. The measure of angle X, to the nearest degree, is

A)  $52^\circ$

B)  $56^\circ$

C)  $61^\circ$

D)  $65^\circ$

**Solution**

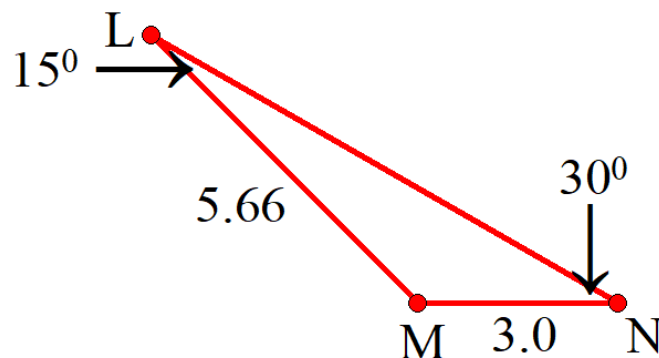
$$\cos x = \frac{9^2 + 6^2 - 8^2}{2(9)(6)}$$

$$\cos x = \frac{53}{108}$$

$$\cos^{-1}(53/108) = 60.61^\circ$$

The correct answer is C.

5. Determine the length of LN, to the nearest  $10^{\text{th}}$ .





### Solution

The measure of angle  $M$  is needed. Use the fact that the 3 angles in every triangle add to  $180^\circ$  to find angle  $M$ .

$$180^\circ - (15^\circ + 30^\circ) = 135^\circ.$$

$$(LN)^2 = (5.66)^2 + (3)^2 - 2(5.66)(3) \cos 135^\circ$$

$$(LN)^2 = 32.0356 + 9 - (-24.0133\dots)$$

$$(LN)^2 = 65.0489\dots$$

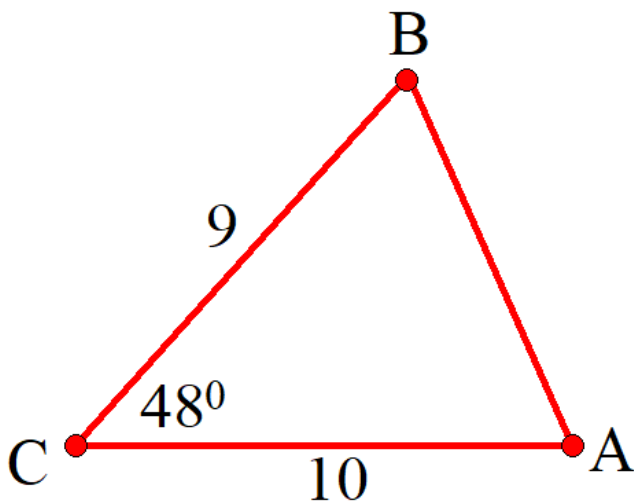
Take the square root of both sides.

$$LN = 8.06529\dots$$

The length of  $LN$  to the nearest tenth is 8.1 units.

6. If  $AC = 10$  cm,  $BC = 9$  cm and  $\angle C = 48^\circ$ , solve triangle  $ABC$ . Give angles to the nearest degree and sides to the nearest tenth.

To solve means to find lengths of all sides and measures of all angles.



$$(BA)^2 = 9^2 + 10^2 - 2(9)(10)\cos 48^\circ$$

$$(BA)^2 = 81 + 100 - 120.44\dots$$

$$(BA)^2 = 60.55\dots$$

$$BA = 7.78\dots$$

$$BA = 7.8 \text{ cm}$$

Now we can find the measure of either angle A or angle B.

I will choose angle A, for no particular reason.

$$\cos A = \frac{(7.78\dots)^2 + (10)^2 - 9^2}{2(7.78\dots)(10)}$$

$$\cos A = \frac{79.55\dots}{155.63\dots}$$

$$\cos A = 0.511\dots$$

$$\cos^{-1}(0.511\dots) = 59.3^\circ$$

Angle A is  $59^\circ$ .

Use the fact that the sum of all the angles in a triangle is  $180^\circ$  to find angle B.

$$180^\circ - (48^\circ + 59^\circ) = 73^\circ.$$

The final answer is:

$$\angle A = 59^\circ$$

$$\angle B = 73^\circ$$

$$\angle C = 48^\circ$$

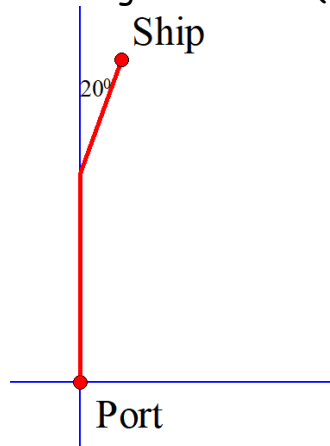
$$AC = 10 \text{ cm}$$

$$BC = 9 \text{ cm}$$

$$BA = 7.8 \text{ cm}$$

Use the following information to answer the next question.

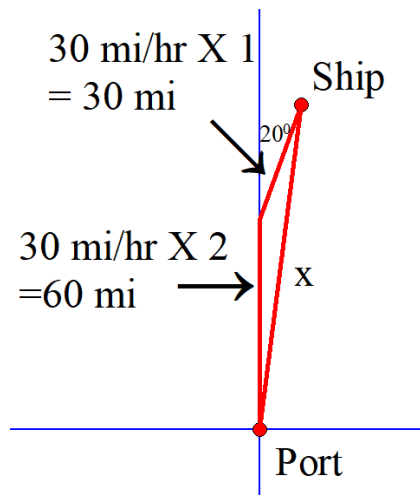
A ship leaves port at 1 pm travelling north at a speed of 30 miles/hour. At 3 pm, the ship adjusts its course on a bearing of  $N 20^\circ E$  (as shown below).

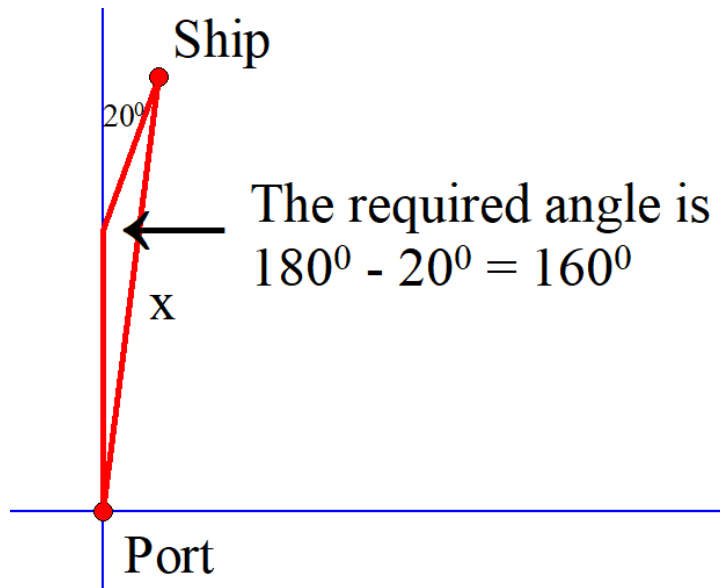


7. How far is the ship, to the nearest tenth of a mile, from the port at 4 pm?

**Solution**

Create a triangle. We know that two of the side lengths are 60 mi and 30 mi.





$$x^2 = (60)^2 + (30)^2 - 2(60)(30)\cos 160^\circ$$

$$x^2 = 4500 - (-3382.89\dots)$$

$$x^2 = 7882.89\dots$$

$$x = 88.7856\dots$$

At 4 pm, the ship is 88.8 mi from the port.