

Lesson Plan

Grade 10 Academic Math

Lesson: 7 - 7

Unit: Trigonometry

Topic: Solving Triangle Problems

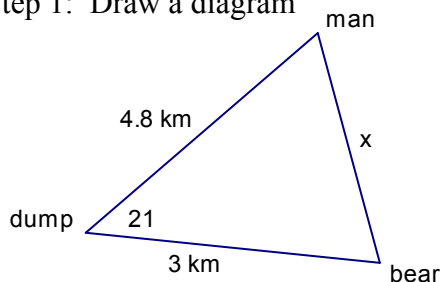
✚ **homework check:** Principles of Mathematics 10 p. 443 # 2 – 5, 11

✚ **note:** Solving Triangle Problems

Many real world problems can be modeled with triangles and solved with either right angle trig or the sine law or cosine law. It is important that you decide the correct process as well as the correct triangle. If a triangle is right, we use SOH CAH TOA to solve for the unknown. If a triangle is oblique (non-right angled), we must use either sine law or cosine law. Once the type of triangle is identified, we must decide what law to use. If we have a complete pair of side and angle, we use sine law. If we have a SAS or SSS situation, we use cosine law. For example,

- a) A bear is 3 km from the town dump. A man is 4.8 km from the dump and needs to dump his garbage but is afraid of bears. If the angle at the dump is 21 degrees, how far apart are the man and the bear?

Step 1: Draw a diagram



Step 2: Is the triangle right or oblique? Which rule will be used?

Step 3: Find your unknown.

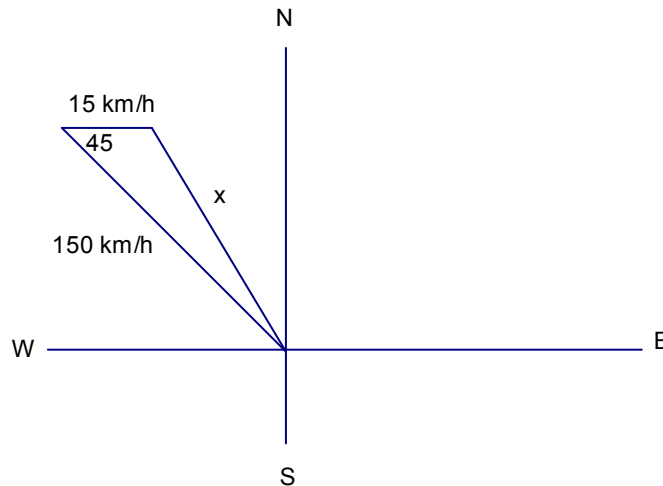
$$c^2 = 3^2 + 4.8^2 - 2 \times 3 \times 4.8 \cos 21$$

$$c^2 = \sqrt{3^2 + 4.8^2 - 2 \times 3 \times 4.8 \cos 21}$$

$$c = 2.3 \text{ km}$$

- b) A plane travels 150km/h N45W. The wind blows from the west at 15km/h. Find the overall velocity of the plane and the direction of travel.

Step 1: Draw a diagram



Step 2: Is the triangle right or oblique? Which rule will be used?

Step 3: Find your unknown speed.

$$c^2 = 15^2 + 150^2 - 2 \times 15 \times 150 \cos 45$$

$$c = \sqrt{15^2 + 150^2 - 2 \times 15 \times 150 \cos 45}$$

$$c = 139.8 \text{ km/h}$$

Step 4: Find your unknown direction.

$$\frac{\sin 45}{139.8} = \frac{\sin y}{15}$$

$$\frac{15 \sin 45}{139.8} = \sin y$$

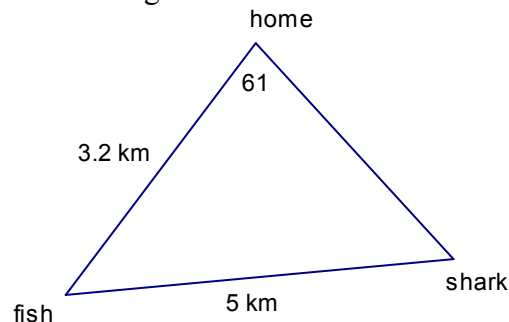
$$y = \sin^{-1} \left[\frac{15 \sin 45}{139.8} \right]$$

$$y = 4.4^\circ$$

Over all angle is $45 + 4.4 = 49.4^\circ$, meaning that the plane is flying W 49.4° N

c) A fish is swimming. He is 3.2 km from home and 5 km from a huge shark. If the angle at home is 61 degrees, how far is the shark from reaching the fish home?

Step 1: Draw a diagram.



Step 2: Is the triangle right or oblique? Which rule will be used?

Step 3: Find your unknown distance.

$$\frac{\sin 61}{5} = \frac{\sin \text{shark}}{3.2}$$

$$\frac{3.2 \sin 61}{5} = \sin \text{shark}$$

$$\text{shark} = \sin^{-1} \left(\frac{3.2 \sin 61}{5} \right)$$

$$\text{shark} = 34.0^\circ$$

$$\text{angle at fish} = 180 - 61 - 34 = 85$$

distance shark is from fish home:

$$\frac{\sin 61}{5} = \frac{\sin 85}{x}$$

$$x = \frac{5 \sin 85}{\sin 61}$$

$$x = 5.7 \text{ km}$$

Therefore the shark is only 5.7 km from the fish home.

■ note: Principles of Mathematics 10 p. 450 # 3 – 6, 10, 13, 14