Course: MFM2P Gr. 10 Applied **Lesson: 2 - 4**

Unit: Right Triangle Trigonometry **Topic: Sine and Cosine Ratio in Right Triangles**

- ***homework check:*** **Lesson 2 - 3**

- ***note:*** **Sine and Cosine Ratio in Right Triangles**

The sine and cosine ratios in a right triangle allow us to determine any missing angle measures. The sine ratio compares the length of the opposite side to the hypotenuse side

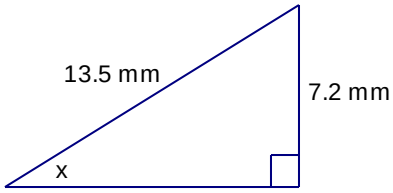
$$\sin x = \frac{length\ of\ \ opposite\ side}{length\ of\ \ hypotenuse\ side}$$

The cosine ratio compares the length of the adjacent side to the hypotenuse side.

$$\cos x = \frac{length\ of\ \ adjacent\ \ side}{length\ of\ \ hypotenuse\ side}$$

Whenever we use the ratios to find an angle, we rely on our scientific calculator and the inverse operation. For example, find the unknown angle:

a)



Step 1: identify sides
Step 2: identify ratio
Step3: solve for unknown angle

$$\sin x = \frac{opposite}{hypotenuse}$$

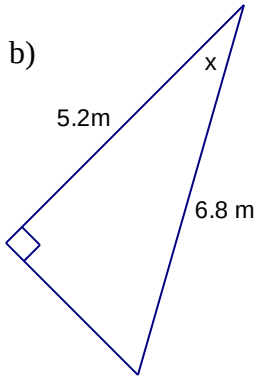
$$\sin x = \frac{7.2}{13.5}$$

$$\sin x = 0.5333$$

$$x = \sin^{-1} 0.5333$$

$$x = 32.2°$$

b)



Step 1: identify sides
Step 2: identify ratio
Step3: solve for unknown angle

$$\cos x = \frac{adjacent}{hyporenuse}$$

$$\cos x = \frac{5.2}{6.8}$$

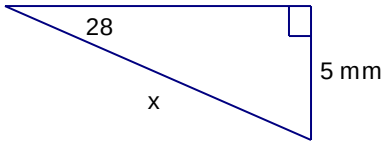
$$\cos x = 0.7647$$

$$x = \cos^{-1} 0.7647$$

$$x = 40.1°$$

These same ratios can also be used with an angle to find a missing side. For example,

c)



Step 1: identify sides
Step 2: identify ratio
Step3: solve for unknown side

$$\sin x = \frac{opposite}{hypotenuse}$$

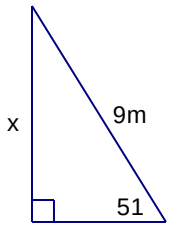
$$\sin 28 = \frac{5}{x}$$

$$x \sin 28 = 5$$

$$x = \frac{5}{\sin 28}$$

$$x = 10.7 mm$$

d)



Step 1: identify sides
Step 2: identify ratio
Step3: solve for unknown side

$$\sin x = \frac{opposite}{hypotenuse}$$

$$\sin 51 = \frac{x}{9}$$

$$9 \sin 51 = x$$

$$x = 7.0m$$

- ***homework assignment:*** **<u>Lesson 2 - 4</u>**

MFM 2P Mrs. Roen Name: _____

Lesson 2 – 4: Sine and Cosine ratios

1. Use your calculator to find each value to fours decimal places.

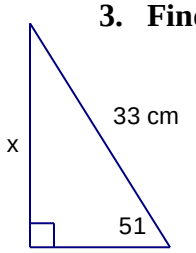
a) $\sin 42° =$ **b)** $\sin 33° =$ **c)** $\cos 19° =$ **d)** $\cos 75° =$

2. Use your calculator to find angle A.

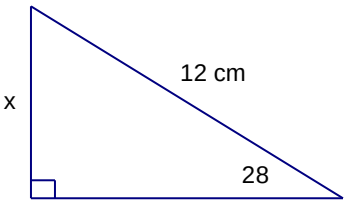
a) $\sin A = 0.6092$ **b)** $\cos A = 0.4067$ **c)** $\sin A = 0.2861$ **d)** $\cos A = 0.7193$

3. Find the unknown to the nearest tenth.

a)

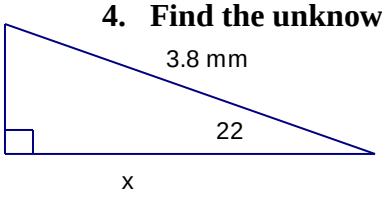


b)

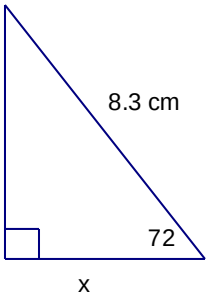


4. Find the unknown to the nearest tenth.

a)

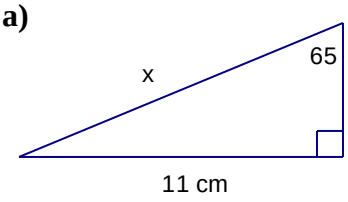


b)

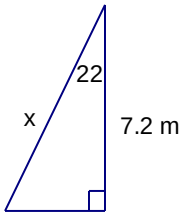


5. Find the unknown to the nearest tenth.

a)

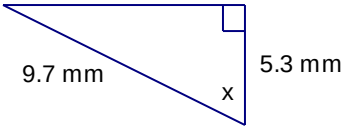


b)

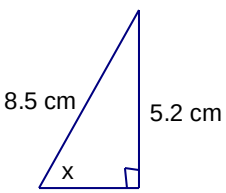


6. Find the unknown to the nearest tenth.

a)



b)



7. Find the unknown to the nearest tenth.

a) In triangle XYZ, $\measuredangle X = 90°, \measuredangle Z = 51°,$ and $XY = 15cm$**. Find the length of YZ. Sketch a diagram as part of your solution.**

b) In triangle PQR, $\measuredangle P = 90°, \measuredangle R = 33°,$ and $\text{QR} = 13.4cm$**. Find PQ and sketch a diagram as part of your solution.**

8. Hannah makes a lean-to shelter against a tree. She uses a plank that is 2.1 m long and wants an angle of 45 degrees with the ground. How far should the plank be from the tree? A sketch will be part of your solution.

9. Hal uses a tree as the back of his fort and a tree branch that approaches the ground as the roof. If the tree branch hits the ground 2m from the tree and is 6m in length, what angle does the branch make with the tree? A sketch will be part of the solution.

10. A caretaker uses a 10 foot ladder to reach 8 feet up the wall. What is the angle made with the floor? A sketch will be part of your solution.