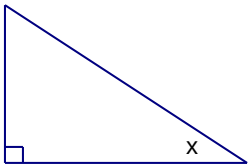
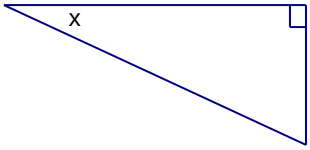
Teacher: **Mrs. Roen** *Unit:* **Trigonometry**

Course: **MAP 4C** *Lesson:* **1-2 Right Angle Trigonometry**

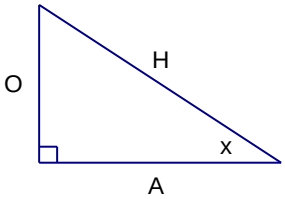
- ***Homework:*** Proportions and Pythagorean Theorem booklet
- ***Note:*** **Right Angle Trigonometry**

Recall naming sides in a right angled triangle depends on the location of the angle. For example, name the sides of each of the following triangles using adjacent (A), opposite (O) or hypotenuse (H).

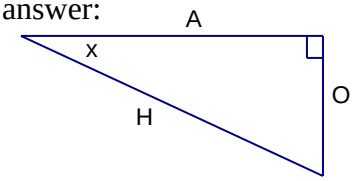




answer:



answer:

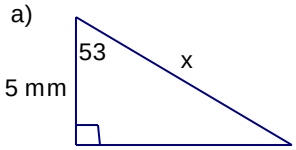


We use SOH CAH TOA to help us remember how to use trigonometry to solve right angled triangles.

$$\sin x = \frac{Opposite}{Hypotenuse} \qquad \cos x = \frac{Adjacent}{Hypotenuse} \qquad \tan x = \frac{Opposite}{Adjacent}$$

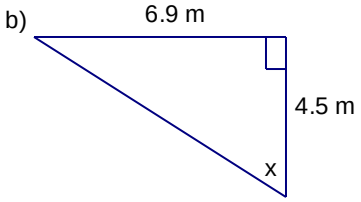
For example, solve each of the following triangles for the unknown side or angle.

a)



$$\cos x = \frac{A}{H}$$
$$\cos 53 = \frac{5}{x}$$
$$x \cos 53 = 5$$
$$x = \frac{5}{\cos 53}$$
$$x = 8.3mm$$

b)



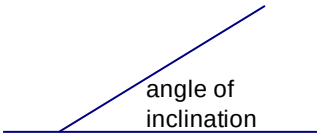
$$\tan x = \frac{O}{A}$$

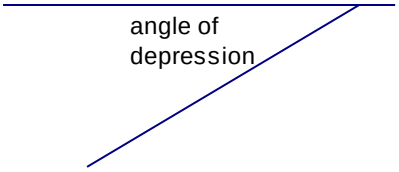
$$\tan x = \frac{6.9}{4.5}$$

$$x = \tan^{-1}\left(\frac{6.9}{4.5}\right)$$

$$x = 56.9°$$

Sometimes word problems are used to describe scenarios that need a picture that is represented by a right angle triangle. Important words needed include angle of inclination and angle of depression as represented in the diagrams below.

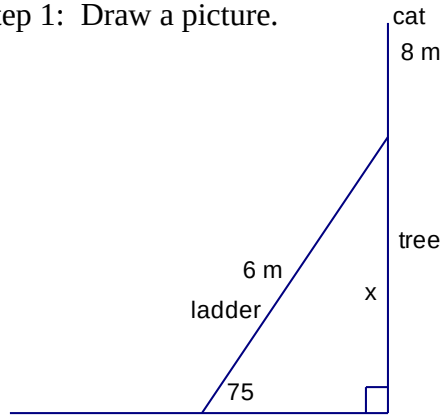




*Note that both of these angles are measured from the horizontal. It is important to find a way to remember how they are constructed. Incline means upwards while depression tends to mean downward as in a depressing mood.

c) A man needs a ladder in order to get his cat from a tree. The ladder is only 6m but he thinks the cat is 8m high in the tree. He knows he must have an angle of inclination of at least 75 degrees in order for the ladder to be safe. Can he reach the cat?

Step 1: Draw a picture.



Step 2: Identify ratio needed.

Step 3: Solve problem.

$$\sin x = \frac{O}{H}$$

$$\sin 75 = \frac{x}{6}$$

$$6\sin 75 = x$$

$$5.8m = x$$

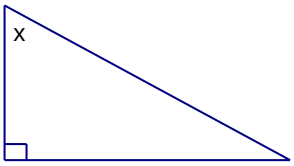
The ladder reaches 5.8 m up the tree. 8 – 5.8 = 2.2 m meaning he probably cannot reach the cat.

Homework: **1-2 Right Angle Trigonometry**

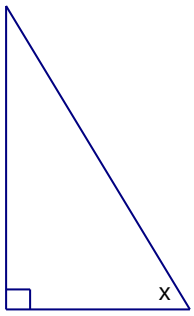
Lesson: <u>1-2 Right Angle Trigonometry</u>

1. Label the sides of each triangle according to angle x given. Use O for opposite, A for adjacent, and H for hypotenuse. **(3 marks each)**

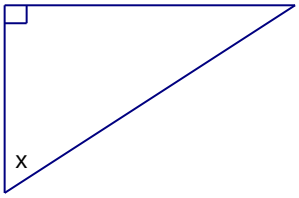
a)



b)

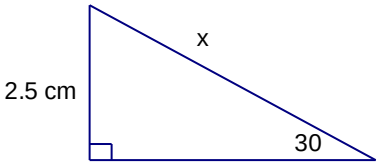


c)

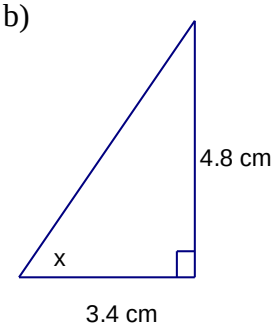


2. Use right triangle trigonometry to solve for the unknown side or angle. **(3 marks each)**

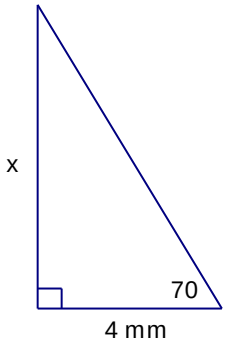
a)



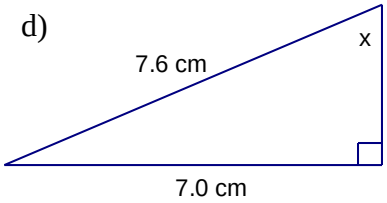
b)



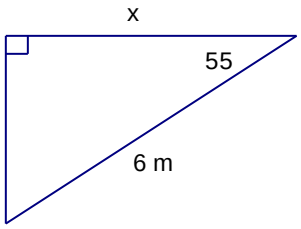
c)



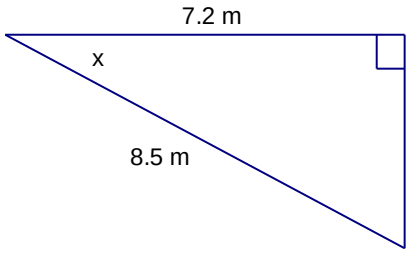
d)



e)



f)



3. Amy can see her bike laying on the ground in her driveway from her second storey window. If she is 5m above the ground and she looks down at her bike at an angle of depression of 60 degrees, how far from her house is the bike? *Include a diagram as part of your answer. **(4 marks)**

4. Mark threw his Frisbee up into a tree. If he is going to retrieve it, he needs to place the ladder at a safe angle with the ground of at least 70 degrees. He knows that the ladder is 3 metres long. How high up can the ladder safely reach? *Include a diagram as part of your answer. **(4 marks)**