

Lesson 3.2: The Sine and Cosine Ratios

Specific Outcome: 4.1 – Explain the relationships between similar triangles and the definitions of the primary trig ratios. 4.2 – Identify the hypotenuse of a right triangle and the opposite and adjacent sides for a given acute angle in the triangle. 4.4 – Solve a problem that involves one or more right triangles by applying the primary trig ratios or the Pythagorean theorem.

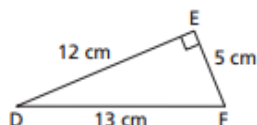
In a right triangle, the 2 ratios that relate each leg (side) to the hypotenuse depend only on the measure of the acute angle. These two ratios are called the **sine ratio** and the **cosine ratio**.

SINE AND COSINE RATIOS

- The *sine ratio* is: $\frac{\text{the measure of the opposite side}}{\text{the measure of the hypotenuse}}$ OR $\sin A = \frac{o}{h}$
- The *cosine ratio* is: $\frac{\text{the measure of the adjacent side}}{\text{the measure of the hypotenuse}}$ OR $\cos A = \frac{a}{h}$
- Tangent, sine and cosine* are called the **primary trigonometric ratios**.

DETERMINING SINE AND COSINE RATIOS OF AN ANGLE

- a) In $\triangle DEF$, identify the side opposite $\angle D$ and the side adjacent to $\angle D$.



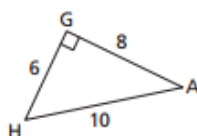
- b) Determine $\sin D$ and $\cos D$ to the nearest hundredth.

Practice:

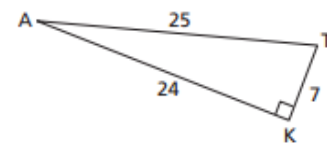
- a) In each triangle below:

- Name the side opposite $\angle A$.
- Name the side adjacent to $\angle A$.
- Name the hypotenuse.

i)



ii)

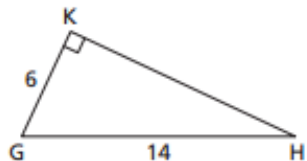


- b) For each triangle in part a, determine $\sin A$ and $\cos A$ to the nearest hundredth.

USING SINE OR COSINE TO DETERMINE MEASURES OF ANGLES

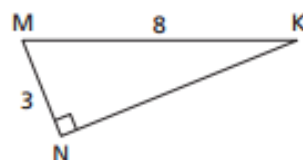
- Remember: to find the measures of angles, we use the **inverses** of sine and cosine ($\sin^{-1}$, $\cos^{-1}$)

Determine the measures of $\angle G$ and $\angle H$ to the nearest degree.

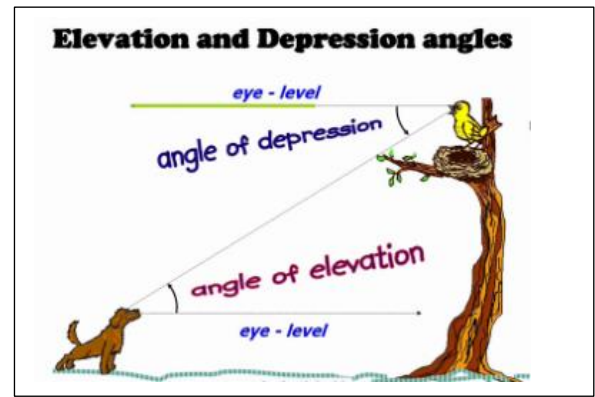
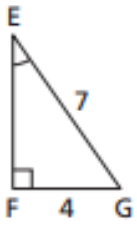


Practice:

1. Determine the measure of $\angle K$ and $\angle M$ to the nearest tenth of a degree.



2. Determine the measure of $\angle G$ and $\angle E$ to the nearest degree.



Problem Solving:

1. A water bomber is flying at an altitude of 5000 ft. The plane's radar shows that it is 8000 ft. from the target site. What is the ***angle of elevation*** of the plane measured from the target site, to the nearest degree?
2. An observer is sitting on a dock watching a float plane in Vancouver harbor. At a certain time, the plane is 300 m above the water and 430 m from the observer. Determine the ***angle of elevation*** of the plane measured from the observer, to the nearest tenth of a degree.
3. A set of stairs has a horizontal distance of 5.0 m. The distance from the top of the stairs to the bottom of the stairs is 6.9 m. The angle, to the nearest degree, between the stairs and the floor is _____.

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