

Example 1 Write Trigonometric Ratios

Write each trigonometric ratio.

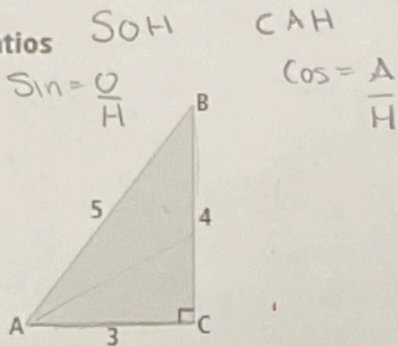
- a) $\sin A$ b) $\cos A$
 c) $\sin B$ d) $\cos B$

$$\begin{aligned} \text{a) } \sin A &= \frac{O}{H} \\ &= \frac{4}{5} \end{aligned}$$

$$\begin{aligned} \text{b) } \cos A &= \frac{A}{H} \\ &= \frac{3}{5} \end{aligned}$$

$$\begin{aligned} \text{c) } \sin B &= \frac{O}{H} \\ &= \frac{3}{5} \end{aligned}$$

$$\begin{aligned} \text{d) } \cos B &= \frac{A}{H} \\ &= \frac{4}{5} \end{aligned}$$



Example 2 Evaluate Trigonometric Ratios

The **primary trigonometric ratios** and their inverses can be evaluated using technology.

- a) Evaluate each ratio, to four decimal places.
 $\sin 42^\circ$ $\cos 68^\circ$
- b) Determine each angle measure, to the nearest degree.
 $\sin \theta = 0.4771$ $\cos \beta = 0.7225$

$$\text{a) } \sin 42 = 0.6691$$

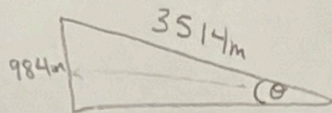
$$\cos 68 = 0.3746$$

$$\begin{aligned} \text{b) } [\sin \theta = 0.4771]^{-1} \\ \theta = 28^\circ \end{aligned}$$

$$\begin{aligned} \cos \beta = 0.7225 \\ \beta = 44^\circ \end{aligned}$$

Example 3 Determine an Angle Using a Trigonometric Ratio

In the World Cup Downhill held at Panorama Mountain Village in British Columbia, the skiers raced 3514 m down the mountain. If the vertical height of the course was 984 m, determine the average angle of the ski course with the ground. Express your answer to the nearest tenth of a degree.



Opp, Hyp

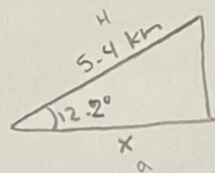
$$\begin{aligned} \sin \theta &= \frac{O}{H} \\ \sin \theta &= \frac{984}{3514} \end{aligned}$$

$$\sin^{-1} \left(\frac{984}{3514} \right) = \theta$$

$$\theta = 16.3^\circ$$

Example 4 Determine a Distance Using a Trigonometric Ratio

A pilot starts his takeoff and climbs steadily at an angle of 12.2° . Determine the horizontal distance the plane has travelled when it has climbed 5.4 km along its flight path. Express your answer to the nearest tenth of a kilometre.



$$\cos \theta = \frac{A}{H}$$

$$\cos 12.2 = \frac{x}{5.4}$$

$$5.4 (\cos 12.2) = x$$

$$x = 5.27$$

$$x = 5.3 \text{ km.}$$

