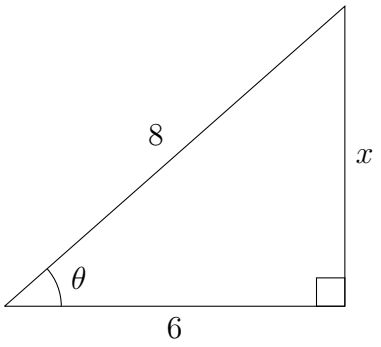
Trig Exact from Exact

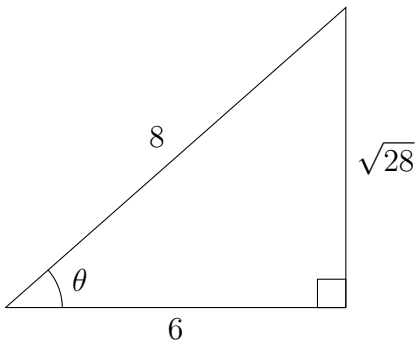
Example Problems

EXAMPLE 1: Given that $\cos(\theta) = \frac{5}{8}$, find the exact value of $\sin(\theta)$.
SOLUTION: Since we know that cos is the ratio between the adjacent and hypotenuse, we can draw a triangle that represents the question.



Now that this triangle has been drawn, we can see that despite not knowing the size of the angle θ we can find the length of the missing side using Pythagoras' theorem,

$$\begin{aligned} x^2 &= 8^2 - 6^2, \\ x^2 &= 28, \\ x &= \sqrt{28}. \end{aligned}$$



Now we have the length of both the opposite side and hypotenuse, we can calculate the exact value of $\sin(\theta)$,

$$\sin(\theta) = \frac{\sqrt{28}}{8}.$$

Question Bank

1. For each of the given trig ratios, find the **exact value** of the second ratio.

   a) If $\cos(\alpha) = \frac{3}{5}$, find $\tan(\alpha)$.

   b) If $\sin(\phi) = \frac{2}{13}$, find $\cos(\phi)$.

   c) If $\tan(\theta) = \frac{15}{4}$, find $\cos(\theta)$.

   d) If $\sin(\alpha) = \frac{21}{24}$, find $\cos(\alpha)$.

   e) If $\cos(x) = \frac{15}{22}$, find $\tan(x)$.

   f) If $\tan(A) = \frac{12}{47}$, find $\sin(A)$.

   g) If $\cos(\beta) = \frac{13}{45}$, find $\sin(\beta)$.

   h) If $\sin(y) = \frac{105}{343}$, find $\sin(y)$.

   i) If $\sin(X) = 0.125$, find $\cos(X)$.

   j) If $\cos(Y) = 0.144$, find $\tan(Y)$.

   k) If $\tan(C) = 5$, find $\sin(C)$.

   l) If $\tan(B) = 12$, find $\cos(B)$.

Answers

1.