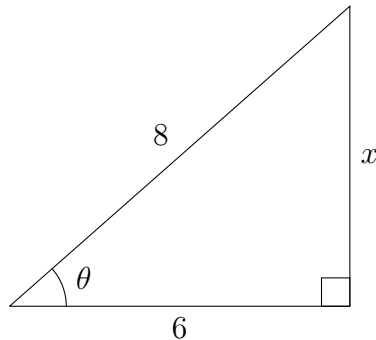


Trig Exact from Exact

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.

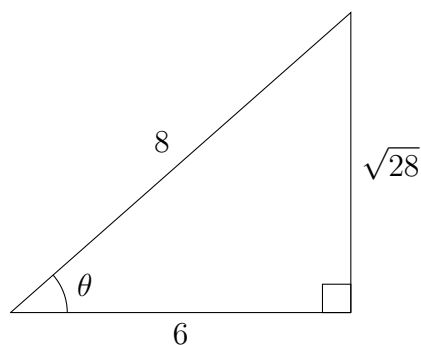


Now that this triangle has been drawn, we can see that despite not knowing the size of the angle θ we can find the length of the missing side using Pythagoras' theorem,

$$x^2 = 8^2 - 6^2,$$

$$x^2 = 28,$$

$$x = \sqrt{28}.$$



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 $\sin(\phi) = \frac{5}{13}$, 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 $\cos(y)$.
- i) If $\sin(X) = 0.125$, find $\cos(X)$.
- j) If $\cos(Y) = 0.68$, find $\tan(Y)$.
- k) If $\tan(C) = 5$, find $\sin(C)$.
- l) If $\tan(B) = 12$, find $\cos(B)$.

Answers

1. a) $\frac{4}{3}$
b) $\frac{12}{13}$
c) $\frac{4}{\sqrt{241}}$
d) $\frac{\sqrt{135}}{24}$ or $\frac{\sqrt{15}}{8}$
e) $\frac{\sqrt{259}}{15}$
f) $\frac{12}{\sqrt{2353}}$

- g) $\frac{\sqrt{1856}}{45}$ or $\frac{8\sqrt{29}}{45}$
h) $\frac{\sqrt{106624}}{343}$ or $\frac{8\sqrt{34}}{49}$
i) $\frac{\sqrt{63}}{8}$ or $\frac{3\sqrt{7}}{8}$
j) $\frac{\sqrt{336}}{25}$ or $\frac{4\sqrt{21}}{25}$
k) $\frac{5}{\sqrt{26}}$
l) $\frac{1}{\sqrt{145}}$