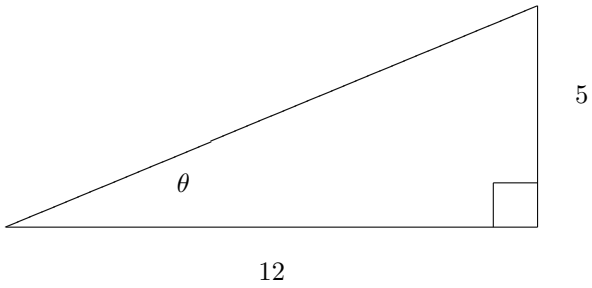
1 *Consider this right triangle, with a positive angle θ and lengths as marked:*



a *What is the length of the unlabelled side?*

Using the Pythagorean Theorem, it's

$$\sqrt{5^2 + 12^2} = 13.$$

b *What is* $\sin\theta$*?*

It's the ratio of the opposite leg to the hypotenuse:

$$\sin\theta = \frac{5}{13}.$$

2 *Suppose that θ is an angle such that*

- $\sin\theta = \dfrac{1}{2}$ *and*
- $\cos\theta = \dfrac{\sqrt{3}}{2}$.

What is $\cot\theta$*? Either draw a diagram or show a calculation before the final answer.*

If I use a diagram, then the hypotenuse is 2, the opposite leg is 1, and the adjacent leg is $\sqrt{3}$. Then the cotangent is

$$\cot\theta = \frac{\sqrt{3}}{1} = \sqrt{3}.$$

Alternatively, I can use a formula:

$$\cot\theta = \frac{\cos\theta}{\sin\theta} = \frac{\sqrt{3}/2}{1/2} = \sqrt{3}.$$

3 *Suppose that θ is an acute angle such that* $\sec\theta = 3$.

a *What is* $\cos\theta$*?*

The cosine and the secant are reciprocals:

$$\cos\theta = \frac{1}{\sec\theta} = \frac{1}{3}.$$

b *What is* $\sin\theta$*? Either draw a diagram or show a calculation before the final answer.*

If I use a diagram, then the hypotenuse is 3 and the adjacent leg is 1, so the oppose leg is $\sqrt{3^2 - 1^2} = 2\sqrt{2}$. Then the sine is

$$\sin\theta = \frac{2\sqrt{2}}{3}.$$

Alternatively, I can use a formula:

$$\sin\theta = \sqrt{1 - \cos^2\theta} = \sqrt{1 - \left(\frac{1}{3}\right)^2} = \frac{2\sqrt{2}}{3}.$$