

# Sine and Cosine Rule

## Score 112: Quiz 3

*Key*

You may find the following table helpful if you did not bring a calculator for the quiz.

$x$	$30^\circ$	$45^\circ$	$60^\circ$	$120^\circ$	$135^\circ$	$150^\circ$
$\cos(x)$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$
$\sin(x)$	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
$\tan(x)$	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$

1. The right triangle ABC is shown below, where B is the right angle and angle C is  $60^\circ$  degrees. This diagram is not to scale. Find the following:

- (a) [1] the measure of  $\angle BAC$

$$\begin{aligned} \text{Sum of angles in } \triangle ABC &= 180^\circ \\ \angle A + \angle B + \angle C &= 180^\circ \\ \angle A + 90^\circ + 60^\circ &= 180^\circ \\ \angle A &= 30^\circ \end{aligned}$$



- (b) [2] the measure of side BC

$$\begin{aligned} \text{From (a), we have } \angle C &= 60^\circ \\ \cos(60^\circ) &= \frac{1}{2} = \frac{1}{3} \quad \{1\} \\ \Rightarrow \frac{1}{3} &= \frac{1.5}{x} \Rightarrow 3 \cdot \frac{1}{3} = x \quad \{2\} \end{aligned}$$

- (c) [1]  $\sin(A)$

$$\begin{aligned} \sin(30^\circ) &= \frac{1}{2} \text{ by chart} \\ \frac{1.5}{x} &= \frac{1}{2} \text{ by } \Delta \quad \{3\} \end{aligned}$$

- (d) [2]  $\sin(C)$

$$\sin(60^\circ) = \frac{\sqrt{3}}{2} \text{ by chart}$$

$$\begin{aligned} \text{Using } \frac{\sqrt{3}}{2} &= \frac{x}{3} \\ \Rightarrow x &= \frac{3\sqrt{3}}{2} \end{aligned}$$

$$\begin{aligned} \text{Then need to find } x^2 &= \text{Area need to find } x^2 \\ x^2 &= 3^2 + 1.5^2 - 2 \cdot 3 \cdot 1.5 \cos(60^\circ) \quad \{1\} \\ &= 9 + 2.25 - 2 \cdot 3 \cdot 1.5 \cdot \frac{1}{2} = 9 + 2.25 - 4.5 = 6.75 = \frac{27}{4} \quad \{2\} \\ \Rightarrow x^2 &= \frac{27}{4} \end{aligned}$$

$$\therefore x \approx 2.6$$

## Solutions

2. The right triangle  $XYZ$  is shown below, where  $Y$  is the right angle. This diagram is not to scale. Answer the questions below.

- (a) [1] Find  $\cos(Z)$

$$\cos(Z) = \frac{\sqrt{2}}{2} \approx .707$$

- (b) [1] Find  $\tan(Z)$

$$\tan(Z) = \frac{\sqrt{2}}{\sqrt{2}} = 1$$

- (c) [2] Find the measure of  $\angle Z$ .

adjacent/hypotenuse

$$\tan(45^\circ) = 1$$

$$\Rightarrow \angle Z = 45^\circ$$

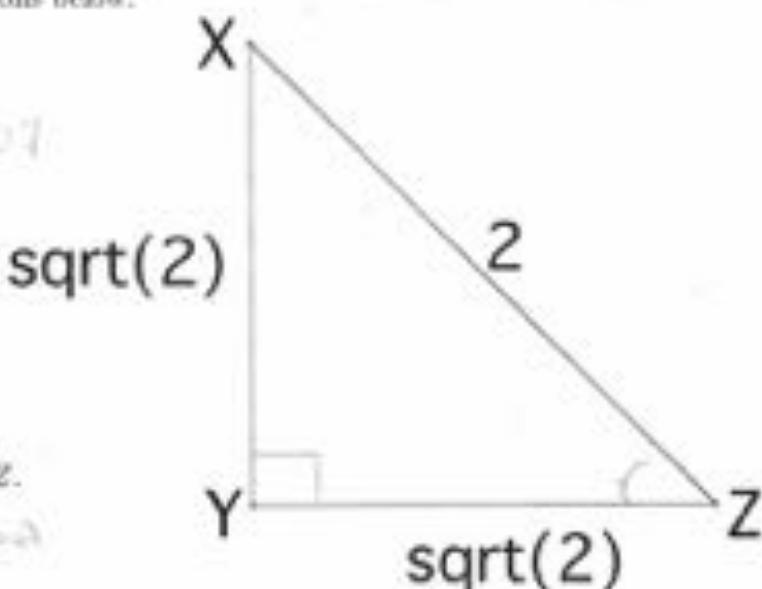


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3. [2] Identify a property, characteristic, attitude, method, or philosophy that both a scientist and a mathematician would agree on.

Mathematicians and scientists

use logic

and the word "prove" is important

4. [2] Identify a property, characteristic, attitude, method, or philosophy that a scientist holds that is different than a mathematician's.

Scientists

mathematicians

explore around

have more opponents

take theory to test

can prove things

5. [1] What is it that Lang calls "point splitting"?

Point splitting is the act of splitting 1 into two more than one fraction. For example, the first example was the Twin Prime Split, in lang this goes back to - See my idea - 21.