

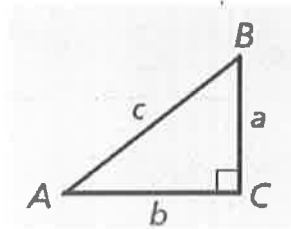
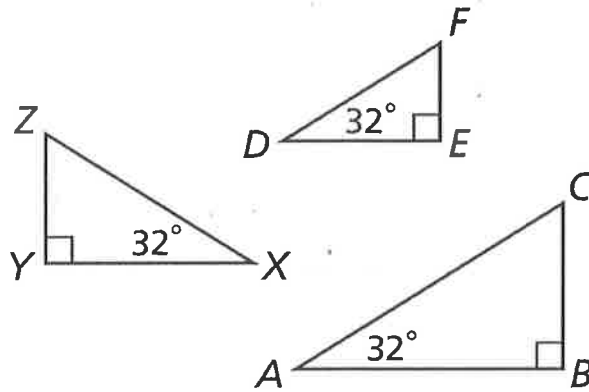
9.4 - 9.5 Trigonometric Ratios.notebook

9.4 - 9.5 Trigonometric Ratios

Find the sine, cosine, and tangent of an acute angle.

Use trigonometric ratios to find side lengths in right triangles and to solve real-world problems.

A **trigonometric ratio** is a ratio of two sides of a right triangle.



SINE	COSINE	TANGENT
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$$\sin = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan = \frac{\text{opposite}}{\text{adjacent}}$$

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$

$$\sin B = \frac{b}{c} \quad \cos B = \frac{a}{c} \quad \tan B = \frac{b}{a}$$

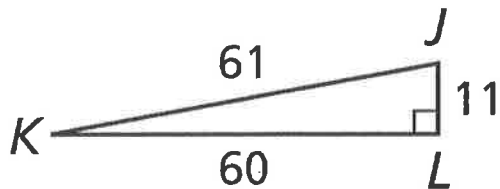
SOH – CAH – TOA

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Writing Math

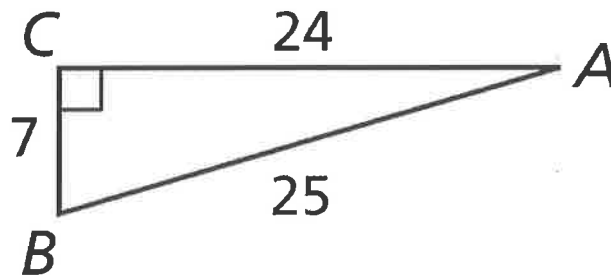
In trigonometry, the letter of the vertex of the angle is often used to represent the measure of that angle. For example, the sine of $\angle A$ is written as $\sin A$.

Write the trigonometric ratio as a fraction and as a decimal rounded to the nearest hundredth.



$$\sin J = \frac{60}{61} \approx .98 \quad \cos J = \frac{11}{61} \approx .18$$

$$\tan K = \frac{11}{60} \approx .18$$



$$\cos A = \frac{24}{25} \approx .96 \quad \tan B = \frac{24}{7} \approx 3.43$$

$$\sin B = \frac{24}{25} \approx .96$$

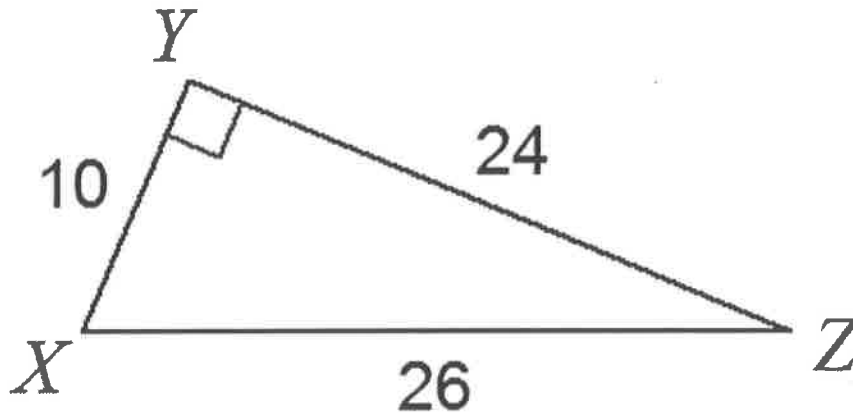
Use your calculator to find the trigonometric ratio. Round to the nearest hundredth.

$$\sin 52^\circ \approx .79$$

$$\cos 19^\circ \approx .95$$

$$\tan 65^\circ \approx 2.14$$

Write each trig ratio as a fraction. Reduce your answer.



1. Sin X

$$\sin X = \frac{24}{26} = \boxed{\frac{12}{13}}$$

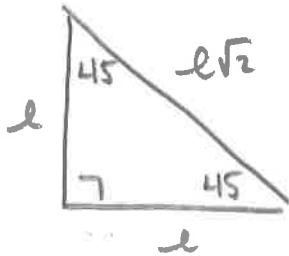
2. Tan Z

$$\tan Z = \frac{10}{24} = \boxed{\frac{5}{12}}$$

3. Cos X

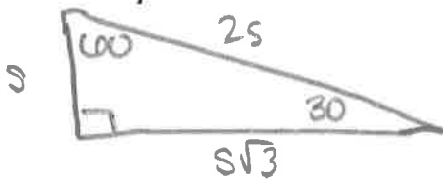
$$\cos X = \frac{10}{26} = \boxed{\frac{5}{13}}$$

Use a special right triangle to write $\tan 45^\circ$ as a fraction.



$$\tan 45 = \frac{l}{l} = 1$$

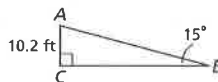
Use a special right triangle to write $\cos 30^\circ$ as a fraction.



$$\cos 30 = \frac{s\sqrt{3}}{2s} = \frac{\sqrt{3}}{2}$$

Find the length. Round to the nearest hundredth.

BC



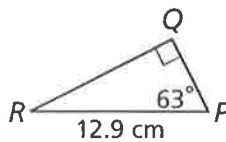
$$\frac{\tan 15}{1} = \frac{10.2}{x}$$

$$\frac{x}{1} = \frac{10.2}{\tan 15}$$

$$x = 38.07 \text{ ft}$$

Do not round until the final step of your answer. Use the values of the trigonometric ratios provided by your calculator.

QR



$$\frac{\sin 63}{1} = \frac{x}{12.9}$$

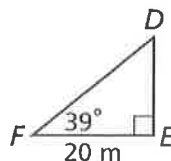
$$x = 12.9 \sin 63 = 11.49 \text{ cm}$$

$$\frac{\cos 39}{1} = \frac{20}{x}$$

$$\frac{x}{1} = \frac{20}{\cos 39}$$

$$x = 25.74 \text{ m}$$

FD



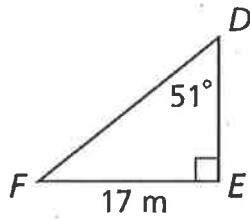
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$$\frac{\sin 51}{1} = \frac{17}{X}$$

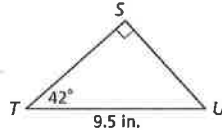
$$X = \frac{17}{\sin 51}$$

$$X = 21.87 \text{ m}$$

DF



ST



$$\frac{\cos 42}{1} = \frac{X}{9.5}$$

$$X = 9.5 \cos 42$$

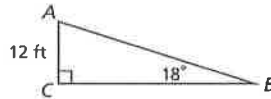
$$X = 7.06 \text{ in}$$

$$\frac{\tan 18}{1} = \frac{12}{X}$$

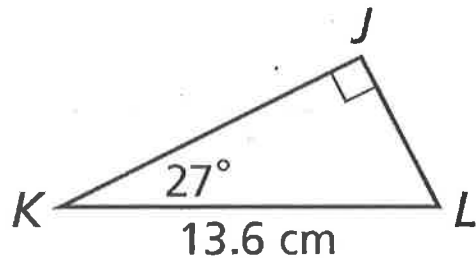
$$\frac{X}{1} = \frac{12}{\tan 18}$$

$$X = 36.93 \text{ ft}$$

BC



JL



$$\frac{\sin 27}{1} = \frac{X}{13.6}$$

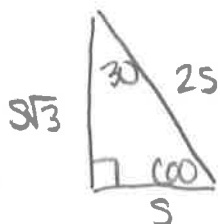
$$X = 13.6 \sin 27$$

$$X = 6.17 \text{ cm}$$

Use a special right triangle to write each trigonometric ratio as a fraction.

1. $\sin 60^\circ$

2. $\cos 45^\circ$



$$\sin 60 = \frac{\sqrt{3}}{2} = \boxed{\frac{\sqrt{3}}{2}}$$

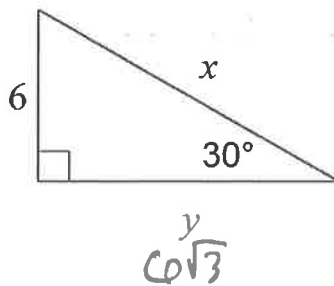
$$\cos 45 = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} = \boxed{\frac{\sqrt{2}}{2}}$$

3. $\tan 60$

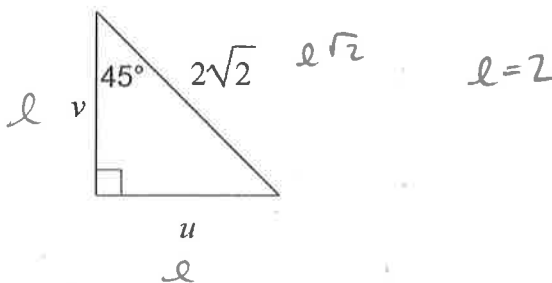
$$\frac{\sqrt{3}}{1} = \boxed{\sqrt{3}}$$

Find the exact area of the triangle.

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2}(6\sqrt{3})(6) \\ &= \boxed{18\sqrt{3} \text{ units}^2} \end{aligned}$$

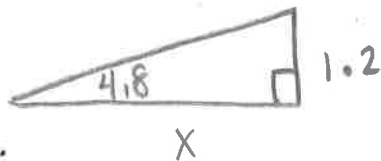


$$A = \frac{1}{2}(2)(2) = \boxed{2 \text{ units}^2}$$



Problem Solving Application

A contractor is building a wheelchair ramp for a doorway that is 1.2 ft above the ground. To meet ADA guidelines, the ramp will make an angle of 4.8° with the ground. To the nearest hundredth of a foot, what is the horizontal distance covered by the ramp?



$$\frac{\tan 4.8}{1} = \frac{1.2}{X}$$

$$\frac{X}{1} = \frac{1.2}{\tan 4.8}$$

$$X = 14.29 \text{ ft}$$

Homework:

WS 9.4 Trigonometric Ratios