

NAME

Ms. Kresovic

Adv Geo –

Fri 21 March 2013

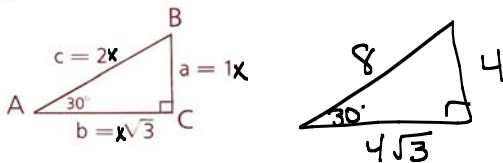
9.9: Introduction to Trigonometry

Objective

After studying this section, you will be able to

- Understand three basic trigonometric relationships

Consider the $(30^\circ, 60^\circ, 90^\circ) \Leftrightarrow (x, x\sqrt{3}, 2x)$ right triangle.



What is the ratio of the leg opposite 30° to the hypotenuse? $\frac{1x}{2x} = \frac{1}{2}$, $\frac{4}{8} = \frac{1}{2}$ Always

What is the ratio of the leg adjacent 30° to the hypotenuse? $= \frac{x\sqrt{3}}{2x} = \frac{\sqrt{3}}{2}$, $\frac{4\sqrt{3}}{8} = \frac{\sqrt{3}}{2}$ Always

What is the ratio of the leg opposite 30° to the leg adjacent to 30° ? $\frac{1}{\sqrt{3}} \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ Always

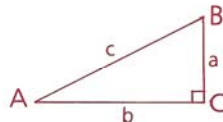
Will these ratios change if a scalar is applied? Why or why not?

No $\rightarrow$ scalar reduces/cancels

The story of Chief SOH CAH TOA (video): <http://www.youtube.com/watch?v=nrMEvrvVBhk>

Definition

Three Trigonometric Ratios



sine of $\angle A = \sin \angle A = \frac{\text{opposite leg}}{\text{hypotenuse}}$

cosine of $\angle A = \cos \angle A = \frac{\text{adjacent leg}}{\text{hypotenuse}}$

tangent of $\angle A = \tan \angle A = \frac{\text{opposite leg}}{\text{adjacent leg}}$

Mnemonics (memory devices) for

Sine (Opposite over Hypotenuse), Cosine (Adjacent over Hypotenuse), Tangent (Opposite over Adjacent):

- Some Old Horse Caught Another Horse Taking Oats Away
- Think of someone kicking a soccer ball with their toe: Soccer-Toa
- Two Old Angels Skipped Over Heaven Carrying A Harp

Maths Tutorial (video) Trigonometry SOH CAH TOA (trigonometric ratios): <http://www.youtube.com/watch?v=5tp74g4N8EY>

Song (video): <http://www.youtube.com/watch?v=8Gkz2OzKyH4>

Additional resource (website): <http://www.mathwords.com/s/sohcahtoa.htm>

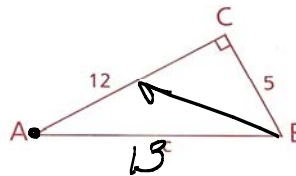
Connection to Unit Circle (video): <http://www.youtube.com/watch?v=1-hrT1Ys390>

Problem 1 Find: **a** $\cos \angle A$
b $\tan \angle B$

$$\cos \angle A = \frac{\text{Adj}}{\text{Hyp}}$$

$$\cos \angle A = \frac{12}{13}$$

$$\tan \angle B = \frac{\text{opp}}{\text{adj}} = \frac{12}{5}$$

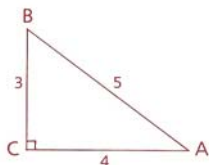


Problem 2 Find the three trigonometric ratios for $\angle A$ and $\angle B$.

$$\sin A = \frac{a}{c} = \frac{3}{5} \quad \sin B = \frac{4}{5}$$

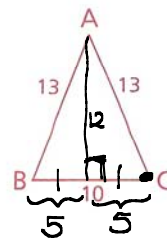
$$\cos A = \frac{b}{c} = \frac{4}{5} \quad \cos B = \frac{3}{5}$$

$$\tan A = \frac{a}{b} = \frac{3}{4} \quad \tan B = \frac{4}{3}$$



Problem 3 $\triangle ABC$ is an isosceles triangle as marked.
Find $\sin \angle C$.

$$\sin C = \frac{12}{13}$$

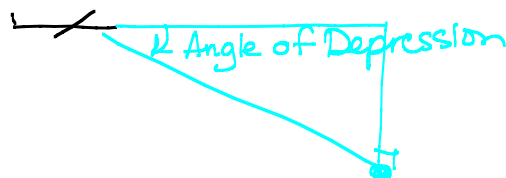
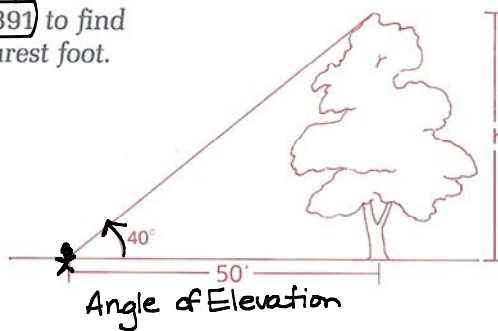


Problem 4 Use the fact that $\tan 40^\circ \approx 0.8391$ to find the height of the tree to the nearest foot.

$$\tan 40^\circ = \frac{h}{50}$$

$$0.8391 = \frac{h}{50}$$

$$h = 41.955 \approx 42 \text{ ft}$$



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9.9 Practice: 1-16, 18

1 Find each ratio.

a $\sin \angle A$

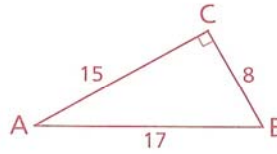
b $\cos \angle A$

c $\tan \angle A$

d $\sin \angle B$

e $\cos \angle B$

f $\tan \angle B$



2 Find each ratio.

a $\sin 30^\circ$

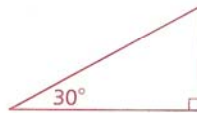
b $\cos 30^\circ$

c $\tan 30^\circ$

d $\sin 60^\circ$

e $\cos 60^\circ$

f $\tan 60^\circ$

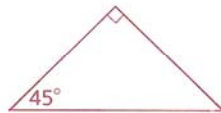


3 Find each ratio.

a $\sin 45^\circ$

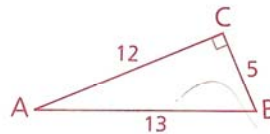
b $\cos 45^\circ$

c $\tan 45^\circ$



5 If $\tan \angle M = \frac{3}{4}$, find $\cos \angle M$. (Hint: Start by drawing the triangle.)

6 Using the figure as marked, name each missing angle.

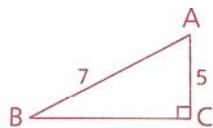


a $\frac{5}{12} = \tan \angle \underline{\hspace{1cm}}$

b $\frac{12}{13} = \cos \angle \underline{\hspace{1cm}}$

c $\frac{5}{13} = \sin \angle \underline{\hspace{1cm}}$

7 Find each quantity.



a BC

b $\sin \angle A$

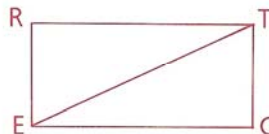
c $\tan \angle B$

8 Given: RECT is a rectangle.

ET = 26, RT = 24

Find: a $\sin \angle RET$

b $\cos \angle RET$

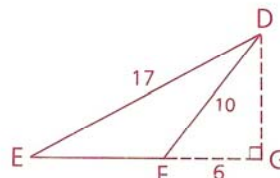
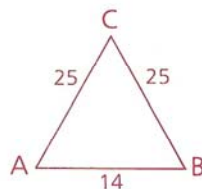


9 Using the given figures, find

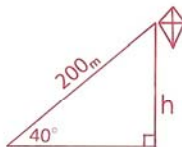
a $\cos \angle A$

b $\sin \angle E$

c $\sin \angle DFG$

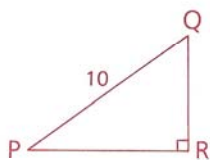


- 10 Use the fact that $\sin 40^\circ \approx 0.6428$ to find the height of the kite to the nearest meter.

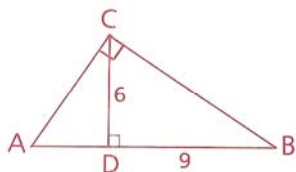


- 11 a If $\tan \angle A = 1$, find $m\angle A$.
b If $\sin \angle P = 0.5$, find $m\angle P$.

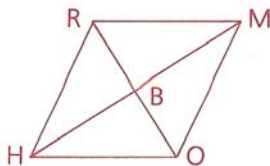
- 12 Given: $\sin \angle P = \frac{3}{5}$, $PQ = 10$
Find: $\cos \angle P$



- 13 Using the figure, find
a $\tan \angle ACD$
b $\sin \angle A$



- 14 Given: RHOM is a rhombus.
 $RO = 18$, $HM = 24$
Find: a $\cos \angle BRM$ b $\tan \angle BHO$



- 15 Given a trapezoid with sides 5, 10, 17, and 10, find the sine of one of the acute angles.

- 16 Given $\triangle ABC$ with $\angle C = 90^\circ$, indicate whether each statement is true Always (A), Sometimes (S), or Never (N).

a $\sin \angle A = \cos \angle B$ b $\sin \angle A = \tan \angle A$ c $\sin \angle A = \cos \angle A$

- 18 If the slope of $\overleftrightarrow{AB}$ is $\frac{5}{8}$, find the tangent of $\angle BAC$.

