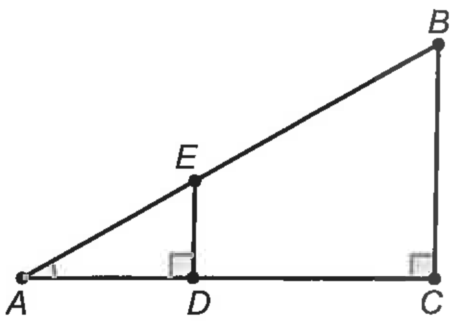
Geometry R – Mr. Bo
Unit 9 – Day 3 Notes

Name notes.
Date______________

Trigonometry & Sides of a Right Triangle



1a. Explain why $\Delta ABC \sim \Delta AED$.

Since $\angle A \cong \angle A$ and $\angle ADE \cong \angle ACB$ the Δ's are similar by A.A.-similarity.

b. Explain why $\dfrac{ED}{BC} = \dfrac{AE}{AB}$.

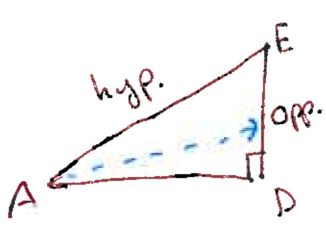
Since, the Δ's are similar, the ratios of corr. sides must be =.

c. Explain why $\dfrac{ED}{AE} = \dfrac{BC}{AB}$ must also be true.

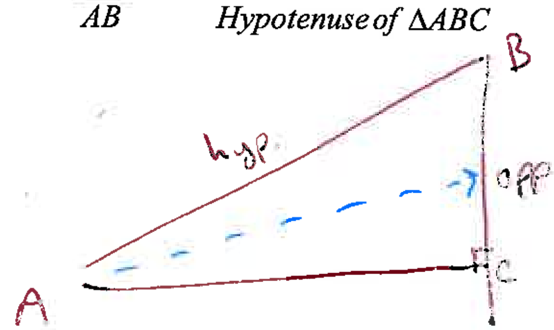
In the proportion in b, we could cross multiply because the prod. of the means = prod. of the extremes. Switching AE and BC in the proportion maintains the same products.

d. Look closer at each of the ratios $\dfrac{ED}{AE}$ and $\dfrac{BC}{AB}$:

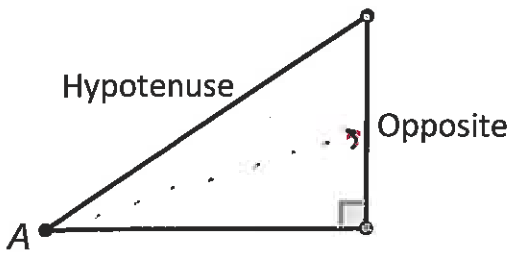
$$\frac{ED}{AE} = \frac{\text{the side of } \Delta AED \text{ opposite } \angle A}{\text{Hypotenuse of } \Delta AED}$$



$$\frac{BC}{AB} = \frac{\text{the side of } \Delta ABC \text{ opposite } \angle A}{\text{Hypotenuse of } \Delta ABC}$$



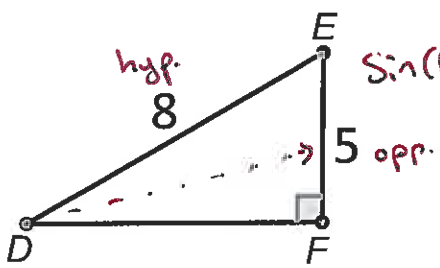
The Sine Ratio: If $\angle A$ is an ***acute angle*** of a ***right triangle*** then the ratio $\dfrac{\textit{the side opposite } \angle A}{\textit{the Hypotenuse of } \Delta}$ is called the "Sine of $\angle A$".



We write: $\sin(A) = \dfrac{\textit{opposite}}{\textit{Hypotenus}}$

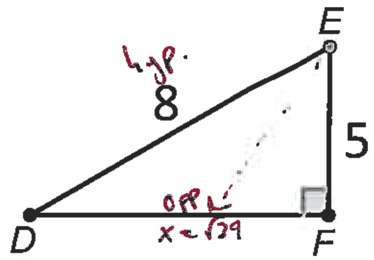
2. Determine each ratio:

a. sin(D)



$\text{Sin}(D) = \dfrac{5}{8}$

b. sin(E)



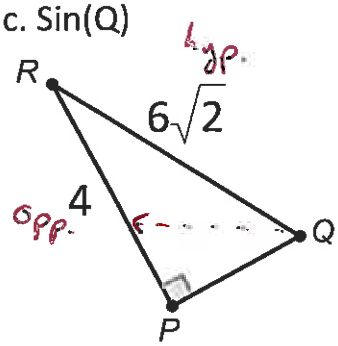
$\text{Sin}(E) = \dfrac{\sqrt{39}}{8}$

$x^2 + 5^2 = 8^2$

$x^2 = 39$

$x = \sqrt{39}$

c. Sin(Q)



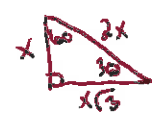
$\text{Sin}\,Q = \dfrac{4}{6\sqrt{2}}$

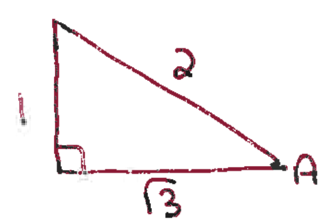
$= \dfrac{4\sqrt{2}}{6 \cdot 2}$

$= \dfrac{\sqrt{2}}{3}$

d. $\sin(A) = \dfrac{1}{2}$. What must $m\angle A$ be and why?

$\text{Sin}(A) = \dfrac{1}{2}$ ← opp. / ← hyp.





Since hyp = 2·(short leg) then $\angle A$ must be $30°$

Using a Calculator:

Your calculator has a "SIN" button, but in order to use it, you must first change your "MODE" to degrees.

3. Use your calculator to compute each value. Round your answers to the nearest hundredth.

a. Sin(30°) = .5

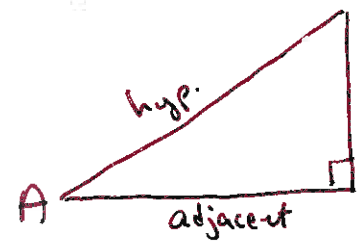
b. Sin(60°) = 0.87

c. Sin(52°) = 0.79

*what is the largest value Sin(A) could be?

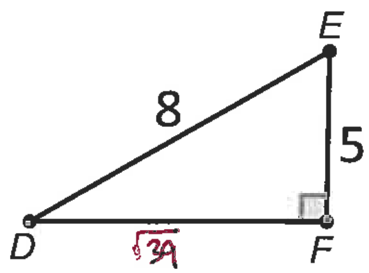
The Cosine Ratio: If $\angle A$ is an ***acute angle*** of a ***right triangle*** then the ratio $\dfrac{\textit{the side adjacent } \angle A}{\textit{the Hypotenuse of } \Delta}$ is called the "Cosine of $\angle A$".

We write: $\cos(A) = \dfrac{adjacent}{Hypotenus}$



4. Determine each ratio:

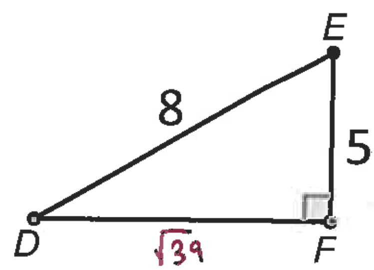
a. Cos(E) and Sin(D)



$\text{Cos}(E) = \dfrac{5}{8}$

$\text{Sin}(D) = \dfrac{5}{8}$

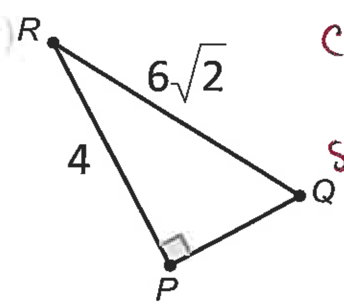
b. Cos(D) and Sin(E)



$\text{Cos}(D) = \dfrac{\sqrt{39}}{8}$

$\text{Sin}(E) = \dfrac{\sqrt{39}}{8}$

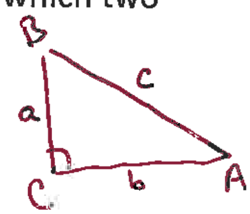
c. Cos(R) and Sin(Q)



$\text{Cos}(R) = \dfrac{4}{6\sqrt{2}} = \dfrac{4\sqrt{2}}{6 \cdot 2} = \dfrac{\sqrt{2}}{3}$

$\text{Sin}(Q) = \dfrac{4}{6\sqrt{2}} = \dfrac{4\sqrt{2}}{6 \cdot 2} = \dfrac{\sqrt{2}}{3}$

d. If ΔABC has right angle C, then which two must always be equal?

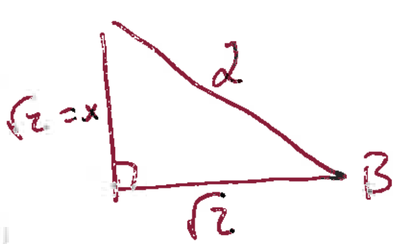


Cos(A)	Sin(B)	Sin(A)
$= \dfrac{b}{c}$	$= \dfrac{b}{c}$	$= \dfrac{a}{c}$

Cos(A) = Sin(B) always!

e. If $\cos(B) = \dfrac{\sqrt{2}}{2}$, then what must be the measure of angle B?

$\text{Cos}(B) = \dfrac{\sqrt{2} \leftarrow \text{adj.}}{2 \leftarrow \text{hyp.}}$



$(\sqrt{2})^2 + x^2 = 2^2$

$2 + x^2 = 4$

$x^2 = 2$

$x = \sqrt{2}$

Since the legs are =, ΔABC must be 45-45-90.

So $\angle B$ must be 45°

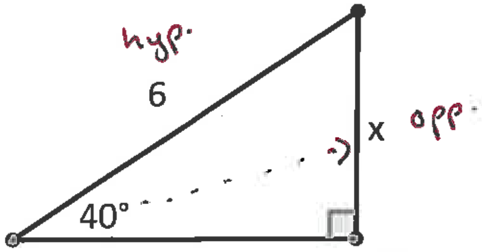
f. Find to the nearest hundredth: cos(56°)

$\text{Cos}(56°) = 0.56$

Finding Side Lengths Using Sine & Cosine

5. Solve for x and round to the nearest tenth.

a.



$\sin(40°) = \frac{opp}{hyp}$

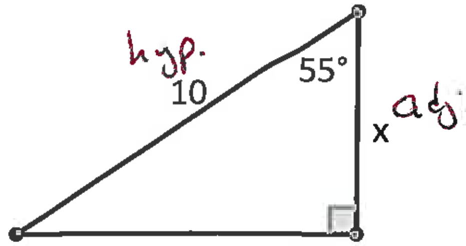
Cross multiply!

$\sin(40) = \frac{x}{6}$

$6\sin(40) = x$

$x = 3.9$

b.



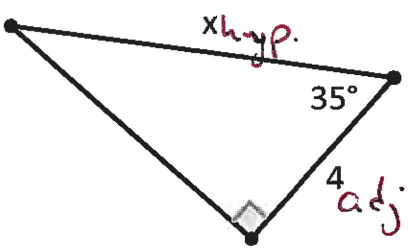
$\cos(55) = \frac{adj}{hyp}$

$\cos(55) = \frac{x}{10}$

$10\cos(55) = x$

$x = 5.7$

c.



$\cos(35) = \frac{adj}{hyp}$

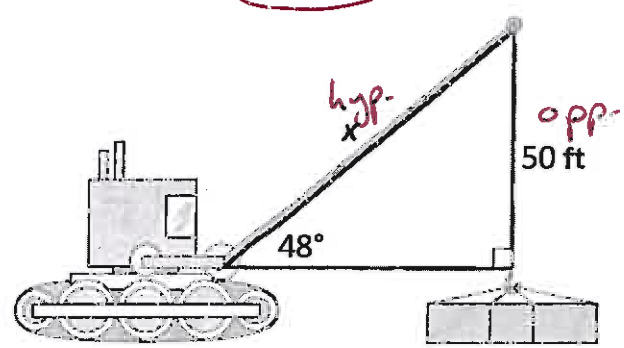
$\cos(35) = \frac{4}{x}$

$x\cos(35) = 4$

$x = \frac{4}{\cos(35)}$

$= 4.9$

d.



$\sin(48) = \frac{opp}{hyp}$

$\sin(48) = \frac{50}{x}$

$x\sin(48) = 50$

$x = \frac{50}{\sin(48)}$

$= 67.3$ ft.