

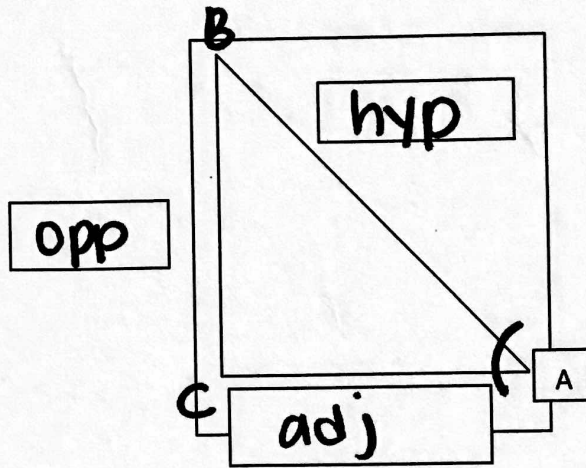
# Day 5 Notes: Trigonometric Ratios & Pythagorean Theorem

## Trig Ratios

Sine:  $\sin A = \frac{\text{opp}}{\text{hyp}}$

Cosine:  $\cos A = \frac{\text{adj}}{\text{hyp}}$

Tangent:  $\tan A = \frac{\text{opp}}{\text{adj}}$



## Reciprocal Trig Ratios

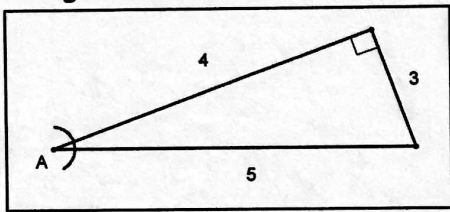
Cosecant:  $\csc A = \frac{1}{\sin A} = \frac{\text{hyp}}{\text{opp}}$

Secant:  $\sec A = \frac{1}{\cos A} = \frac{\text{hyp}}{\text{adj}}$

Cotangent:  $\cot A = \frac{1}{\tan A} = \frac{\text{adj}}{\text{opp}}$

EX.

1. Find all 6 trigonometric ratios of the following:



$\sin A = \frac{3}{4}$   
 $\cos A = \frac{5}{4}$   
 $\tan A = \frac{3}{5}$

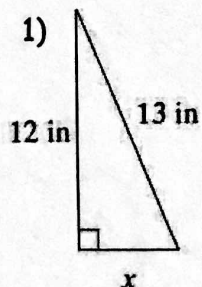
$\csc A = \frac{4}{3}$   
 $\sec A = \frac{4}{5}$   
 $\cot A = \frac{5}{3}$

Pythagorean Theorem:  $a^2 + b^2 = c^2$

a and b: legs of  $\Delta$       c: hypotenuse (opp  $90^\circ$ )

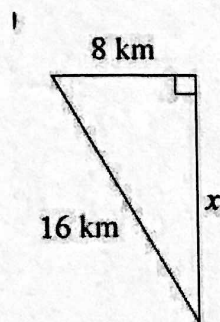
Solve for the missing side.

1)



$x^2 + 12^2 = 13^2$   
 $x = 5$

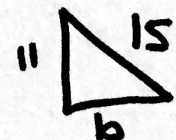
2)



$x^2 + 8^2 = 16^2$   
 $x = \sqrt{144}$   
 $x = \sqrt{64 \cdot 3}$   
 $x = 8\sqrt{3}$

3)

$a = 11 \text{ m}, c = 15 \text{ m}$



$11^2 + b^2 = 15^2$   
 $b = \sqrt{104}$   
 $b = \sqrt{4 \cdot 26}$   
 $b = 2\sqrt{26}$

## Rationalizing Denominators

Solve the first 15 perfect square roots.

$$\sqrt{1} = \underline{1}$$

$$\sqrt{25} = \underline{5}$$

$$\sqrt{9} = \underline{3}$$

$$\sqrt{4} = \underline{2}$$

$$\sqrt{100} = \underline{10}$$

$$\sqrt{64} = \underline{8}$$

$$\sqrt{121} = \underline{11}$$

$$\sqrt{36} = \underline{6}$$

$$\sqrt{196} = \underline{14}$$

$$\sqrt{81} = \underline{9}$$

$$\sqrt{16} = \underline{4}$$

$$\sqrt{49} = \underline{7}$$

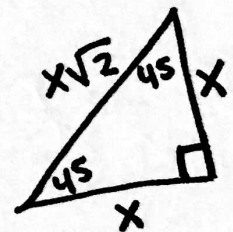
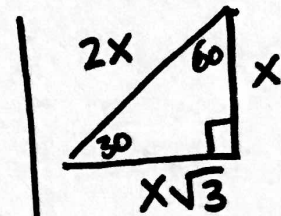
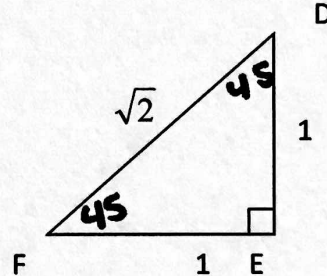
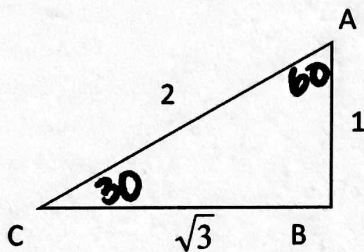
$$\sqrt{144} = \underline{12}$$

$$\sqrt{225} = \underline{15}$$

$$\sqrt{169} = \underline{13}$$

Note:

Find each ratio. Rationalize the denominator when possible.



$$a.) \frac{AB}{AC} = \frac{1}{2}$$

$$d.) \frac{AB}{CB} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$g.) \frac{DF}{FE} = \frac{\sqrt{2}}{1} = \sqrt{2}$$

$$b.) \frac{DE}{EF} = \frac{1}{1} = 1$$

$$e.) \frac{BC}{AC} = \frac{\sqrt{3}}{2}$$

$$h.) \frac{AC}{AB} = \frac{2}{1} = 2$$

$$c.) \frac{EF}{DF} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$f.) \frac{DE}{DF} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$i.) \frac{AC}{CB} = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

Rationalize each denominator. When possible, simplify by reducing the resulting fraction.

$$1. \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

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

$$3. \frac{1}{\sqrt{7}} = \frac{\sqrt{7}}{7}$$

$$4. \frac{6}{\sqrt{2}} = \frac{6\sqrt{2}}{2} = 3\sqrt{2}$$

$$5. \frac{15}{\sqrt{5}} = \frac{15\sqrt{5}}{5} = 3\sqrt{5}$$

$$6. \frac{42}{\sqrt{7}} = \frac{42\sqrt{7}}{7} = 6\sqrt{7}$$

$$7. \frac{1}{\sqrt{81}} = \frac{1}{9}$$

$$8. \frac{2}{\sqrt{11}} = \frac{2\sqrt{11}}{11}$$

$$9. \frac{4}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$$

$$10. \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$11. \frac{1}{\sqrt{225}} = \frac{1}{15}$$

$$12. \frac{1}{3\sqrt{16}} = \frac{1}{3 \cdot 4} = \frac{1}{12}$$

$$13. \frac{8}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{6} = \frac{4\sqrt{2}}{3}$$

$$14. \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$15. \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$16. \frac{1}{\sqrt{12}} = \frac{1}{\sqrt{4 \cdot 3}} = \frac{1}{2\sqrt{3}} = \frac{\sqrt{3}}{6}$$

$$17. \frac{11}{\sqrt{121}} = \frac{11}{11} = 1$$

$$18. \frac{12}{\sqrt{36}} = \frac{12}{6} = 2$$

$$19. \frac{2}{\sqrt{300}} = \frac{2}{\sqrt{100 \cdot 3}}$$

$$20. \frac{1}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{6}$$

$$21. \frac{7}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{7\sqrt{3}}{3}$$

$$= \frac{2}{10\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{30} = \frac{\sqrt{3}}{15}$$