Name ______________________________ Final Exam Study Guide: Unit 5

Soh Cah Toa

$\sin\theta = \frac{opposite}{hypotenuse}$ $\cos\theta = \frac{adjacent}{hypotenuse}$ $\tan\theta = \frac{opposite}{hypotenuse}$

Area of a triangle using trig: $\mathbf{A} = \frac{1}{2}\mathbf{bc(sinA)}$ b, c are sides of a triangle, A is the included angle

Law of sines: $\frac{sinA}{a} = \frac{sinB}{b} = \frac{sinC}{c}$ (a is side opposite to angle A)

Law of cosines:

$a^2 = b^2 + c^2 - 2bc(\cos A)$

What to do if "a" is not the side you need: $b^2 = a^2 + c^2 - 2ac(\cos B)$

if looking for b – change all a's for b's + b's for a

$\cos A = \frac{b^2+c^2-a^2}{2bc}$

What to do if A is not the angle you need:

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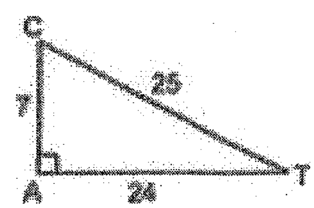
Two investigations that we completed:

1. Angle C and angle T are complementary angles because they must sum to 90.

sin T = $\frac{7}{25}$ $16.26 = \sin^{-1}$

cos C = $\frac{24}{25}$ $16.26 = \cos^{-1}$



Therefore the sin of an angle = cos of its complement

2. cos 50° = sin 40

3. sin 20° = cos 70

4. sin 75° = cos 15°

5. cos 32° = sin 58°

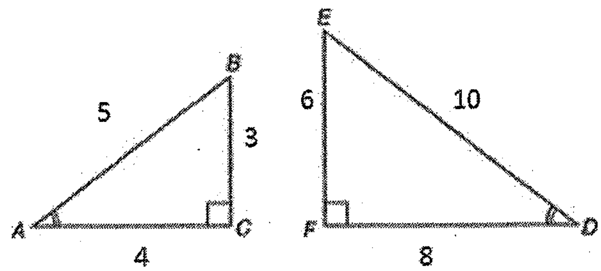
Similar triangles and trig ratios:

6. Triangle ABC is similar to triangle DEF

sin A $\frac{3}{5}$ sin D $\frac{6}{10} = \frac{3}{5}$

sin B $\frac{4}{5}$ sin E $\frac{8}{10} = \frac{4}{5}$

tan A $\frac{3}{4}$ tan D $\frac{6}{8} = \frac{3}{4}$



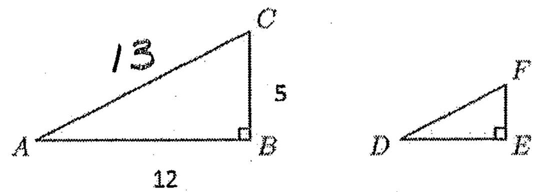
conclusion: similar triangle have the same trig ratios!

7. $\Delta ABC \sim \Delta DEF$

tan F $\frac{12}{5}$

sin F $\frac{12}{13}$

cos F $\frac{5}{13}$



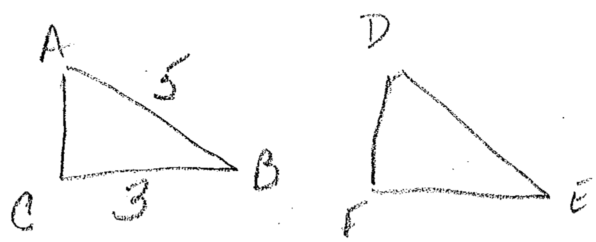
8. $\Delta ABC \sim \Delta DEF$

sin A = $\frac{9}{41}$ sin D = $\frac{9}{41}$

tan B = $\frac{40}{9}$ tan E = $\frac{40}{9}$

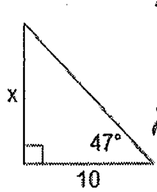
9 $\Delta ABC \sim \Delta DEF$

cos B = $\frac{3}{5}$ cos E = $\frac{3}{5}$



Use Soh Cah Toa to find the missing side lengths:

10.

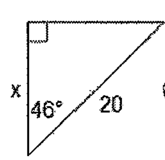


$\tan 47 = \frac{x}{10}$

$x = 10(\tan 47)$

$= 10.7237$

11.

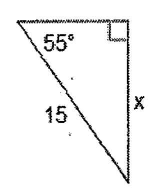


$\cos 46 = \frac{x}{20}$

$x = 20(\cos 46)$

$= 13.8932$

12.

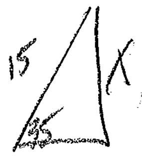


$\sin 55 = \frac{x}{15}$

$x = 15 \sin 55$

$= 12.2873$

13. A 15 foot ladder makes a 35 degree angle with the ground. How high can the ladder reach when it is leaning against a tree? (Hint: DRAW this!)



$\sin 35 = \frac{X}{15}$ $X = 15(\sin 35)$

$= 8.6036$

8.6 ft

14. A triangle has sides of 6 inches and 4 inches, and its included angle is 38°. What is its area?

$A = \frac{1}{2} bc(\sin A)$

$= \frac{1}{2}(6)(4)(\sin 38)$

$= 7.3879$

7.4 in^2

15. Triangle ABC has the sides: a = 24, b = 20, c = 30. Use the law of cosines to find the measure of angle A.

$a^2 = b^2 + c^2 - 2bc(\cos A)$

$24^2 = 20^2 + 30^2 - 2(20)(30)(\cos A$

$576 = 400 + 900 - 1200(\cos A$

$576 = 1300 - 1200(\cos A$

$-724 = -1200(\cos A)$

$\cos A = \frac{181}{300}$

$\cos^{-1}$

52.89

16. Triangle ABC has the sides: a = 24, b = 20, c = 30. Use the law of cosines to find the measure of angle B.

$20^2 = 24^2 + 30^2 - 2(24)(30)(\cos B$

$400 = 576 + 900 - 1440(\cos B)$

$400 = 1476 - 1440(\cos B)$

$-1076 = -1440(\cos B$

$\cos B = \frac{269}{360}$

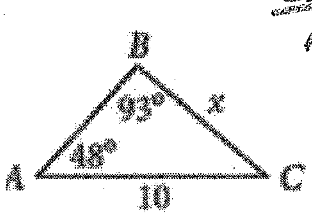
$\cos^{-1}\left(\frac{269}{360}\right)$

41.6496

Use the law of sines to solve for x:

17.

$\frac{\sin 93}{10} = \frac{\sin 48}{X}$



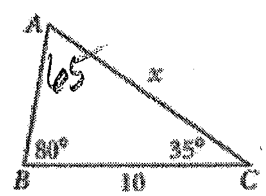
$X(\sin 93) = 10(\sin 48)$

$X = \frac{10(\sin 48)}{\sin 93}$

$= 7.4416$

18.

$\frac{\sin 80}{X} = \frac{\sin 65}{10}$



$X \sin 65 = 10(\sin 80)$

$X = \frac{10(\sin 80)}{\sin 65}$

$= 10.8662$