Unit 2 Review

7.2 Things to Know!

- Solve a right triangle, SOH CAH TOA,

$$\sin\theta = \frac{opp}{hyp}, \cos\theta = \frac{adj}{hyp}, \tan\theta = \frac{opp}{adj}, \csc\theta = \frac{hyp}{opp}, \sec\theta = \frac{hyp}{adj}, \cot\theta = \frac{adj}{opp}$$

- Use SOH CAH TOA to solve RIGHT triangles. (Problems that say angle of elevation/depression)

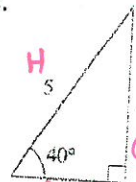
Practice:

1.

$\tan\theta = \frac{5}{7}$

$\theta = \tan^{-1}\left(\frac{5}{7}\right) = \boxed{35.54°}$

2.



$\cos(40) = \frac{x}{5}$

$x = 5\cos 40$

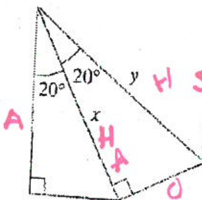
$\boxed{x = 3.83}$

$\sin(40) = \frac{y}{5}$

$y = 5\sin 40$

$\boxed{y = 3.21}$

3.



$\sin(20) = \frac{1}{x}$

$x = \frac{1}{\sin 20}$

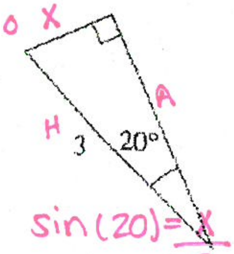
$x = 2.92$

$\cos(20) = \frac{2.92}{y}$

$y = \frac{2.92}{\cos(20)}$

$\boxed{y = 3.11}$

4.

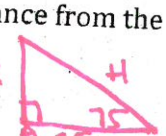


$\sin(20) = \frac{x}{3}$

$x = 3\sin 20$

$\boxed{x = 1.03}$

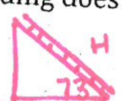
5. A guy wire from the top of the transmission tower at WJBC forms a 75° angle with the ground at a 55-foot distance from the base of the tower. How tall is the tower?



$\tan(75) = \frac{x}{55}$

$x = 55 \cdot \tan 75 = \boxed{205.26 ft}$

6. The base of a ladder is 6ft from the building, and the angle formed by the ladder and the ground is 73°. How high up the building does the ladder touch?



$\tan(73) = \frac{x}{6}$

$x = 6\tan 73$

$x = 19.63$

7.4 Things to Know!

- Law of Sines - $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$.
- Use if you have ASA or AAS (that is not a right triangle), then you will only produce 1 triangle
- Use if you have SSA (that is not a right triangle), then you could produce 0, 1 or 2 triangles. If sin A>1, then no solution. If sin A < 1, consider 2 triangles!!!!

Practice:

7. Two markers A and B are on the same side of a canyon rim 56 ft apart. A third marker, C, located across the rim, is positioned so that ΔBAC = 72° and ΔABC = 53°. Find the distance between C and A.

X C

A 72 53 B

56

$m\angle C = 180 - 72 - 53$

$m\angle C = 55$

$\frac{\sin 55}{56} = \frac{\sin 53}{x}$

$x = \frac{56 \cdot \sin 53}{\sin 55}$

$\boxed{x = 54.6 ft}$

8. A civil engineer wants to determine the distances from points A and B to an inaccessible point C, as shown. From direct measurements, the engineer knows that AB = 25m, ∠A = 110°, and ∠B = 20°. Find AC and BC.

X C Y

A 110 20 B

25

$m\angle C = 180 - 110 - 20$

$m\angle C = 50$

$\frac{\sin 50}{25} = \frac{\sin 20}{x}$

$\boxed{x = 11.16}$

$\frac{\sin 50}{25} = \frac{\sin 110}{y}$

$\boxed{y = 30.67}$

7.5 Things to Know!

- Law of Cosines - $a^2 = b^2 + c^2 - 2bc\cos A$, $b^2 = a^2 + c^2 - 2ac\cos B$, $c^2 = a^2 + b^2 - 2ab\cos C$
- Use Law of Cosines if you have SAS or SSS.

Practice:

9. Find the measure of the largest angle in the triangle below.

*Largest angle is across from longest side

$20^2 = 9^2 + 13^2 - 2(9)(13)\cos(x)$

$400 = 250 - 234\cos(x)$

$-250 \quad -250$

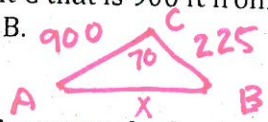
$\frac{150}{-234} = \frac{-234\cos(x)}{-234}$

$\cos(x) = \frac{-150}{234}$

$x = \cos^{-1}\left(\frac{-150}{234}\right)$

$x = 129.87°$

10. In order to determine the distance between two points A and B on opposite sides of a lake, a surveyor chooses a point C that is 900 ft from A and 225 ft from B. If the measure of the angle at C is 70°, find the distance between A and B.



$x^2 = 900^2 + 225^2 - 2(900)(225)\cos(70)$

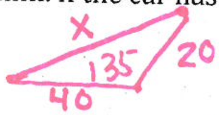
$\sqrt{x^2} = \sqrt{722106.84}$

$\boxed{x = 849.77 \text{ ft}}$

11. A car travels along a straight road, heading east for 1 hour, then changing to northeast direction at 135º onto another road, traveling for 30 min. If the car has maintained a constant speed of 40mph, how far is it from its starting point?

1 hr = 40 miles

30 min = 20 miles

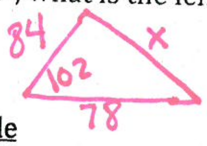


$x^2 = 40^2 + 20^2 - 2(40)(20)\cos(135)$

$\sqrt{x^2} = \sqrt{3131.37}$

$\boxed{x = 55.96 \text{ miles}}$

12. Suppose you want to fence a triangular lot. If two sides measure 84 feet and 78 feet and the angle between the two sides is 102º, what is the length of the fence to the nearest foot?



$x^2 = 84^2 + 78^2 - 2(84)(78)\cos(102)$

$\sqrt{x^2} = \sqrt{15864.47}$

$x = 125.95$

$125.95 + 84 + 78 = \boxed{287.94 \text{ ft total fencing}}$

Area of a Triangle

- The area of a triangle with sides of lengths a and b and with included angle θ is $A = \frac{1}{2}ab\sin\theta$.

Practice:

13. Find the area of a triangle whose side lengths are 8 and 14 and has an included angle of 35º.

$A = \frac{1}{2}(8)(14)\sin 35$

$\boxed{A = 32.12}$

14. Find the area of a triangle with side lengths 5, 6 and 8.

*Need to find any angle!

$8^2 = 5^2 + 6^2 - 2(5)(6)\cos(x)$

$64 = 61 - 60\cos x$

$3 = -60\cos x$

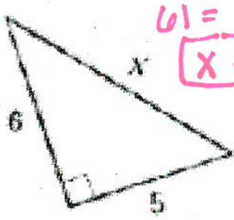
$\cos x = \frac{-3}{60}$ $x = \cos^{-1}\left(\frac{-3}{60}\right) = 92.87°$

$A = \frac{1}{2}(5)(6)\sin(92.87)$

$\boxed{A = 14.98}$

Mixing it all up...

15. Solve for x

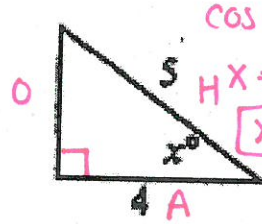


$6^2 + 5^2 = x^2$

$61 = x^2$

$\boxed{x = \sqrt{61}}$

16. Solve for x

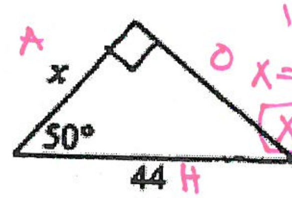


$\cos(x) = \frac{4}{5}$

$x = \cos^{-1}\left(\frac{4}{5}\right)$

$\boxed{x = 36.87°}$

17. Solve for x

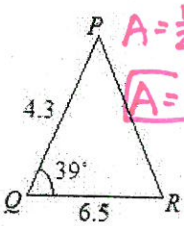


$\frac{\cos(50)}{1} = \frac{x}{44}$

$x = 44\cos(50)$

$\boxed{x = 28.28}$

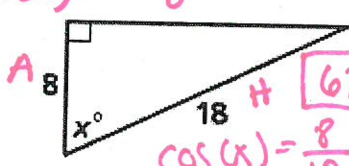
18. Find the area of the ΔPQR



$A = \frac{1}{2}(4.3)(6.5)\sin(39)$

$\boxed{A = 8.79}$

19. Solve for x

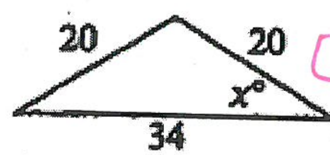


$\boxed{63.61°}$

$\cos(x) = \frac{8}{18}$

$x = \cos^{-1}(8/18)$

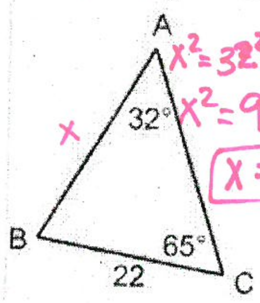
20. Solve for x



$20^2 = 20^2 + 34^2 - 2(20)(34)\cos x$

$\boxed{x = 31.79°}$

21. Find the length of side AB

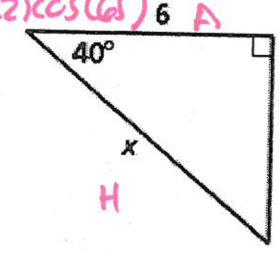


$x^2 = 32^2 + 22^2 - 2(32)(22)\cos(65°)$

$x^2 = 912.95$

$\boxed{x = 30.22}$

22. Solve for x



$\frac{\cos(40)}{1} = \frac{6}{x}$

$\cancel{6} = \cancel{x}\cos 40$

$x = \frac{6}{\cos 40}$

$\boxed{x = 7.83}$

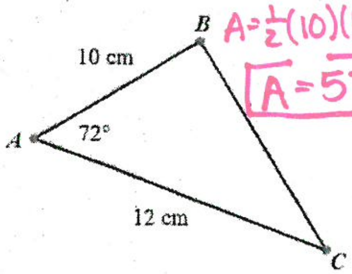
23. Solve for x

$10^2 + 24^2 = x^2$

$676 = x^2$

$\boxed{x = 26}$

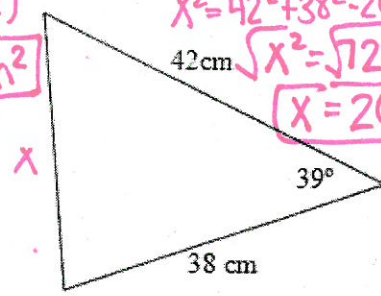
24. Find the area of ΔABC.



$A = \frac{1}{2}(10)(12)\sin(72)$

$\boxed{A = 57.06 cm^2}$

25. Solve for the missing side

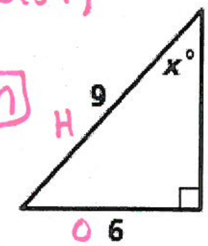


$x^2 = 42^2 + 38^2 - 2(42)(38)\cos(39)$

$\sqrt{x^2} = \sqrt{727.35}$

$\boxed{x = 26.97 cm}$

26. Solve for x



$\sin(x) = \frac{6}{9}$

$x = \sin^{-1}(\frac{6}{9})$

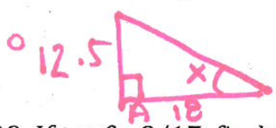
$\boxed{x = 41.81°}$

27. From the top of a 120 foot tower, an air traffic controller observes an airplane on the runway at an angle of depression of 19°. How far from the base of the tower is the airplane?

$\frac{\tan 19}{1} = \frac{120}{x}$ $x \tan(19) = 120$

$x = \frac{120}{\tan 19} = \boxed{348.51 ft}$

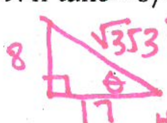
28. Find the angle of elevation of the sun when a 12.5 meter tall telephone pole casts an 18 meter long shadow.



$\tan(x) = \frac{12.5}{18}$ $x = \tan^{-1}(12.5/18)$

$\boxed{x = 34.78°}$

29. If $\tan\theta = 8/17$, find the other 6 trig ratios



$8^2 + 17^2 = x^2$

$\sin\theta = \frac{8\sqrt{353}}{353}$ $\csc\theta = \frac{\sqrt{353}}{8}$ $\cot\theta = \frac{17}{8}$

$\cos\theta = \frac{17\sqrt{353}}{353}$ $\sec\theta = \frac{\sqrt{353}}{17}$

30. If $\csc\theta = \sqrt{13}/4$, find the other 6 trig ratios

SKIP!

31. If $\cos(x) = 0.42$, what is the measure of angle x?

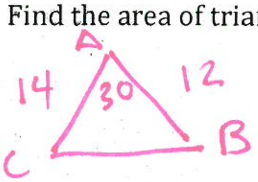
$x = \cos^{-1}(0.42)$

$x = 65.17°$

32. Evaluate tan(45)

1

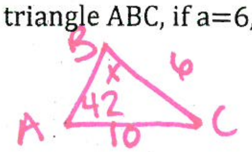
33. Find the area of triangle ABC if angle A is 30 degrees, AB=12 and AC=14.



$A = \frac{1}{2}(14)(12)\sin 30$

$\boxed{A = 42}$

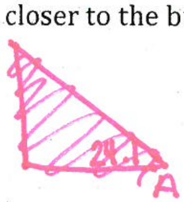
34. In triangle ABC, if a=6, b=10 and ∠A=42, how many triangles can be formed?

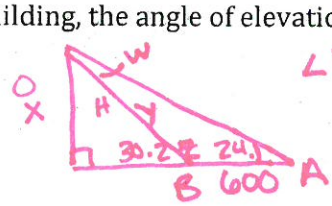


$\frac{\sin 42}{6} = \frac{\sin x}{10}$ $\sin x = \frac{10\sin 42}{6}$ $\sin^{-1}(1.12) = ERROR$

$\sin x = 1.12$ $\boxed{No\ \Delta's}$

35. From a point A on the ground, the angle of elevation to the top of a tall building is 24.1°. From a point B, which is 600 feet closer to the building, the angle of elevation is measured to be 30.2°. Find the height of the building.





$\angle Z = 180 - 30.2$
$= 149.8$
$\angle W = 180 - 149.8 - 24.1$
$= 6.1$

$\frac{\sin 6.1}{600} = \frac{\sin 24.1}{y}$

$y = 2305.56$

$\sin(30.2) = \frac{x}{2305.56}$ $\boxed{x = 1159.74}$