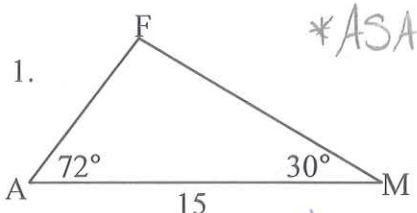
Algebra III
Chapter 9
REVIEW

Name KEY

Hour _____ Date _____

Solve each triangle. Express sides and angles to the nearest tenth.

1. *ASA → Law of Sines



180 − 72 − 30 = 78

$m\angle F = 78°$

$\frac{\sin 78}{15} = \frac{\sin 72}{a}$

$\frac{\sin 78}{15} = \frac{\sin 30}{m}$

$m = 7.7$ un

$a = 14.6$ un

2. In ΔWEY, $\angle W = 90°$, w = 18, e = 8

$y^2 + 8^2 = 18^2$

$y = 16.1$ un

$\cos Y = \frac{8}{18}$

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

$m\angle Y = 63.6°$

180 − 63.6 = $m\angle E = 26.4°$

3. In ΔCHS, c = 5, h = 7, and s = 9.

*SSS → Law of cosines

$\cos C = \frac{5^2 - 7^2 - 9^2}{-2(7)(9)} = \frac{-105}{-126} = .8333$

$\cos^{-1}(.833) = m\angle C = 33.6°$

$\cos H = \frac{7^2 - 5^2 - 9^2}{-2(5)(9)} = .633$

$\cos^{-1}(.633)$

$m\angle H = 50.7°$

$m\angle S = 95.7°$

4. In ΔABC, b = 795.1, c = 775.6, and $\angle B = 51.9°$ *SSA

$\frac{\sin 51.9}{795.1} = \frac{\sin C}{775.6}$

$\sin C = .76$

$m\angle C = 50.1°$

$m\angle A = 78°$

$\frac{\sin 78}{a} = \frac{\sin 51.9}{795.1}$

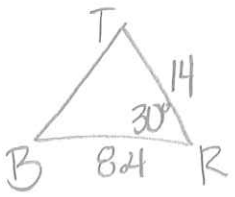
$a = 988.6$ un

2nd Δ? → 180 − 50.1 = 129.9

B = 51.9
+ C = 129.9
181.8
Too much

Find the area of each figure.

5. ΔTRB with t = 8.4, b = 14, and $\angle R = 30°$

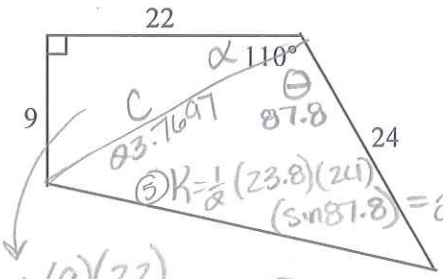


$\text{Area} = \frac{1}{2} ab \sin C$

$= \frac{1}{2}(14)(8.4)\sin(30°)$

$A = 29.4$ un²

6.



① $A = \frac{1}{2}(9)(22)$

$A = 99$ un²

② $9^2 + 22^2 = c^2$

$c = 23.7697$

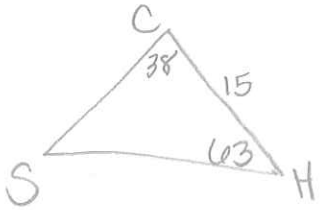
③ $\tan\alpha = \frac{9}{22}$ $\alpha = 22.2$

④ $\theta = 110 - 22.2 = 87.8$

⑤ $K = \frac{1}{2}(23.8)(24)(\sin 87.8) = 285.4$

⑥ 99 + 285.4 = 384.4 un²

7. ΔCHS with $\angle C = 38°$, $\angle H = 63°$, and s = 15cm.



180 − 38 − 63 = 79° = m∠S

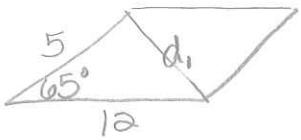
$\frac{\sin 79}{15} = \frac{\sin 38}{c}$

$c = 9.4$

$\text{Area} = \frac{1}{2}(15)(9.4)\sin(63)$

$A = 62.8$ cm²

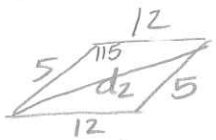
8. A parallelogram has a 65° angle and sides 5 cm and 12 cm. How long are its diagonals?



$(d_1)^2 = 5^2 + 12^2 - 2(5)(12)\cos(65°)$

$(d_1)^2 = 118.286$

$d_1 = 10.88\text{cm}$



$180 - 65 = 115$

$(d_2)^2 = 5^2 + 12^2 - 2(5)(12)\cos 115°$

$(d_2)^2 = 219.7$

$d_2 = 14.8\text{cm}$

9. Find the measure of the smallest and largest angles in a triangle with sides 3, 9, and 10.

Smallest ∠ → short side = 3

$\cos\theta = \frac{3^2 - 9^2 - 10^2}{-2(9)(10)} = \frac{-172}{-180}$

$\cos\theta = .9555$ $\quad \theta = \cos^{-1}(.955) = 17.1°$ (smallest)

Largest ∠ → long side = 10

$\cos\alpha = \frac{10^2 - 3^2 - 9^2}{-2(3)(9)} = \frac{10}{-54}$

$\alpha = \cos^{-1}(-.185) = 100.7°$ (large)

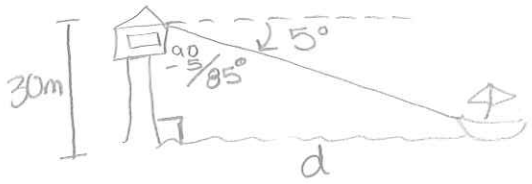
10. The safety instructions for a 30-foot ladder indicate that a ladder should not be inclined at more than a 60° angle with the ground. Suppose a ladder is leaned against a house at this angle, find the distance from the base of the house to the foot of the ladder.

$\cos 60° = \frac{X}{30}$

$X = 30(\cos 60°)$

$X =$ 15 feet

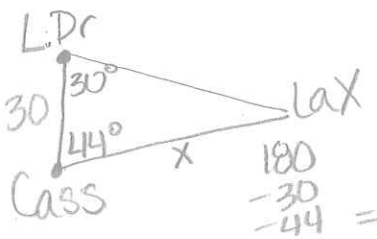
11. From the top of a lighthouse 30 meters from sea level, a sailboat is sighted having an angle of depression of 5°. How far from the base of the lighthouse is the boat?



$\tan 85° = \frac{d}{30}$

$d = 30(\tan 85) = 342.9\text{m}$

12. A fire tower on Cass Street is 30 km south of the fire tower on Lang Drive. A fire on LaCrosse Street can be seen from both towers. If the measure of the angle created by the fire to Cass to Lang is 44° and the measure of the angle from the fire to Lang to Cass is 30°, figure out which tower is closer and the distance to the fire.



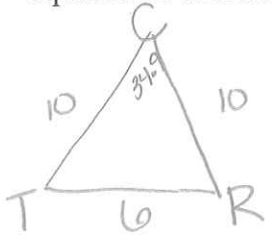
Cass St. tower is closer (smallest ∠ opposite of shortest side)

$180 - 30 - 44 = 106°$

$\frac{\sin 106}{30} = \frac{\sin 30}{X}$

$X =$ 15.6 km Cass St. to Fire

13. An enclosed triangular courtyard has sides of lengths 10 feet, 10 feet, and 6 feet. How many square feet of slate is needed to cover the entire floor?



*SSS

Law of Cosines

(OR $m\angle T = m\angle R = 72.55°$)

$\cos C = \frac{6^2 - 10^2 - 10^2}{-2(10)(10)} = \frac{-164}{-200}$

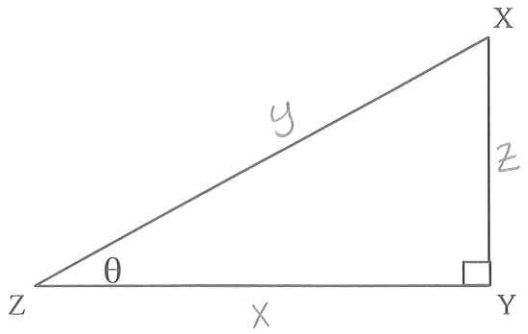
$\cos^{-1}(.82) = m\angle C = 34.9$

Area = $\frac{1}{2}ab\sin C$

$\frac{1}{2}(10)(10)\sin(34.$

$A = 28.6\text{ ft}^2$

14. Given the triangle below and angle θ, state all six trigonometric functions in terms of x, y, and z.



$\sin\theta = \frac{O}{H} = \frac{z}{y}$ $\quad \cos\theta = \frac{A}{H} = \frac{x}{y}$

$\tan\theta = \frac{O}{A} = \frac{z}{x}$ $\quad \cot\theta = \frac{A}{O} = \frac{x}{z}$

$\sec\theta = \frac{H}{A} = \frac{y}{x}$ $\quad \csc\theta = \frac{H}{O} = \frac{y}{z}$

15.6 A triangle has sides lengths a = 120, b = 150, and $\angle A = 32°$. Solve the triangle(s).

*SSA 0, 1, or 2 Δ's?

① $\frac{\sin 32}{120} = \frac{\sin B}{150}$ within domain ∴ 1 or 2 Δs exist!

$\sin B = .6623$

$\sin^{-1}(.6623) = m\angle B = 41.5°$

2nd Δ?

$180 - 41.5 = 138.5°$

④ $m\angle B = 138.5°$

② $m\angle C = 180 - 32 - 41.5$

$m\angle C = 106.5°$

$180 - 32 - 138.5$

⑤ $m\angle C = 9.5°$ 2 Δs exist

③ $\frac{\sin 106.5}{C} = \frac{\sin 32}{120}$

$C = 217.1$ un

⑥ $\frac{\sin 9.5}{C} = \frac{\sin 32}{120}$

$C = 37.4$ un