

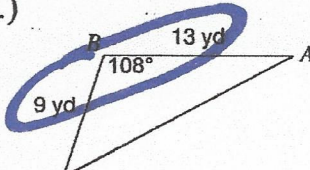
I. Find the asked side or angle for each triangle. Round to tenth place. Show work!

| | | | |
|--|--|--|---|
| <p>1.) Find: side b</p> <p> $A = 180 - 70 - 58$ $A = 52^\circ$ </p> <p> $\frac{26}{\sin 52} = \frac{b}{\sin 58}$ $\frac{b \sin 52}{\sin 52} = \frac{26 \sin 58}{\sin 52}$ </p> <p>Answer: <u>$b = 28$</u></p> | <p>2.) Find: largest angle</p> <p> $32^2 = 30^2 + 22^2 - 2(30)(22)\cos B$ $1024 = 1384 - 1320 \cos B$ $-360 = -1320 \cos B$ $B = \cos^{-1}(-\frac{360}{1320})$ </p> <p>Answer: <u>$B = 74.2^\circ$</u></p> | <p>3.) Find: angle C</p> <p> $\frac{50}{\sin 55} = \frac{43}{\sin C}$ $50 \sin C = 43 \sin 55$ $\frac{50 \sin C}{50} = \frac{43 \sin 55}{50}$ $C = \sin^{-1}(\frac{43 \sin 55}{50})$ </p> <p>Answer: <u>$C = 59^\circ$</u></p> | <p>4.) Find: side a</p> <p> $a^2 = 25^2 + 33^2 - 2(25)(33)\cos 101$ $a^2 = 2028.434842$ </p> <p>Answer: <u>$a = 45$</u></p> |
|--|--|--|---|

II. State and find what is asked for each triangle. Round to tenth place. Use appropriate letters! Show all of your work for each part no matter how simple it is!

| Given Triangle | Type of Triangle Method | Required Work | Answers |
|----------------|--|---|--|
| <p>5.)</p> | <p>AAS Δ</p> <p>Law of Sines</p> | <p>① $C = 180 - 92 - 59$ <u>$C = 29^\circ$</u></p> <p>② $\frac{35}{\sin 92} = \frac{b}{\sin 59}$ <u>$b = 30$</u></p> <p>③ $\frac{35}{\sin 92} = \frac{c}{\sin 29}$ <u>$c = 17$</u></p> | <p>$C = 29^\circ$</p> <p>$b = 30$</p> <p>$c = 17$</p> |
| <p>6.)</p> | <p>SSS Δ</p> <p>Law of Cosines</p> | <p>① $13^2 = 9^2 + 12^2 - 2(9)(12)\cos A$ <u>$A = 75^\circ$</u></p> <p>② $\frac{13}{\sin 75} = \frac{12}{\sin B}$ <u>$B = 63.1^\circ$</u></p> <p>③ $C = 180 - 75 - 63.1$ <u>$C = 41.9^\circ$</u></p> | <p>$A = 75^\circ$</p> <p>$B = 63.1^\circ$</p> <p>$C = 41.9^\circ$</p> |
| <p>7.)</p> | <p>SSA Δ</p> <p>Law of Sines</p> | <p>① $\frac{33}{\sin 75} = \frac{29}{\sin A}$ <u>$A = 58.1^\circ$</u></p> <p>② $C = 180 - 75 - 58.1$ <u>$C = 46.9^\circ$</u></p> <p>③ $\frac{33}{\sin 75} = \frac{c}{\sin 46.9}$ <u>$c = 24.9$</u></p> | <p>$A = 58.1^\circ$</p> <p>$C = 46.9^\circ$</p> <p>$c = 24.9$</p> |
| <p>8.)</p> | <p>SAS Δ</p> <p>Law of Cosines</p> | <p>① $a^2 = 27^2 + 34^2 - 2(27)(34)\cos 115$ <u>$a = 51.6$</u></p> <p>② $\frac{51.6}{\sin 115} = \frac{34}{\sin B}$ <u>$B = 36.7^\circ$</u></p> <p>③ $C = 180 - 115 - 36.7$ <u>$C = 28.3^\circ$</u></p> | <p>$B = 36.7^\circ$</p> <p>$C = 28.3^\circ$</p> <p>$a = 51.6$</p> |

III. Using appropriate formula, find the area of each triangle. Round to tenth place. Show work!

9.) 

① $A = \frac{1}{2}(9)(13)\sin 108$

Area of $\Delta = \underline{55.6 \text{ yd}^2}$

10.) ③ base = $11 + 5 = 16$

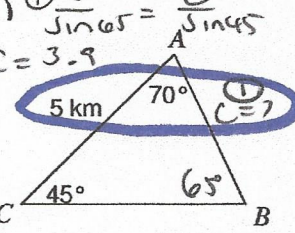
① $\tan 40 = \frac{h}{11}$
 $h = 13.1$

② $\tan 69 = \frac{h}{x}$
 $x = 5$

④ $A = \frac{1}{2}(16)(13.1)$

Area of $\Delta = \underline{104.8 \text{ unit}^2}$

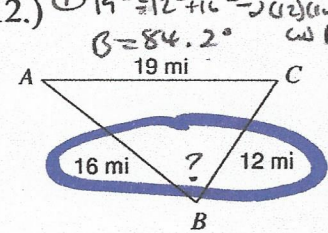
11.) ① $\frac{5}{\sin 65} = \frac{c}{\sin 45}$
 $c = 3.9$



② $A = \frac{1}{2}(5)(3.9)\sin 70$

Area of $\Delta = \underline{9.2 \text{ km}^2}$

12.) ① $19^2 = 12^2 + 16^2 - 2(12)(16)\cos B$
 $B = 84.2^\circ$

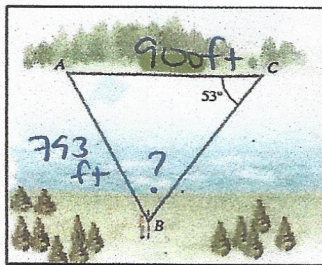


② $A = \frac{1}{2}(16)(12)\sin 84.2$

Area of $\Delta = \underline{95.5 \text{ mi}^2}$

IV. Simple Word Problems – Complete each problem that requires one to two steps for the answer.

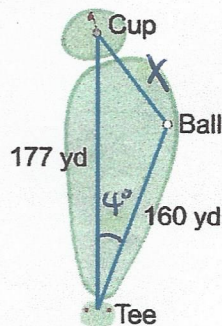
13.) A surveyor is standing opposite of two points (A and C) on the bank of a river. The distance between the two points is 900 feet. The width of the river opposite of point C is 793 feet. What is the angle formed at the surveyor?



$$\frac{793}{\sin 53} = \frac{900}{\sin B}$$

$$\underline{B = 65^\circ}$$

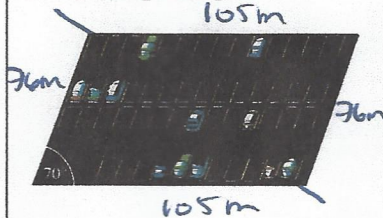
14.) A golfer hits a golf ball at a 4° from the ball's straight path to the cup. How far does the ball lie from the cup?



$$X^2 = 177^2 + 160^2 - 2(177)(160)\cos 4$$

$$\underline{X = 20.7 \text{ yd}}$$

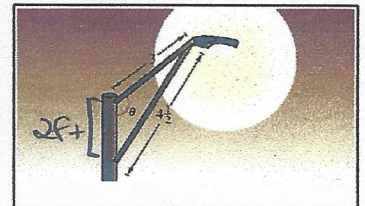
15.) An office building has a parallelogram shaped parking lot with side lengths of 76 meters and 105 meters. What is the area of the parking lot?



$$A = 2\left(\frac{1}{2} \cdot 76 \cdot 105 \sin 70\right)$$

$$\underline{A = 7498.7 \text{ m}^2}$$

16.) Below is a design for a street light. The distance between the two arms that connect to the light is 2 feet. What is measure of angle θ ?



$$4.5^2 = 2^2 + 3^2 - 2(2)(3)\cos \theta$$

$$20.25 = 13 - 12\cos \theta$$

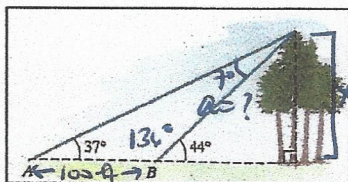
$$\frac{7.25}{-12} = \frac{-12\cos \theta}{-12}$$

$$\theta = \cos^{-1}\left(\frac{7.25}{-12}\right)$$

$$\underline{\theta = 127.0^\circ}$$

V. Complex Word Problems – Complete each problem that requires multiple steps for the answer.

17.) The distance between two points on the ground is 100 ft. What is the height of the tree?



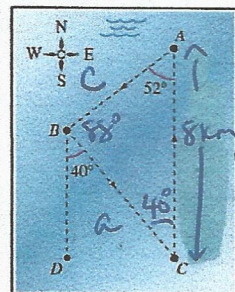
$$\frac{100}{\sin 7} = \frac{a}{\sin 37}$$

$$a = 493.8$$

$$\frac{a}{\sin 44} = \frac{x}{\sin 49.8}$$

$$\underline{x = 343 \text{ ft}}$$

18.) The diagram of a sailboat race is given below using triangle ABC. The length of side b is 8 km. What is the total distance of the race?



$$\frac{8}{\sin 88} = \frac{a}{\sin 52}$$

$$a = 6.3$$

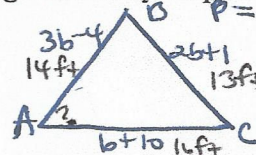
$$\frac{8}{\sin 88} = \frac{c}{\sin 40}$$

$$c = 5.1$$

$$\text{Total race} = 8 + 6.3 + 5.1$$

$$\underline{= 19.4 \text{ km}}$$

19.) Adam is designing a triangular pen in his backyard with lengths: $(2b + 1)$ ft, $(b + 10)$ ft, and $(3b - 4)$ ft. Adam has 43 ft of fencing for the pen. What is the smallest angle formed by the pen?



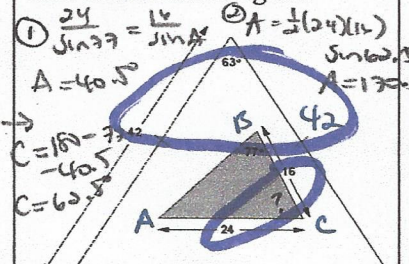
$$3b - 4 + b + 10 + 2b + 1 = 43$$

$$6b + 7 = 43 \rightarrow b = 6$$

$$13^2 = 16^2 + 14^2 - 2(16)(14)\cos A$$

$$\underline{A = 50.5^\circ}$$

20.) A dart is thrown at the board below. What is the probability that the dart will land in the shaded region?



$$\frac{24}{\sin 37} = \frac{16}{\sin A}$$

$$A = 40.5^\circ$$

$$C = 180 - 73.4 - 40.5 = 66.1^\circ$$

$$A = \frac{1}{2}(42)(42)\sin 63$$

$$A = 755.9$$

$$\text{Probability} = \frac{170.3}{755.9} = \underline{21.7\%}$$