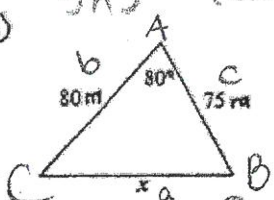
Law of Sines and Cosines Review:

Solve for the side or angle indicated in each.

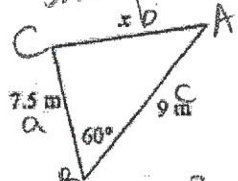
① SAS → Law of cosine



$x^2 = 80^2 + 75^2 - 2(80)(75)\cos(80)$

$\boxed{x = 99.7\ m}$

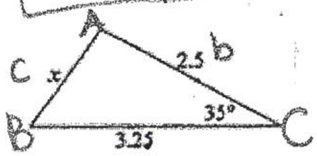
② SAS → Law of cosine



$x^2 = 7.5^2 + 9^2 - 2(7.5)(9)\cos(60)$

$\boxed{x = 8.4\ m}$

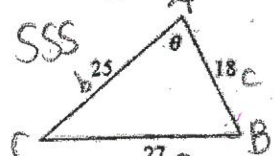
③ SAS ↓ Law of cosine



$x^2 = 3.25^2 + 2.5^2 - 2(3.25)(2.5)\cos(35)$

$\boxed{x = 1.87}$

④ SSS



$27^2 = 25^2 + 18^2 - 2(25)(18)\cos A$

$27^2 = 949 - 900\cos A$

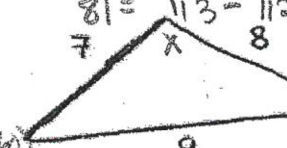
$-220 = -900\cos A$

$.24 = \cos A$

$\boxed{75.9° = A}$

Find the area of the following triangles.
(Do not round angles before finding the area)

⑦



1st) find an angle

$9^2 = 7^2 + 8^2 - 2(7)(8)\cos X$

$81 = 113 - 112\cos X$

$-32 = -112\cos X$

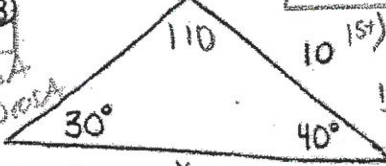
$.2857 = \cos X$

$X = 73.4°$

2nd) Area $= \frac{1}{2}(7)(8)\sin(73.4)$

$\boxed{26.8\ \text{units}^2}$

⑧



1st) $\frac{\sin(110)}{x} = \frac{\sin(30)}{10}$

$\frac{10\sin(110)}{\sin(30)} = x$

$18.8 = x$

2nd) Area $= \frac{1}{2}(10)(18.8)\sin(40)$

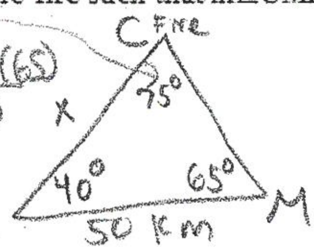
9. Two lookout towers, L and M, are 50 kilometers apart. The ranger in Tower L sees a fire at point C such that $m\angle CLM = 40°$. The ranger in Tower M sees the same fire such that $m\angle CML = 65°$. How far is the fire from Tower L?

① $180 - 65 - 40 = \boxed{75 = C}$ (M, L)

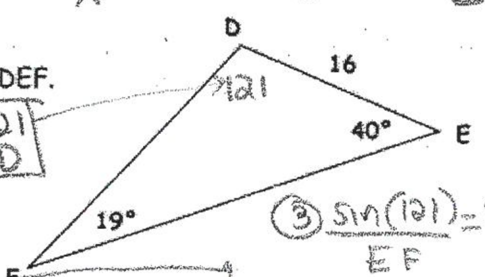
② $\frac{\sin(75)}{50} = \frac{\sin(65)}{x}$

$\frac{x\sin(75)}{\sin(75)} = \frac{50\sin(65)}{\sin(75)}$

$\boxed{x = 46.9\ km}$



10. Find the perimeter of ΔDEF.



① $180 - 40 - 19 = \boxed{121\ D}$ (E, F)

② $\frac{\sin(19)}{16} = \frac{\sin 40}{DF}$

$\frac{16\sin(40)}{\sin(19)} = \frac{DF\sin(19)}{\sin(19)}$

$\boxed{DF = 31.6}$

③ $\frac{\sin(121)}{EF} = \frac{\sin(19)}{16}$

$\frac{16\sin(121)}{\sin(19)} = \frac{EF\sin(19)}{\sin(19)}$

$\boxed{42.1 = EF}$

perimeter of ΔDEF $= DE + EF + DF$

$= 16 + 42.1 + 31.6$

$\boxed{\text{perimeter of } \Delta DEF = 89.7\ \text{units}}$

Solve the Triangles:

11 ~~10~~. a = 5, b = 8, and c = 10

① $c^2 = a^2 + b^2 - 2ab\cos C$

$10^2 = 5^2 + 8^2 - 2(5)(8)\cos C$

$100 = 25 + 64 - 80\cos C$

$\frac{11}{-80} = \frac{-80\cos C}{-80}$

$\cos^{-1}(-11/80) = \boxed{C = 97.9°}$

② $\frac{\sin C}{c} = \frac{\sin A}{a}$

$\frac{\sin(97.9)}{10} = \frac{\sin A}{5}$

$\frac{5\sin(97.9)}{10} = \frac{10\sin A}{10}$

$\boxed{29.7° = A}$

③ $180 - 29.7\ A - 97.9\ C$

$\boxed{52.4° = B}$

12. $b = 110$, $c = 180$, and $B = 40°$

SSA and Side across from angle < other side → check for ambiguous case

① $\frac{\sin(40)}{110} = \frac{\sin C}{180}$

$\frac{180\sin(40)}{110} = \frac{110\sin(C)}{110}$

$1.05 = \sin(C)$ → sin MUST be ≤ 1

$C = \sin^{-1}(1.05)$

→ Error in calc

$\boxed{\text{No Solution}}$

No △ because 1 side is too short

13. $a = 12$, $b = 7.8$, and $B = 35°$

① SSA and ② Side across from angle < other side → ambiguous case

① $\frac{\sin(35)}{7.8} = \frac{\sin A}{12}$

$\frac{12\sin(35)}{7.8} = \frac{7.8\sin(A)}{7.8}$

$.8824 = \sin A$

$\boxed{A_1 = 61.9°}$

② 180
− 61.9 A
− 35 B

$\boxed{83.1° = C_1}$

③ $\frac{\sin(83.1)}{c} = \frac{\sin(35)}{7.8}$

$\frac{7.8\sin(83.1)}{\sin(35)} = \frac{c\sin(35)}{\sin(35)}$

$\boxed{13.5 = c}$

① 180 − 61.9 = $\boxed{118.1°}$ new A_2

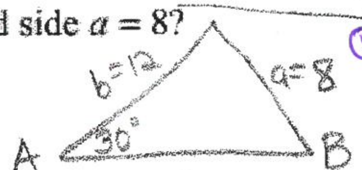
② 180 − 118.1 − 35 = $\boxed{26.9°}$ C_2
A B

③ $\frac{\sin(26.9)}{c} = \frac{\sin(35)}{7.8}$

$c = \frac{7.8\sin(26.9)}{\sin(35)}$

$\boxed{c_2 = 6.15}$

14. $m\angle A = 30$, side $b = 12$, and side $a = 8$?



① SSA and ② Side across from angle < other side → ambiguous case

① $\frac{\sin(30)}{8} = \frac{\sin B}{12}$

$\frac{12\sin(30)}{8} = \frac{8\sin B}{8}$

$.75 = \sin B$

$\sin^{-1}(.75) = B$

$\boxed{48.6° = B_1}$

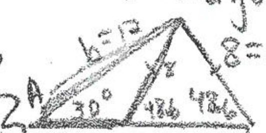
② 180
− 48.6 B
− 30 A

$\boxed{91.4° = C_1}$

③ $\frac{\sin(91.4)}{c} = \frac{\sin(30)}{8}$

$\frac{8\sin(91.4)}{\sin(30)} = \frac{c\sin(30)}{\sin(30)}$

$\boxed{16.0 = c_1}$



① 180 − 48.6 = $\boxed{131.4°}$ new B_2

② 180
− 131.4 B
− 30 A

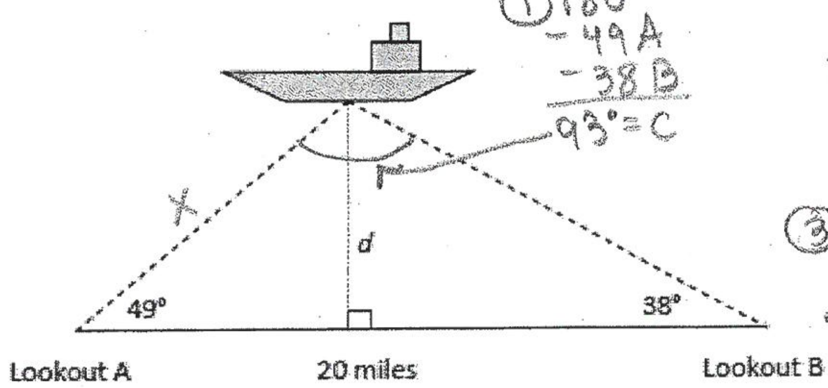
$\boxed{C_2 = 18.6°}$

③ $\frac{\sin(18.6)}{c} = \frac{\sin(30)}{8}$

$\frac{8\sin(18.6)}{\sin(30)} = \frac{c\sin(30)}{\sin(30)}$

$\boxed{5.1 = c_2}$

15. Triangulation can be used to find the location of an object by measuring the angles to the object from two points at the end of a baseline. Two lookouts 20 miles apart on the coast spot a ship at sea. Using the figure below find the distance, *d*, the ship is from shore to the nearest tenth of a mile.



① 180
− 49 A
− 38 B
93° = C

② $\frac{\sin(93)}{20} = \frac{\sin(38)}{x}$

$\frac{x\sin(93)}{\sin(93)} = \frac{20\sin(38)}{\sin(93)}$

$\boxed{x = 12.3 \text{ miles}}$

③

SOHCAHTOA

$\frac{\sin(49)}{1} = \frac{d}{12.3}$

$d = 12.3\sin(49)$

$\boxed{d = 9.7 \text{ miles}}$