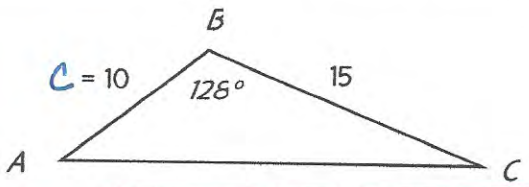
Name Key Date _____ Period _____

Law of Cosines Homework

Problems 1 – 8, solve each triangle, if possible. Express your answer to nearest hundredth.

1.



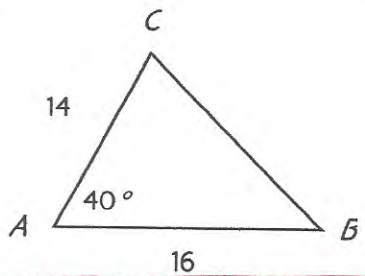
$b = \sqrt{10^2 + 15^2 - 2(10)(15)\cos 128°}$

$b \approx 22.58$

$\frac{\sin C}{10} = \frac{\sin 128°}{22.58}$

$\angle C \approx 20.43°$ $\angle A \approx 31.57°$

2.



$a = \sqrt{14^2 + 16^2 - 2(14)(16)\cos 40°}$

$a \approx 10.43$

$\frac{\sin B}{14} = \frac{\sin 40°}{10.43}$

$\angle B \approx 59.63°$ $\angle C \approx 80.37°$

3. $\angle A = 56°$, $b = 15$, $c = 8$

$a = \sqrt{15^2 + 8^2 - 2(15)(8)\cos 56°}$

$a \approx 12.44$

$\frac{\sin C}{8} = \frac{\sin 56°}{12.44}$

$\angle C \approx 32.22°$

$\angle B \approx 91.78°$

4. $\angle B = 34°$, $a = 40$, $c = 17$

$b = \sqrt{40^2 + 17^2 - 2(40)(17)\cos 34°}$

$b \approx 27.60$

$\frac{\sin C}{17} = \frac{\sin 34°}{27.60}$

$\angle C \approx 20.15°$

$\angle A \approx 125.85°$

5. $a = 12$, $b = 20$, $\angle C = 92°$

$C = \sqrt{12^2 + 20^2 - 2(12)(20)\cos 92°}$

$C = 23.68$

$\frac{\sin A}{12} = \frac{\sin 92°}{23.68}$

$\angle A \approx 30.43°$

$\angle B \approx 57.57°$

6. $a = 2$, $b = 6$, $c = 4$

$\cos B = \frac{2^2 + 4^2 - 6^2}{2(2)(4)}$

$\angle B = 180°$

no triangle possible

Jean Adams

7. $\angle A = 57°$, $b = 12$, $c = 9$

$a = \sqrt{12^2 + 9^2 - 2(12)(9)\cos 57°}$

$a \approx 10.36$

$\frac{\sin C}{9} = \frac{\sin 57°}{10.36}$

$\angle C \approx 46.77°$

$\angle B \approx 76.23°$

8. $\angle B = 70.6°$, $a = 9.5$, $c = 8.2$

$b = \sqrt{9.5^2 + 8.2^2 - 2(9.5)(8.2)\cos 70.6°}$

$b \approx 10.28$

$\frac{\sin C}{8.2} = \frac{\sin 70.6°}{10.28}$

$\angle C \approx 48.80°$

$\angle A \approx 60.60°$

Problems 9 – 10, find the area of the triangle.

9. $\angle A = 48°$, b = 34 in., $c = 20$ in.

$A = \frac{1}{2}(34)(20)\sin 48°$

$A = 252.67 \text{ in}^2$

10. $\angle C = 110°$, a = 2.4 ft., $b = 5.6$ ft.

$A = \frac{1}{2}(2.4)(5.6)\sin 110°$

$A \approx 6.31 \text{ ft}^2$

Problems 11 – 14, decide whether a triangle can be formed with the given side lengths. If so, use Heron's formula to find the area of the triangle.

11. $a = 6$, $b = 6$, $c = 10$

$S = \frac{1}{2}(6+6+10)$

$S = 11$

$A = \sqrt{11(11-6)(11-6)(11-10)}$

$A = \sqrt{11 \cdot 5 \cdot 5 \cdot 1}$

$A \approx 16.58$

12. $a = 3$, $b = 5$, $c = 9$

$\sin C = \frac{3^2 + 5^2 - 9^2}{2(3)(5)}$

$\sin C = -1.57$

no triangle formed

Jean Adams

13. $a = 18.7$, $b = 21.6$, $c = 32$

$S = \frac{1}{2}(18.7 + 21.6 + 32)$

$S = 36.15$

$A = \sqrt{36.15(17.45)(14.55)(4.15)}$

$A \approx 195.17$

14. $a = 17.4$, $b = 16.2$, $c = 12.3$

$S = \frac{1}{2}(17.4 + 16.2 + 12.3)$

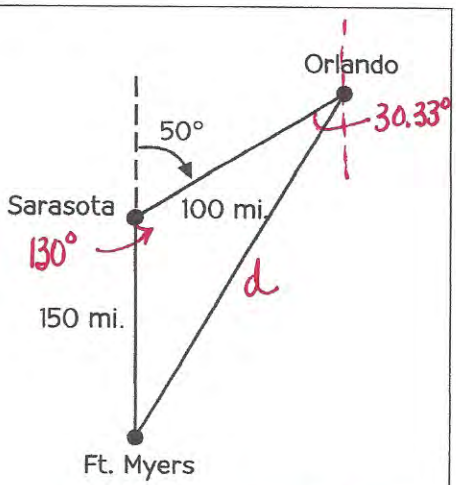
$S = 22.95$

$A = \sqrt{22.95(5.55)(6.75)(10.65)}$

$A \approx 95.69$

Problems 15 – 18, solve each problem.

15. A jet plane flies 150 miles, from Ft. Myers, FL to Sarasota, FL, and then turns 50° towards the east heading to Orlando, FL which is a distance of 100 miles.



A) How far is the return trip from Orlando to Ft. Myers?

$d = \sqrt{150^2 + 100^2 - 2(150)(100)\cos 130°}$

$d \approx 227.56$ miles

B) Through what angle should the pilot turn at Orlando to return to Ft. Myers?

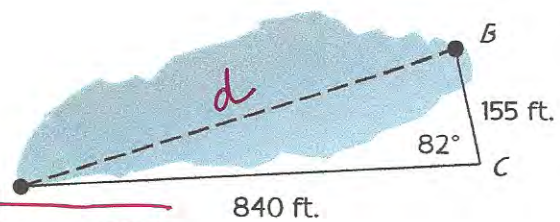
$\angle O \approx 30.33°$

$130° + 30.33° \approx 160.33°$

$\frac{\sin O}{150} = \frac{\sin 130°}{227.56}$

$\angle O \approx 30.33°$

16. Rachel must find the distance from A to B on the opposite sides of a lake. She locates a point C that is 840 feet from A and 155 feet from B. Her angle at C measures 82°. What is the distance across the pond to the nearest foot?

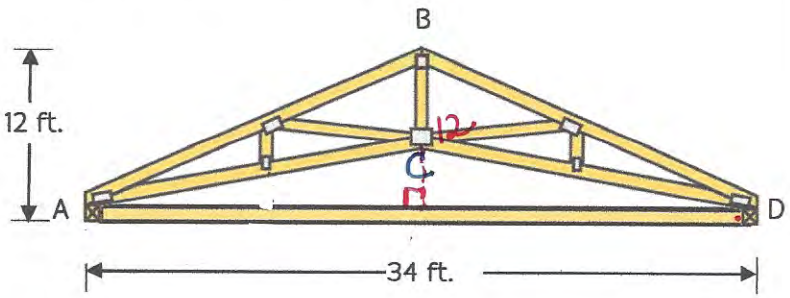


$d = \sqrt{155^2 + 840^2 - 2(155)(840)\cos 82°}$

$d \approx 832.70$ ft

$d \approx 833$ ft

17. A truss company is designing the truss for a new home shown below.



A) If $m\angle CAD = 10°$, find the measure of $\angle BAC$.

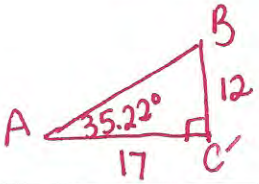
$\tan A = \frac{12}{17}$

$\angle A \approx 35.22°$

$\angle BAC \approx 25.22°$

B) Find the length of AB.

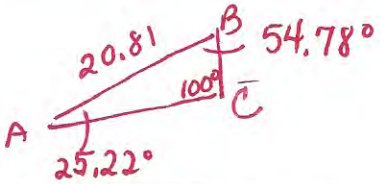
$AB \approx 20.81$ ft



$\sin 35.22° = \frac{12}{AB}$

C) Find the length of AC.

$AC \approx 17.26$ ft $\quad \frac{AC}{\sin 54.78°} = \frac{20.81}{\sin 100°}$

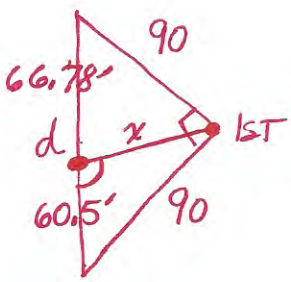


18. A Major League baseball diamond is actually a square whose sides measure 90 feet. The pitching mound is 60.5 feet from home plate on a line that joins home plate and second base.

A) Find the distance from the pitching mound to first base.

$x = \sqrt{60.5^2 + 90^2 - 2(60.5)(90)\cos 45°}$

$x \approx 63.72$ ft



B) How far is it from the pitching mound to second base?

$d = \sqrt{90^2 + 90^2} - 60.5$

$d \approx 127.28 - 60.5$

$d \approx 66.78$ ft

C) If a pitcher is facing home plate, through what angle does he need to turn to face first base?

$\cos P = \frac{60.5^2 + 63.72^2 - 90^2}{2(60.5)(63.72)}$

$P \approx 92.82°$