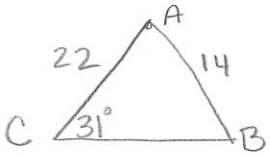
Precalculus
Law of Sines and Cosines Test Review

Name Key
Period _____ Date _____

Solve the following triangles.

1. $m\angle C = 31°, b = 22, c = 14$



$\frac{\sin 31°}{14} = \frac{\sin B}{22}$

$\angle B = 54.0°$

$\angle A = 95.0°$

$\frac{\sin 31°}{14} = \frac{\sin 95°}{a}$

$a = 27.1$

Case II

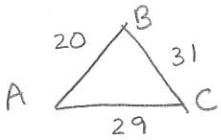
$\angle B = 126°$

$\angle A = 23°$

$\frac{\sin 31°}{14} = \frac{\sin 23°}{a}$

$a = 10.6$

2. $a = 31, c = 20, b = 29$



$31^2 = 20^2 + 29^2 - 2(20)(29)\cos A$

$.24137931 = \cos A$

$\angle A = 76°$

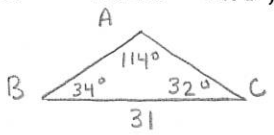
$\frac{\sin 76°}{31} = \frac{\sin C}{20}$

$\sin C = .62599$

$\angle C = 38.8°$

$\angle B = 65.2°$

3. $m\angle A = 114°,\ m\angle B = 34°,\ a = 31$



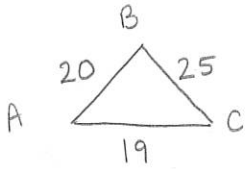
$\frac{\sin 114°}{31} = \frac{\sin 32°}{c}$

$c = 18$

$\frac{\sin 114°}{31} = \frac{\sin 34°}{b}$

$b = 19$

4. $b = 19,\ c = 20,\ a = 25$



$25^2 = 20^2 + 19^2 - 2(20)(19)\cos A$

$-136 = -760 \cos A$

$.178947 = \cos A$

$\angle A = 79.7°$

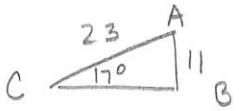
$\frac{\sin 79.7}{25} = \frac{\sin B}{19}$

$.747752628$

$\angle B = 48.4°$

$\angle C = 51.9°$

5. $m\angle C = 17°, b = 23, c = 11$



$\frac{\sin 17°}{11} = \frac{\sin B}{23}$

$.611322655 = \sin B$

$\angle B = 37.7°$

$\angle A = 125.3°$

$\frac{\sin 125.3°}{a} = \frac{\sin 17°}{11}$

$a = 30.7$

Case II

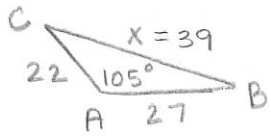
$\angle B = 142.3°$

$\angle A = 20.7°$

$\frac{\sin 17°}{11} = \frac{\sin 20.7}{a}$

$a = 13.3$

6. $b = 22, c = 27, m\angle A = 105°$



$x^2 = 22^2 + 27^2 - 2(22)(27)\cos 105°$

$x^2 = 1520.4$

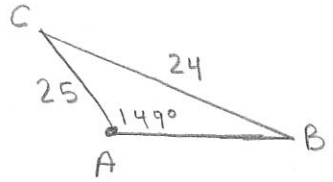
$x = 39$

$\frac{\sin B}{22} = \frac{\sin 105}{39}$

$\angle B = 33°$

$\angle A = 42°$

7. $m\angle A = 149°, c = 25, a = 24$

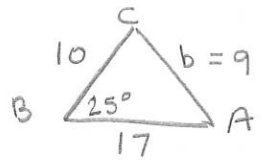


$$\frac{\sin 149°}{24} = \frac{\sin B}{25}$$

$\angle B = 32.4°$

Not a triangle

8. $m\angle B = 25°, c = 17, a = 10$



$b^2 = 10^2 + 17^2 - 2(10)(17)\cos 25°$

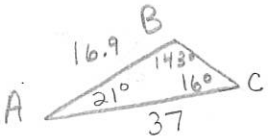
$b = 9$

$$\frac{\sin 25°}{9} = \frac{\sin A}{10}$$

$\angle A = 28°$

$\angle B = 127°$

9. $m\angle C = 16°, m\angle A = 21°, b = 37$



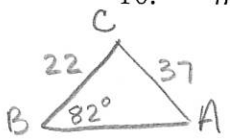
$$\frac{\sin 143°}{37} = \frac{\sin 16°}{c}$$

$c = 16.9$

$$\frac{\sin 143°}{37} = \frac{\sin 21°}{a}$$

$a = 22.0$

10. $m\angle B = 82°, a = 22, b = 37$



$$\frac{\sin 82°}{37} = \frac{\sin A}{22}$$

$\angle A = 36.1°$

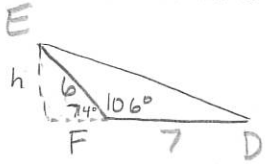
$\angle C = 61.9°$

$$\frac{\sin 61.9°}{c} = \frac{\sin 82°}{37}$$

$c = 33$

Find the area of each triangle to the nearest tenth.

11. ΔFDE: $d = 6$ mi, $m\angle F = 106°$, $e = 7$ mi



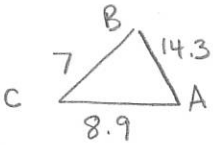
$\sin 74° = \frac{h}{6}$

$h = 5.77$

$A = \frac{1}{2}(7)(5.77)$

$A = 20.195$ mi^2

12. ΔCAB: $a = 7$ in, $b = 8.9$ in, $c = 14.3$ in

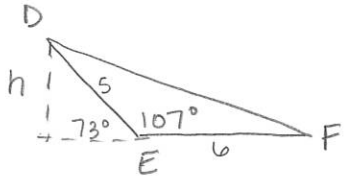


$S = \frac{30.2}{2} = 15.1$

$A = \sqrt{15.1(15.1-7)(15.1-8.9)(15.1-14.3)}$

$A = 24.6$ in^2

13. ΔEFD: $d = 6$ mi, $m\angle E = 107°$, $f = 5$ mi



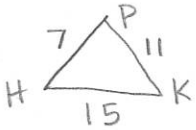
$\sin 73° = \frac{h}{5}$

$h = 4.78$

$A = \frac{1}{2}(6)(4.78)$

$A = 14.34$ mi^2

14. ΔHPK: $p = 15$ km, $k = 7$ km, $h = 11.1$ km



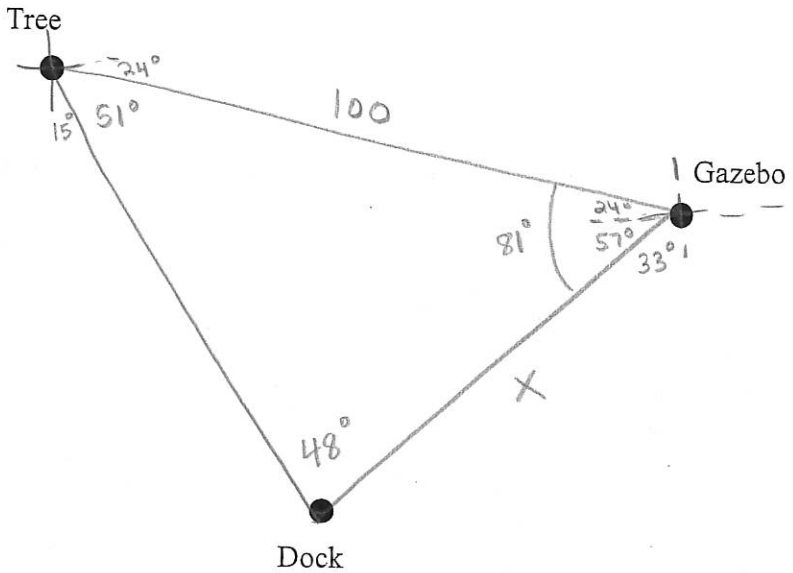
$S = 16.5$

$A = \sqrt{16.5(16.5-7)(16.5-15)(16.5-11)}$

$A = 35.96$ km^2

Law of Sine and Cosine Word Problems

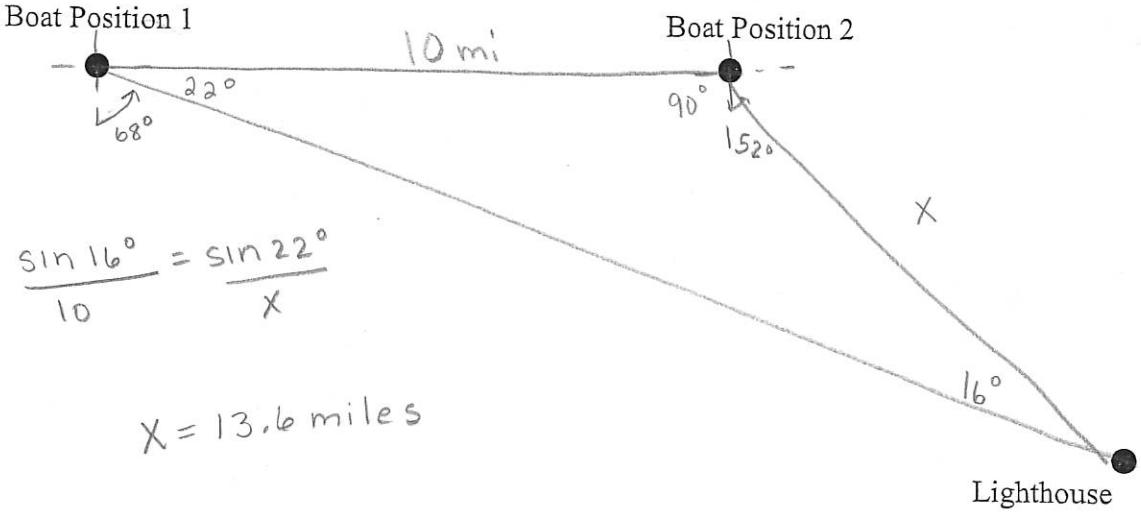
1. A footbridge is to be built across a small lake from a gazebo to a dock. From a tree 100 yards from the gazebo the bearing is E 24° S. From the tree to the dock the bearing is S 15° E. The bearing from the gazebo to the dock is S 33° W. What is the length of the bridge?



$$\frac{\sin 48^\circ}{100} = \frac{\sin 51^\circ}{x}$$

$X = 104.6$ yds

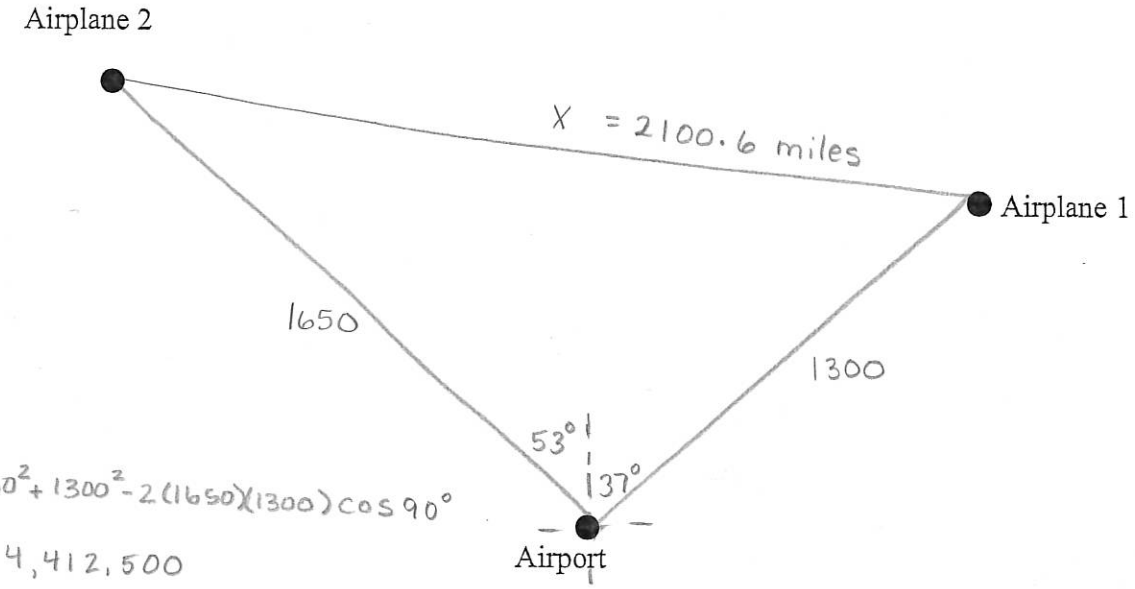
2. A boat is sailing due east parallel to the shoreline at a speed of 20 miles per hour. At a given time the, the bearing to a lighthouse is S 68° E, and 30 minutes later the bearing is S 52° E. Find the distance from the boat to the lighthouse at Boat Position 2.



$$\frac{\sin 16^\circ}{10} = \frac{\sin 22^\circ}{X}$$

$X = 13.6$ miles

3. Two planes leave an airport at the same time. One plane is flying 650 m.p.h at a bearing N 37° E, and the other plane is flying at 825 m.p.h at a bearing of N 53° W. How far apart are the planes after flying for 2 hours?



$X^2 = 1650^2 + 1300^2 - 2(1650)(1300)\cos 90°$

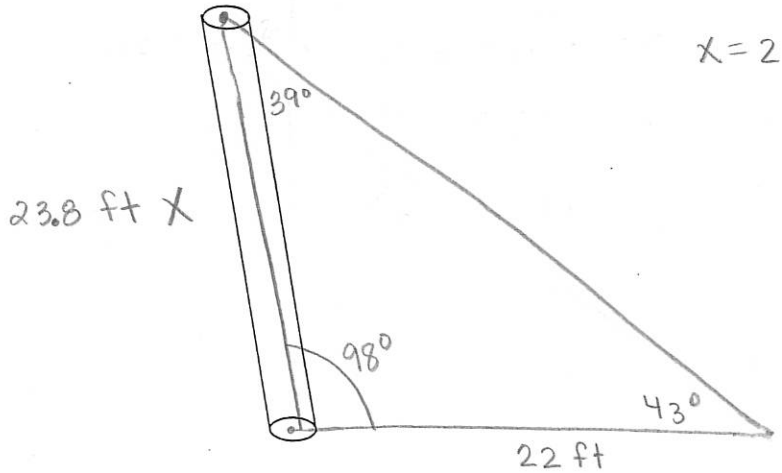
$X^2 = 4,412,500$

$X = 2100.6$

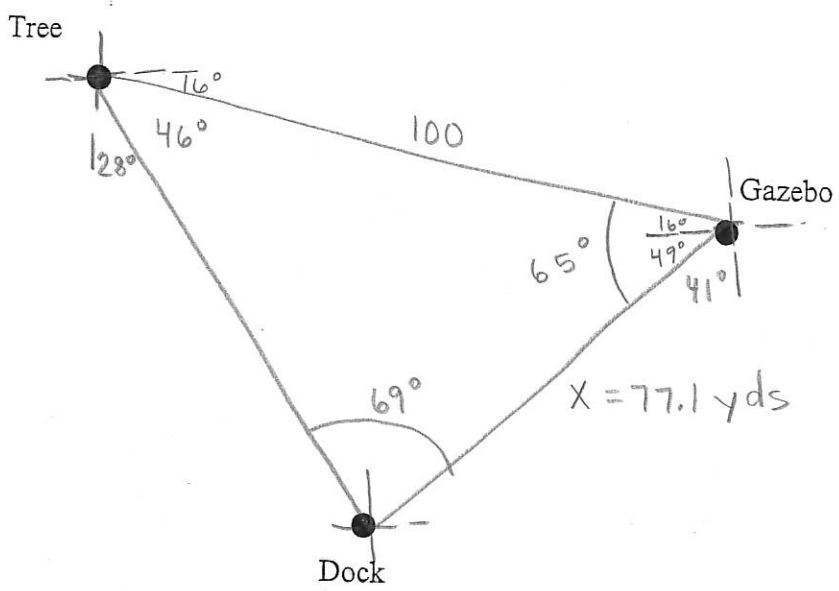
4. A poll tilts towards the sun at an 8° angle from the vertical at it casts a 22-ft shadow. The angle of elevation from the shadow to the top of the pole is 43°. How tall is the poll?

$$\frac{\sin 43°}{X} = \frac{\sin 39°}{22}$$

$X = 23.8$



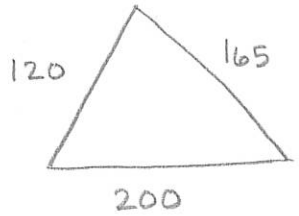
5. A footbridge is to be built across a small lake from a gazebo to a dock. From a tree 100 yards from the gazebo the bearing is E 16° S. From the tree to the dock the bearing is S 28° E. The bearing from the gazebo to the dock is S 41° W. What is the length of the bridge?



$$\frac{\sin 46^\circ}{X} = \frac{\sin 69^\circ}{100}$$

$X = 77.1$

6. A town planning board wishes to place sod on their village commons that is in the shape of a triangle whose sides have lengths of 120 feet, 165 feet, and 200 feet. If the sod costs $0.35 per square foot, determine the cost, to the nearest dollar, for covering the commons in sod.



$$S = \frac{120+165+200}{2} = 242.5$$

$$A = \sqrt{242.5(242.5-120)(242.5-200)(242.5-165)}$$

$$A = \sqrt{242.5(122.5)(42.5)(77.5)}$$

$$A = 9891.7 \text{ ft}^2$$

$$(9891.7)(.35)$$

Cost $3,462