Name______________________________ Advanced Pre-Calculus 2012

Date ______________ Period ___________ Review of 4.8, 6.1, 6.2

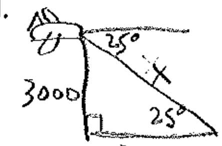
I. Round all answers to two decimal places.

1) A water tower in Houston casts a shadow 150 meters long when the angle of elevation of the sun is 52°. Find the height of the tower.

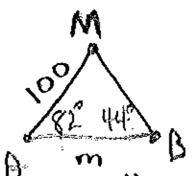
$\tan 52^\circ = \frac{x}{150}$ $\quad x = 150 \cdot \tan 52^\circ = \boxed{191.99\text{m}}$

2) The angle of depression of the closest point on the ground that is visible over the nose of the airplane is 25°. If a certain plane is flying level at an altitude of 3000 feet, find the line of sight distance from the pilot to the closest visible point on the ground.

$\sin 25^\circ = \frac{3000}{x}$ $\quad x = \frac{3000}{\sin 25^\circ} = \boxed{7098.60\text{ft}}$

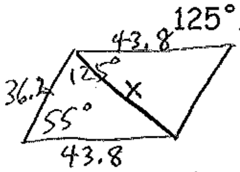


3) Two surveyors located at points A and B sight the marker at M. The line of sight angle measure to the marker from point A is 82°; and from point B, 44°. The distance from A to M is 100 yards. Determine the distance between the surveyors to the nearest tenth of a yard.



$M = 180 - 82 - 44 = 54^\circ$ $\quad \frac{\sin 54^\circ}{m} = \frac{\sin 44^\circ}{100}$ $\quad m = \frac{100 \cdot \sin 54^\circ}{\sin 44^\circ} = \boxed{116.46\text{ yd}}$

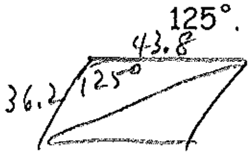
4) The sides of a parallelogram are 43.8 cm and 36.2 cm, and the measure of one angle is 125°. Determine the length of the shorter diagonal.



$x^2 = 36.2^2 + 43.8^2 - 2 \cdot 36.2 \cdot 43.8 \cdot \cos 55^\circ$

$x = \sqrt{\text{Ans}} = \boxed{37.55\text{ cm}}$

5) The sides of a parallelogram are 43.8 cm and 36.2 cm, and the measure of one angle is 125°. Find the area of the parallelogram

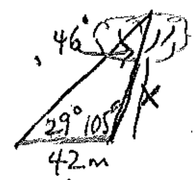


$A_\Delta = \frac{1}{2} \cdot 36.2 \cdot 43.8 \cdot \sin 125^\circ$

$A_\square = 2 \cdot A_\Delta = \boxed{1298.81\text{cm}^2}$

6) Strong winds have forced a tree to grow 15° from vertical toward the sun . The tree casts a shadow of 42 meters. If the angle of elevation from the tip of the shadow to the top of the tree is 29°, how tall is the tree?

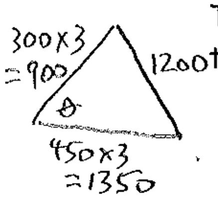
$\frac{\sin 46^\circ}{42} = \frac{\sin 29^\circ}{x}$ $\quad x = \frac{42 \cdot \sin 29^\circ}{\sin 46^\circ} = \boxed{28.31\text{m}}$



$90^\circ + 15^\circ = 105^\circ$

$180^\circ - 29^\circ - 105^\circ = 46^\circ$

7) Two planes, one flying 300 mph and the other 450 mph, left an airport at the same time. Three hours later they were 1200 miles apart. What was the measure of the angle between their flight paths?

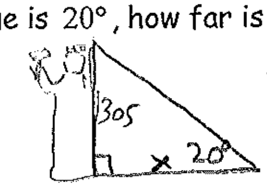


$\cos\theta = \frac{900^2 + 1350^2 - 1200^2}{2 \cdot 900 \cdot 1350}$

$\theta = \cos^{-1}(\text{Ans}) = \boxed{60.61^\circ}$

8) A ship is just offshore of New York City. A sighting is taken of the Statue of Liberty, which is about 305 feet tall. If the angle of elevation to the top of the statue is 20°, how far is the ship from the base of the statue?

$\tan 20^\circ = \frac{305}{x}$ $\quad x = \frac{305}{\tan 20^\circ} = \boxed{837.98\text{ft}}$



IV. Solve the following triangles. Round to two decimal places.

9) Given: a = 9 in., b = 15 in., c = 21in.

$\boxed{A=21.79^\circ \quad B=38.21^\circ \quad c=120^\circ}$

$\cos C = \frac{9^2+15^2-21^2}{2\cdot 9\cdot 15}$ $C=\cos^{-1}(\text{Ans}) = \underline{120^\circ}$ $\frac{\sin A}{9} = \frac{\sin C}{21}$ $\sin A = \frac{9\cdot \sin C}{21}$ $A = \sin^{-1}(\text{Ans}) = \underline{} = \underline{21.79^\circ}$

$B = 180 - C - A = \underline{38.21^\circ}$

10) Give ∠ G = 48°, h = 22 ft., i = 15 ft.

$\boxed{g=16.35\text{ft} \quad I=42.98^\circ \quad H=89.02^\circ}$

$g^2 = 22^2+15^2-2\cdot 22\cdot 15\cdot \cos 48^\circ$ $g=\sqrt{\text{Ans}} = \underline{16.35}$

$\frac{\sin 48^\circ}{g} = \frac{\sin I}{15}$ $\sin I = \frac{15\cdot \sin 48^\circ}{g}$ $I = \sin^{-1}(\text{Ans}) = \underline{42.98^\circ}$

$H = 180-48-I = \underline{89.02^\circ}$

11) ΔABC, where $\angle C = 90°$, $\angle B = 68°$, and $a = 37$ in.

$\boxed{A=22^\circ \quad b=91.58\text{ in} \quad c=98.77\text{ in}}$

$A = 180-90-68 = \underline{22^\circ}$ $\frac{\sin 22^\circ}{37} = \frac{\sin 68^\circ}{b}$ $b = \frac{37\cdot \sin 68^\circ}{\sin 22^\circ} = \underline{91.58}$

$\frac{\sin 90^\circ}{c} = \frac{\sin 22^\circ}{37}$ $c = \frac{37\cdot \sin 90^\circ}{\sin 22^\circ} = \underline{98.77}$

12) ΔABC where $\angle C = 90°$, $b = 6$ cm, and $c = 37$ cm.

$\boxed{B=9.33^\circ \quad A=80.67^\circ \quad a=36.51\text{cm}}$

$\frac{\sin 90^\circ}{37} = \frac{\sin B}{6}$ $\sin B = \frac{6\cdot \sin 90^\circ}{37}$ $B = \sin^{-1}(\text{Ans}) = \underline{9.33^\circ}$

$A = 180-90-B = \underline{80.67^\circ}$ $\frac{\sin A}{a} = \frac{\sin 90^\circ}{37}$ $a = \frac{37\cdot \sin A}{\sin 90^\circ} = \underline{36.51}$

13) ΔABC where $\angle A = 54°$, $\angle B = 72°$, and $a = 32$ ft.

$\boxed{C=54^\circ \quad c=32\text{ft} \quad b=37.62\text{ft}}$

$C = 180-54-72 = \underline{54^\circ}$ $c = a = \underline{32}$

$\frac{\sin 54^\circ}{32} = \frac{\sin 72^\circ}{b}$ $b = \frac{32\cdot \sin 72^\circ}{\sin 54^\circ} = \underline{37.62}$

14) ΔABC where $\angle A = 48°$, $a = 46.2$ ft, and $c = 62.3$ ft.

$\boxed{\text{Not Possible}}$

$\frac{\sin 48^\circ}{46.2} = \frac{\sin C}{62.3}$

$\sin C = \frac{62.3 \sin 48^\circ}{46.2}$ $C = \sin^{-1}(\text{Ans}) = \underline{\phi}$

*15) ΔABC where $\angle A = 49°$, $b = 24$ ft, and $a = 22$ ft.

$\boxed{B=55.42^\circ \quad C=75.58^\circ \quad c=28.23\text{ft}}$

$\frac{\sin 49^\circ}{22} = \frac{\sin B}{24}$ $\sin B = \frac{24\cdot \sin 49^\circ}{22}$ $B = \sin^{-1}(\text{Ans}) = \underline{55.42^\circ}$

$C = 180-49-B = \underline{75.58^\circ}$ $\frac{\sin 49^\circ}{22} = \frac{\sin C}{c}$ $c = \frac{22\cdot \sin C}{\sin 49^\circ} = \underline{28.23}$

16) ΔABC where $\angle A = 75°$, $b = 38$ ft, and $a = 41$ ft.

$\boxed{B=63.54^\circ \quad C=41.46^\circ \quad c=28.10\text{ft}}$

$\frac{\sin 75^\circ}{41} = \frac{\sin B}{38}$ $\sin B = \frac{38\cdot \sin 75^\circ}{41}$ $B = \sin^{-1}(\text{Ans}) = \underline{63.54^\circ}$

$C = 180-75-B = \underline{41.46^\circ}$ $\frac{\sin 75^\circ}{41} = \frac{\sin C}{c}$ $c = \frac{41\cdot \sin C}{\sin 75^\circ} = \underline{28.10}$

17) ΔABC where $\angle A = 118°$, $\angle B = 25°$, and $c = 37$ meters.

$\boxed{C=37^\circ \quad a=54.28\text{m} \quad b=25.98\text{m}}$

$C = 180-118-25 = \underline{37^\circ}$ $\frac{\sin 37^\circ}{37} = \frac{\sin 118^\circ}{a}$ $a = 37\cdot \sin 118^\circ / \sin 37^\circ = \underline{54.28}$

$\frac{\sin 37^\circ}{37} = \frac{\sin 25^\circ}{b}$ $b = 37\cdot \sin 25^\circ / \sin 37^\circ = \underline{25.98}$

18) Determine the area of a triangular lot if the sides measure 120 ft, 250 ft, and 150ft.

$\boxed{A_\Delta = 6327.72\text{ ft}^2}$

$S = \frac{120+250+150}{2} = 260$ $A_\Delta = \sqrt{260(260-120)(260-250)(260-150)} = \underline{6327.72}$

19) Determine the area of triangle ΔABC if $\angle A = 54°$, $b = 23.7$ cm, $c = 19.1$ cm.

$\boxed{A_\Delta = 183.11\text{ cm}^2}$

$A_\Delta = \frac{1}{2}\cdot 23.7\cdot 19.1\cdot \sin 54^\circ = \underline{183.11}$