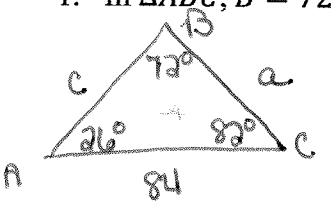
Honors Precalc **Name:** Key

Unit 4: Analytic Trigonometry and Trigonometric Applications **Period**_____

APPLICATIONS (Quiz 3 Review)

For #1 - #6 determine how many triangles could be drawn with the characteristics. Then, find the missing sides and angles for all possible triangles. Round your answers to two decimal places.

1. In $\Delta ABC, B = 72°, C = 82°\ b = 84.$



AAS ⇒ one triangle

$\angle A = 26°$

$a = 38.72$

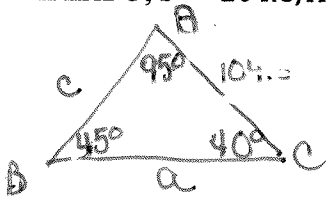
$c = 87.46$

$\frac{\sin 26°}{a} = \frac{\sin 72°}{84} = \frac{\sin 82°}{c}$

$a = \frac{84 \sin 26°}{\sin 72°} \approx 38.72$

$c = \frac{84 \sin 82°}{\sin 72°} \approx 87.46$

2. In $\Delta ABC, b = 104.8, A = 95°, B = 45°.$



AAS ⇒ one triangle

$\angle C = 40°$

$a \approx 147.65$

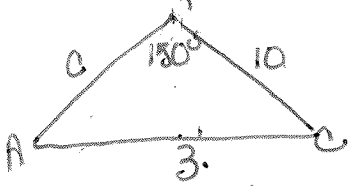
$c \approx 95.27$

$\frac{\sin 45}{104.8} = \frac{\sin 95}{a} = \frac{\sin 40}{c}$

$a = \frac{104.8 \sin 95}{\sin 45} \approx 147.65$

$c = \frac{104.8 \sin 40°}{\sin 45°} \approx 95.27$

3. In $\Delta ABC, B = 150°, a = 10\ b = 3.$



SSA

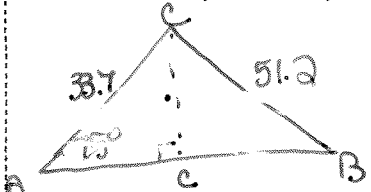
$\angle B$ is obtuse

$3 < 10$

no triangle possible

$\left(\frac{\sin 150}{3} = \frac{\sin A}{10}\right.$ would give a domain error $\left.\right)$

4. In $\Delta ABC, A = 75°, a = 51.2\ b = 33.7.$



$h = 33.7 \sin 75$

≈ 32.55

$32.55 < 33.7 < 51.2$

$h \quad b \quad a$

1 possible

TRIANGLE 1

$\frac{\sin 75}{51.2} = \frac{\sin B}{33.7} = \frac{\sin 65.2}{c}$

$\angle B \approx 39.48°$

$\angle C \approx 65.2°$

$c \approx 48.12$

5. In $\Delta ABC, a = 2.5,\ b = 5.0, c = 4.5.$

$5^2 = 2.5^2 + 4.5^2 - 2(2.5)(4.5)\cos B$

$B \approx 86.18°$

$(2.5)^2 = 5^2 + 4.5^2 - 2(5)(4.5)\cos A$

$A \approx 29.92°$

$(4.5)^2 = (2.5)^2 + (5.0)^2 - 2(5)(2.5)\cos C$

$C \approx 163.90°$

I forgot an example of 2 triangles:

$\angle B = 22°$ $b = 16.8$, $a = 22.42$

$h = 22.42 \sin 22 \approx 8.4$

$8.4 < 16.8 < 22.42$

2 possible.

$\frac{\sin 22}{16.8} = \frac{\sin A}{22.42} = \frac{\sin 128.01}{c}$

TRIANGLE 1

$\angle A \approx 29.99$

$\angle C \approx 128.01$

$c \approx 35.34$

TRIANGLE 2

$\angle A \approx 150.01$

$\angle C \approx 7.99$

$c \approx 6.23$

6. In $\Delta ABC, A = 62°, b = 11.4\ c = 19.52$

$a^2 = (11.4)^2 + (19.52)^2 - 2(11.4)(19.52)\cos 62°$

$a \approx 17.38$

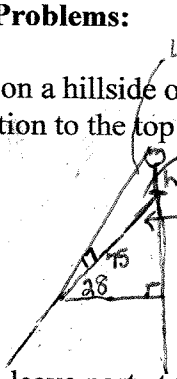
$\frac{\sin 62}{17.38} = \frac{\sin B}{11.4} = \frac{\sin C}{19.52}$

$\angle B \approx 35.20°$ (smaller $\angle$ first)

$\angle C \approx 82.80°$

Applications Word Problems:

7. A tree stands on a hillside of slope 28°, from the horizontal. From a point 75 feet down the hill, the angle of elevation to the top of the tree is 45°. Find the height of the tree.

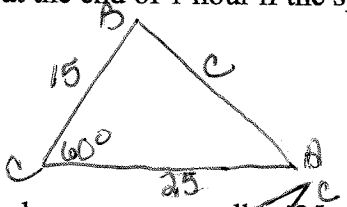


$180-17-118=45°$

$$\frac{\sin 17}{h}=\frac{\sin 45}{75}$$

$$h=\frac{75\sin 17}{\sin 45}\approx 31.22 \text{ feet}$$

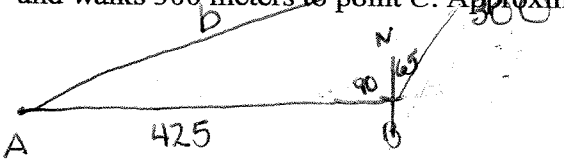
8. Ships A and B leave port at the same time and sail on straight paths making an angle of 60° with each other. How far apart are the ships at the end of 1 hour if the speed of ship A is 25 km/h and that of ship B is 15 km/h?



$c^2=15^2+25^2-2(15)(25)\cos 60^\circ$

$c\approx 21.79$ km

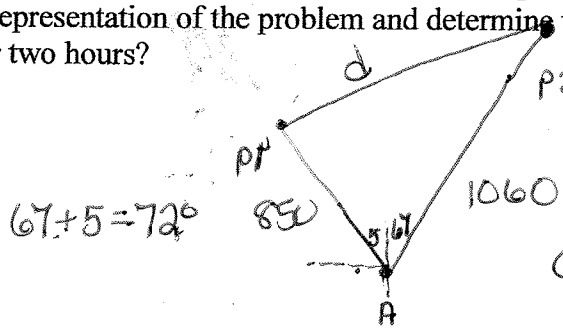
9. To approximate the length of a marsh, a surveyor walks 425 meters from point A to point B. Then the surveyor turns 65° and walks 300 meters to point *C*. Approximate the length *AC* of the marsh.



$b^2=300^2+425^2-2(300)(425)(\cos 155^\circ)$

$b\approx AC\approx 708.33$ m

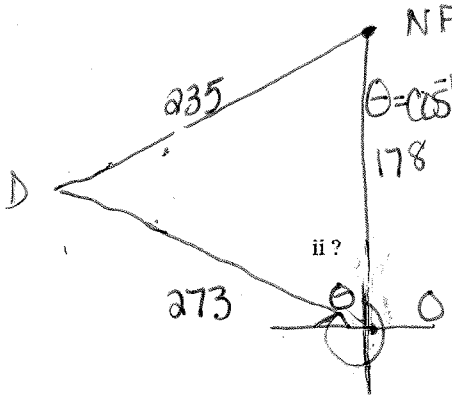
10. Two planes leave Raleigh-Durham Airport at approximately the same time. One is flying 425 miles per hour at a bearing of 355°, and the other is flying 530 miles per hour at a bearing of 67°. Draw a figure that gives a visual representation of the problem and determine the distance between the planes after they have flown for two hours?



$d^2=850^2+1060^2-2(850)(1060)\cos 72^\circ$

$d\approx 1135.42$ miles

11. On a map, Orlando is 178 mm due south of Niagra Falls, Denver is 273 mm from Orlando, and Denver is 235 mm from Niagra Falls. Find the bearing of Denver from Orlando. Find the bearing of Denver from Niagra Falls.



$\theta=\cos^{-1}\left(\frac{235^2-178^2-273^2}{-2(178)(273)}\right)$

$\theta\approx 58.36^\circ$

$360-58.36$

bearing is 301.64°.