

Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 3

Question 1. (5 marks) Find the resultant of \vec{A} and \vec{B} where $A = 135.2$, $\theta_A = 162.11^\circ$ and $B = 42.75$, $\theta_B = 93.01^\circ$.

$$A_x = 135.2 \cos 162.11^\circ = -128.7 \quad B_x = 42.75 \cos 93.01^\circ = -2.245$$

$$A_y = 135.2 \sin 162.11^\circ = 41.53 \quad B_y = 42.75 \sin 93.01^\circ = 42.69$$

LET $\vec{R} = \vec{A} + \vec{B}$, $R_x = A_x + B_x = (-128.7) + (-2.245) = -130.9$

$$R_y = A_y + B_y = (41.53) + (42.69) = 84.22$$

$$\therefore R^2 = (-130.9)^2 + (84.22)^2 = 24227.8184$$

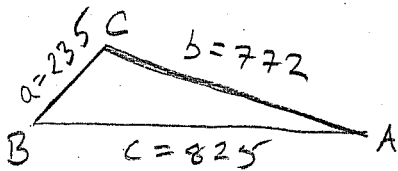
$$\boxed{R = 155.7}$$

$$\tan \theta_R = \frac{84.22}{-130.9}, \quad \tan^{-1}\left(\frac{84.22}{-130.9}\right) = -32.76^\circ \Rightarrow \alpha = 32.76^\circ$$

$$R_x < 0, R_y > 0 \Rightarrow \theta_R \text{ IS IN QUAD II} \Rightarrow \theta_R = 180^\circ - 32.76^\circ = \underline{147.2^\circ}$$

Question 2. (10 marks) Solve the the triangles with the following parts:

(a) Sides $a = 235$, $b = 772$, and $c = 825$.



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$\Rightarrow \cos C = \frac{c^2 - a^2 - b^2}{-2ab} = \frac{(825)^2 - (235)^2 - (772)^2}{-2(235)(772)}$$

$$\therefore \cos C = -0.0810715467$$

$$\therefore \underline{C = 94.7^\circ}$$

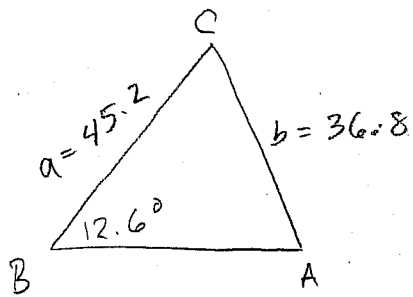
$$\frac{a}{\sin A} = \frac{c}{\sin C}$$

$$\sin A = \frac{a \sin C}{c} = \frac{235 \sin 94.7^\circ}{825}$$

$$A = \sin^{-1}(0.2838906496) \\ = \underline{16.5^\circ}$$

$$B = 180^\circ - 94.7^\circ - 16.5^\circ \\ = 68.8^\circ$$

(b) Sides $a = 45.2$, $b = 36.8$ and angle $B = 12.6^\circ$.



$$\frac{a}{\sin A} = \frac{b}{\sin B} \Rightarrow \sin A = \frac{a \sin B}{b}$$

$$= \frac{45.2 \sin 12.6^\circ}{36.8}$$

$$= 0.2679368074$$

$$\sin^{-1}(0.2679368074) = 15.5^\circ$$

∴ ACUTE CASE

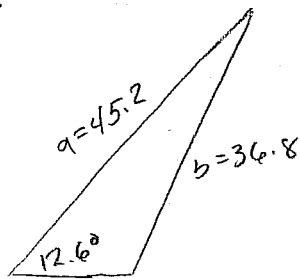
$$A = 15.5^\circ$$

$$C = 180^\circ - 15.5^\circ - 12.6^\circ = 151.9^\circ$$

$$\frac{b}{\sin B} = \frac{c}{\sin C}$$

$$c = \frac{b \sin C}{\sin B} = \frac{36.8 \sin 151.9^\circ}{\sin 12.6^\circ}$$

$$= 79.5$$



OR OBTUSE CASE:

$$A = 180^\circ - 15.5^\circ = 164.5^\circ$$

$$C = 180^\circ - 164.5^\circ - 12.6^\circ$$

$$= 2.9^\circ$$

$$\frac{b}{\sin B} = \frac{c}{\sin C}$$

$$c = \frac{b \sin C}{\sin B} = \frac{36.8 \sin 2.9^\circ}{\sin 12.6^\circ}$$

$$= 8.53$$