Algebra

Name: Key

4.3 – Law of Cosines

Date: _____ Period: _____

Solve each triangle. If necessary, round answers to the nearest hundredths.

SSS 1st 2nd

1.) $a = 80 \quad b = 92 \quad c = 124$

$80^2 = 92^2 + 124^2 - 2(92)(124)\cos A$

$6400 = 23840 - 22816\cos A$

$-17440 = -22816\cos A$

$.7643... = \cos A$

$40.15^\circ = A$

$\frac{80}{\sin 40.15} = \frac{92}{\sin B}$

$\sin B = .7415...$

$B = 47.86^\circ$

$\angle A = 40.15^\circ$
$\angle B = 47.86^\circ$
$\angle C = 91.99^\circ$

ASS!

2.) $B = 110^\circ \quad b = 125 \quad c = 200$

$\frac{125}{\sin 110} = \frac{200}{\sin C}$

$\sin C = 1.50...$

$C = \varnothing$

no solutions

3.) $B = 10.5^\circ \quad a = 6.8 \quad c = 2.4$ SAS

(last)

$b^2 = 6.8^2 + 2.4^2 - 2(6.8)(2.4)\cos 10.5$

$b^2 = 19.906...$

$b = 4.46$

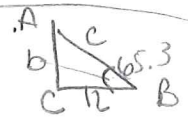
$\frac{4.46}{\sin 10.5} = \frac{2.4}{\sin C}$

$\sin C = .0980...$

$C = 5.63^\circ$

$\angle A = 163.87^\circ$
$\angle C = 5.63^\circ$
$b = 4.46$

4.) $a = 12 \quad B = 65.3^\circ \quad C = 90^\circ$ right



$\tan 65.3 = \frac{b}{12}$

$b = 26.089$
$= 26.09$

$\angle A = 90 - 65.3$
$= 24.7$

$12^2 + 26.09^2 = c^2$

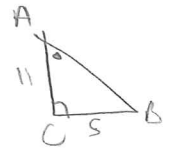
$824.6881 = c^2$

$28.72 = c$

$\angle A = 24.7^\circ$
$b = 26.09$
$c = 28.72$

Right

5.) $a = 5 \quad b = 11 \quad C = 90°$



$5^2 + 11^2 = c^2$

$146 = c^2$

$12.08 = c$

$\text{Tan } A = \frac{5}{11}$

$A = 24.44°$

$\angle A = 24.44°$
$\angle B = 65.56$
$C = 12.08$

AAS

6.) $A = 24.3° \quad C = 54.6° \quad c = 2.7$

$\frac{2.7}{\sin 54.6} = \frac{a}{\sin 24.3}$

$a = 1.36$

$\frac{2.7}{\sin 54.6} = \frac{b}{\sin 101.1}$

$b = 3.25$

$\angle B = 101.1°$
$a = 1.36$
$b = 3.25$

SSS 2nd 1st

7.) $a = 19 \quad b = 18 \quad c = 23$

$18^2 = 19^2 + 23^2 - 2(19)(18)\cos B$

$324 = 890 - 874\cos B$

$-566 = -874\cos B$

$.6475... = \cos B$

$49.64° = B$

$\frac{18}{\sin 49.64} = \frac{19}{\sin A}$

$\sin A = .80423...$

$A = 53.54°$

$\angle A = 53.54°$
$\angle B = 49.64°$
$\angle C = 76.82°$

ASS!

8.) $A = 60° \quad a = 9 \quad c = 10$

$\frac{9}{\sin 60} = \frac{10}{\sin C}$

$\sin C = .9622...$

$C = 74.21° \rightarrow C_2 = 105.79°$

$B = 45.79° \quad B_2 = 14.21°$

$\frac{9}{\sin 60} = \frac{b}{\sin 45.79}$

$b = 7.45$

$\frac{9}{\sin 60} = \frac{b}{\sin 14.21}$

$b = 2.55$

$\angle B = 45.79° \quad \angle B_2 = 14.21°$
$\angle C = 74.21° \quad \angle C_2 = 105.79°$
$b = 7.45 \quad b_2 = 2.55$

9.) $C = 145°$ $b = 4$ $c = 14$

$$\frac{14}{\sin 145} = \frac{4}{\sin B}$$

$\sin B = .1638....$

$B = 9.43°$ → ~~$B_2 = 170.57$~~

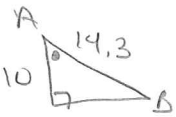
$A = 25.57°$

~~$A_2 =$ #~~

$$\frac{14}{\sin 145} = \frac{a}{\sin 25.57°}$$

$a = 10.53$

$\angle A = 25.57°$
$\angle B = 9.43°$
$a = 10.53$



Right

10.) $b = 10$ $c = 14.3$ $C = 90°$

$a^2 + 10^2 = 14.3^2$

$a^2 = 104.49$

$a = 10.22$

$\cos A = \frac{10}{14.3}$

$A = 45.63°$

$\angle A = 45.63°$
$\angle B = 44.37°$
$a = 10.22$

SAS

11.) $A = 120°$ $b = 3$ $c = 10$

$a^2 = 3^2 + 10^2 - 2(3)(10)\cos 120$

$a^2 = 139$

$a = 11.79$

$$\frac{11.79}{\sin 120} = \frac{3}{\sin B}$$

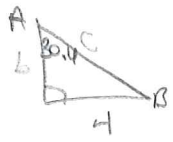
$\sin B = .22036....$

$B = 12.73°$

$\angle B = 12.73°$
$\angle C = 47.27°$
$a = 11.79$

Right

12.) $a = 4$ $A = 30.6°$ $C = 90°$



$\sin 30.6 = \frac{4}{C}$

$C = \frac{4}{\sin 30.6}$

$C = 7.86$

$4^2 + b^2 = 7.86^2$

$b^2 = 45.7796$

$b = 6.77$

$\angle B = 59.4°$
$b = 6.77$
$C = 7.86$