1

Key
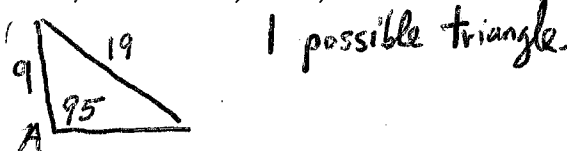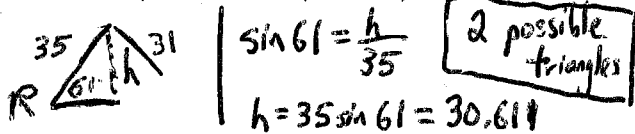
3.05 Law of Sines and Cosines Review   Date: _____

State the number of possible triangles that can be formed using the given measurements.
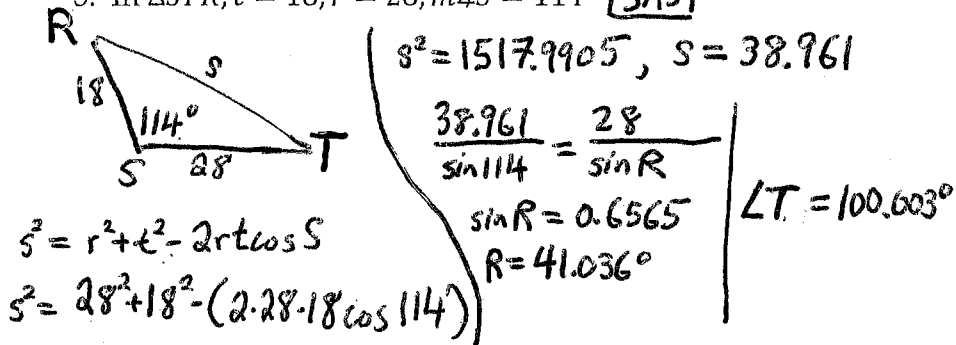
1. In $\triangle RST, m\angle R = 61°, t = 35, r = 31$

$\sin 61 = \dfrac{h}{35}$ **2 possible triangles**

$h = 35 \sin 61 = 30.611$

2. In $\triangle CAB, m\angle A = 95°, c = 9, a = 19$

1 possible triangle

Solve each triangle.

3. In $\triangle STR, t = 18, r = 28, m\angle S = 114°$ **SAS**

$s^2 = 1517.9905, \quad s = 38.961$

$\dfrac{38.961}{\sin 114} = \dfrac{28}{\sin R}$

$\sin R = 0.6565$

$R = 41.036°$

$\angle T = 100.003°$

$s^2 = r^2 + t^2 - 2rt \cos S$

$s^2 = 28^2 + 18^2 - (2 \cdot 28 \cdot 18 \cos 114)$

$R_1 = 41.036°$	$R_2 =$
$T_1 = 100.003°$	$T_2 =$
$s_1 = 38.961$	$s_2 =$

4. In $\triangle PKH, m\angle P = 19°, h = 34, p = 26$

$\sin 19 = \dfrac{h}{34} \rightarrow h = 34 \sin 19 = 11.069$

$\dfrac{26}{\sin 19} = \dfrac{34}{\sin H}$

$\sin H = \dfrac{34 \sin 19}{26}$

$H = \sin^{-1}(0.42574) = 25.198°$

$k = 135.802$

$\dfrac{k}{\sin 135.802} = \dfrac{26}{\sin 19}$
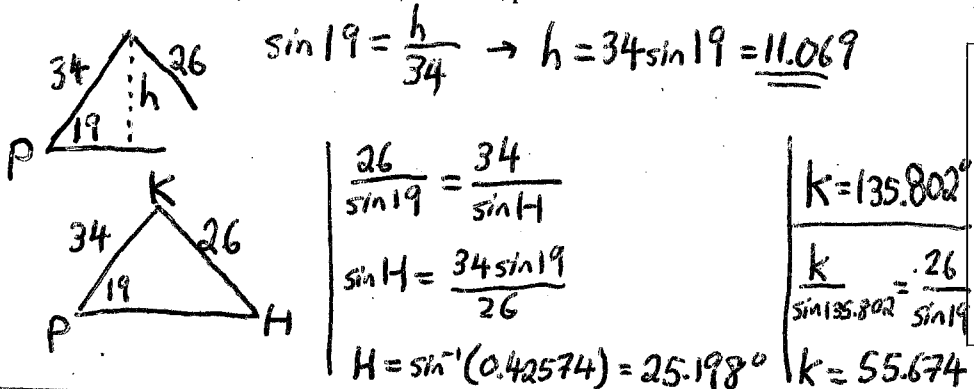
$k = 55.674$

$H_1 = 25.198°$	$H_2 =$
$K_1 = 135.802°$	$K_2 =$
$k_1 = 55.674$	$k_2 =$

5. In $\triangle CAB, a = 24.1, b = 28.9, c = 28.1$ **SSS**

✳ start with the largest angle:

$b^2 = a^2 + c^2 - 2ac \cos B$

$28.9^2 = 24.1^2 + 28.1^2 - [2(24.1)(28.1)\cos B]$
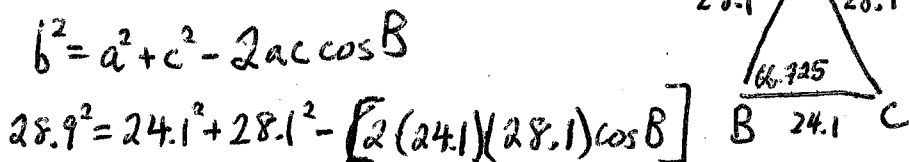
$0.395158 = \cos B$

$B = 66.725°$

$\dfrac{28.9}{\sin 66.725} = \dfrac{24.1}{\sin A}$

$\sin A = 0.766045$

$A = \sin^{-1}(0.766045)$

$A = 50°$

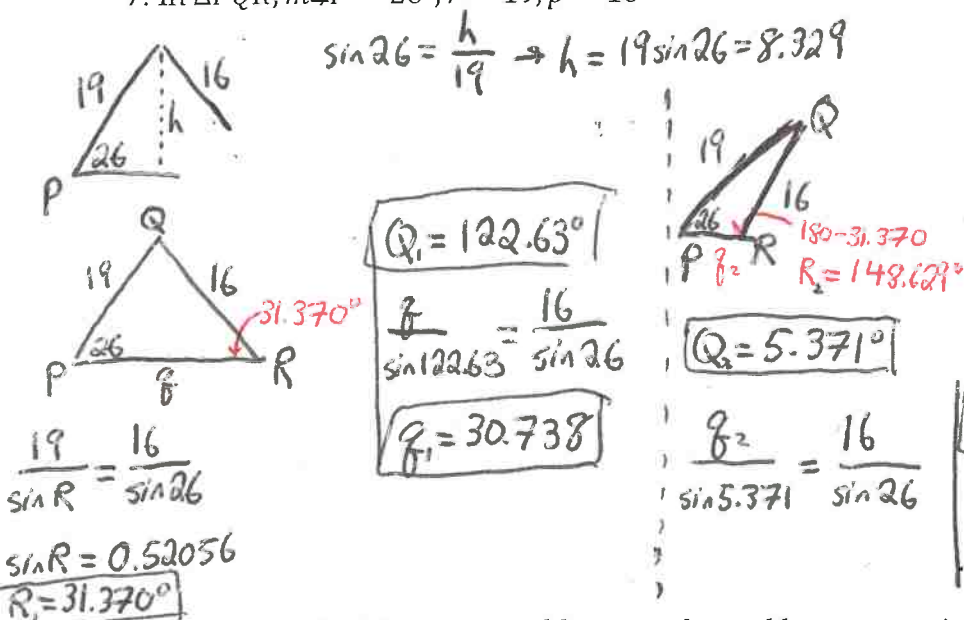$\angle C = 63.275°$

$A_1 = 50°$	$A_2 =$
$B_1 = 66.725°$	$B_2 =$
$C_1 = 63.275°$	$C_2 =$

6. In $\triangle ZXY$, $m\angle Z = 48°$, $m\angle X = 78°$, $y = 24$

$\boxed{Y = 54°}$

$24 \diagup 78 \diagdown Z$ (X at top)

$48 \diagup 54° \diagdown Y$ (Z bottom left, Y bottom right, x along bottom)

$\dfrac{24}{\sin 54} = \dfrac{x}{\sin 78}$

$\dfrac{24}{\sin 54} = \dfrac{z}{\sin 48}$
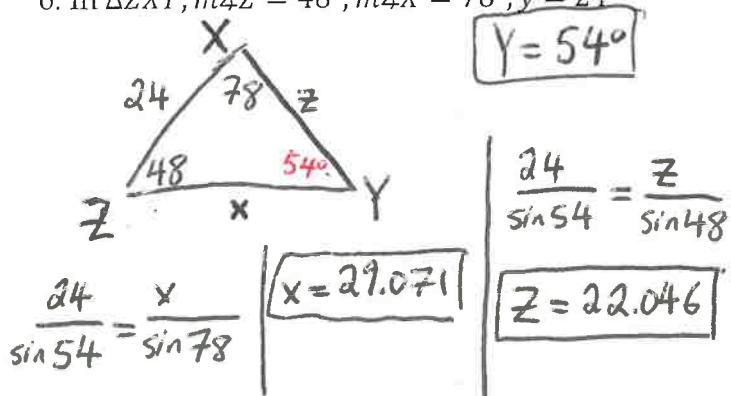
$\boxed{x = 29.071}$

$\boxed{Z = 22.046}$

$Y_1 = 54°$	$Y_2 = $
$z_1 = 22.046$	$z_2 = $
$x_1 = 29.071$	$x_2 = $

7. In $\triangle PQR$, $m\angle P = 26°$, $r = 19$, $p = 16$

$\sin 26 = \dfrac{h}{19} \rightarrow h = 19 \sin 26 = 8.329$

$19 \diagup h \diagdown 16$ with 26 at P

$\dfrac{19}{\sin R} = \dfrac{16}{\sin 26}$

$\sin R = 0.52056$

$\boxed{R_1 = 31.370°}$

$\boxed{Q_1 = 122.63°}$

$\dfrac{q}{\sin 122.63} = \dfrac{16}{\sin 26}$

$\boxed{q_1 = 30.738}$

$180 - 31.370$

$R_2 = 148.629°$

$\boxed{Q_2 = 5.371°}$

$\dfrac{q_2}{\sin 5.371} = \dfrac{16}{\sin 26}$

$\boxed{q_2 = 3.416}$

$R_1 = 31.370°$	$R_2 = 148.629°$
$Q_1 = 122.63°$	$Q_2 = 5.371°$
$q_1 = 30.738$	$q_2 = 3.416$

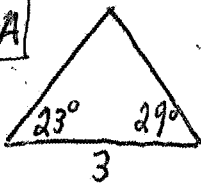8. Determine which law you would use to solve and how many triangles there are given $A = 62°$, $b = 24$, and $a = 20$

SSA $\rightarrow$ use law of sines

$24 \diagup 20$ with 62 at A

$24 \diagup h$ with 62 at A

$\sin 62 = \dfrac{h}{24}$

$h = 24 \sin 62$

$h = 21.191$

No triangle since side $a < h$.
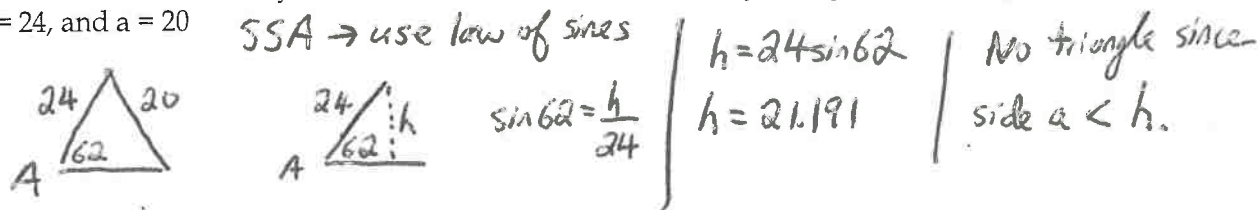
9. Determine which law you would use to solve and how many triangles there are given $B = 138°$, $c = 15$, and $a = 12$
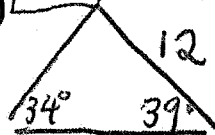
SAS $\rightarrow$ use Law of cosine, $\boxed{1 \text{ triangle}}$

12 from C to B, 138 at B, 15 from B to A
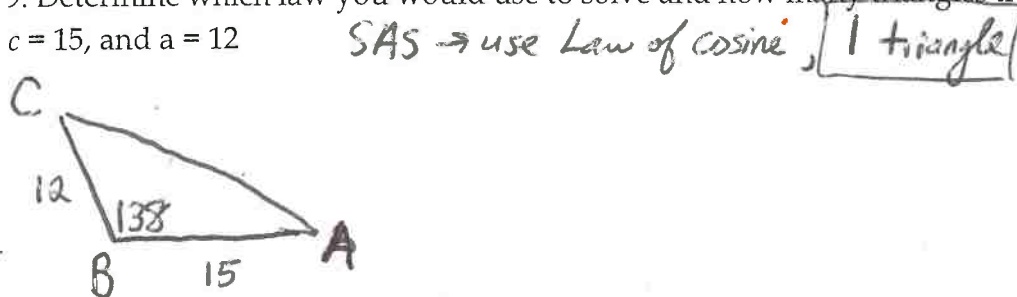
1) Start with Law of Sines $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
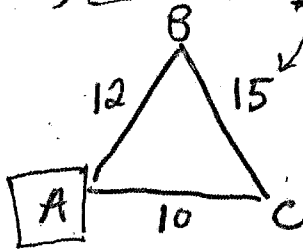
a) ASA

b) AAS
12
34° 39°

c) SSA * (Ambiguous Case)
12 / 10
34°
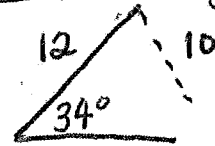
2) Start with Law of Cosines

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$c^2 = a^2 + b^2 - 2ab\cos C$$

a) SAS
B
16
34°
A   C
14
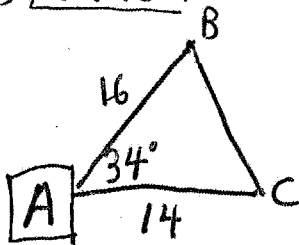
b) SSS
B
12   15
A   C
10

* start with
✓ largest angle
(across from the
longest side)