Suppose that $w = 4.8$ and $U = 57°$.

SCORE: ____ / 6 PTS

[a] Find all values of u for which there are two possible triangles. **Do NOT solve the triangles.**

$4.8 \sin 57° < u < 4.8$

$4.0 < u < 4.8$

[b] Find all values of u for which there are no possible triangles.

$u < 4.8 \sin 57°$

$u < 4.0$

[c] Find all values of u for which there is exactly one possible triangle. **Do NOT solve the triangle.**

$u = 4.8 \sin 57° = 4.0$ or $u \geq 4.8$

Find the areas of the following triangles.

SCORE: ____ / 4 PTS

[a] ΔQRS if $q = 4.6$, $r = 6.1$ and $s = 3.9$

$s = \frac{1}{2}(4.6 + 6.1 + 3.9) = 7.3$

$A = \sqrt{7.3(7.3-4.6)(7.3-6.1)(7.3-3.9)} = 9.0$

[b] ΔBCD if $b = 2.6$, $c = 4.2$, $C = 93°$ and $D = 59°$

$A = \frac{1}{2}(2.6)(4.2)\sin 59° = 4.7$

Solve the following triangles. **Sketch and label triangles with your final answers (don't need to be to scale).** **SCORE: ____ / 12 PTS**
If no such triangle exists, write "DNE" and explain briefly why. If more than one triangle is possible, solve for **all** possible triangles.

[a] ΔMNP if $m = 7.3$, $p = 9.8$ and $M = 43°$

$9.8 \sin 43° = 6.7 < 7.3 < 9.8$

2 Δ's POSSIBLE

$\frac{\sin P}{9.8} = \frac{\sin 43°}{7.3}$

$P = \sin^{-1}\left(\frac{9.8}{7.3}\sin 43°\right) = 66.3°$

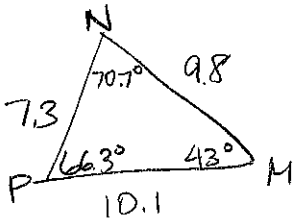
OR $180° - 66.3° = 113.7°$

IF $P = 66.3°$

$N = 180° - (66.3° + 43°) = 70.7°$

$\frac{n}{\sin 70.7°} = \frac{7.3}{\sin 43°}$

$n = \frac{7.3 \sin 70.7°}{\sin 43°} = 10.1$

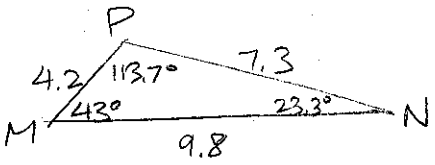


IF $P = 113.7°$

$N = 180° - (113.7° + 43°) = 23.3°$

$\frac{n}{\sin 23.3°} = \frac{7.3}{\sin 43°}$

$n = \frac{7.3 \sin 23.3°}{\sin 43°} = 4.2$



[b] ΔXYZ if $x = 10.7$, $y = 19.2$ and $z = 8.4$

$10.7 + 8.4 = 19.1 < 19.2$

NO Δ'S POSSIBLE

[c] ΔJKL if $j = 7$, $k = 5$ and $l = 4$

$7^2 = 5^2 + 4^2 - 2 \cdot 5 \cdot 4 \cos J$

$\cos J = -\frac{1}{5}$

$J = \cos^{-1}\left(-\frac{1}{5}\right) = 101.5°$

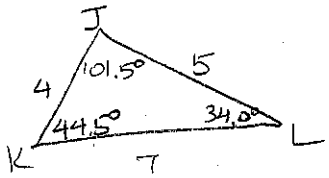
$\frac{\sin L}{4} = \frac{\sin 101.5°}{7}$

$L = \sin^{-1}\left(\frac{4}{7}\sin 101.5°\right)$

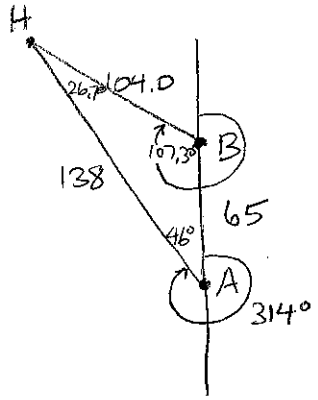
$= 34.0°$

$K = 180° - (101.5° + 34.0°)$

$= 44.5°$



Two cars are parked on a north-south road. A house sits off the side of the road. **SCORE: ____ / 8 PTS**
The house is 138 feet from the first car on a bearing of 314°.
The second car is 65 feet north of the first car. Find the distance and bearing of the house from the second car.



$\angle HAB = 360° - 314° = 46°$

$a^2 = 138^2 + 65^2 - 2(138)(65)\cos 46°$

$a = 104.0$

$\frac{\sin H}{65} = \frac{\sin 46°}{104}$

$H = \sin^{-1}\left(\frac{65}{104}\sin 46°\right) = 26.7°$

$\angle HBA = 180° - (26.7° + 46°) = 107.3°$

BEARING $= 180° + 107.3° = 287.3°$

DISTANCE $= 104.0$ FEET