QUIZ #2 @ 80 points   *Solutions*

Write in a neat and organized fashion. Use a pencil. Show all work to get credit.

1. In the given figure, $m \parallel n$ and $m\angle 3 = 65°$.
   Find the measure of all angles 1 through 8.
   Explain your reasoning. (Informal proof OK)
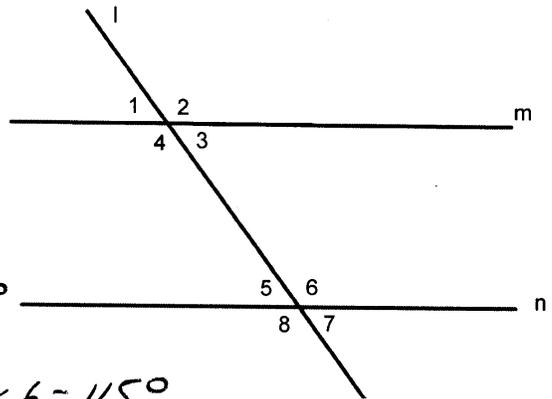
Given: $m \parallel n$ Find:
$m\angle 3 = 65°$ $m\angle 1, 2, 4, 5, 6, 7, 8$

Solution

$\angle 1, \angle 3 = $ vertical $\angle's \Rightarrow m\angle 1 = m\angle 3 = 65°$

$\angle 1, \angle 2 = $ supplementary $\angle's \Rightarrow m\angle 2 = 180° - 65° = 115°$

$\angle 2, \angle 4 = $ vertical $\angle's \Rightarrow m\angle 4 = m\angle 2 = 115°$

$\angle 4, \angle 6 = $ alternate interior $\angle's \Rightarrow m\angle 4 = m\angle 6 = 115°$

$\angle 6, \angle 8 = $ vertical $\angle's \Rightarrow m\angle 8 = m\angle 6 = 115°$

$\angle 5, \angle 3 = $ alternate interior $\angle's \Rightarrow m\angle 5 = m\angle 3 = 65°$

$\angle 7, \angle 5 = $ vertical $\angle's \Rightarrow m\angle 7 = m\angle 5 = 65°$

2. State the hypothesis and the conclusion using math notation pertinent to your drawing.
   Prove the following using an <u>indirect proof</u> :

   If two coplanar lines are each perpendicular to a third line, then these lines are parallel to each other.

Given: $\ell_1, \ell_2 = $ coplanar
$\ell_1 \perp g, \ell_2 \perp g$

Prove: $\ell_1 \parallel \ell_2$

ℓ_1 _____

ℓ_2 _____ $\bullet A$

g

Indirect proof

Assume $\ell_1 \nparallel \ell_2$

But $\ell_1, \ell_2 = $ coplanar $\Big\} \Rightarrow \ell_1 \cap \ell_2 = A$

(ℓ_1 and ℓ_2 have a common pct. A)
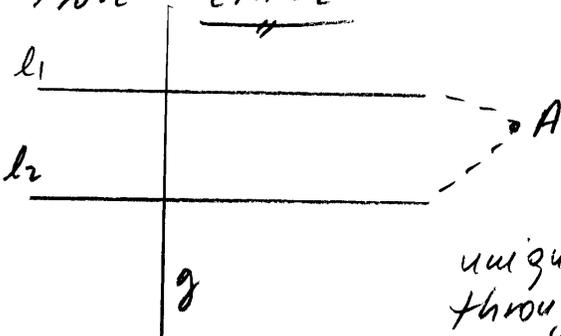
We have a point (A)
a line (g)
two $\perp$ lines to g through A

This contradicts the Postulate about the uniqueness of a perpendicular to a line through a given point not on the line.

Therefore, our assumption is wrong.

Therefore, $\ell_1 \parallel \ell_2$

3. - Draw a scalene triangle.
   - Mark an exterior angle for the triangle.
   - What is the measure of the exterior angle in terms of one angle of the triangle?
   - What is the measure of the exterior angle in terms of two angles of the triangle?
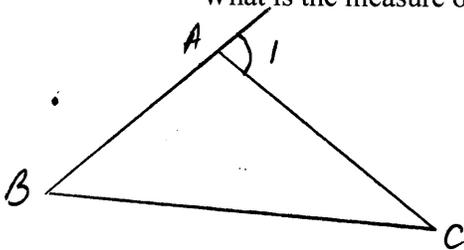
$\angle 1$ = exterior angle (formed by one side and an extension of another side)

$m\angle 1 = 180° - m\angle A$

$m\angle 1 = m\angle B + m\angle C$

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4. What are the four cases of congruency for right triangles?

$\angle\angle$, $\angle A$, HA, HL

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5. Given: $\angle B \cong \angle D$
   $\overline{AB} \parallel \overline{CD}$

   We will show
   $\triangle ABC \cong \triangle COA$
   AAS
   given ↑ ↑ ↑ common
   alt. int. ∡'s

   Prove: $\overline{BC} \cong \overline{DA}$
   (Formal proof)
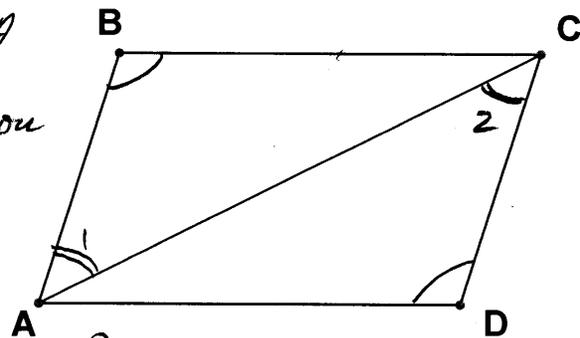
   Proof

Statements	Reasons
1. $\angle B \cong \angle D$	1. given
2. $\overline{AB} \parallel \overline{CD}$	2. given
3. $\angle 1 \cong \angle 2$	3. if 2 lines $\parallel$, then alt. int. ∡'s $\cong$. ($\overline{AB} \parallel \overline{CD}$ and transversal $\overline{AC}$)
4. $\overline{AC} \cong \overline{AC}$	4. reflexive prop. of $\cong$
5. $\triangle ABC \cong \triangle COA$ (1,3,4)	5. AAS
6. $\overline{BC} \cong \overline{DA}$	6. CPCTC

Q.E.D.