Quiz 4

Key

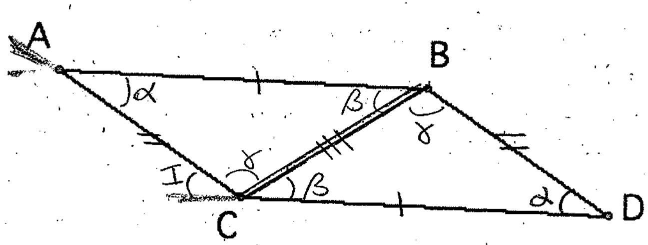
Show *all* your work on the following. A right answer with no supporting work will receive no credit.

1. [2] Circle the cases below that ensure two triangles who share those properties are congruent. (i.e. they determine a unique triangle.)

SSS	~~SSA~~	SAS	SAA
~~ASS~~	ASA	AAS	AAA

the same case

2. [3] Given the following quadrilateral where $AB = CD$ and $AC = BD$, *prove* that $\overrightarrow{AB}$ is parallel to $\overrightarrow{CD}$. (You must use similar triangles.)



To show $\overline{AB} \parallel \overline{CD}$ it suffices to show the alternating interior angle property. Thus we work to show $\angle BAC \cong \angle I$.

Draw the diagonal $\overline{CB}$

By SSS $\triangle ABC \cong \triangle DCB$

thus $\angle A \cong \angle D$, $\angle ABC \cong \angle DCB$, and $\angle ACB \cong \angle DBC$.

Label these α, β, and γ respectively.

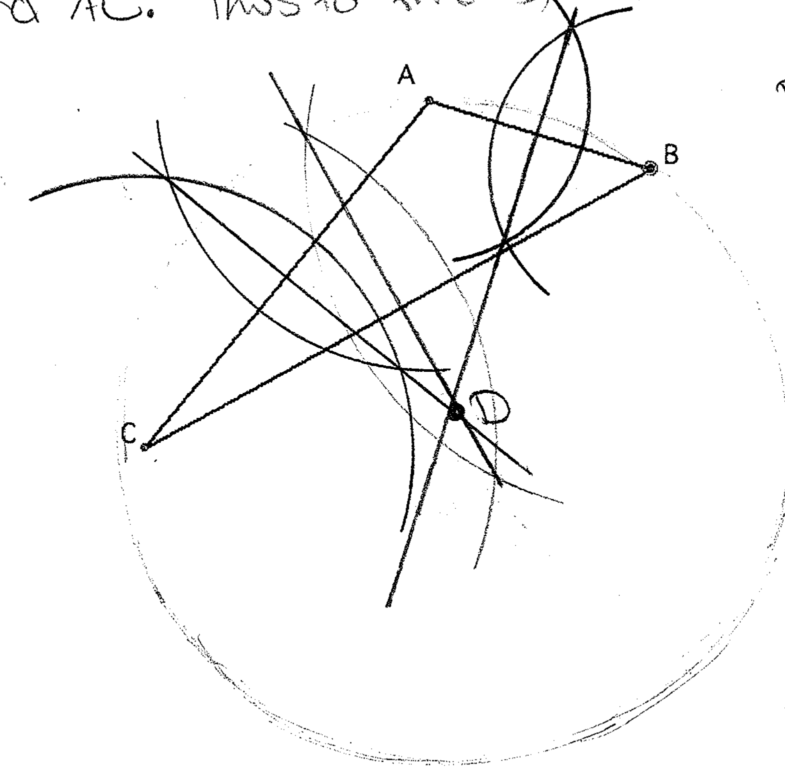
Note $m\angle\alpha + m\angle\beta + m\angle\gamma = 180°$ since the sum of angles in a $\triangle$ are $180°$.

Note also I and $\alpha+\beta$ are supplementary angles so $m\angle I + m\angle\alpha + m\angle\beta = 180°$

Thus $m\angle I = m\angle\alpha$. We have the alternating interior angle property, thus $\overline{AB} \parallel \overline{CD}$.

3. [5] Consider the triangle ABC below. Construct a circle that circumscribes the triangle ABC.

Let D be the center of the circle that circumscribes the triangle below. D must be equidistant from the points A, B & C. Since D is equidistant from A & B, D must be on the $\perp$ bisector of $\overline{AB}$. Similarly D must be on the $\perp$ bisector of $\overline{BC}$ and $\overline{AC}$. Thus to find D, we will construct the



perpendicular bisectors of $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$. The intersection will be the point D. Our radius can be set by measuring the distance from D to any of the points A, B or C.