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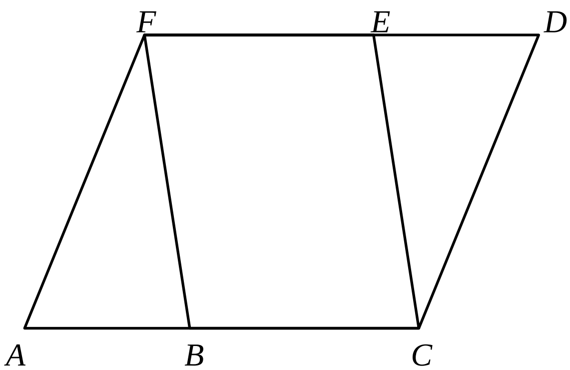
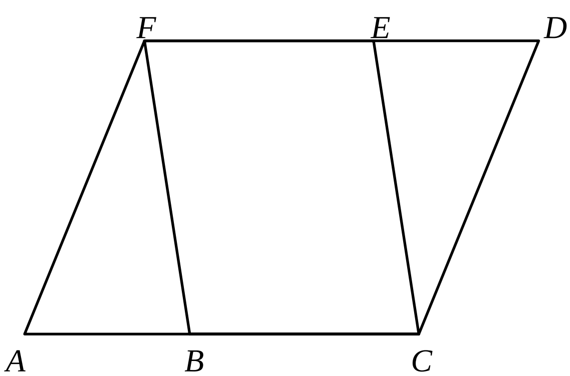
*P.I. G.G.27: Write a proof arguing from a given hypothesis to a given conclusion*

1. Given: $ACDF$ is a parallelogram and $\overline{FB} \parallel \overline{EC}$
   Prove: $BCEF$ is a parallelogram




2. Given: $\Delta ABF \cong \Delta DEC$ and $\overline{FB} \parallel \overline{EC}$
   Prove: $BCEF$ is a parallelogram



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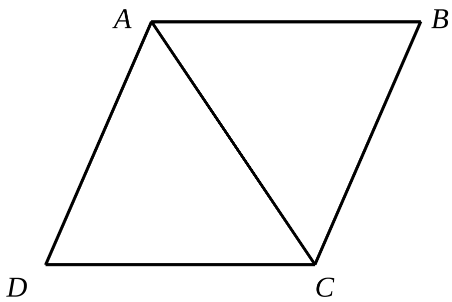
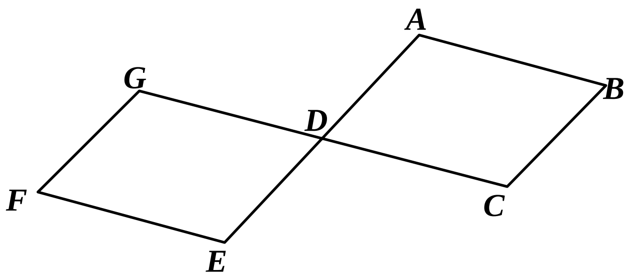
3. Given: *ABCD* is a rhombus.
Prove: $\Delta\ BCA \cong \Delta\ DAC$




4. Given that *ABCD* and *EFGD* are parallelograms and that *D* is the midpoint of $\overline{CG}$ and $\overline{AE}$, prove that *ABCD* and *EFGD* are congruent.




5. Given quadrilateral *ABCD* with $\angle BAC \cong \angle ACD$ and $\overline{AB} \cong \overline{CD}$. Write a paragraph proof, a flow proof, or a two-column proof to show *ABCD* is a parallelogram.

6. Theorem 9-6 states that if one pair of opposite sides of a quadrilateral is congruent and parallel, the quadrilateral is a parallelogram. This condition is met in two quadrilaterals. $\overline{AB}$ is parallel and congruent to $\overline{DC}$ in *ABCD*, $\overline{EF}$ is parallel and congruent to $\overline{HG}$ in *EFGH*, and $\overline{AB} \cong \overline{EF}$. Are the two quadrilaterals congruent?

[1]

| | |
|---|---|
| 1. $ACDF$ is a parallelogram | 1. Given |
| 2. $\overline{FE} \parallel \overline{CB}$ | 2. Definition of a parallelogram |
| 3. $\overline{FB} \parallel \overline{EC}$ | 3. Given |
| 4. $BCEF$ is a parallelogram | 4. Definition of a parallelogram |

[2]

| | |
|---|---|
| 1. $\Delta ABF \cong \Delta DEC$ | 1. Given |
| 2. $\overline{BF} \cong \overline{EC}$ | 2. C.P.C.T.C. |
| 3. $\overline{FB} \parallel \overline{EC}$ | 3. Given |
| 4. $BCEF$ is a parallelogram | 4. If 1 pair of opposite sides are $\parallel$ and $\cong$, then the quadrilateral is a parallelogram. |

[3]

| | |
|---|---|
| 1. $ABCD$ is a rhombus | 1. Given |
| 2. $ABCD$ is a a parallelogram | 2. Definition of a rhombus |
| 3. $\Delta BCA \cong \Delta DAC$ | 3. The diagonals of a parallelogram form two congruent triangles. |

[4] Check students' work. They should use the def. of midpoint and opposite sides of a parallelogram are $\cong$ to show that $\overline{AD} \cong \overline{DE} \cong \overline{FG} \cong \overline{BC}$ and $\overline{GD} \cong \overline{DC} \cong \overline{AB} \cong \overline{EF}$. Then, using the vert. $\angle$ thm. and opposite $\angle$'s of a parallelogram are $\cong$, show that $\angle GDE \cong \angle ADC \cong \angle B \cong \angle F$. $\angle G \cong \angle E \cong \angle C \cong \angle A$, since opposite angles are = and add to 360° in a parallelogram. Therefore $ABCD \cong EFGD$ because their corresponding sides and corresponding $\angle$'s $\cong$.

[5] Check students' work. Show $\Delta ABC \cong \Delta CDA$ by SAS and that $ABCD$ is a parallelogram since both pairs of opposite sides of a quadrilateral are congruent.

[6] No, the other two sides are not necessarily congruent. Check students' examples.