

### Problem-Based Task: Stained Glass Pattern, Part I

#### Coaching Sample Responses

- a. What are the properties of the sides and angles of a square?

All sides are congruent and all angles are congruent.

- b. What are the properties of the sides and angles of a rhombus?

All sides are congruent and opposite angles are congruent.

- c. Which sides in the pattern are congruent and why?

$\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DA}$  because  $\square ABCD$  is a square.

$\overline{BC} \cong \overline{BE} \cong \overline{EF} \cong \overline{FC}$  because  $\square BEFC$  is a rhombus.

$\overline{FC} \cong \overline{FG} \cong \overline{GH} \cong \overline{HC}$  because  $\square CFGH$  is a square.

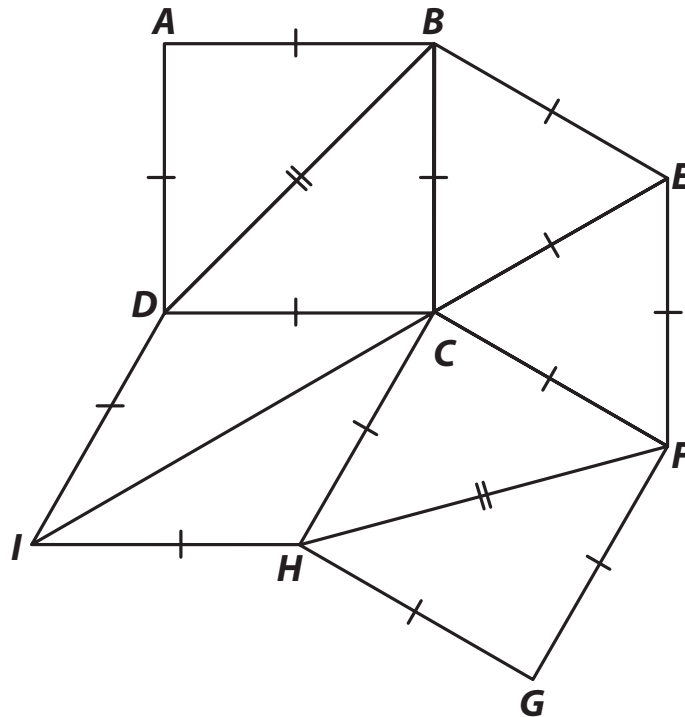
$\overline{HC} \cong \overline{HI} \cong \overline{ID} \cong \overline{DC}$  because  $\square DCHI$  is a rhombus.

$\overline{EC} \cong \overline{BC}$  because this was given.

- d. How do you indicate on a diagram that sides are congruent?

Use the same number of tick marks on the sides that are congruent.

- e. Mark the congruent sides on the diagram.



f. Which angles are congruent and why?

$\angle DAB \cong \angle HGF \cong \angle DCB \cong \angle HCF$  because these are the vertices of the squares; the measure of the vertex of a square is always  $90^\circ$ .

$\angle ABD \cong \angle DBC \cong \angle ADB \cong \angle BDC$  because the diagonal of a square bisects the opposite pairs of angles.

$\angle CHF \cong \angle GHF \cong \angle CFH \cong \angle GFH$  because the diagonal of a square bisects the opposite pairs of angles.

$\angle CBE \cong \angle EFC$  because these are the opposite vertices of a rhombus; opposite vertices of a rhombus are congruent.

$\angle BCE \cong \angle ECF \cong \angle BEC \cong \angle FEC$  because the diagonal of a rhombus bisects the opposite pairs of angles.

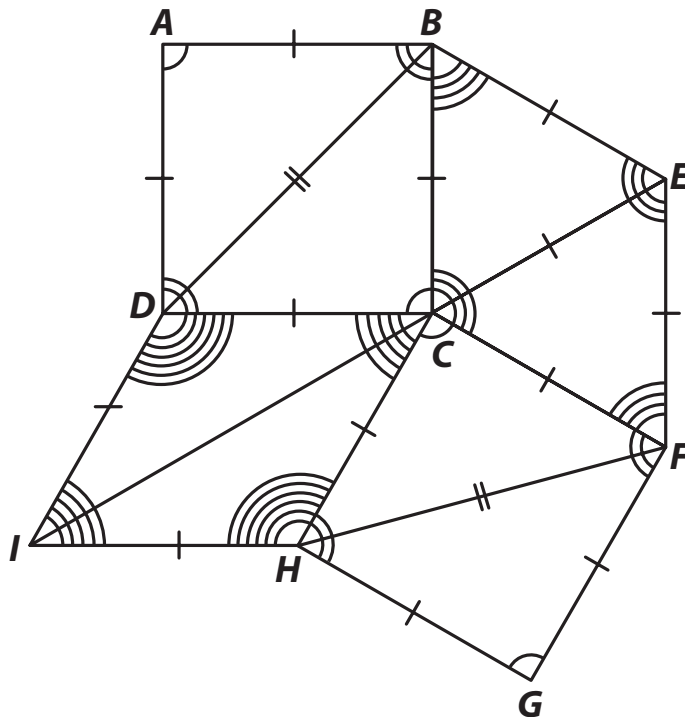
$\angle IDC \cong \angle IHC$  because these are the opposite vertices of a rhombus; opposite vertices of a rhombus are congruent.

$\angle DIC \cong \angle HIC \cong \angle DCI \cong \angle HCI$  because the diagonal of a rhombus bisects the opposite pairs of angles.

g. How do you indicate on a diagram that angles are congruent?

Use the same number of arcs on the angles that are congruent.

h. Mark congruent angles on the diagram.



- i. Name one pair of congruent triangles. Justify your answer by indicating which corresponding parts are congruent.

$$\triangle ABD \cong \triangle CBD$$

$$\angle DAB \cong \angle DCB$$

$$\angle ADB \cong \angle CDB$$

$$\angle ABD \cong \angle CBD$$

$$\overline{AB} \cong \overline{CB}$$

$$\overline{AD} \cong \overline{CD}$$

$$\overline{BD} \cong \overline{BD}$$

- j. Name a second pair of congruent triangles. Justify your answer by indicating which corresponding parts are congruent.

$$\triangle HCF \cong \triangle HGF$$

$$\angle HCF \cong \angle HGF$$

$$\angle CHF \cong \angle GHF$$

$$\angle CFH \cong \angle GFH$$

$$\overline{HC} \cong \overline{HG}$$

$$\overline{CF} \cong \overline{GF}$$

$$\overline{HF} \cong \overline{HF}$$

- k. Name a third pair of congruent triangles. Justify your answer by indicating which corresponding parts are congruent.

$$\triangle CBE \cong \triangle CFE$$

$$\angle CBE \cong \angle CFE$$

$$\angle BEC \cong \angle FEC$$

$$\angle ECB \cong \angle ECF$$

$$\overline{CB} \cong \overline{CF}$$

$$\overline{BE} \cong \overline{FE}$$

$$\overline{CE} \cong \overline{CE}$$

- l. Name a fourth pair of congruent triangles. Justify your answer by indicating which corresponding parts are congruent.

$$\triangle IDC \cong \triangle IHC$$

$$\angle IDC \cong \angle IHC$$

$$\angle DIC \cong \angle HIC$$

$$\angle DCI \cong \angle HCI$$

$$\overline{ID} \cong \overline{IH}$$

$$\overline{DC} \cong \overline{HC}$$

$$\overline{IC} \cong \overline{IC}$$

- m. Are any pairs of triangles that you identified congruent? If so, name them.

Yes,  $\triangle ABD \cong \triangle CBD \cong \triangle HCF \cong \triangle HGF$ .

- n. How can Mary use this information to plan her project?

Mary can use the congruent triangles to create a template for her needed cuts.

She can then verify that the triangles she has cut will fit her pattern if the cut pieces are congruent.

### Recommended Closure Activity

Select one or more of the essential questions for a class discussion or as a journal entry prompt.