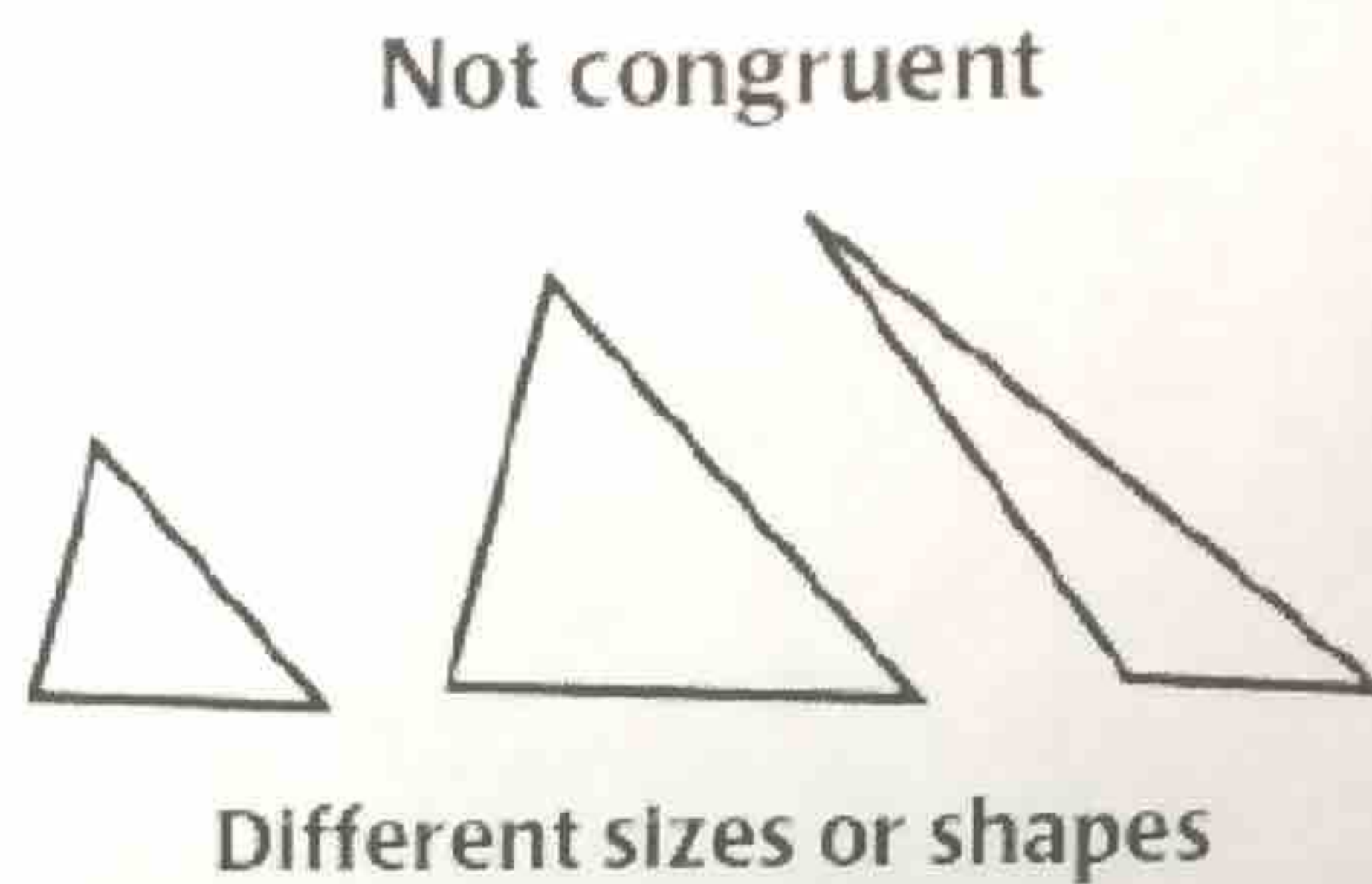
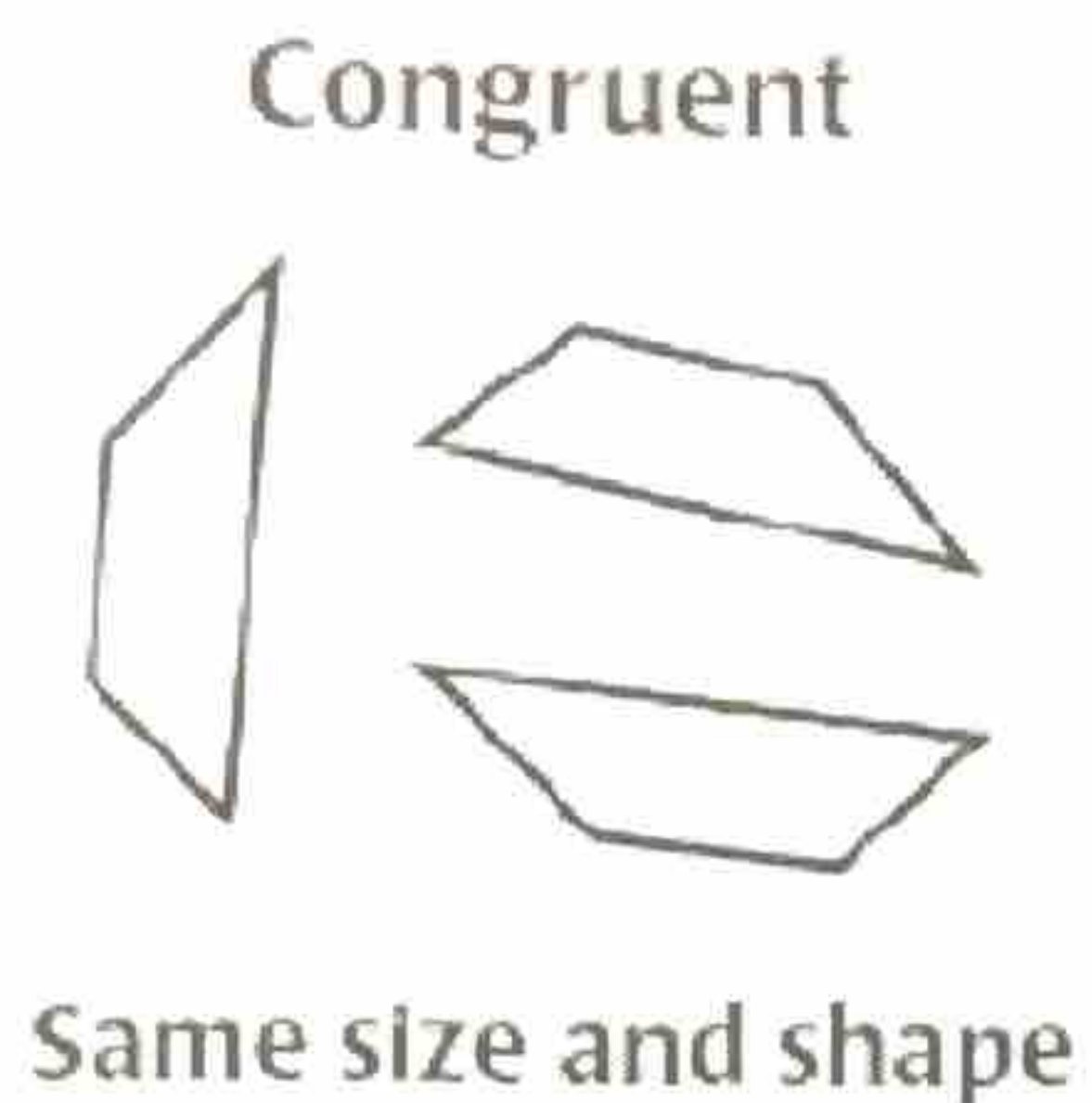


4.2 Apply Congruence and Triangles

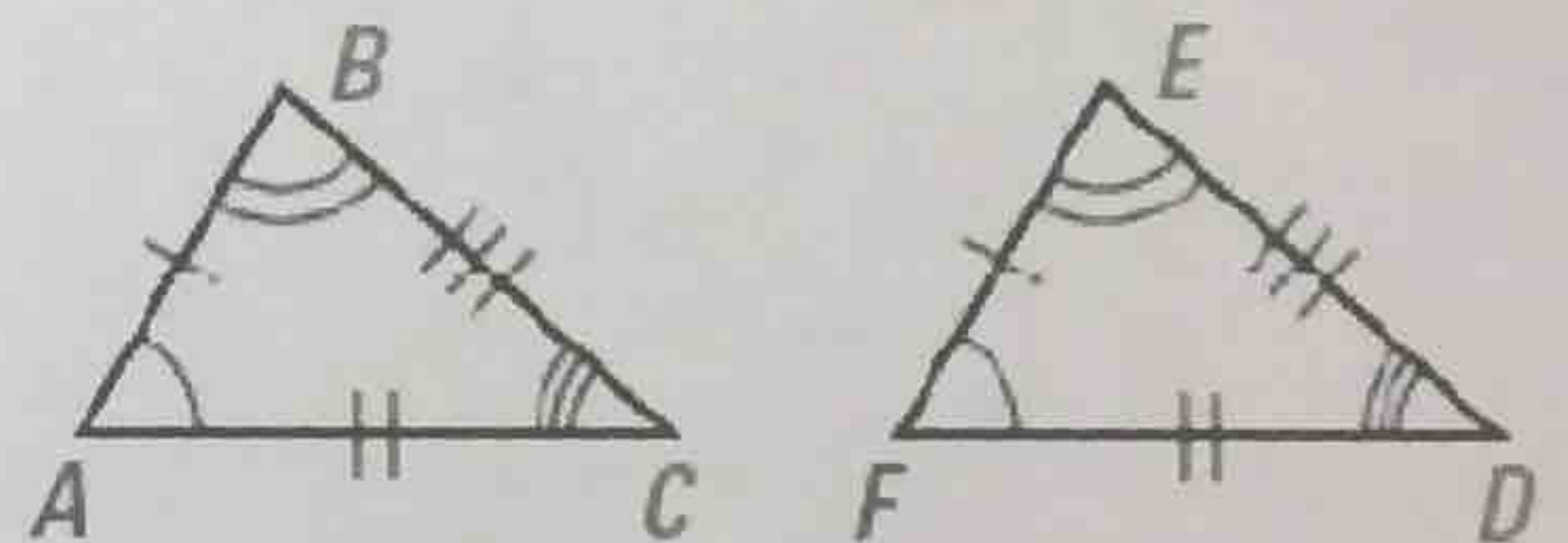
congruent - when geometric figures have exactly the same size and shape



congruent figures - all the parts of one figure are congruent to the corresponding parts of the other figure

Ex 1: Identify all pairs of congruent corresponding parts for the triangles shown. Then write a congruence statement for the triangles.

Corresponding Angles:

$$\angle A \cong \angle F$$
$$\angle B \cong \angle E$$
$$\angle C \cong \angle D$$


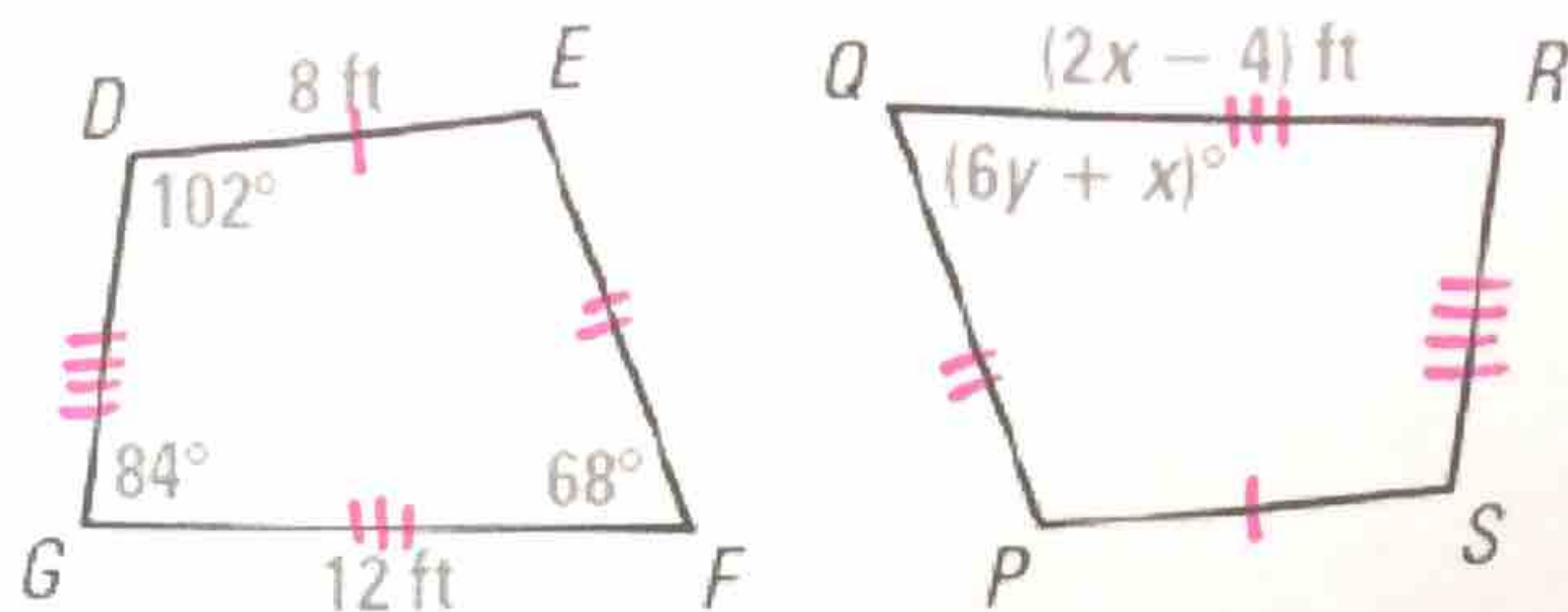
Corresponding Sides:

$$\overline{AB} \cong \overline{FE}$$
$$\overline{AC} \cong \overline{FD}$$
$$\overline{BC} \cong \overline{ED}$$

Congruence Statements:

$$\triangle ABC \cong \triangle FED$$
$$\triangle ACB \cong \triangle FDE$$
$$\triangle BCA \cong \triangle EDF$$

Ex 2: In the diagram $DEFG \cong SPQR$
Find the values of x and y .



$$\overline{FG} \cong \overline{QR}$$

$$12 = 2x - 4$$

$$16 = 2x$$

$$\boxed{x = 8}$$

$$\angle F \cong \angle Q$$

$$68 = 6y + x$$

$$68 = 6y + (8)$$

$$60 = 6y$$

$$\boxed{y = 10}$$

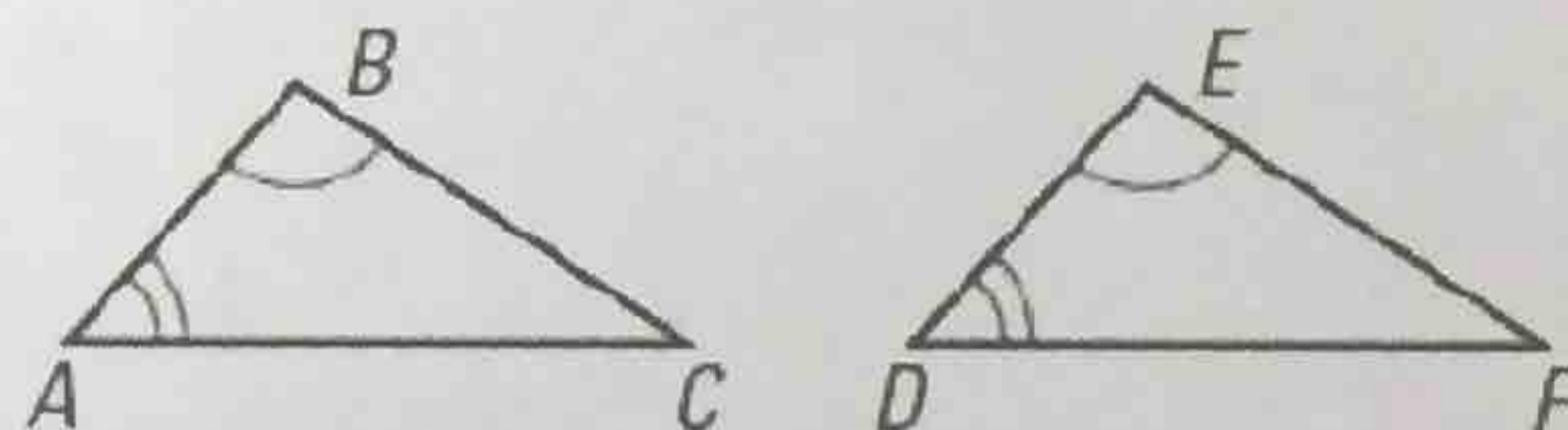
THEOREM

For Your Notebook

THEOREM 4.3 Third Angles Theorem

If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.

Proof: Ex. 28, p. 230



If $\angle A \cong \angle D$, and $\angle B \cong \angle E$, then $\angle C \cong \angle F$.

Ex 3: Find $m\angle BDC$.

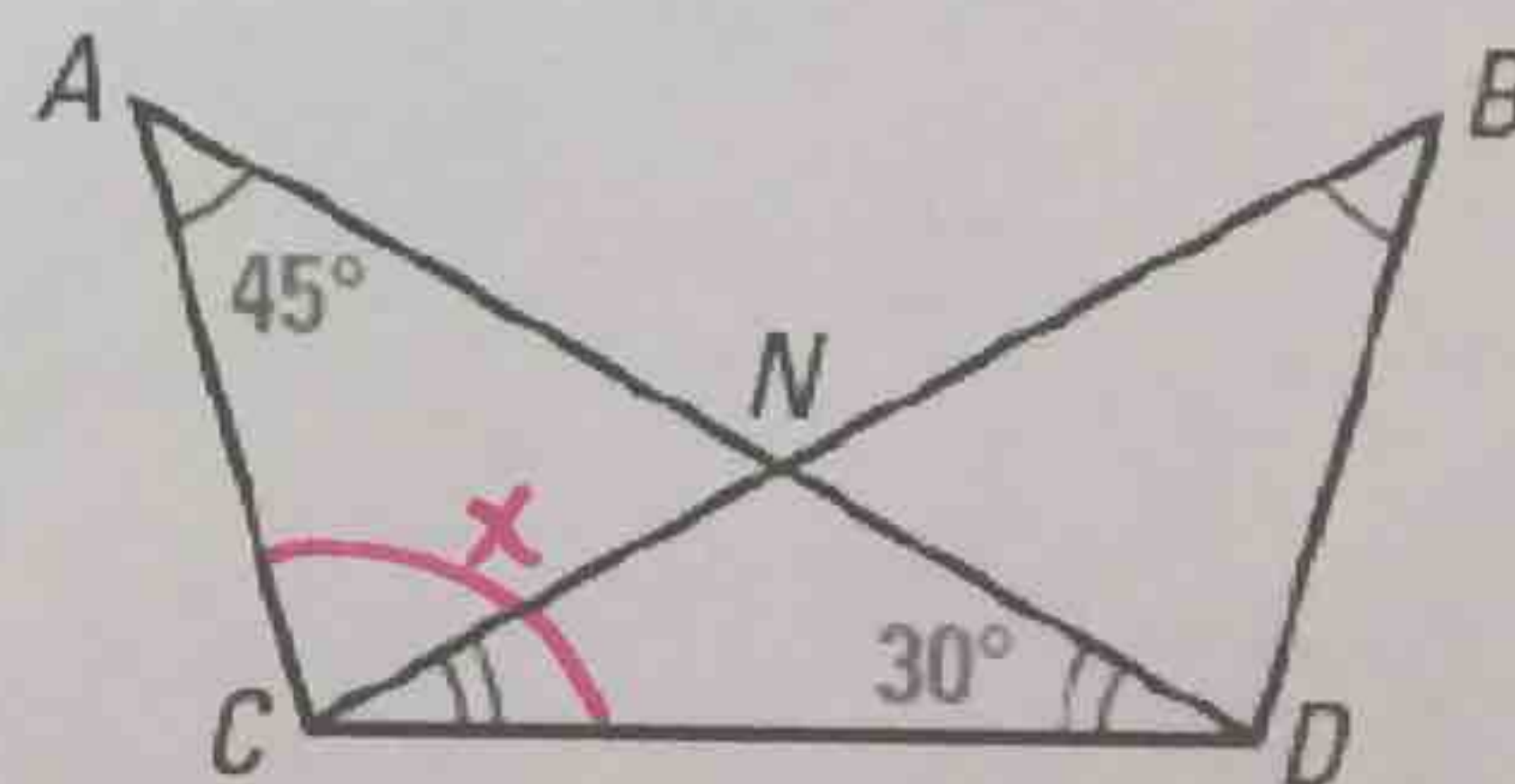
$$\angle ACD \cong \angle BDC \text{ (Third Angles Thm)}$$

$$45 + 30 + x = 180$$

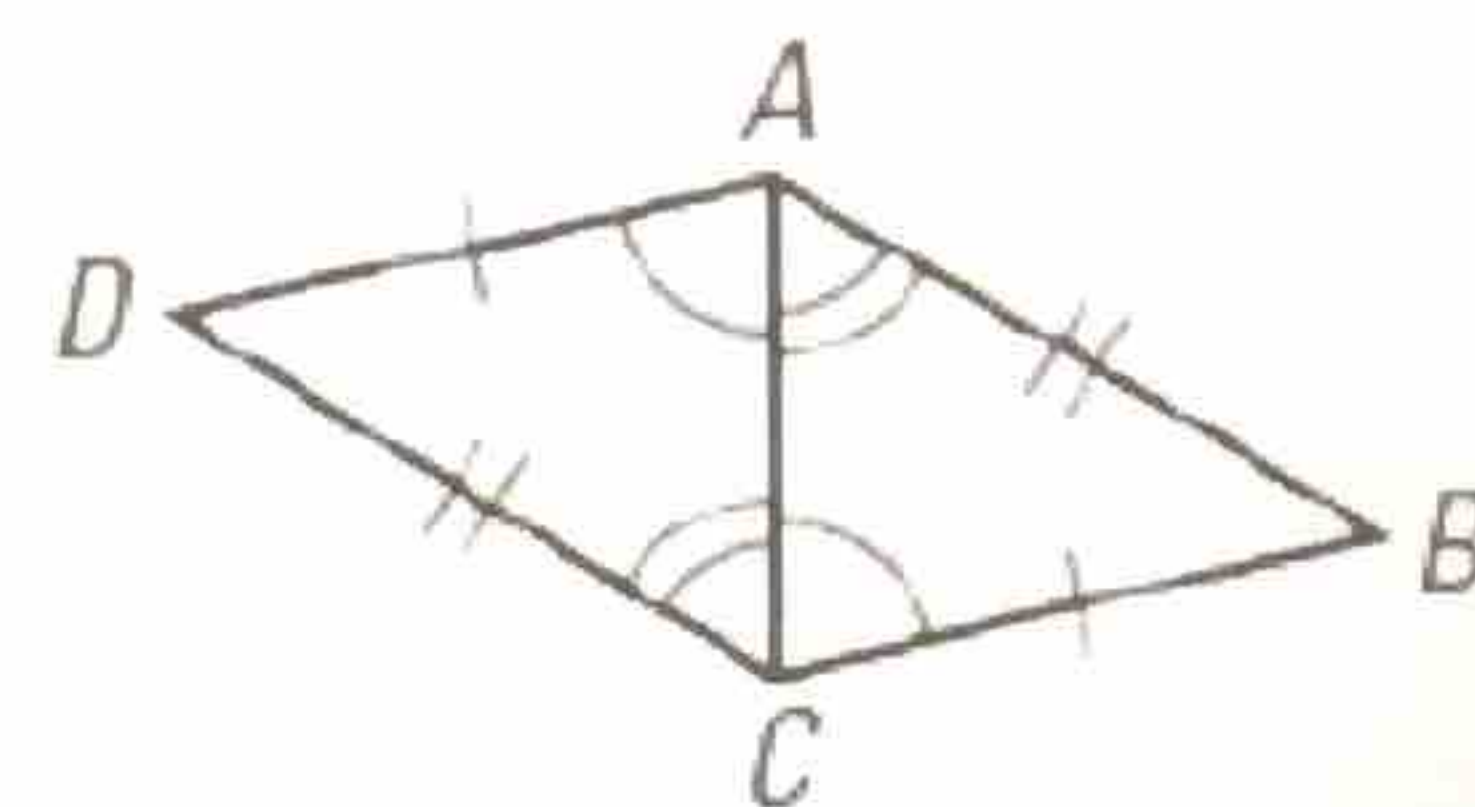
$$x + 75 = 180$$

$$x = 105$$

$$\boxed{m\angle ACD = m\angle BDC = 105^\circ}$$



Ex 4: Write a proof.



GIVEN $\triangleright \overline{AD} \cong \overline{CB}, \overline{DC} \cong \overline{BA}, \angle ACD \cong \angle CAB,$
 $\angle CAD \cong \angle ACB$

PROVE $\triangleright \triangle ACD \cong \triangle CAB$

STATEMENTS

REASONS

1. $\overline{AD} \cong \overline{CB}, \overline{DC} \cong \overline{BA}$
 $\angle ACD \cong \angle CAB, \angle CAD \cong \angle ACB$

1. Given

2. $\overline{AC} \cong \overline{AC}$

2. Reflexive Property of Congruence

3. $\angle B \cong \angle D$

3. Third Angles Theorem

4. $\triangle ACD \cong \triangle CAB$

4. Definition of Congruent Figures

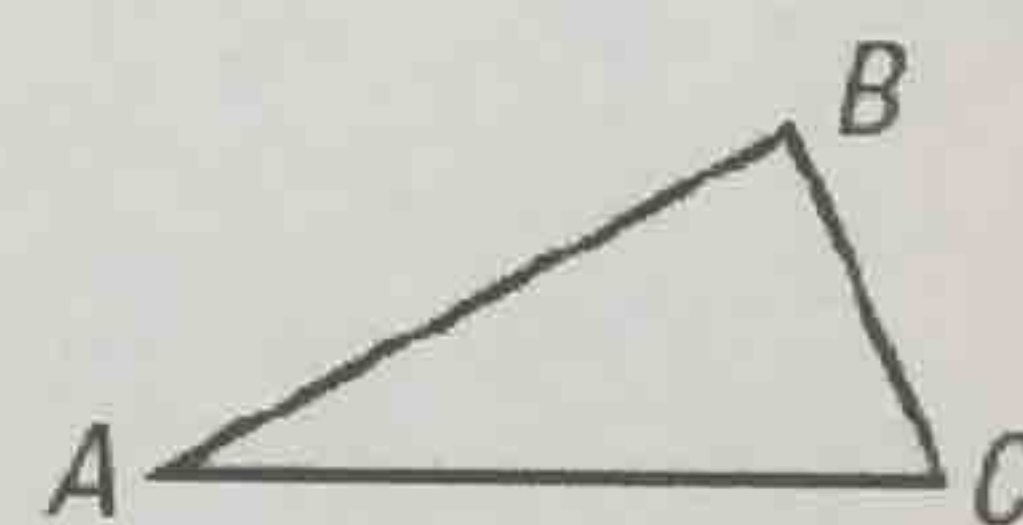
THEOREM

For Your Notebook

THEOREM 4.4 Properties of Congruent Triangles

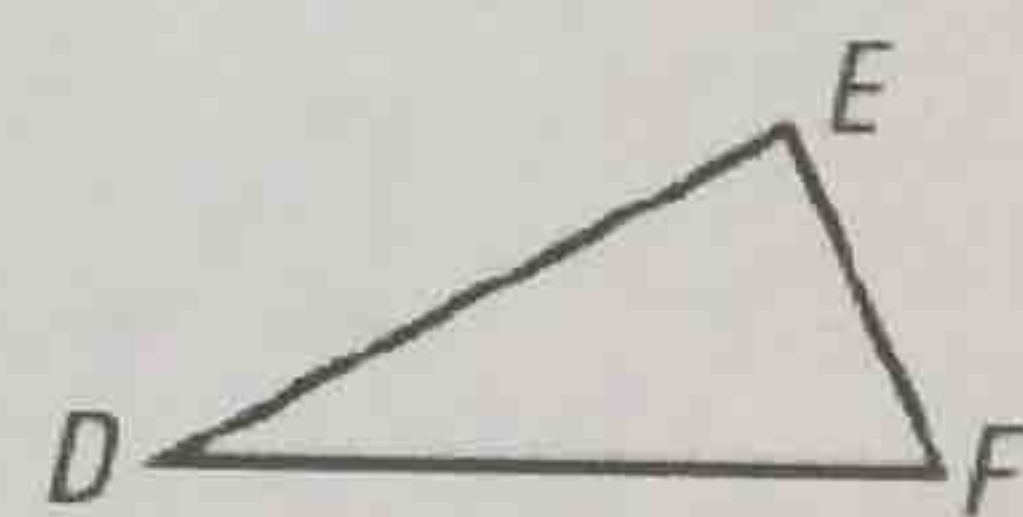
Reflexive Property of Congruent Triangles

For any triangle ABC , $\triangle ABC \cong \triangle ABC$.



Symmetric Property of Congruent Triangles

If $\triangle ABC \cong \triangle DEF$, then $\triangle DEF \cong \triangle ABC$.



Transitive Property of Congruent Triangles

If $\triangle ABC \cong \triangle DEF$ and $\triangle DEF \cong \triangle JKL$, then $\triangle ABC \cong \triangle JKL$.

