H.Geometry - Chapter 1 – Definition Sheet

Section 1.9

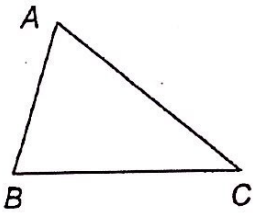
Definition of:

Transformation

- A one-to-one mapping of points in a figure to points in a resulting figure
- Manipulating an original figure to get a new figure

Pre-Image

- The original figure



Preimage: ΔABC

Image

- The resulting figure
- Notation: often indicated with primes (apostrophes)

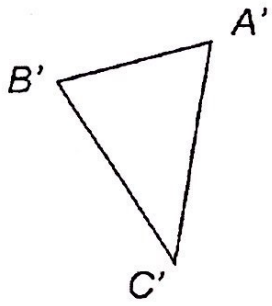


Image: $\Delta A'B'C'$

NOTE: one-to-one correspondence:

- Each pre-image point has exactly one image point
- Each image point comes from exactly one pre-image

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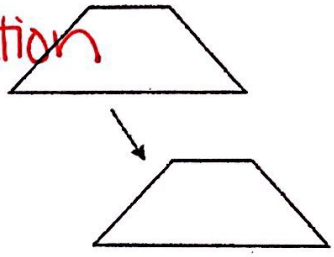
Some Types of

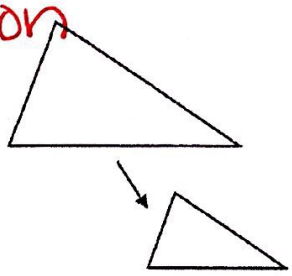
Transformation

congruence transformation



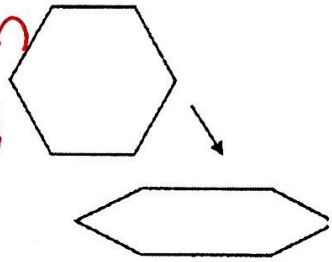
- Preimage and image are same size and same shape.

size-change transformation



- Preimage and image are same shape but different sizes

distortion transformation



- Preimage and image are different shapes ~~but~~ and different sizes

Definition of

Isometry

- A transformation preserving both size and shape
- Preimage and image are always congruent
- Also known as a rigid transformation or congruence transformation

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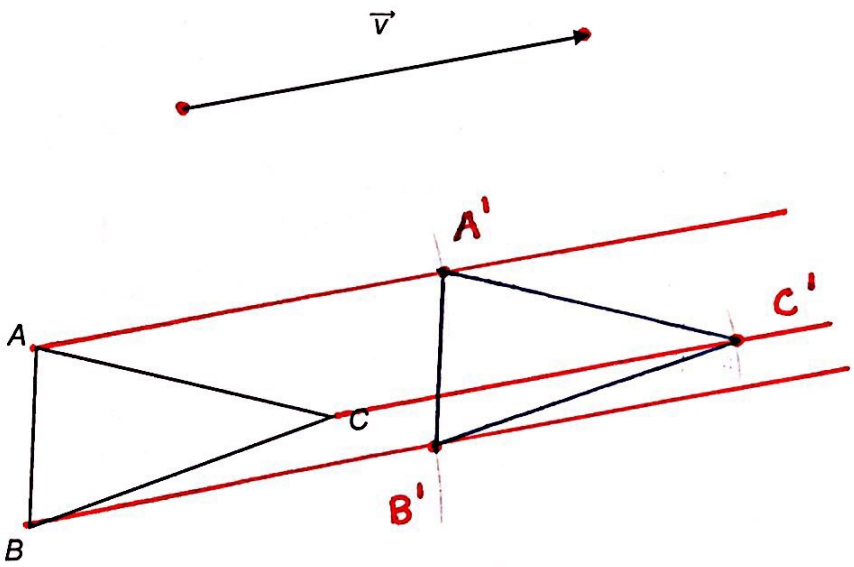
Types of Isometries

1. Translation (*slide*)

Definition: A transformation in which all the points of the preimage move the same distance and direction to create the image.

Translation Vector: defines the direction and magnitude of a translation.

Example: Translating ΔABC by vector $\vec{v}$.



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2. Rotation (*turn*)

Definition: A transformation in which all points of the pre-image move the same number of degrees in a circular direction around a fixed point (the center)

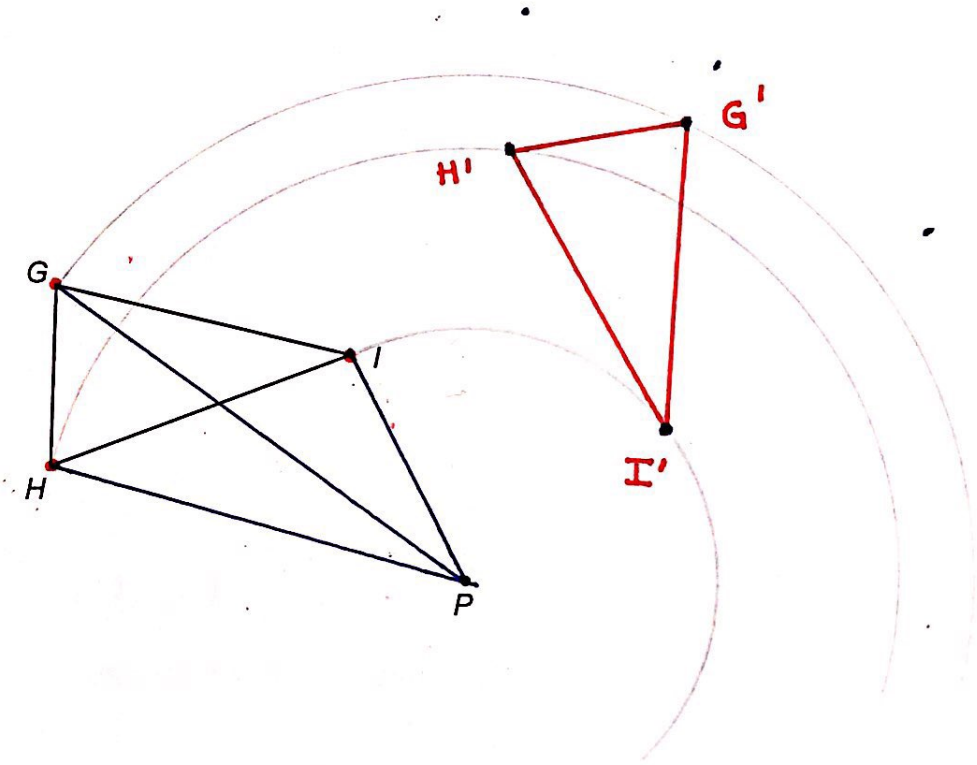
Direction: clockwise or counter-clockwise

Magnitude: the number of degrees to rotate.

Positive magnitude: counter-clockwise

Negative magnitude: clockwise

Example: Rotating ΔGHI by -80° around point *P*.



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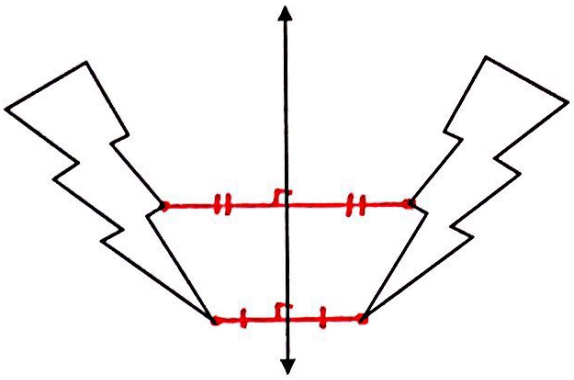
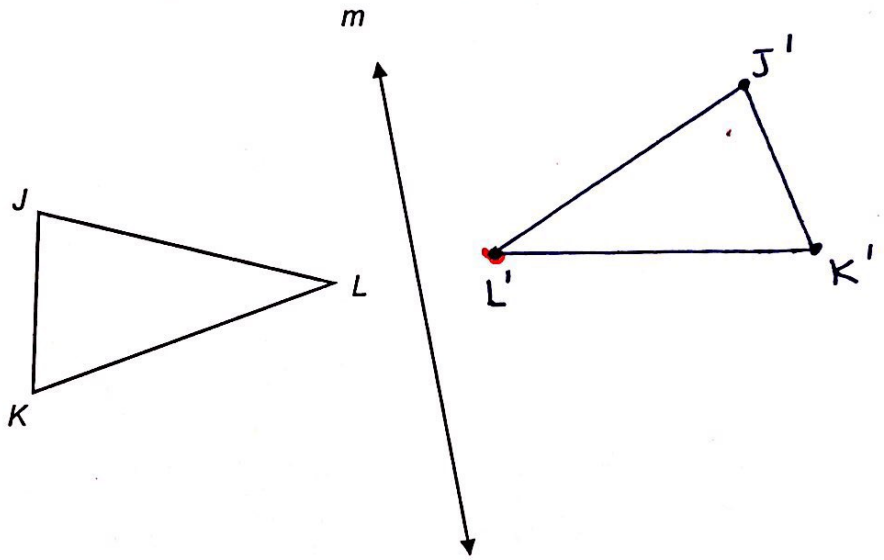
3. Reflection (*flip*)



Definition: A transformation that provides/produces a mirror image over a line (reflecting line)

***Reflection Line Conjecture*:** The reflecting line is the ⊥ bisector of the segment between a preimage point and its image.

Example: Reflecting ΔJLK over line m: $r_m(\Delta JLK)$



4. Glide Reflection (*walk*)

Definition: a combination of a Translation and a reflection

Sample: