

Fractals



Definition (page 92 of text)

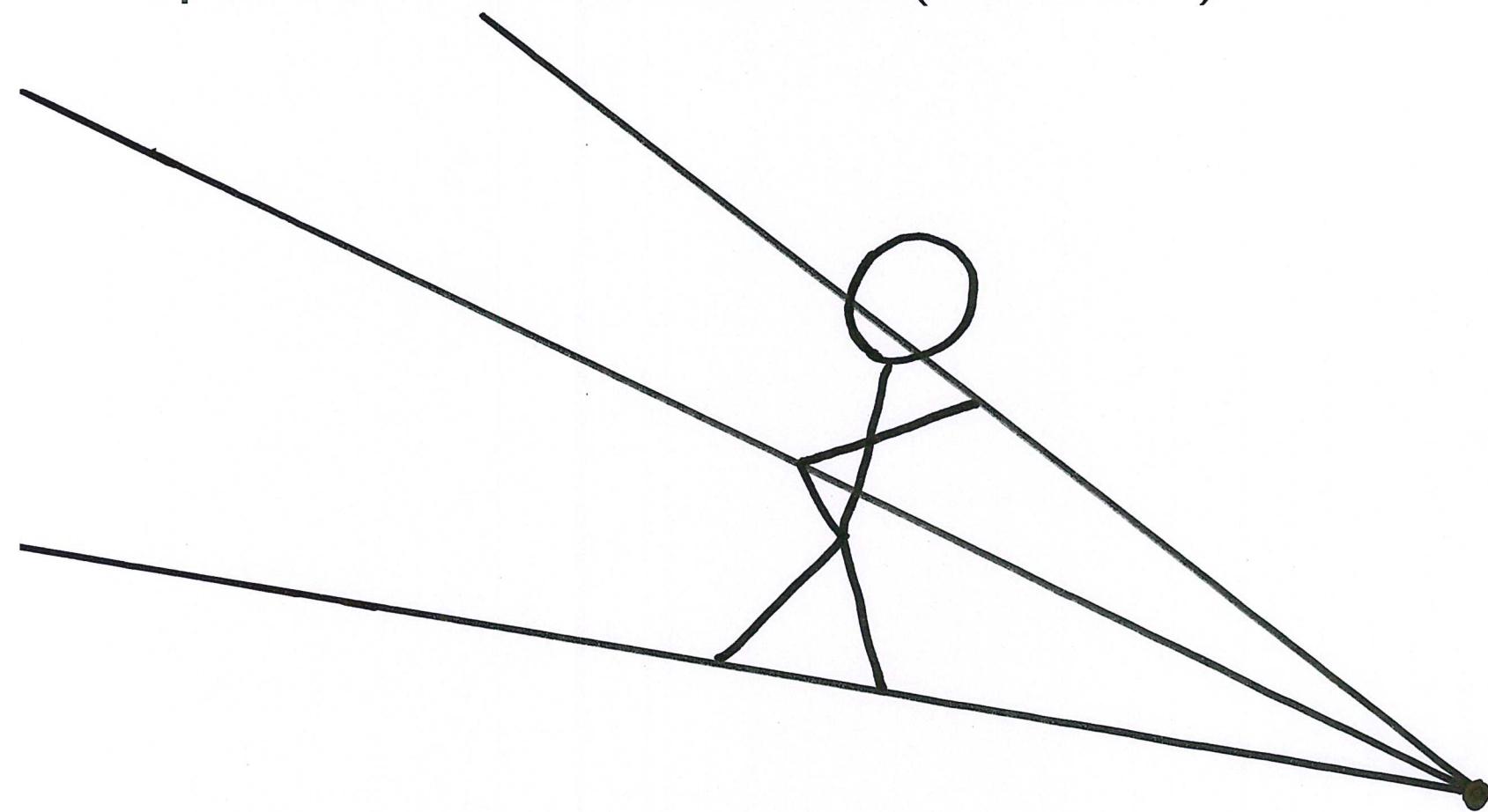
A plane transformation f is called a **similarity** if there exists a positive number α such that for every two points A and B on the plane, we have

Note: If $\alpha = 1$ then

- The number α is called the

— Similarities

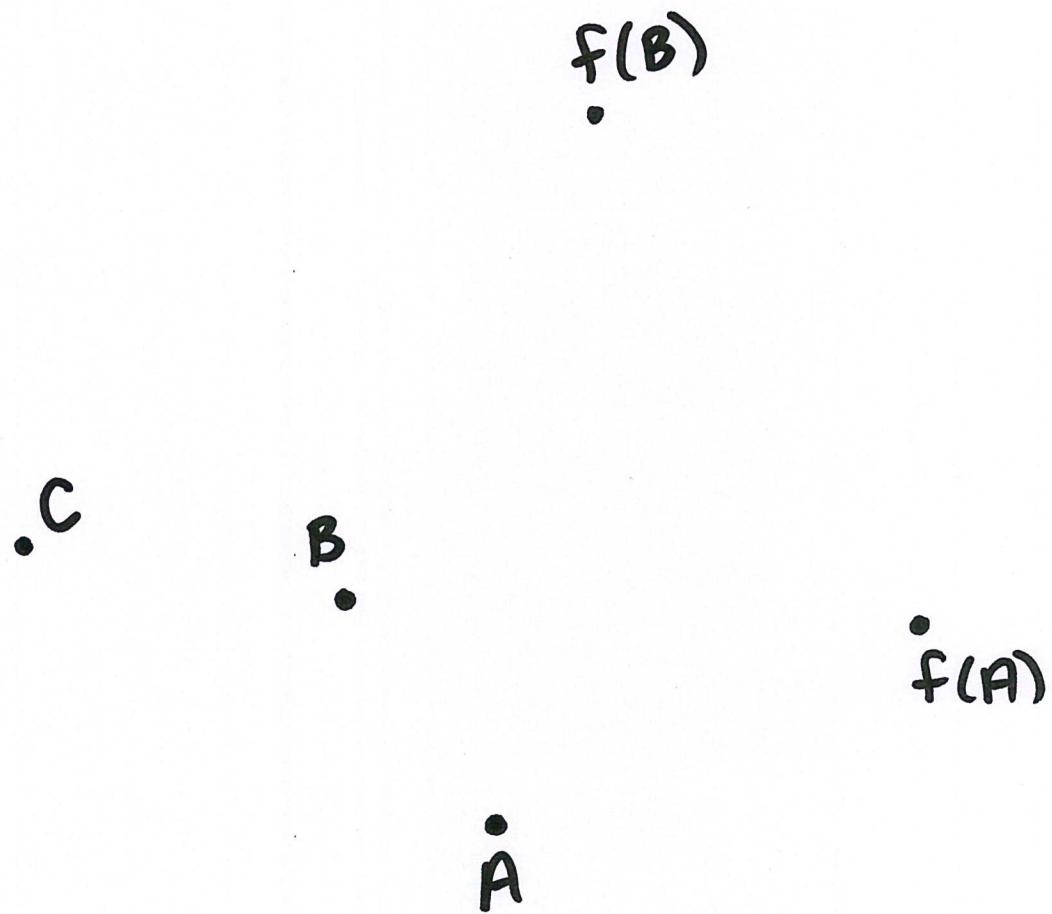
Example: Central Similarities (Dilations)



—Similarities

Example

Find: (1) the center of the central similarity f ; (2) the image of C under f .



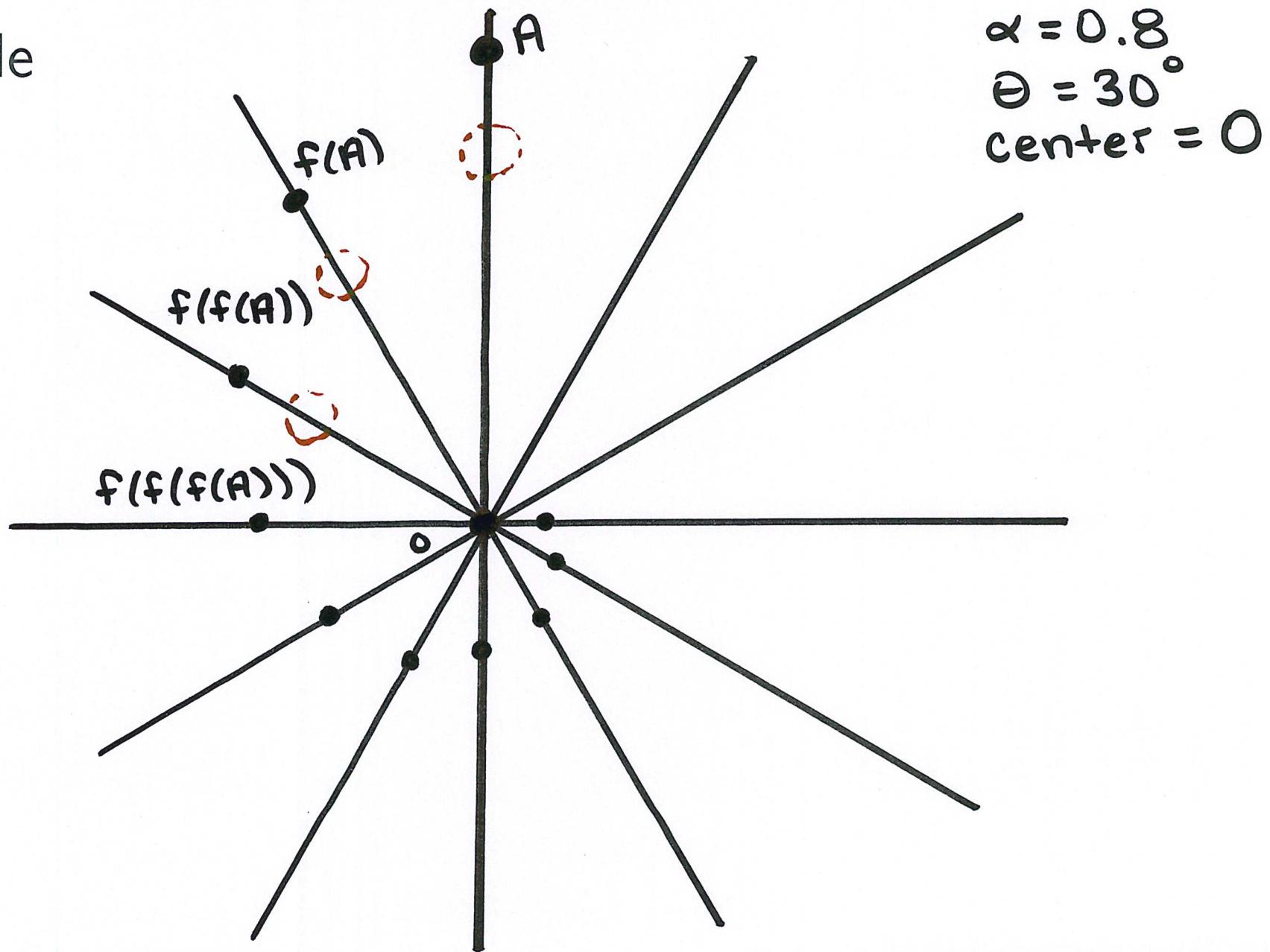
Spiral Similarity

Let f be a composition of a

Note: f is a similarity.

- If the center is the same point for both the rotation and central similarity, then f is called a **spiral similarity**.

Example



Dilative Reflection

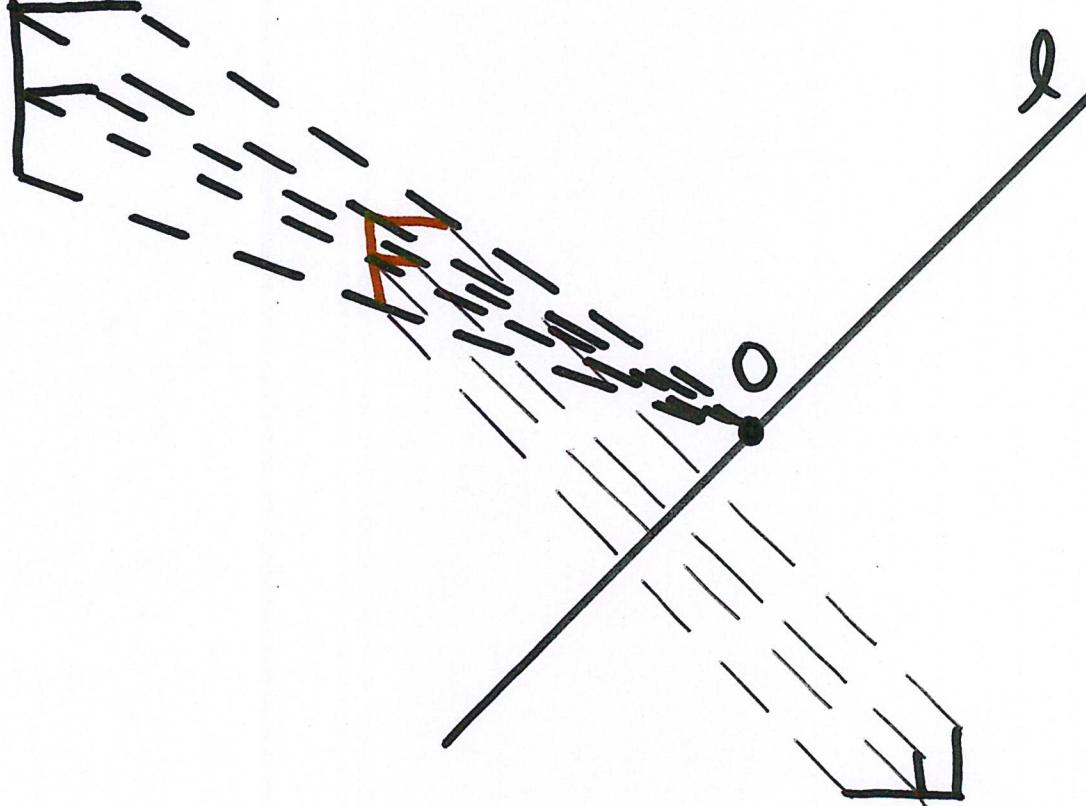
Let f be a composition of a

Note: f is a similarity.

- If the center of the central similarity is on the line of reflection, then f is called a **dilative reflection**.

└ Similarities

Example



Classification For Similarities

Theorem

Every similarity is a symmetry, a spiral similarity, or a dilative reflection.

Similar Objects

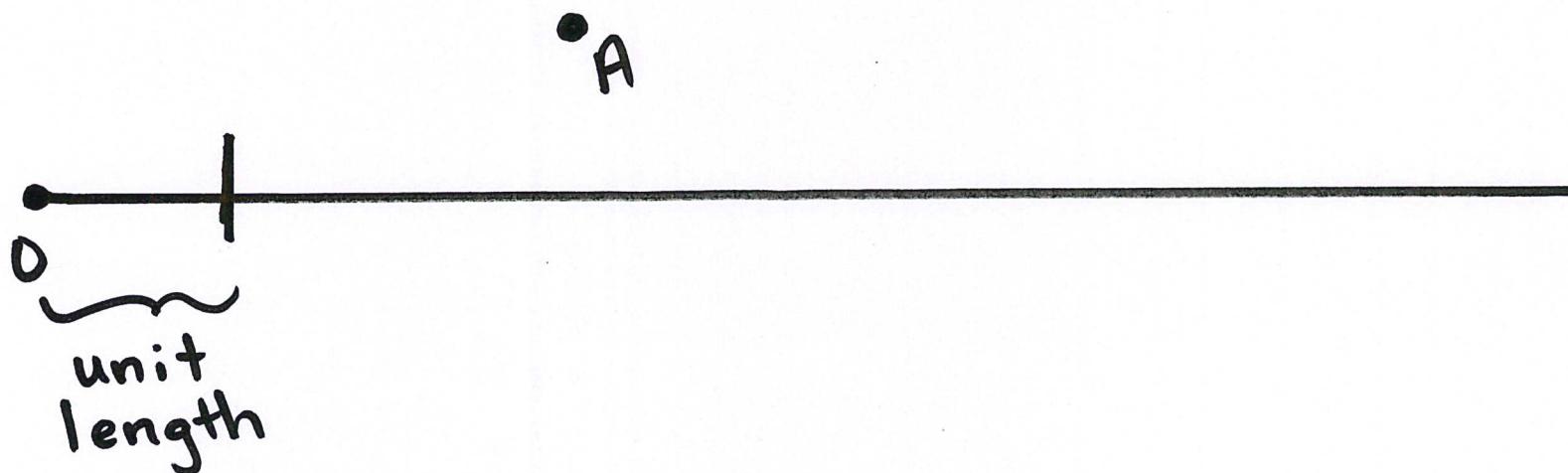
Two objects are **similar** if they have the same shape, regardless of orientation.

Example: Similar Always? Never? Sometimes?

- two rectangles having the same area
- two Golden triangles
- two isosceles triangles with different heights
- two isosceles triangles with the same height
- two Golden obtuse triangles having different heights
- two circles of different diameters
- two pentagons
- a square and a Golden Rectangle

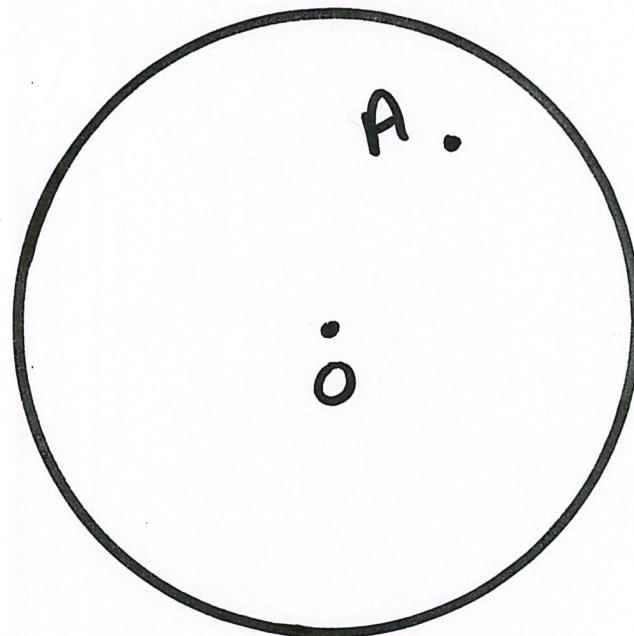
Squaring Transformation

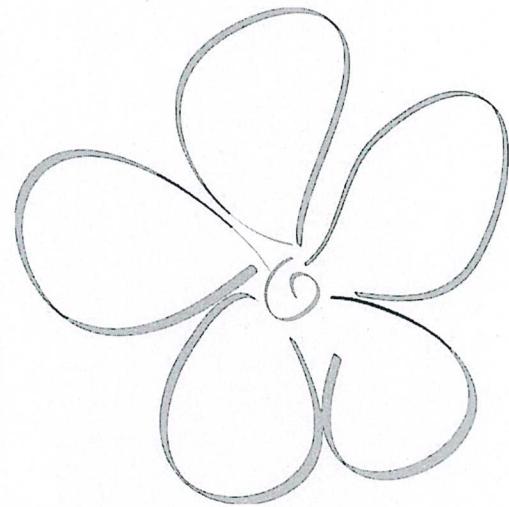
Square the distance, double the angle.



└ Similarities

Circle Inversion





QUESTIONS???