RIGID MOTIONS OF THE PLANE

Definition 1. A *rigid motion* of the plane (or an *isometry*) is a motion which preserves distance.

There are four basic rigid motions:

(1) Reflection
(2) Glide Reflection
(3) Rotation
(4) Translation

Theorem 2. *The above list contains all rigid motions of the plane.*

Exercise 1. Describe compositions of the following motions as one of the motions from the list above.

(1) Rotation by α (radians) counter clockwise around the origin followed by rotation by β (radians) counter clockwise around the origin.
Answer:

(2) Translation by a vector (a, b) followed by translation by a vector (c, d).
Answer:

(3) Reflection through a line l_1 followed by reflection through a line l_2.
Answer:

(4) Translation by $(1, 1)$ followed by rotation by 90^o $(=\frac{\pi}{2})$ counter clockwise around the origin.
Answer:

(5) Rotation by 90^o counter clockwise around the origin followed by translation by $(1, 1)$.
Answer:

(6) Rotation by 90^o counter clockwise around the origin followed by rotation by 90^o clockwise around the point with coordinates $(2, 0)$.
Answer:

Once your entire group is done with exercise 1, and the answers are written down and checked, try to prove Theorem 2.

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