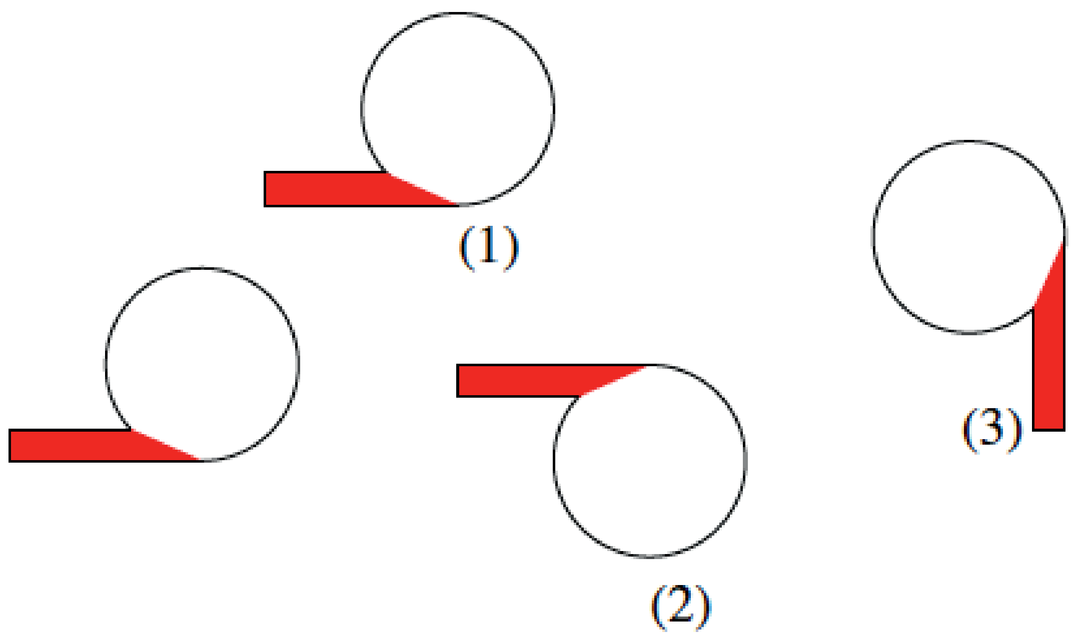
Lesson 1: Why Move Things Around?

Classwork

Exploratory Challenge

a. Describe, intuitively, what kind of transformation is required to move the figure on the left to each of the figures (1)–(3) on the right. To help with this exercise, use a transparency to copy the figure on the left. Note: Begin by moving the left figure to each of the locations in (1), (2), and (3).



b. Given two segments AB and CD, which could be very far apart, how can we find out if they have the same length without measuring them individually? Do you think they have the same length? How do you check? In other words, why do you think we need to move things around on the plane?

Lesson Summary

A *transformation* F of the plane is a function that assigns to each point P of the plane a point $F(P)$ in the plane.

- By definition, the symbol $F(P)$ denotes a specific single point, unambiguously.
- The point $F(P)$ will be called the image of P by F. Sometimes the image of P by F is denoted simply as P' (read "P prime").
- The transformation F is sometimes said to "move" the point P to the point $F(P)$.
- We also say F maps P to $F(P)$.

In this module, we will mostly be interested in transformations that are given by rules, that is, a set of step-by-step instructions that can be applied to any point P in the plane to get its image.

If given any two points P and Q, the distance between the images $F(P)$ and $F(Q)$ is the same as the distance between the original points P and Q, and then the transformation F preserves distance, or is distance-preserving.

- A distance-preserving transformation is called a *rigid motion* (or an *isometry*), and the name suggests that it moves the points of the plane around in a rigid fashion.

Problem Set

1. Using as much of the new vocabulary as you can, try to describe what you see in the diagram below.

2. Describe, intuitively, what kind of transformation is required to move Figure A on the left to its image on the right.