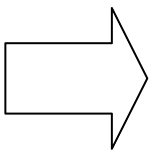
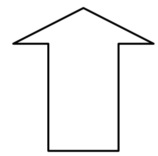
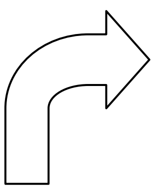
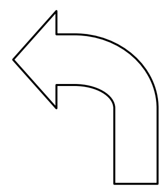
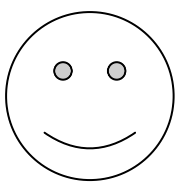
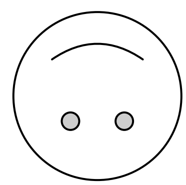
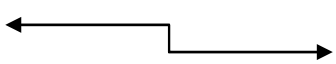
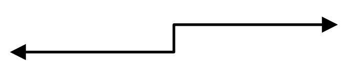
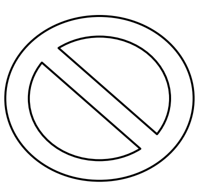
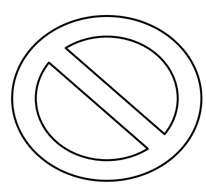
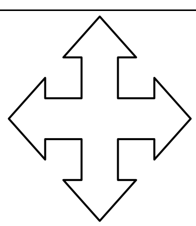
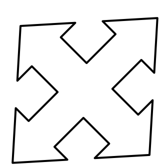
Basic Rigid Motion – A basic rigid motion is a **rotation, reflection(flip),** or **translation(slide)** of the plane.

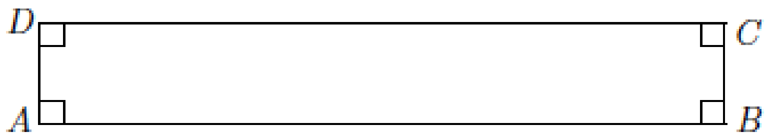
Class Activity for 02-01

Use an overhead projector sheet and a dry erase marker to determine what rigid motion(s) you need to use to move the pre-image to the current image.

Pre-image	**Image**	**Circle the Rigid Motion(s) used**
		• Rotation • Reflection • Translation
		• Rotation • Reflection • Translation
		• Rotation • Reflection • Translation
		• Rotation • Reflection • Translation
		• Rotation • Reflection • Translation
		• Rotation • Reflection • Translation

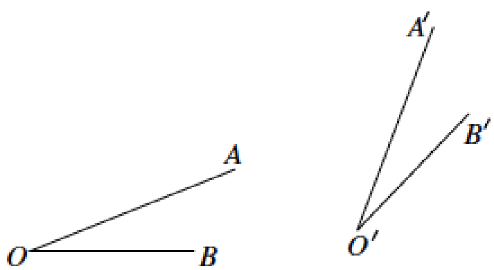
- Given two segments AB and CD, which could be very far apart, how can we find out if they have the same length without measuring them individually? Do you think they have the same length? How do you check?

- For example, given a quadrilateral $ABCD$ where all four angles at A, B, C, D are right angles, are the opposite sides AD, BC of equal length?

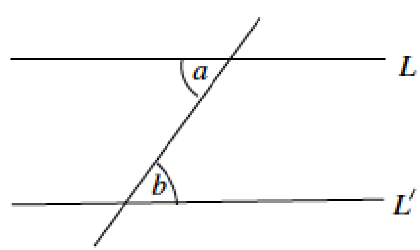


Later, we will *prove* that they have the same length.

- Similarly, given angles $\angle AOB$ and $\angle A'O'B'$ how can we tell whether they have the same degree without having to measure each angle individually?



- For example, if two lines L and L' are parallel and they are intersected by another line, how can we tell if the angles $\angle a$ and $\angle b$ (as shown) have the same degree when measured?

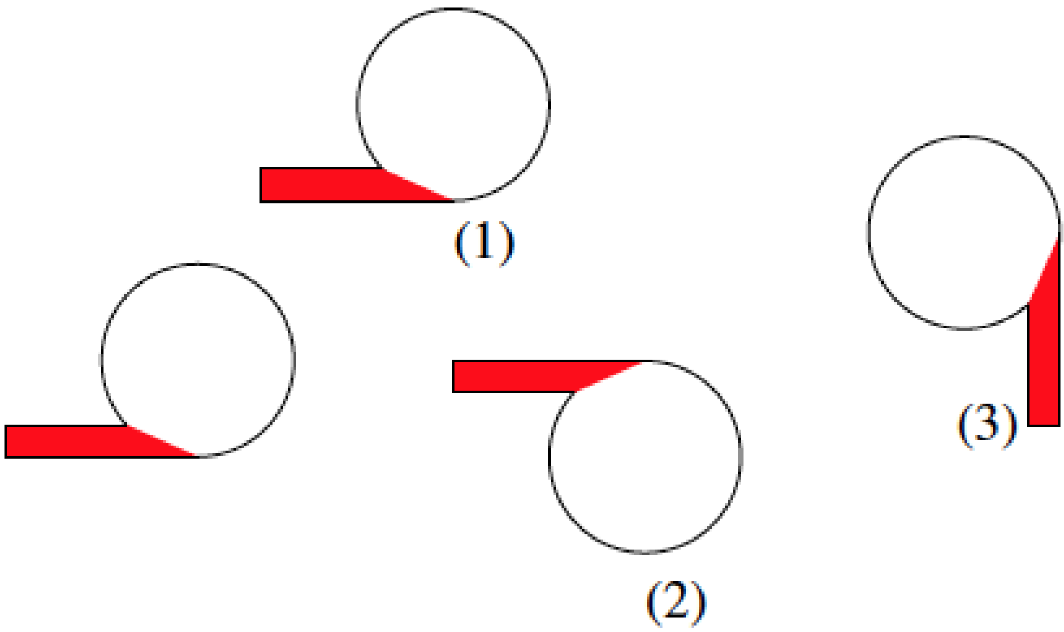


Lesson 1: Why Move Things Around?

Classwork

Exploratory Challenge 1

1. Describe, *intuitively*, what kind of transformation will be 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 that you are supposed to begin by moving the left figure to each of the locations in (1), (2), and (3).



2. 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 of the plane, to be denoted by F, is a rule that assigns to each point P of the plane, one and only one (unique) point which will be denoted by $F(P)$.

- So, by definition, the symbol $F(P)$ denotes a specific single point.
- The symbol $F(P)$ shows clearly that F moves P to $F(P)$
- The point $F(P)$ will be called the image of P by F
- We also say F maps P to $F(P)$

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, 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 will be required to move Figure A on the left to its image on the right.