

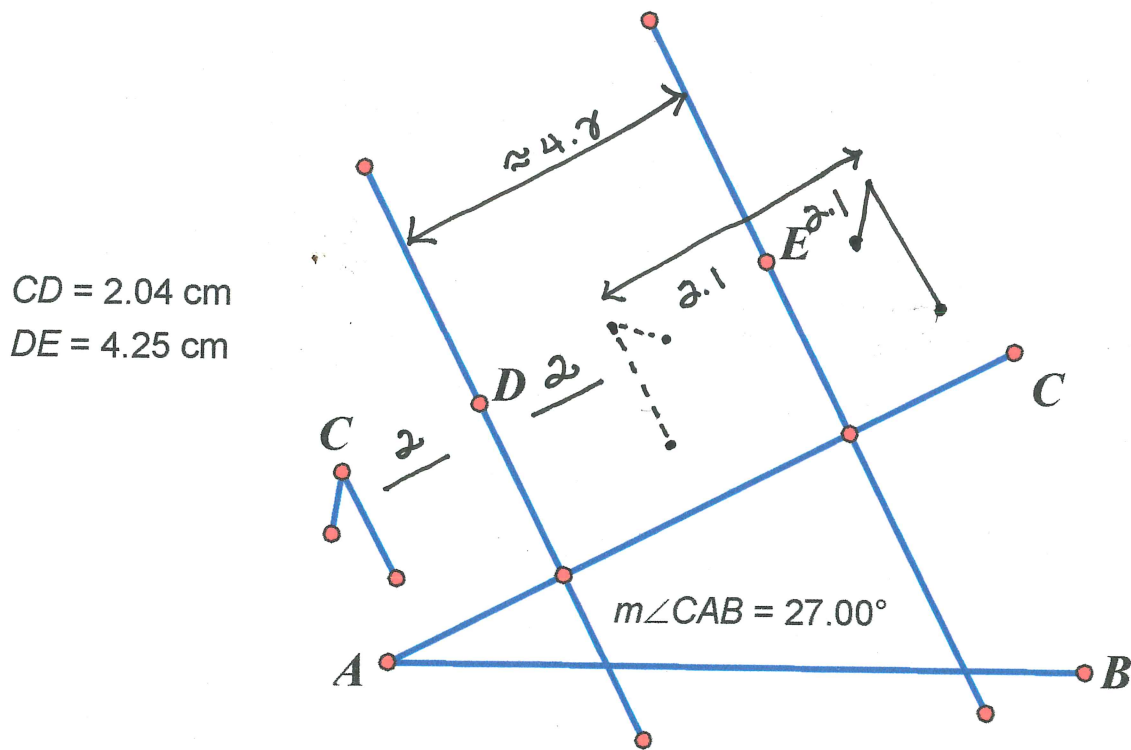
## Chapter 4 Translations Video B

A translation is an even, direct, orientation-preserving motion. Let's look at one closely.

Translate the checkmark along the path. What is the final distance.

$R(LE) \circ R(LD)$  checkmark.

Note perpendicular bisector action at each reflection. Note interim and final orientations. Note also that the path doesn't have to be horizontal!



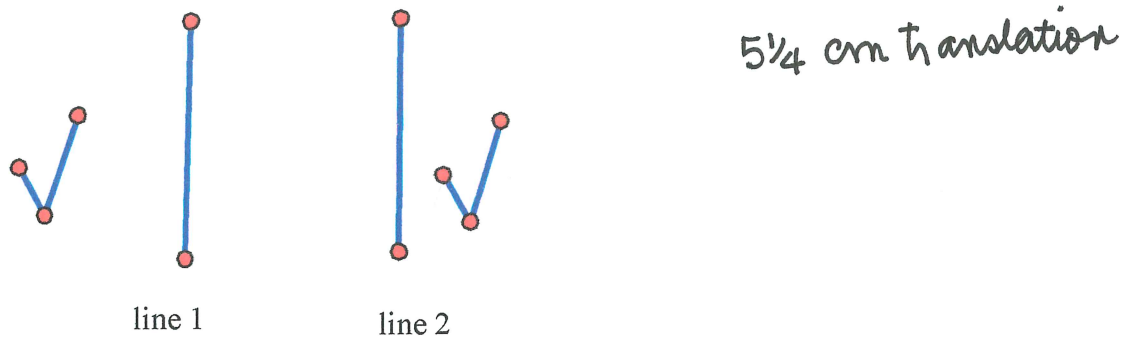
Note that the lines of symmetry are parallel to each other and perpendicular to the path of the translation. Key fact.

These reflections do not commute! Let's look at two tiny horizontal ones to see this.

Line 1 and Line 2 are in order of their subscripts. I will take a check mark and do L2 AFTER L1 in picture 1 ( $L2 \circ L1$ ) and L1 AFTER L2 in picture 2 ( $L1 \circ L2$ ). I'm going to show no interim in picture 1...just initial and final images...then all 3 in picture 2.

Picture 1 L2 after L1 ( $L2 \circ L1$  checkmark)

Let's put in the interim object and note it's orientation is reversed.



Note that a reflection followed by another reflection preserves orientation (aka "direct" or even transformation). Is this a rotation? What's different about this double reflection than a rotation?

Note too: the lines of reflection or lines of symmetry are parallel to one another and perpendicular to the path of the transformation.

Let's measure the distance traveled in 3 steps. If the total translation is  $c$ , where are  $a$  and  $b$  for interim distances.  $c = 2(a + b)$ .

Initial to interim and then interim to final,

Initial to final and distance between the lines of reflection.

See page 140 for further details.

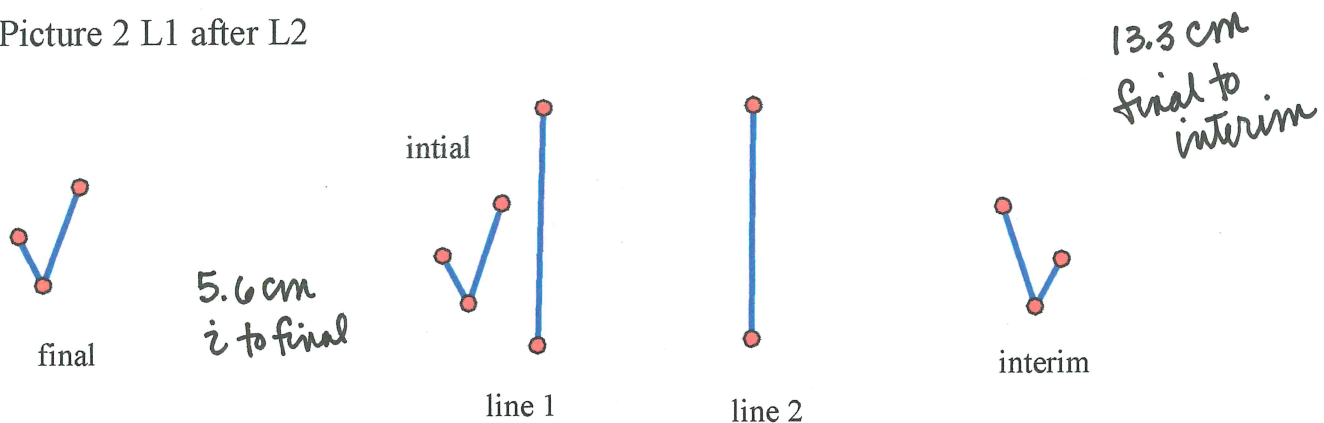
### Chapter 4 Popper Question 5

A translation is a transformation of two reflections composed along a path.

- A. True
- B. False

Now for the NOT commutative part:

Picture 2 L1 after L2



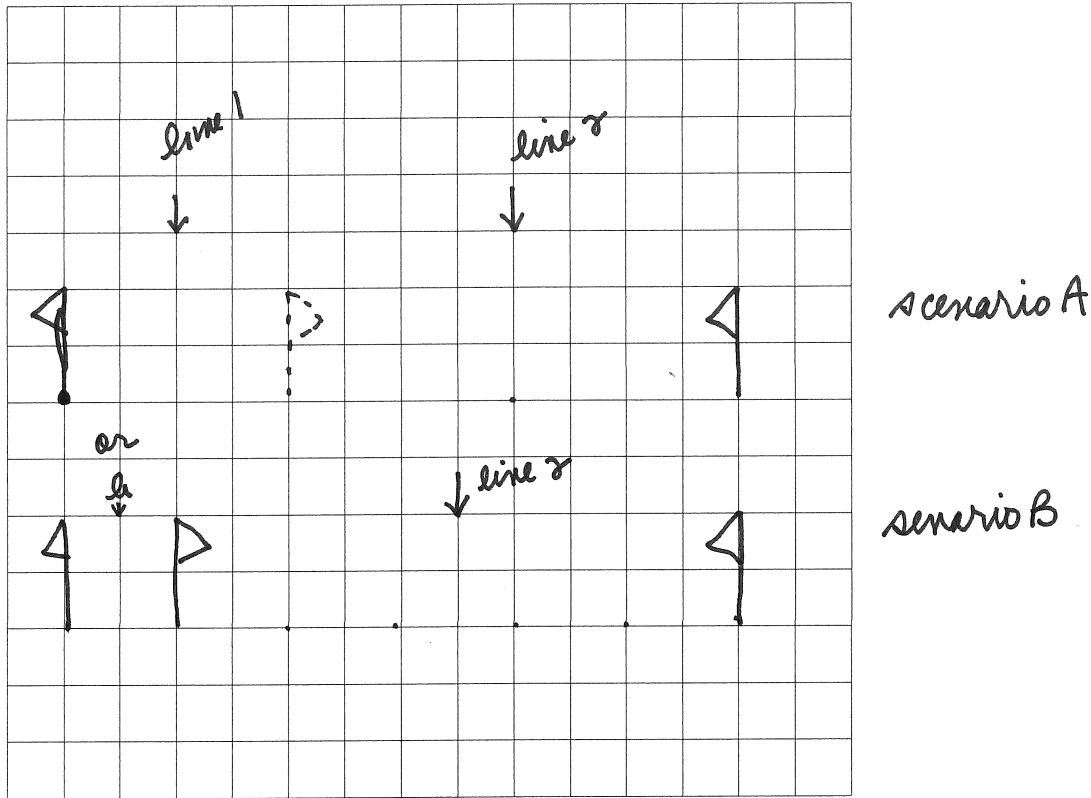
This is not at all what people expect so be sure to read the instructions saying “after” and do it in the right order! Let’s scroll between the two images again.

### Chapter 4 Popper Question 6

The lines of symmetry (aka lines of reflection) are perpendicular to each other and parallel to the path of the translation.

- A. True
- B. False

Now let's do one more: How to put in the lines of reflection! You get CHOICES for this!



So now do a small review:

A reflection is the basic move. All three of the other moves are compositions of this basic move. The composition command does not commute. The instructions to reflect are given IN ORDER and that order should be followed. Translation is a composition of two reflections about parallel lines of symmetry that are perpendicular to the path of the translation.

Ms. Leigh's Question One

You are given a segment from (1,1) to (1,4) and you do a translation to a segment (3,5) to (3,8). Put this on a grid and mark off two lines of reflection of your own choosing. Be sure to show the path of the translation as well as the lines of

symmetry. Then write a brief paragraph about how this motion can be written as  $F(x + 2, y + 4)$ . Connect back to learning this movement in Chapter 3 and now having an alternate presentation and a name here in Chapter

Ok, no essays, 2 popper questions and one homework here in Video B. See you next up for rotations, video C.

