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LESSON TITLE *How Do You Get There From Here?*

GRADE: 8

SUBJECT: Math

TIME FRAME

2 class periods- (40 minute classes)

PLANNING AND PREPARATION

The students will be sitting in groups of 3 or 4

MATERIALS AND EQUIPMENT NEEDED

The following may be used:

- Smart board- It's easy for the students to see
- Overhead projector and transparencies- students can see how the rotation works
- Clear write on pockets and markers- It's easier for students to make changes as they try to solve their challenge.

LEARNING STANDARDS

8.G.3.1 Identify the new coordinates of a translation

8.G.3.2 Identify the new coordinates of a reflection

8.G.3.3 Identify the new coordinates of a rotation

8.G.2.6 Students will be able to perform defined transformations. Students will also be able to determine what series of transformations were performed to result in a given transformation.

Standards of mathematical practice:

MP 1. Make sense of a problem and persevere in solving it.

MP 3. Construct viable arguments and critique the reasoning of others.

MP 6. Attend to precision.

CONTENT OBJECTIVES

- Students will be able to determine multiple transformations to map the image of a given polygon to the identified location.

SHIFTS IN RELATION TO THE COMMON CORE STANDARDS

- Previous transformation activities were mostly students performing an identified transformation. This activity shifts to a Deeper Understanding and Application of transformations. The students must be able to analyze and construct a minimum of 2 consecutive transformations to arrive at the resulting image.

ACADEMIC VOCABULARY

- Image
- Pre-image
- Transformation
- Translation
- Reflection
- Rotation

DIFFERENTIATED INSTRUCTION:

This activity lends itself well to students of varying abilities. The introduction and directions may need to be explained to students in different ways.

MATH PROBLEM

Given a pre-image and an image on a coordinate grid perform at least two transformations that will map the pre-image to the image.

SEQUENCE OF LESSON ACTIVITIES

DAY 1

- First review the transformations of translation, reflection and rotation. The review may be done through numerous ways such as a warm up quick write, through student demonstration, etc.
- Discuss the directions and the meaning of what “a minimum of 2 transformations” means.
- Discuss how students will be evaluated: how the task is completed, how well the group explains their solution, how well the group worked together (each group member doing their assigned job) and if the group stayed on task. Each student in the group must understand the solution and be able to answer any question asked about the solution. Even though the reporter presents the solution to the class, each student is given a sheet that tells how they will be graded. Earlier in the year students learn how to work in groups with each person having a role within the group. i.e. Recorder, timekeeper, reporter, etc. Students also do a short evaluation of the other members of the group.
- Members are responsible to be sure everyone understands the Solution and can explain it.
- Have students get in groups, determine group roles and begin work on the task. Determining student groups before class saves time and allows the teacher to encourage a successful outcome.
- Circulate around the room as students are working to be sure they understand the task correctly, they are working together and they are recording their progress

- Summarize the day's proceedings and remind the students that for the next class they will be presenting their results to the class.

DAY 2

- Remind students that they will be presenting their group results to the class.
- Review evaluation criteria:
 - how well they explain their work
 - if the solution meets the criteria and is correct
 - group member involvement in the solution and presentation
 - how well each group member can answer any question posed
- Have students get in their groups and allow about 5 minutes to review their solution and to prepare for their presentation.
- Groups will present their solutions and the solutions will be discussed by the class.

QUESTIONS

- What transformations were performed to solve the task?
- Does the order that the transformations were performed affect the desired outcome?
- If you started with the image and performed at least two transformations to get to the pre-image, how would the result compare to the solution of starting with the pre-image and landing at the image?
- Are there a maximum number of transformations that can result in the solution to the task?

Students having trouble finding an entry point to solving the problem may need some direction such as asking what they know about the transformations, asking them to try one of the transformations and see where it gets them, etc.

ASSESSMENT

- The students will be assessed based on their work in the group, achievement of the task outcome and their presentation to the class.

REFLECTION

- This lesson shifts from students performing given transformations (lower order thinking) to being able to see how transformations effect a polygon and how they move a polygon on a coordinate plane. This is a shift to deeper understanding and being able to apply the concepts of transformation in different circumstances.