

Lesson 1 - Rigid Transformations

Background Information

Standards >

[M1.G.CO.A.5](#)

[M1.G.CO.B.6](#)

Vocabulary >

[Transformation](#)

[Rigid Transformation](#)

[Non-Rigid Transformation](#)

[Translation](#)

[Rotation](#)

[Reflection](#)

[Dilation](#)

[Pre-Image](#)

[Image](#)

[Corresponding Sides](#)

[Corresponding Angles](#)

[Clockwise](#)

[Counterclockwise](#)

[Scale Factor](#)

Dilations

We will not be covering dilations in detail in this lesson. Dilations are a [Non-Rigid Transformation](#) that will be discussed later.

🕒 Objectives >

Learning Objective

Student will draw various shapes in various transformations, such as translations, rotations, dilations, and reflections in a group setting.

Performance Goals: I can...

Describe rigid motions of figures in transformations

Draw a figure before and after a mathematically defined rigid transformation.

☰ Materials and Resources >

Group work

VNPS (Vertical Boards,) cut-out shapes, and a grid marked on each group's vertical board.

Groups will complete transformations via verbal instructions using grid on board and provided shape

Think-Pair-Share: Discover coordinate math dictating transformations

Tracing Paper and Coordinate Plane worksheet

Students will draw a shape on their tracing paper and use that to complete and analyze transformations mathematically

Individual Work: Delta Math

Students will work independently to reinforce knowledge and extend knowledge further

Bellwork and Exit Ticket

3x5 index cards

Students will complete Bellwork and exit ticket on index card and return to teacher at the end of class

Dry erase boards and markers - VNPS

Computer and Projector - Formalization

Accomodations >

Learning Difficulties: >

Developmentally Delayed Students:

- Group students to encourage problem-solving and conversation
- Provide direct support, such as re-asking questions in a different way
- Allow student to provide answers in alternative formats, such as sharing out rather than writing
- Increase teacher-student interaction time with questions to deepen understanding and relate back to previous knowledge.

Disabled Students:

- All work will also be made available in both print and electronic form.
- High contrast and large fonts will be used when available
- Allow student to provide answer in alternative formats, such as sharing out rather than writing
- Allow breaks as needed to accommodate

Inclusion Students:

- Preferential grouping to ensure appropriate collaboration and encouragement
- Allow student to provide answer in alternative formats, such as sharing out rather than writing
- Allow breaks as needed to accommodate
- Provide instructions in an alternative format (verbally, written, etc.)
- Work more closely with groups with inclusion students to help these students feel like they are capable and contributing

Student Interests:

- Artistic students should be given the opportunity to create graphically impressive images. Art drawn on exit tickets should be displayed.
- Sport, musician, and business-minded students can be given an alternative problem with the same numbers to allow contextual application

Cultural Inclusion >

ELL Students**

Translated copies may be given as needed and indicated in an ILP
Incorporation of culturally appropriate contexts, such as using alternative currency instead of dollars
Allow student to provide answer in alternative formats, such as sharing out rather than writing

Differentiated Learning >

Alternative Questioning

Students are given multiple questions, allowing each student to contribute by their own abilities
Enrichment/Extension
Higher level questioning is used to extend understanding past the "what" and into the "why."
More difficult questions are made available to students requiring a greater challenge
Students are given independent work
Remediation
Knowledge is reinforced through recurring questions
Lower level questioning encourages students to persevere
Students are divided into groups and guided by a teacher or student leader

Motivating Students/Anticipatory Set >

Bellwork >

Student is provided a 3x5 notecard for Bellwork and Exit Ticket.

First period is a half block, resulting in a splitting of the lesson.

1. *Three images of the same triangle and one image of a different triangle are drawn on the board.*
 - a. Which triangle doesn't belong?
2. *Three images of the same quadrilateral and one image of a different quadrilateral are drawn on the board.*
 - a. Which quadrilateral does not belong?

Hook >

A short explanation of the subject at hand:

When we move shapes around, as in, just from one place to another, does it actually change the shape?

What ways can we move a shape, and it remain the same shape?

In a moment, you will move with your group to your vertical board. On your board, you have a shape. You will be given ways to move that shape. You will need to move to the new position following the instructions.

Each board will have the same shape, a right triangle, cut out from construction paper and stuck to the board via sticky tack.

Instructional Procedures

Todo >

Beginning >

Bellwork – On Board

Intro to Unit 7 (Hook)

Unit 7 – Lesson 1 – Rigid Transformations: Agenda

Vertical Boards – Provide a shape at each board. Challenge each group to move that shape in a certain way.

Middle >

Formalization – Shapes and transformations on the coordinate plane

Think-Pair-Share: How would moving the shape affect its coordinates?

Independent Work: Delta Math

End >

Lesson Content

Describe Specific Instructions >

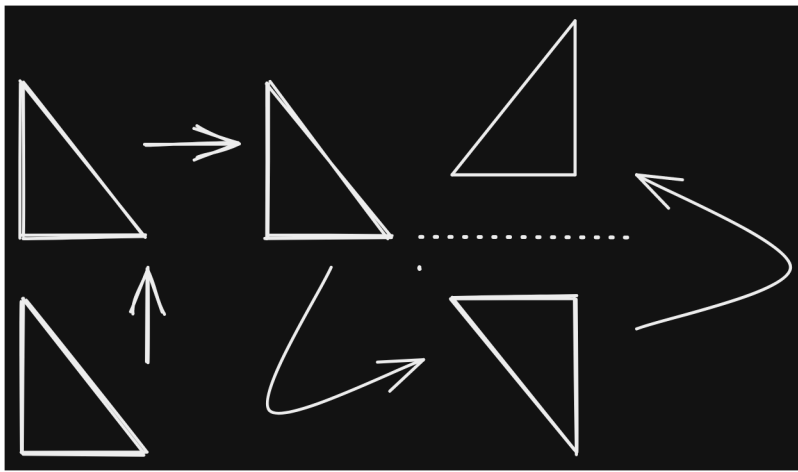
Be specific about your instructions. Make sure the rules are clear and concise:

- 1. Everyone in the group must contribute
- 2. Conversations with other groups should not be taking place
- 3. I will give directions as we go. Please be listening for further instructions

Discovery

- | You have been given a shape on your board
 - | Your job is to move that shape based on my instructions
 - | Pay attention to how each move affects your shape
-

What did we find?



Formalize

What are [Rigid Transformations](#)?

Rigid transformations change the:

- Shape
- Position
- NOT the size

Types of [Rigid Transformations](#):

- Rotations
- Translations
- Reflections

[✎ Extension >](#)

[Non-Rigid Transformations](#) include dilations which result in the same shape but not same size.

Transformations on the coordinate plane

What happens to coordinates when they undergo transformations?

Work at your table with your groups using your tracing paper and the coordinate plane to determine if there are any patterns.

- o Students use coordinate plane and tracing paper to complete transformations and note coordinates.

- o Think Pair Share

- § How does a transformation affect coordinates?

- § How does changing coordinates cause a transformation?

- § Is there a common formula we can use?

- o Have at least one member of each group share out.

Practice and Apply

- Individual Work: Delta Math

- Close with take-a-ways

- o Rigid transformations are the changes in position of a shape.

- o Moving to the right and/or up increases the value of coordinates

- o Moving to the left/down decreases the value of coordinates

End

Assessment

- Assess using exit ticket (Summative)

- o Write the steps to produce the transformation shown: (Drawn on board)

Dismiss

Questioning/Thinking/Problem Solving

🔍 Knowledge

Describe the process and result of a transformation.

② Comprehension

Explain how the transformation affects the shape/image.

② Apply

Show how transformations can be used to solve real world problems.

② Analysis

Compare different transformations.

② Synthesis

Construct an image from a pre-image and transformation instructions.

② Evaluation

Evaluate the differences in coordinates based on the different types of transformations.

Assessment Procedures

✓ Formative >

Bellwork
Presenting Group Work
Think-Pair-Share
Polling the class
Reviewing individual work with each student
Unit test (allows test corrections)

✓ Summative >

Exit Ticket

Follow-up

☰ Enrichment

☰ Reinforcement

☰ Remediation

Grouping

Students are assigned semi-permanent groups (changed regularly) based on the following criteria in this order of priority:

1. Roster order sorted by S1 grade.
2. Personality/behavior

Students have been assigned groups of 2-3 people. If a group is missing 1 or 2 people, it may be combined with another group to create a group of up to 3 people.

Students will be instructed to take the roles of:

- Scribe (writes on the board)
- Crier (describes what is on the board)
- Sage (facilitates the conversation and provides insight)

These roles will rotate regularly during the group work phase, and are also used at student tables to define roles for think-pair-share activities.