Unit 01: Transformations

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **6 weeks**
Status: **Published**

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit…

The purpose of this unit is to extend student knowledge of coordinate graphing and apply transformations to figures on the coordinate plane to increase spatial awareness and build critical thinking skills

Meaning

Essential Questions

Essential Questions

-How do we use transformations on the coordinate grid to understand a figure's movement?

-What algebraic rules help us to apply transformations?

-How can we use the idea of similar figures and dilations to indirectly measure lengths and angles?

Enduring Understanding/Indicators of Understanding

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-Translations, reflections, and rotations are all transformations that result in congruent figures

-All transformations can be represented algebraically

-A dilation of a figure can be created using a scale factor which results in similar figures

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

-Definition of congruent figures

-How to graph points on the coordinate grid

-How to recognize which transformation has taken place on a given set of figures

-How coordinates change based on each type of transformation (translations, rotations, reflections, and dilations)

-Definition of similar figures

-How to use proportional reasoning to identify, create, and calculate unknown measures of similar figures

Skills

Skills

Student will be skilled at …

-Transform figures on the coordinate plane

-Determine whether a given transformation results in congruent figures or similar figures

-Generate the algebraic rule when given the preimage and image

-Describe the transformations that have taken place given a preimage and image

-Establish the scale factor given the preimage and image where a dilation has taken place

Standards Alignment

New Jersey Student Learning Standards

MATH.8.G	Geometry
MATH.8.G.A	Understand congruence and similarity using physical models, transparencies, or geometry

	software
MATH.8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:
MATH.8.G.A.1.a	Lines are transformed to lines, and line segments to line segments of the same length.
MATH.8.G.A.1.b	Angles are transformed to angles of the same measure.
MATH.8.G.A.1.c	Parallel lines are transformed to parallel lines.
MATH.8.G.A.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
MATH.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
MATH.8.G.A.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
MATH.8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

Integration of Career Readiness, Life Literacies and Key Skills

CAEP.9.2.8.B.1	Research careers within the 16 Career Clusters ® and determine attributes of career success.

Technology / Integration of Computer Science and Design Thinking

CS.6-8.8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
CS.6-8.8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section

ELA.L.VL.8.3.A	Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
ELA.L.VL.8.3.B	Analyze the impact of specific word choices on meaning and tone.
ELA.L.VL.8.3.C	Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., precede, recede, secede).
ELA.L.VL.8.3.D	Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.
ELA.L.VL.8.3.E	Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

Unit 1 activities.docx
Unit 1- Cycle 1 = graph gift of yet four quadrant.docx
Unit 1-Cycle 1 Graph-gift of yet.docx
Unit 1-Cycle 1- Discover Jar STEaM.docx
Unit 3 - reflection activity.docx
Unit 1-PARCC.docx

Formative Assessment Strategies

Formative Assessment Strategies

- ixl.com scores
- tenmarks.com scores
- teacher center observation
- STEM projects

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Transformations: Approximately 5 Cycles

Cycle 1: Topics Covered

- Coordinate graphing
- Congruent figures

- Activities/Centers
    - IXL.com centers
        - P.1 Coordinate plane review
        - P.2 Quadrants and axes
    - Tenmarks centers
        - 8.G.1b Recognize Transformations with Angles
        - 8.G.2 Understanding Congruence Using Transformations
        - 8.G.5 Classifying Congruent Triangles
    - Hands-On/Creative Centers
        - Graph the message “Gift of Yet”*
    - Online games
        - Graph the points http://www.mathplayground.com/locate_aliens.html
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 36—page 143-144
        - Bellringers: Week 36—page 141-142
        - Teacher created problems on white boards: Graphing points
- STEM activity:
    - Create a discovery jar. Have students brainstorm all of the questions or ideas he/she is curious about related to science, technology, engineering, art, or math . Maybe it is why grass is green or how space travel started. Or how many varieties of leaves exist on the trees in the yard. Then put all of the questions into a mason jar. Each group chooses out of the jar at a center and will research and explore the topic. (This activity can be repeated throughout the year and questions can be added as well).*

Cycle 2: Topics Covered

- Translations

- Activities/Centers
    - IXL.com centers
        - Q.2 Translations: graph the image
        - Q.3 Translations: find the coordinates
    - Tenmarks centers

        - 8.G.3 Effects of Translation
    - Hands-On/Creative Centers
        - http://www.uen.org/mathshorts/downloads/translation_classroom_activity.pdf
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 36—page 139-140
        - Bellringers: Week 36—page 137-138
        - Teacher created problems on white boards: Given a point name the new point after a translation

Cycle 3: Topics Covered

- Reflections: x-axis and y-axis

- Activities/Centers
    - IXL.com centers
        - Q.4 Reflections: graph the image
        - Q.5 Reflections: find the coordinates
    - Tenmarks centers
        - 8.G.3 Effects of Reflection
    - Hands-On/Creative Centers
        - Create your name in bubble letters and record the points. Then, reflect over the x-axis and record the new points.*
    - Online games
        - https://www.khanacademy.org/math/basic-geo/transformations-congruence-similarity-geo/transformations-basics/e/performing-reflections-on-the-coordinate-plane
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 35—page 135-136
        - Bellringers: Week 35—page 133-134
        - Teacher created problems on white boards: Given a point give the new point after a given reflection.

Stem: Reflection lesson https://illuminations.nctm.org/Lesson.aspx?id=3704

Cycle 4: Topics Covered

- Rotations: 90, 180, and 270 degrees

- Activities/Centers
    - IXL.com centers
        - Q.6 Rotations: graph the image
        - Q.7 Rotations: find the coordinates
    - Tenmarks centers
        - 8.G.3 Effects of Rotation
    - Hands-On/Creative Centers
        - http://www.stemcollaborative.org/standards.html a variety of hands-on dilation/scale factor

activities
    - Online games
        - http://www.mathplayground.com/ShapeMods/ShapeMods.html
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 35—page 131-132
        - Bellringers: Week 35—page 129-130
        - Teacher created problems on white boards: Teacher created problems on white boards: Given a point give the new point after a given rotation.
- STEM activity: Rotation activity: http://www.mathgiraffe.com/blog/plastic-plate-activities-for-math-class

All transformations (minus dilations) http://web.csulb.edu/~lhenriqu/TransformationsAndIllusions.pdf

Cycle 5: Topics Covered

- Dilations
- Similar figures
- Scale factor

- Activities/Centers
    - IXL.com centers
        - Q.8 Dilations: graph the image
        - Q.9 Dilations: find the coordinates
        - Q.10 Dilations: scale factor and classification
    - Tenmarks centers
        - 8.G.1a Recognize Transformations
        - 8.G.1c Recognize Transformations with Parallel Lines
        - 8.G.3 Effects of All Types of Transformations
        - 8.G.3 Effects of Reflection
        - 8.G.4 Understanding Similarity
        - 8.G.5 Classifying Triangles as Congruent or Similar
    - Hands-On/Creative Centers
        - Scale model ramp activity https://www.hand2mind.com/pdf/hos/78871_HOSC_7_Less1_RPRx.pdf
    - Online games
        - https://www.mangahigh.com/en-us/games/transtar
        - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 34—page 127-128
        - Bellringers: Week 34—page 125-126
        - Teacher created problems on white boards: Teacher created problems on white boards: Given a point give the new point after a given scale factor.
        - PARCC practice*
- STEM activity: http://www.cpalms.org/Public/PreviewResourceLesson/Preview/137808

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Glfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a

child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.