Complete Unit 1 Package
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**Unit 1 Geometric Transformations**

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<th>Week 2 – Rotations, Reflections, and Translations</th>
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**CCSS.MATH.CONTENT.HSG.CO.A.2**
Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

**CCSS.MATH.CONTENT.HSG.CO.A.3**
Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

**CCSS.MATH.CONTENT.HSG.CO.A.4**
Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

I can define what a transformation is and state a few common transformations. I can briefly say what these transformations are. I can describe transformation as functions having inputs and outputs. I can compare transformations that preserve distance and angle with those that do not.
| Unit 1 Geometric Transformations | Week 2 – Rotations, Reflections, and Translations | 9 | CCSS.MATH.CONTENT.HSG.CO.A.5
Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. | Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. | I can draw the transformed figure (using graph paper, tracing paper, or geometry software) under rotation, reflection, or translation given the object (original) figure I can specify a sequence of transformations that will carry a given figure onto another. |
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<td>Unit 1 Geometric Transformations</td>
<td>Week 2 – Rotations, Reflections, and Translations</td>
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<td>Assessment</td>
<td>Assessment</td>
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</table>
| Unit 1 Geometric Transformations | Week 3 – Congruence | 11 | CCSS.MATH.CONTENT.HSG.CO.B.6
Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. | Use geometric descriptions of rigid motions to transform figures (2d-figures) | I can use geometric descriptions of rigid motions to transform figures (2d-figures) |
| Unit 1 Geometric Transformations | Week 3 – Congruence | 12 | CCSS.MATH.CONTENT.HSG.CO.B.6
Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. | Given two figures, the image and the object, identify the transformation(s) involved. | I can identify the transformation(s) involved from one figure to another (image to an object) |
<table>
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<tr>
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<th>Week 3 – Congruence</th>
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<th>CCSS.MATH.CONTENT.HSG.CO.B.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</th>
<th>Use geometric descriptions of rigid motion to predict the effect of a given rigid motion on a given figure</th>
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<td>Week 3 – Congruence</td>
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<td>CCSS.MATH.CONTENT.HSG.CO.B.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</td>
<td>Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</td>
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<td>Unit 1 Geometric Transformations</td>
<td>Week 3 – Congruence</td>
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<td>HSG.CO.A.1</td>
<td>Definition of angles and lines</td>
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<td>HSG.CO.A.2</td>
<td>Representing transformations in the plane</td>
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<td>HSG.CO.A.3</td>
<td>Describing the rotations and reflections that carry it onto itself.</td>
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<td>HSG.CO.A.4</td>
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<td>HSG.CO.A.5</td>
<td>Drawing the transformed figure</td>
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<td>HSG.CO.B.6</td>
<td>Transforming figures and predicting the effect of a given rigid motion on a given figure</td>
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<td>7</td>
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<td>HSG.CO.B.6</td>
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<td>Unit: Unit 1</td>
<td>Course: Geometry</td>
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<td>Geometric Transformations</td>
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<th>Common Core State Standard:</th>
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<td>CCSS.MATH.CONTENT.HSG.CO.A.1</td>
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<tr>
<td>Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, the distance along a line, and distance around a circular arc.</td>
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<td>Reason abstractly and quantitatively.</td>
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<th>Objective:</th>
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<tr>
<td>Know precise definitions of angle, based on the undefined notions of point, line, the distance along a line, and distance around a circular arc. Give types the basic types of angles that are not described using any form algebra.</td>
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<table>
<thead>
<tr>
<th>I can statement:</th>
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<tr>
<td>I can define an angle</td>
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<tr>
<td>I can identify situations or cases where angles appear in day to day life</td>
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<th>Procedures:</th>
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<tr>
<td>1. Students will complete the bellringer.</td>
</tr>
<tr>
<td>2. Students will work in groups of at least 3 to 5, on the activity, based on the availability wall clock. They will use the clock wall to identify and give the measures of angles</td>
</tr>
<tr>
<td>3. The presentation will be used to look for misconceptions and encourage discussion.</td>
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<tr>
<td>4. Students will complete the exit slip before leaving for the day.</td>
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<td>Day 1 Presentation</td>
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<td>Day 1 Exit Slip</td>
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<td>Course: Geometry</td>
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<td>CCSS.MATH.CONTENT.HSG.CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, the distance along a line, and distance around a circular arc.</td>
<td>CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.</td>
</tr>
<tr>
<td>Objective:</td>
<td>I can statement:</td>
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<tr>
<td>Know precise definitions of circle and line segment based on the undefined notions of point, line, the distance along a line, and distance around a circular arc. Parts of circles; types of circles when in groups.</td>
<td>I can define and identify line segment I can define and identify a circle I can identify lines and segments found in a circle I can identify situations or cases where circles are applied in real life situation</td>
</tr>
<tr>
<td>Procedures:</td>
<td>Materials:</td>
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<tr>
<td>1. Students will complete the bellringer. 2. Students will work in groups of at least 2. They will fold a circular paper (example, a filter paper) to help them locate the center and identify other parts of a circle 3. The presentation will be used to look for misconceptions and encourage discussion.</td>
<td>Bellringer 2 Day 2 Activities Day 2 Practice Day 2 Presentation Day 2 Exit Slip</td>
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4. Students will complete the exit slip before leaving for the day.

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<th>Accommodations/Special Circumstances:</th>
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<th>Reflection:</th>
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## Unit 1 Lesson Plan

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<th>Course: Geometry</th>
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<td><strong>Topic:</strong> Week 1 – Definitions</td>
<td><strong>Day:</strong> 3</td>
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<td><strong>Mathematical Practice:</strong></td>
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<td>CCSS.MATH.CONTENT.HSG.CO.A.1</td>
<td>CCSS.MATH.PRACTICE.MP2</td>
</tr>
<tr>
<td>Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, the distance along a line, and distance around a circular arc.</td>
<td>Reason abstractly and quantitatively.</td>
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<tr>
<td><strong>Objective:</strong></td>
<td><strong>I can statement:</strong></td>
</tr>
<tr>
<td>Know precise definitions of perpendicular line based on the undefined notions of point, line, distance along a line, and distance around a circular arc.</td>
<td>I can define and identify perpendicular line. I can be able to identify a case where perpendicular lines have been used in a classroom.</td>
</tr>
<tr>
<td><strong>Procedures:</strong></td>
<td><strong>Materials:</strong></td>
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<tr>
<td>1. Students will complete the bellringer.</td>
<td>Bellringer 3</td>
</tr>
<tr>
<td>2. Students will work in groups of at least 2. They will use the idea of paper folding to identify the geometric features created.</td>
<td>Day 3 Activities</td>
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<tr>
<td>3. The presentation will be used to look for misconceptions and encourage discussion.</td>
<td>Day 3 Practice</td>
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<tr>
<td>4. Students will complete the exit slip before leaving for the day.</td>
<td>Day 3 Presentation</td>
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<td>Day 3 Exit Slip</td>
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<td>Accommodations/Special Circumstances:</td>
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<th>Extra/Additional Resources:</th>
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</table>
**Unit: Unit 1**  
Geometric Transformations  

| Course: Geometry |

**Topic: Week 1 – Definitions**  

| Day: 4 |

**Common Core State Standard:**  

| CCSS.MATH.CONTENT.HSG.CO.A.1  
Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, the distance along a line, and distance around a circular arc. |

**Mathematical Practice:**  

| CCSS.MATH.PRACTICE.MP2  
Reason abstractly and quantitatively. |

**Objective:**  

| Know precise definitions of parallel lines based on the undefined notions of point, line, the distance along a line, and distance around a circular arc. |

**I can statement:**  

| I can define and identify parallel lines  
I can be able to identify a case where parallel lines have been used in a classroom |

**Procedures:**  

|  
1. Students will complete the bellringer.  
2. Students will work in groups of at least 5. The activity is about marking the extent of a rectangular or parallelogram based flower bed on the ground.  
3. The presentation will be used to look for misconceptions and encourage discussion.  
4. Students will complete the exit slip before leaving for the day. |

**Materials:**  

| Bellringer 4  
Day 4 Activities  
Day 4 Practice  
Day 4 Presentation  
Day 4 Exit Slip |
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<tr>
<th>Accommodations/Special Circumstances:</th>
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<td><strong>Unit</strong>: Unit 1</td>
<td><strong>Course</strong>: Geometry</td>
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<tr>
<td>Geometric Transformations</td>
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<tr>
<td><strong>Topic</strong>: Week 1 – Definitions</td>
<td><strong>Day</strong>: 5</td>
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<td><strong>Common Core State Standard</strong>:</td>
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<td><strong>Objective</strong>:</td>
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<td><strong>Materials</strong>:</td>
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<tr>
<td><strong>Reflection</strong>:</td>
<td><strong>Extra/Additional Resources</strong>:</td>
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| Unit: Unit 1  
| Geometric Transformations | Course: Geometry |
| Topic: Week 2 – Rotations, Reflections, and Translations | Day: 6 |
| Common Core State Standard: | Mathematical Practice: |
| CCSS.MATH.CONTENT.HSG.CO.A.2  
Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). | CCSS.MATH.PRACTICE.MP2  
Reason abstractly and quantitatively. |
<p>| Objective: | I can statement: |
| Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Give short and precise definitions of transformations (translation, reflection, rotation, dilation). Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). | I can define what a transformation is and state a few common transformations. I can briefly say what these transformations are I can describe transformation as functions having inputs and outputs I can compare transformations that preserve distance and angle with those that do not |</p>
<table>
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<tr>
<th>Procedures:</th>
<th>Materials:</th>
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<tbody>
<tr>
<td>1. Students will complete the bellringer.</td>
<td>Bellringer 6</td>
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<tr>
<td>2. Students will work in groups of at least 5. We demonstrate the features of translation and rotation using a wooden block and one student respectively.</td>
<td>Day 6 Activities</td>
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<tr>
<td>3. The presentation will be used to look for misconceptions and encourage discussion.</td>
<td>Day 6 Practice</td>
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<tr>
<td>4. Students will complete the exit slip before leaving for the day.</td>
<td>Day 6 Presentation</td>
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<td>Day 6 Exit Slip</td>
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<td>CCSS.MATH.PRACTICE.MP4</td>
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<tr>
<td>Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.</td>
<td>Model with mathematics.</td>
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<td>Objective:</td>
<td>I can statement:</td>
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<tr>
<td>Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.</td>
<td>I can describe the rotations and reflections that carry a rectangle, parallelogram, trapezoid, or regular polygon into itself</td>
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<td>1. Students will complete the bellringer.</td>
<td>Bellringer 7</td>
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<tr>
<td>2. Students will work in groups of at least 3.</td>
<td>Day 7 Activities</td>
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<tr>
<td>Students are going to rotate a rectangle about its center and discover how many times it fits into the original rectangle in one turn</td>
<td>Day 7 Practice</td>
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<tr>
<td>3. The presentation will be used to look for misconceptions and encourage discussion.</td>
<td>Day 7 Presentation</td>
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<tr>
<td>4. Students will complete the exit slip before leaving for the day.</td>
<td>Day 7 Exit Slip</td>
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<td>Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.</td>
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<tr>
<td>Look for and make use of the structure.</td>
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<td><strong>Objective:</strong></td>
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<td>Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.</td>
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<tr>
<td><strong>I can statement:</strong></td>
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<tr>
<td>I can develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.</td>
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<td>2. Students will work in groups of at least 4. We determine the type path made by a rotating object using the rotating chalk or marker pen.</td>
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<td>3. The presentation will be used to look for misconceptions and encourage discussion.</td>
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<td>Bellringer 8</td>
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<td>Day 8 Activities</td>
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<td>Day 8 Practice</td>
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<td>Day 8 Presentation</td>
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<td>Day: 9</td>
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| CCSS.MATH.CONTENT.HSG.CO.A.5  
Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. | CCSS.MATH.PRACTICE.MP1  
Make sense of problems and persevere in solving them. |
| Objective: | I can statement: |
| Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. | I can draw the transformed figure (using graph paper, tracing paper, or geometry software) under rotation, reflection, or translation given the object (original) figure  
I can specify a sequence of transformations that will carry a given figure onto another. |
| Procedures: | Materials: |
| 1. Students will complete the bellringer.  
2. Students will work in groups of at least 4. We will carry out translations and rotation to locate | Bellringer 9  
Day 9 Activities  
Day 9 Practice  
Day 9 Presentation  
Day 9 Exit Slip |
the images of the plastic block under the transformations.
3. The presentation will be used to look for misconceptions and encourage discussion.
4. Students will complete the exit slip before leaving for the day.

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<td>Topic: Week 3 – Congruence</td>
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<td>CCSS.MATH.CONTENT.HSG.CO.B.6</td>
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<td>Use geometric descriptions of</td>
<td>Model with mathematics.</td>
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<td>rigid motions to transform</td>
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<td>figures and to predict the</td>
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<td>effect of a given rigid motion</td>
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<td>on a given figure; given two</td>
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<td>figures, use the definition of</td>
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<td>congruence in terms of rigid</td>
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<td>motions to decide if they are</td>
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<td>congruent.</td>
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<td>Objective:</td>
<td>I can statement:</td>
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<tr>
<td>Use geometric descriptions of</td>
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<td>rigid motions to transform</td>
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<td>figures (2d-figures)</td>
<td>I can use geometric descriptions of</td>
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<td>rigid motions to transform figures</td>
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<td>(2d-figures)</td>
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<tr>
<td>1. Students will complete the</td>
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<tr>
<td>bellringer.</td>
<td>Bellringer 11</td>
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<tr>
<td>2. Students will work in groups</td>
<td>Day 11 Activities</td>
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<td>of at least 2. Students will</td>
<td>Day 11 Practice</td>
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<td>discover the basic properties</td>
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<td>of a rigid motion in a plane</td>
<td>Day 11 Exit Slip</td>
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<td>using a translation</td>
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<td>3. The presentation will be</td>
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<td>used to look for misconceptions</td>
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<td>and encourage discussion.</td>
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<td>4. Students will complete the</td>
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<td>exit slip before leaving for</td>
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<td>the day.</td>
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### Unit: Unit 1  
Geometric Transformations

| Course: Geometry |

| Topic: Week 3 – Congruence |

| Day: 12 |

| Common Core State Standard: |

| CCSS.MATH.CONTENT.HSG.CO.B.6 |

Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

| Mathematical Practice: |

| CCSS.MATH.PRACTICE.MP8 |

Look for and express regularity in repeated reasoning.

| Objective: |

| I can statement: |

Given two figures, the image and the object, identify the transformation(s) involved.

I can identify the transformation(s) involved from one figure to another (image to an object)

| Procedures: |

1. Students will complete the bellringer.
2. Students will work in groups of at least 3. They will use molded rectangles to identify rigid transformations.
3. The presentation will be used to look for misconceptions and encourage discussion.
4. Students will complete the exit slip before leaving for the day.

| Materials: |

Bellringer 12  
Day 12 Activities  
Day 12 Practice  
Day 12 Presentation  
Day 12 Exit Slip
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<td>Topic: Week 3 – Congruence</td>
<td>Day: 13</td>
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<td>CCSS.MATH.CONTENT.HSG.CO.B.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</td>
<td>CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.</td>
</tr>
<tr>
<td>Objective:</td>
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<tr>
<td>Use geometric descriptions of rigid motion to predict the effect of a given rigid motion on a given figure</td>
<td>I can use geometric descriptions of rigid motion to predict the effect of a given rigid motion on a given figure</td>
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<tr>
<td>Procedures:</td>
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<tr>
<td>1. Students will complete the bellringer.</td>
<td>Bellringer 13</td>
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<tr>
<td>2. Students will work in groups of at least 2. students will discover the effects of rigid motion on a plane figure using a glide reflection.</td>
<td>Day 13 Activities</td>
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<td>3. The presentation will be used to look for misconceptions and encourage discussion.</td>
<td>Day 13 Practice</td>
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| CCSS.MATH.CONTENT.HSG.CO.B.6  
Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. | CCSS.MATH.PRACTICE.MP1  
Make sense of problems and persevere in solving them. |
| **Objective:** | **I can statement:** |
| Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. | Given two figures, I can use the definition of congruence in terms of rigid motions to decide if they are congruent. |
| **Procedures:** | **Materials:** |
| 1. Students will complete the bellringer.  
2. Students will work in groups of at least 3. We are required to cut a plain paper into two squares then cut each square into different shapes and identify the rigid motion exhibited.  
3. The presentation will be used to look for misconceptions and encourage discussion.  
4. Students will complete the exit slip before leaving for the day. | Bellringer 14  
Day 14 Activities  
Day 14 Practice  
Day 14 Presentation  
Day 14 Exit Slip |
## Unit 1 Lesson Plan

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1. Measure the following angles using a protractor and give their approximated values to the nearest 1 degree.

(a) 

(b)
2. Measure the following angles and determine whether they lie between $0^\circ - 90^\circ$, $90^\circ - 180^\circ$ or between $180^\circ - 360^\circ$

(a) 

(b) 

(c)
Answer Key

Day 1
1. 
   (a) 157°
   (b) 48°

2. 
   (a) 180° − 360°
   (b) 90° − 180°
   (c) 0° − 90°
1. What angle has the minute hand swept through after an hour?

2. What angle has the minute hand swept through after half an hour?

3. What time is it when the angle between the hour arm and minute arm is exactly 90° when the minute arm is pointing at 12?

4. At what time does the hour arm and minute arm form a straight line when the minute arm is pointing at 12?

5. At what time does both arms point in exactly the same direction when the minute arm is pointing at 12?

6. What angle has the minute hand swept through after five minutes?

7. Calculate the angle between the hour arm and the minute arm at 1.25 o’clock.
In this activity, you will need to have an analog wall clock before the lesson. As long as the students know that a whole turn is 360°, then they will be able to identify angles using the clock face with ease. The wall clock should be big and bright enough for students to see clearly. Emphasize on using only the hour hand and minute hand. You should adjust the arms to show different times and angles where deemed necessary.

**Answer Keys**

**Day 1:**

1. 360°
2. 180°
3. 9 o’clock and 3 o’clock
4. 6 o’clock
5. 12 o’clock
6. 30°
7. 107.5°
Study the figure below and use it to answer questions 1 - 4

1. Name all the points.

2. Name five rays in the figure above.

3. Name any five angles.

4. Identify any two lines.

The figure below shows a combination of points, rays, and lines. Study it and use it to answer questions 5 - 9.

5. How many lines are there?
6. Name the ray that contains the point L.

7. Name all the rays that lie on \( \overrightarrow{KQ} \).

8. Name the endpoint of \( \overrightarrow{QP} \)

9. Name all the points that lie on \( \overrightarrow{KQ} \)

Identify the vertex and name the rays that form the angles in questions 10 and 11.

10.

11.
Classify the following angles as either acute, right, straight, obtuse or reflex. 12 -13.

12.

13.

Identify the type of angle formed as either acute, right, straight, obtuse or reflex between the hands of a clock at the following time. 14 – 15.

14. 9 o’clock

15. 8 o’clock

In the figure below, identify each type of an angle as either acute, right, straight, obtuse or reflex from questions 16 –17

16. $\angle AOE$
17. \( \angle AOC \)

18. In the pentagon below, identify the type of angle formed at the vertex \( Y \).

Determine if the following angles are acute, obtuse, straight or reflex in 19 and 20.

19. 277°

20. 111°
**Answer Keys**

**Day 1:**

1. Points A, B, C, D, E and F

2. \( \overline{FB}, \overline{BA}, \overline{AC}, \overline{CA} \) and \( \overline{BC} \)

3. \( \angle ABD, \angle ABF, \angle ABC, \angle ABE, \angle DBF, \angle DBC, \angle CBE, \angle FBC, \angle FBE \) and \( \angle CBD \)

4. \( \overline{AC} \) and \( \overline{DE} \)

5. 1

6. \( \overline{KL} \)

7. K, N and Q

8. Q

9. K, N and Q

10. Vertex: S

    Rays: \( \overline{ST} \) and \( \overline{SU} \)

11. Vertex: P

    Rays: \( \overline{PQ} \) and \( \overline{PR} \)

12. Straight angle

13. Reflex angle

14. Right angle

15. Obtuse angle

16. Acute angle

17. Obtuse angle

18. Obtuse angle

19. Reflex angle

20. Obtuse angle
Draw and label the following using the notation of a point, a line, and a ray.

(a) \( \overline{PQ} \)

(b) \( \overline{KL} \)
Answer Keys

Day 1:

(a).

(b).

K

L
Study the figure below and answer the following questions.

1. Name all the points on $\overline{GC}$

2. Is HF a ray? If yes, give its endpoint.

3. Identify any three rays on line y.

4. What is the difference between $\overline{AD}$ and $\overline{HF}$?

5. Identify the ray that contains point B.
Day 2 Bellringer

Name___________________________

Answer Keys

Day 2

1. C, H, and G

2. Yes, H

3. \(\overline{HA}, \overline{HD}, \overline{AD}, \overline{DA}\)

4. \(\overrightarrow{HF}\) has an end point and extends in one direction.

\(\overrightarrow{AD}\) has no endpoint and extends in both directions.

5. \(\overline{BH}\)
1. What is the shape of the filter paper you have?

2. Fold the paper at the center into half.

3. Fold the paper again into half again as shown below.

4. Open up the paper. What is formed along the folds?

5. Put a mark at the position where the folds meet and label this as point O. What do you say about the position of point O in relation to the circle?
6. Draw a line along the folds using a ruler making sure the lines are drawn exactly along the folds. The lines should cross each other at point O.

7. How many angles are formed at the point O after drawing the lines?

8. Which type of angles are these?

9. Measure the length of one of the lines from one edge of the circle to the other in inches.

10. Then measure the length from the point O to the edge of the circle. What do you notice about the two lengths?
In this activity, you are required to help students appreciate a circle and identify its basic properties using white circular filter papers. Each student is required to have a filter paper (or any circular paper), a pencil and a ruler. The filter paper will be folded as shown below.

**Answer Keys**

**Day 2:**

1. Circular, round shape

2 – 3. No response

4. Two lines or creases crossing each other

5. The point is at the center of the circle

6. No response

7. Four

8. Right angles

9. No response

10. The length of the line from one edge of the circle to the other is twice the length from point O to the edge.
1. Find the diameter of a circular wash area whose radius is 14.4 ft.

From the circle below, identify the following parts:

2. Diameter

3. Chord

4. Tangent

5. Secant

6. Two line segments
Identify what each of the following parts of the accompanying circle represents.

7. $\overline{GH}$

8. $\overline{AB}$

9. $\overline{EF}$

10. $\overline{OD}$

11. $\overline{OC}$

12. $\overline{CD}$
Give the name of parts of a circle indicated by letters in the figure below.

13. P

14. Q

15. R

16. Draw and label $\overline{ST}$.

17. The diameter of the top of a circular table is 5 ft. What is the radius of the table?
Use the figure below to answer question 18-20.

18. Identify two line segments.

19. Identify a line which is a secant.

20. Which two line segments are radii of the circle?
Answer Keys

Day 2:

1. 28.8 ft.
2. $TU$
3. RS
4. PQ
5. VW
6. RS and TU
7. Tangent
8. Chord
9. Secant
10. Radius
11. Radius
12. Diameter
13. Minor segment
14. Major segment
15. Sector
16.

17. 2.5 ft.
18. $RS$, $OP$, $OQ$, $WX$, $QX$, $QW$ and $TU$
19. $RS$
20. $OQ$ and $OP$
Identify the parts of the circle represented by lines and line segments in the circle below.

(a) $\overrightarrow{VW}$

(b) $\overline{PR}$

(c) $\overrightarrow{ST}$

d) $\overline{OQ}$

(e) $\overline{MN}$

(f) $\overline{OR}$
Answer Keys

Day 2:
(a) Secant
(b) Diameter
(c) Tangent
(d) Radius
(e) Chord
(f) Radius
Identify the parts of the circle represented by lines and line segments in the circle below.

(a) $VW$

(b) $PR$

(c) $ST$

(d) $OQ$

(e) $MN$

(f) $OR$
Answer Keys

Day 2:
(a) Secant
(b) Diameter
(c) Tangent
(d) Radius
(e) Chord
(f) Radius
1. The figure below shows an angle, study it and answer the questions that follow.

(a) Name the angle represented above in three different ways.

(b) What type of angle is in (a) above?

(c) List all the points on $\overline{LM}$
2. Use the accompanying diagram to answer the following questions.

(a) Identify all angles.

(b) Name all rays.

(c) Identify the common vertex?
Answer Key

Day 3:

1. (a) \( \angle KLM \) or \( \angle MLK \); \( \angle L \); \( \angle \alpha \)
   
   (b) Right angle

   (c) L and M

2. (a) \( \angle PQR, \angle PQS, \angle SQR \)

   (b) \( \overline{QP}, \overline{QS}, \overline{QR} \)

   (c) Vertex Q
1. Fold the paper once and open it up.

2. What do you see at the fold after opening the paper?

3. Refold the paper on the same fold, then carefully fold the paper a second time along the first fold as shown above.

4. Open up the paper and count the number of angles formed at the intersection of the folds.

5. Label the angles formed at the intersection point as $a, b, c$ and $d$ then measure the size of each angle using a protractor.

6. What do you notice after measuring the angles?
In this activity, you will be required to help students form perpendicular lines using plain papers. Each student will require one plain paper and a protractor. The students will fold the guide below.

**Answer Keys**

**Day 3:**

1. Each student will fold the paper. Differently, most will fold it at the center.

2. The fold forms a line.

3. The second fold should be aligned exactly on the first fold.

4. Four angles are formed.

5. Measures are done.

6. The angles are all equal to 90°.
State whether the pairs of angles in question 1-5 are perpendicular or not.

1.

2.

3.
4. From each of the following geometric figures identify pairs of perpendicular line segments.

5. From each of the following geometric figures identify pairs of perpendicular line segments.

6.
7.

[Diagram of a square with vertices labeled N, O, P, M]

8.


9.

[Diagram of an equilateral triangle with vertices labeled Q, R, P]
10.

Study the accompanying figure and use it to answer 11-12

11. How many pairs of perpendicular line segments are in the figure?

12. Name all the pairs of perpendicular line segments.
Use the figure below to answer question 13 and 14.

13. How many pairs of perpendicular line are seen?

14. Identify the pairs of perpendicular lines seen

Use the line setup to answer questions 15 and 16

15. Identify pairs of perpendicular lines from the set up.
16. Identify pairs of lines that are not perpendicular.

Identify whether or not the pairs of lines will form perpendicular lines when they intersect in the given directions given that they are either vertical or horizontal lines except in 20.

17. 

18. 

19. 
20.
Answer Keys

Day 3:

1. Not perpendicular

2. Not perpendicular

3. Perpendicular

4. Perpendicular

5. Not perpendicular

6. $\overline{KL} \perp \overline{LM}$

7. $\overline{MN} \perp \overline{NO}$
   $\overline{MN} \perp \overline{MP}$
   $\overline{NO} \perp \overline{OP}$
   $\overline{OP} \perp \overline{PM}$

8. $\overline{JK} \perp \overline{JU}$
   $\overline{JK} \perp \overline{KL}$
   $\overline{LM} \perp \overline{MN}$
   $\overline{KL} \perp \overline{LM}$
   $\overline{MN} \perp \overline{NO}$
   $\overline{NO} \perp \overline{OP}$
   $\overline{OP} \perp \overline{QR}$
   $\overline{QR} \perp \overline{RS}$

9. No pairs of perpendicular line segments.

10. $\overline{JO}$ and $\overline{OM}$

11. Four pairs

12. $\overline{DE}$ and $\overline{EF}$
   $\overline{EF}$ and $\overline{FG}$
   $\overline{IJ}$ and $\overline{JD}$
   $\overline{JD}$ and $\overline{DE}$

13. Two pairs

14. $\overline{WX} \perp \overline{WV}$, $\overline{WX} \perp \overline{XY}$

15. Line $y$ is not perpendicular to line $w$

16. They will form perpendicular lines

17. They will form perpendicular lines

18. They will not form perpendicular lines

19. They will not form perpendicular lines

20. They will not form perpendicular lines
Identify rays and line segments that are perpendicular to each other in the figure below.
Answer Keys

Day 3:

\[ \overrightarrow{PQ} \text{ and } \overrightarrow{QS} \]
\[ \overrightarrow{QR} \text{ and } \overrightarrow{RS} \]
\[ \overrightarrow{RS} \text{ and } \overrightarrow{PS} \]
1. Identify perpendicular line in the following diagrams

A

B

C

D

E

G

2. Identify one type of line segments in a circle which can be drawn in such a way that they do not meet when extended in both directions.

3. If you extend each of the following lines, which set of line will intersect?

H

K

L

M

N

P
4. Can we have a situation where the radii of a circle don’t meet? If yes, illustrate using the diagram. If no, explain why not?

5. Which of the following is true. Identify all that applies.
   A. A Circle can have more than one diameter
   B. The tangent is a line that intersects a circle once
   C. For every secant, we must be able to identify a chord with it.
   D. A radius and a diameter of a circle can have more than one common point
Answer Key

Day 4

1. A, C, and D
2. Chord
3. L, M, and P
4. No, because by definition of radius, radii must begin from the center of the circle, hence, the latter is the point of intersection.
5. A, C, and D
Day 4 Bellringer

1. Identify the place to mark the flower bed.

2. Let two students at least 6.5 yards apart hold the rope tight close to the ground.

3. Draw a straight line on the ground as guided by the tightrope.

4. Position the pegs along the line at a distance of 6 yards from each other.

5. Tie two pegs at the ends of the meter rule or the 3-yard stick.

6. Let one peg (on the meter rule/3-yard stick) be on the line drawn as shown below.

6. Move the direction shown as you let the other peg create a new line. Stop when you get to the 6.5-yard peg.
7. Identify the beginning and the end of the peg that was making the newline and fix a peg at each of the identified points.

8. Connect the pegs to the others by lines to form either a rectangle or a parallelogram.

9. Identify any two pairs of parallel lines on the diagram made (the map of the floor bed).

10. Estimate the length of the shortest distance between the longest parallel lines.
In this activity, we will mark a rectangular or parallelogram based flower bed on the ground. It is recommended to have at least 4 students in each group to carry out this activity. We need a 3-yard stick or one-meter rule, six relatively sharp wooden pegs and a that is at least 7 yards.

**Answer Keys**

**Day 1:**
1 – 7; students procedures to be monitored
8. Either a rectangle or a parallelogram
9. They should be opposite sides
10. It should be the length of the perpendicular line to the longest parallel lines
Use the following diagram to answer questions 1 – 6.

1. Identify a pair of parallel lines.

2. Identify a pair of parallel lines apart from the ones above.

3. Identify a pair of parallel lines apart from the ones above.

4. Identify a pair of parallel lines apart from the ones above.

5. Identify a set of 3 lines that are parallel to each other.

6. Identify a line that is not parallel to any line.
Use the following diagram to answer questions 7 – 9. Identify a set of lines composed of parallel lines only.

7. [Diagram of lines]

8. [Diagram of lines]

9. [Diagram of lines]

10. [Diagram of lines]

11. [Diagram of lines]
12.

13.

14.

15.

16.
Use the diagram below to answer questions 17 - 20

17. Identify a pair of lines that are parallel.

18. Identify a pair of lines that are parallel apart from the ones above.

19. Identify a pair of lines that are parallel apart from the ones above.

20. Identify all lines that are not parallel to any of the lines above.
**Answer Keys**

**Day 4:**

1 – 4: Any of these; L2 and L5, L6 and L7, L9 and L13, L10 and L11
5. L1, L3, and L4
6. L8
7. P
8. C
9. E
10. L
11. V
12. (iii).
13. (iv).
14. (ii).
15. (ii).
16. (iii).
17 -19: Any of these; L1 and L4, L15 and L9, L12 and L14
Identify a pair of parallel lines (if any) in the following diagram.
Answer Keys

Day 4:

$L_5$ and $L_7$
High School Math Teachers
Geometry
Weekly Assessment Package
Week 1

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Week 1
Weekly Assessments
1. Identify the line segments in the circle below.

   ![Circle Diagram]

   a. $\overline{DC}$
   b. $\overline{AB}$
   c. $\overline{AG}$
   d. $\overline{EF}$

2. The radius of a circle is 3.512 in. How long is the diameter of the same circle?

3. State whether the lines below are perpendicular or parallel.

   a)
   b)
4. Which figure do two lines sharing a common vertex form?

<table>
<thead>
<tr>
<th>a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>b)</td>
</tr>
<tr>
<td>c)</td>
</tr>
</tbody>
</table>

5. State whether the given figure is an angle, arc or a line.

- a) [Diagram of a circle]
- b) [Diagram of a line segment AB]
- c) [Diagram of a line with arrows]
Week 1 - KEYS

Weekly Assessments
Week #1 KEY

1. Identify the line segments in the circle below.

   a. \( DC \)
      Tangent
   b. \( AB \)
      Chord
   c. \( AG \)
      Diameter
   d. \( EF \)
      Secant

2. The radius of a circle is 3.512 in. How long is the diameter of the same circle?
   \( 7.024 \text{ in} \)

3. State whether the lines below are perpendicular or parallel.
   a) 
      Parallel
   b) 
      Perpendicular
4. Which figure is formed by two lines sharing a common vertex?
   - Angle

5. State whether the given figure is an angle, arc or a line.
   a) Arc
   b) Line
   c) Angle
Use the figure below to answer the following questions, 1 - 3

1. Identify all reflex angles

2. Identify all obtuse angles

3. Identify all acute angles
Use the diagram below to answer the following questions, from 4 – 5.

4. Identify all pairs of parallel lines

5. Identify all pairs of perpendicular lines

6. Identify lines that are neither perpendicular nor parallel to any of the lines above.
Answer Key

Day 6

1. (iii) and (viii)
2. (iv) and (vii)
3. (i) and (v)
4. L1 and L2; L3 and L5
5. L1 and L8; L2 and L8
6. L4, L7 and L6
1. Get a block of wood and put on the flat surface.

2. Note the width, height, and length of the wood.

3. Gentle, push the wood forward and let it move freely unit it stops.

4. Note the distance through which it moved. Write it in inches.

5. Note its new height, width, and length.

6. Are there any changes in size and shape?

7. Identify the type of transformation it went through.

We want to base our argument to the fact that a person does not become smaller, larger, bigger, or basically change when he/she moves from one place to another in the same normal environment. We have to be in a field to carry out this activity. However, it can still be done in class using other instruments and item instead of a student.

8. Drive the peg in the ground and tie a rope on it.

9. Hold the other end of the rope and make sure it is relatively tight.

10. Move in any specified direction while keeping the rope relatively tight.

11. Stop after three to four footsteps.

12. Is there any transformation that can describe your motion?

13. With respect to the motion in 11 above, how may we refer to the peg?

14. The fact that such kind of motion cannot change a person’s shape or size, how can you use this to relate the image and the pre-image of such kind of transformation?
In this activity, would like to demonstrate what it means by no change in shape and size under rotation as well as translation. Let us have at least 5 groups of students, a block of wood, a peg, a rope and flat surface like a top of a table or a clean, smooth floor.

**Answer Keys**

**Day 6:**
1. No response
2. Answers vary
3. No response
4. Answer varies
5. Answer varies
6. No change in size and shape
7. Translation
8. No response
9. No response
10. No response
11. No response
12. Rotation
13. Center of rotation
14. The shape and the size of the pre-image remain unchanged under rotation.
1. Identify the kind of transformation where an image appears to be flipped with respect to the pre-image.

2. A student realizes that after performing the instructed transformation, the image becomes smaller than the pre-image. Which kind of transformation is he performing?

3. The company has come up with a model of the site of their location. They plan to install all the structures on the site as it is on the model after 10 years. Which transformation would relate the model to the actual site after 10 years?

4. A child is playing with a model of a motorboat on shallow stagnant rainy waters. He enjoys pushing it in water and leave it to move and at high speed to the other side of the water. Which kind of transformation could this child be applying on the model of the motorboat?

5. Which kind of transformations does the hand of a driver on a steering wheel undergo? Explain all that applies.

6. What could be the image of \((-2, 6)\) under rotation of \(-90^\circ\) about the origin?

7. What could be the image of \((4, -9)\) under translation of 2 units upwards and 3 units to the right?

8. An image \((12, 18)\) had undergone a dilation of scale factor 3. What was the pre-image?

9. What is the image of \((0, -7)\) under reflection about \(x\) \(-\)axis.

10. What is the image of \((3, -8)\) under reflection about \(x + y = 0\).
11. What is the image of \((13, -2)\) under reflection about \(y\)-axis?

12. What is the image of \((-3, -4)\) under reflection about \(y = 5\)?

13. Identify any two transformations that preserve shape and size.

14. Identify a transformation that preserves orientation.

15. Find the image of \((-6, 2)\) after dilation of the scale factor of \(\frac{1}{2}\).

16. What could be the image of \((6, -3)\) under rotation of \(-180^\circ\) about the origin?

17. What could be the image of \((-3, 2)\) under rotation of \(-270^\circ\) about the origin?

18. What could be the image of \((-1, 3)\) under translation of 6 units to the left?

19. The pre-image was rotated about \(-90^\circ\) to get the image \((-4, -4)\). What was the pre-image?

20. The pre-image was reflected about \(x = -3\) to get the image \((2, -7)\). What was the pre-image.
**Answer Keys**

**Day 6:**
1. Reflection
2. Dilation
3. Dilation
4. Translation
5. Ratio along the circumference of the wheel
   Translation along the road as the vehicle moves
6. \((6,2)\)
7. \((7,-7)\)
8. \((36,54)\)
9. \((0,7)\)
10. \((8,3)\)
11. \((13,2)\)
12. \((-3,14)\)
13. Any two: Rotation, reflection, and translation
14. Translation
15. \((-3,1)\)
16. \((-6, -3)\)
17. \((-2, -3)\)
18. \((-7,3)\)
19. \((4, -4)\)
20. \((-8, -7)\)
A point (1,4) is rotated through an angle of $-360^\circ$ about the origin the translated 2 units up and 3 units to the left. What would be its image?
Day 6 Exit Slip

Name ________________________

Answer Keys

Day 6:

(−2,6)
1. To the right is a regular polygon, study it and answer the following questions.

(a) How many sides does it have?

(b) Give its name.

2. Find the coordinates of the image of points with the following coordinates after a rotation of $-360^\circ$ about the origin.

(a) $(-4, 7)$

(b) $(10, -10)$

3. How many sides does the following regular polygon have?
Answer Keys

**Day 7:**

1. (a) 8
   
   (b) Octagon

2. (a) $(-4,7)$
   
   (b) $(10,-10)$

3. 7
1. Copy the rectangle accurately using a red ink pen onto the first tracing paper. This will act as the object.

2. Copy the rectangle accurately using a pencil onto the second tracing paper. This will act as your image.

3. Locate the centers, O, of the rectangles on the tracing papers by accurately drawing two dotted diagonal lines to intersect at the center as shown below. Maintain the colors.

4. On the rectangle drawn in ink, draw a line segment using a pen from the center to one of the vertices as shown. Label it as OA.

5. On the rectangle drawn pencil, draw a line segment using a pencil from the center to one of the vertices as shown. Label it as OB.

6. Place the tracing paper having the rectangle drawn in pencil on top of the other tracing paper.

7. Carefully slide the tracing papers until the rectangles on both tracing papers coincide, ensuring that point A and point B coincide.

8. Put the tip of the pencil at the center point O to ensure that the rectangles do not separate.
Day 7 Activity

9. Turn the top tracing paper clockwise over the other tracing paper carefully making sure the bottom tracing paper does not move until the rectangles coincide.

10. Measure \( \angle AOB \) using a protractor.

11. How many degrees did you turn the rectangle from its original position?

12. Continue turning clockwise until the rectangles coincide for the second time. What do you notice?

13. What does this tell you about the angle you have rotated from the original position?

14. How many times has the rectangle fitted into itself from the start to the end of the rotation?

15. If the rectangle is turned anticlockwise, will we get the same results?
In this activity, students are going to rotate a rectangle about its center and discover how many times it fits into the original rectangle in one turn. We will work with groups of at least 3 students.
Each group requires a pencil, a red ink pen, a ruler, a protractor and two tracing papers. Each student will be given a copy of a rectangle having suitable dimensions drawn accurately on a white paper.

**Answer Keys**

**Day 7:**
1-9. No response
10. $\angle AOB \approx 180^\circ$
11. $\approx 180^\circ$
12. OA and OB coincide.
13. The angle is $360^\circ$
14. Twice.
15. Yes.
1. Find the least angle of rotation that a regular nonagon can be rotated about its center to get mapped onto itself.

Use the following information to answer questions 2 - 6
Show using dotted lines on the plane figures the positions of lines of reflection that will map the plane figures onto themselves when reflected along those lines.

2. Rectangle

3. Trapezoid

4. Square
5. Rhombus

6. Equilateral triangle

Use the following information to answer questions 7 - 10

Identify the angle of rotation, $\theta$, in the range $0^\circ \leq \theta \leq 360^\circ$ about the center of the rectangle that maps clockwise the given pre-images onto the images shown.

7.

8.
9.

10.

Use the following information to answer questions 11 - 16
Identify the number of times the following plane figures get mapped onto themselves in one turn about their centers.

11. Rectangle

12. Trapezoid

13. Parallelogram

14. Square
15. Rhombus

16. Regular pentagon

Use the following information to answer questions 17 - 20

Given rectangle JKLM below, sketch its image after the following clockwise angles of rotation about its center.

17. 90°

18. 180°

19. 270°

20. 360°
Answer keys

Day 7:
1. 40°
2. 
3. 
4. 
5. 
6.

7. 180°
8. 270°
9. 360° or 0°
10. 90°
11. Twice
12. Once
13. Twice
14. 4 times
15. 2 times
16. 5 times
17. K

L
M
18.

```
L
M
J
```

19.

```
M
J
K
```

20.

```
J
K
L
```
Find the least angle of rotation that a regular octagon can be rotated about its center to get mapped onto itself.
Answer Keys

Day 7:

45°
Find the image of (12,4) under the following transformations, 1 - 3
1. Reflection about \( y = x \)

2. Rotation about of 180 about the origin.


Find the pre-image of \((-7, -4)\) under the following transformations, 4 – 6.
4. Reflection about \( y = 0 \).

5. Rotation of \(-90^\circ\) about the origin.

6. Reflection about \( x = 4 \).
Answer Key

Day 6

1. (4, 12)
2. (−12, −4)
3. (48, 16)
4. (−7, 4)
5. (4, −7)
6. (15, −4)
1. On a tightly fixed peg, tie the string in such a way that it (peg) should allow it to move freely around.

2. Approximate a suitable length and tie the chalk or the marker pen.

3. While keeping the string relatively tight, take the pen gently around the peg and it marks its path. Make a complete turn.

4. Identify the pre-image and the image of rotation.

5. Identify the center of rotation.

6. Identify the path taken by the rotating object.

7. What would kind of image the marker/chalk would have made if it were to be closer or further from the peg than in 2 above?

8. Is there any relation between the paths in 6 and 7 above? Which one?
In this activity, would like to determine the kind of path traced by an object undergoing rotation. We are required to have a chalk (white or any color) or a marker, a string, a tightly fixed peg (fixed on a board by any suitable mean).

**Answer Keys**

**Day 6:**
1. No response
2. No response
3. No response
4. Image - Marker pen or chalk
   - Image - Marker pen or chalk
5. The position of the peg
6. A circle
7. Made closer: A smaller circle
   - Made larger: A larger circle
8. Yes

In all the two cases in 7, there would be concentric circles
Identify a transformation where the pre-image moves along a circular path.
Answer Keys

Day 8:

Rotation
Identify the following transformations

1.

2.

3.
4.

5.
Answer Key

Day 9

1. Reflection
2. Translation
3. Rotation
4. Reflection
5. Rotation
1. Place the block on a graph paper and trace it on the paper at its exact location. Label it as B.
2. Slide the block slightly along a horizontal surface (along a ruler) for about 3 units.

3. Trace the image of the block at that particular point. Label it as C
4. Identify the image and the pre-image

5. Lift the block and compare the B and $B'$ then note any difference in shape, size and orientation

Now, we want to carry out rotation.
5. Make a small hole towards one corner and tie a string to the block through it (the hole).

6. Select a suitable point to place your peg and fix it.
7. Tie one end of the string (at a distance of about 2 in) to the peg in a way that allows the block to move around.

8. Hold the string tight and trace the image of the block at that particular place. Label it, A
9. Move the block in a counterclockwise direction through a quarter turn and trace the image of the block at that particular location. Label it, G.
10. Identify the image and the pre-image

11. Compare A and G then tell any difference.
In this activity, we would like to manually carry out translation and rotation and determine the image given an object. Students will work in groups of at least 4. We are required to have a plastic block of about 1 – 4 square meter, two A4 graph paper, a peg, a pencil and a ruler.

**Answer Keys**

**Day 9:**
1 - 3. No response
4. Pre-image B, Image C
5. No difference in shape, size and orientation.
6 - 9. No response
10. Pre-image A, Image G
11. No difference in shape, size
   The orientation changes
Use the following information to answer questions 1 – 5. Translate the following figures to the indicated points.

1. 

2. 

3. 

4. 

5.
5. Use the following information to answer questions 6 – 9.
Reflect the following figures about the given mirror line.

6.

7.
Use the following information to answer questions 10 – 13.
Rotate the following figures through the given angle about the given point.
10. 45°
11. $-90^\circ$

12. $-360^\circ$

13. Positive quarter turn
Use the following information to answer questions 14–16
Translate the following figure through the given distance.

14. 3 units down

15. 3 units down and 3 units left
16. 1 unit down and 2 units left

Use the following information to answer questions 17–20

Identify a series of transformations linking the two images.

17.

18.
19.

20.
Answer Keys

Day 9:
1.

2.

3.

4.
5.

6.

7.
8.

9.

10.
11.

12.

13.
16. [Diagram of two squares on a grid]

17. Translation and rotation
18. Reflection and rotation
19. Reflection and translation
20. Rotation and translation
Find the image of the following figure under reflection about the given line
Answer Keys
Day 9:
Week 2
Weekly Assessments
Week #2

1. State the transformation that is described in each case.

   a) A transformation that moves the image such the straight lines joining points of the image to the corresponding points of the pre-image are parallel, and the orientation of the image remains unchanged.

   b) A transformation that moves the image such the straight lines joining points of the image to the corresponding points of the pre-image is parallel and the orientation of the image changes to the opposite direction. These lines are also perpendicular to the symmetrical line between the image and the pre-image.

2. In the graph provided below, $\Delta A'B'C'$ is an image of $\Delta ABC$ under a rotation of $+180^\circ$ about the origin. Rectangle $M'N'O'P'$ is a translation eight steps to the right. Draw their pre images.
3. On the figures below, draw a mirror line that will reflect the figure onto itself in a single reflection.

   a) 
   
   b) 
   
   c) 

4. State the least angle that the given figure can be rotated about one of its vertices to map onto itself?

   a) 
   
   b) 
   
   c)
5. Describe a series of reflections that will map a hexagon onto itself.

6. The figures below are reflected along line AB. Draw their respective images.

<table>
<thead>
<tr>
<th>a)</th>
<th>b)</th>
<th>c)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Hexagon" /></td>
<td><img src="image2" alt="Parallelogram" /></td>
<td><img src="image3" alt="Arrow" /></td>
</tr>
</tbody>
</table>

A

B
Week 2 - KEYS

Weekly Assessments
**Week #2 KEY**

1. State the transformation that is described in each case.

   a) A transformation that moves the image such the straight lines joining points of the image to the corresponding points of the pre-image are parallel, and the orientation of the image remains unchanged.
      Translation

   b) A transformation that moves the image such the straight lines joining points of the image to the corresponding points of the pre-image are always parallel and the orientation of the image changes to the opposite direction. These lines are perpendicular to the symmetrical line between the image and the pre-image.
      Reflection

2. In the graph provided below, $\Delta A'B'C'$ is an image of $\Delta ABC$ under a rotation of $+180^\circ$ about the origin. Rectangle $M'N'O'P'$ is a translation eight steps to the right. Draw their pre images.
3. On the figures below, draw a mirror line that will reflect the figure onto itself in a single reflection.

<table>
<thead>
<tr>
<th>Figure</th>
<th>Mirror Line Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image" alt="Mirror Line a) Diagram" /></td>
</tr>
<tr>
<td>b)</td>
<td><img src="image" alt="Mirror Line b) Diagram" /></td>
</tr>
<tr>
<td>c)</td>
<td><img src="image" alt="Mirror Line c) Diagram" /></td>
</tr>
</tbody>
</table>

4. State the least angle that the given figure can be rotated about one of its vertices to map onto itself?

<table>
<thead>
<tr>
<th>Figure</th>
<th>Least Rotation Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image" alt="Least Rotation Angle a) Diagram" /></td>
</tr>
<tr>
<td>b)</td>
<td><img src="image" alt="Least Rotation Angle b) Diagram" /></td>
</tr>
<tr>
<td>c)</td>
<td><img src="image" alt="Least Rotation Angle c) Diagram" /></td>
</tr>
</tbody>
</table>
5. Describe a series of reflections that will map a hexagon onto itself.

Hexagon will map onto itself by reflecting it, then using the image as the pre-image and reflecting it through the same mirror line.

6. The figures below are reflected along line AB. Draw their respective images.

<table>
<thead>
<tr>
<th>a)</th>
<th>b)</th>
<th>c)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="a)" /></td>
<td><img src="image" alt="b)" /></td>
<td><img src="image" alt="c)" /></td>
</tr>
</tbody>
</table>
1. Give the correct names of the following descriptions.

(a) A plane figure that is formed after a transformation of another figure.

(b) A plane figure that undergoes a transformation.

(c) A transformation where all points of a plane figure move in the same direction and at the same distance.

(d) A transformation that represents a flip of a plane figure about a line.

2. When a pre-image is reflected along a mirror line, what happens to the images?

(a) shape in relation to the pre-image?

(b) size in relation to the pre-image?

(c) oriented in relation to the pre-image?
Answer Key

Day 11:

1. (a) Image
   (b) Pre-image
   (c) Translation
   (d) Reflection

2. (a) Image has the same shape as the pre-image.
   (b) Image has the same size as the pre-image.
   (c) Image becomes laterally inverted
1. Put the set square along the ruler on the plain paper as shown below.

2. Draw a dotted outline along the edge of the set square.

3. Carefully slide the set square along the ruler to the new position as shown above.

4. Draw a dotted outline on the edge of the set square in the new position.

5. Remove the ruler and the set square on the paper.

6. Which plane are figures formed from the dotted lines?

7. Measure and compare the lengths of the corresponding sides of the two triangles. What do you notice?
8. Measure and compare the corresponding angles of the two triangles using a protractor. What do you notice?

9. From your responses to question 7 and 8, state whether there was a change in shape or not when the set square was slid along the ruler to the new position.

10. From your responses to question 7 and 8, state whether there was a change in size or not when the set square was slid along the ruler to the new position.
In this activity, students will discover the basic properties of a rigid motion in a plane using a translation. Students will work in a group of at least 3. Each group will require one A4 plain paper, a set square, a ruler, a pencil and a protractor.

**Answer Keys**

**Day 11:**

1-5: No response

6. Triangles

7. Corresponding lengths are equal

8. Corresponding angles are equal

9. No change in shape

10. No change in size
Take a close look at the shapes below then state whether the transformations that result in images in questions 1-10 are rigid or non-rigid.

<table>
<thead>
<tr>
<th>Pre-image</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Pre-image 1" /></td>
<td><img src="image2.png" alt="Image 1" /></td>
</tr>
<tr>
<td><img src="image3.png" alt="Pre-image 2" /></td>
<td><img src="image4.png" alt="Image 2" /></td>
</tr>
<tr>
<td><img src="image5.png" alt="Pre-image 3" /></td>
<td><img src="image6.png" alt="Image 3" /></td>
</tr>
<tr>
<td><img src="image7.png" alt="Pre-image 4" /></td>
<td><img src="image8.png" alt="Image 4" /></td>
</tr>
</tbody>
</table>
5.

6.

7.

8.
Sketch the images of the plane figures in questions 11-15 after a reflection in the lines of reflection represented by the lines each question.

11.
12. 

A \hspace{1cm} D

B \hspace{1cm} C

13. 

J

K \hspace{1cm} L

14. 

M \hspace{1cm} P

N \hspace{1cm} O
In the following cases in question 16-20, state whether the situation is a rigid motion or not.

16. A triangle translated three units to the left and five units downwards on the coordinate plane.

17. A rhombus rotated 260° about the origin on the coordinate plane.

18. A rectangle is undergoing a dilation of scale factor 2 about the origin on the coordinate plane.

19. A trapezoid reflected along the x-axis then translated three units to the left on the coordinate plane.

20. A rectangle translated three units then reflected along the y-axis on the coordinate plane.
Answer keys

Day 11:

1. Non-rigid

2. Rigid

3. Non-rigid

4. Non-rigid

5. Rigid

6. Non-rigid

7. Rigid

8. Rigid

9. Rigid

10. Rigid

11.

12.
13. Rigid motion

14. Non-rigid motion

15. Rigid motion

16. Rigid motion

17. Rigid motion

18. Non-rigid motion

19. Rigid motion

20. Rigid motion
Sketch the image of the triangle KLM after a slide to the left, labeling its vertices using the prime symbols. State whether it is a rigid motion or not.
Answer Keys

Day 11:

A Rigid transformation.
1. a) What is rigid motion?

b) Name the four types of rigid motion.

2. The setup below represents a rectangle and a mirror line. Use it to answer the questions that follow.

a) Sketch the image.

b) What is the relationship between the distance from the object to the mirror line and the distance from the image to the mirror line?
3. Show the image if the object is translated six steps to the right.
**Answer Key**

1. a) A transformation where the length of the sides of the pre-image and the size of the angle are preserved.
   
b) Rotation
   Reflection
   Glide reflection.
   Translation

2. a)

   ![Image]

   b) The two distances are equal.

3. 

   ![Image]
1. Using the molding clay, mold three rectangles and label them A, B and C.

2. Using the scalpel and the ruler mark a line from one long side of rectangle A to the other longer side such that the rectangle is divided into two equal parts.

3. Relate the two resultant figures with a rigid transformation, which one is the most appropriate?

4. Mark a line that would divide the rectangle into two along the longer sides, to cut the shorter sides into two equal lengths.

5. Relate the two resultant figures with a rigid transformation, which one is the most appropriate?

6. Make a mark through the diagonal of rectangle C using the ruler and the scalpel as shown below.

7. Relate the two resultant figures with a rigid transformation, which one is the most appropriate?
In this activity, we are required to mold rectangles using molding clay (or similar plastic material) and divide it into different figures. Students are required to divide themselves into groups of at least three and each group is required to have molding clay, scalpel (any tool with a cutting edge), and a ruler.

**Answer Keys**

**Day 12:**

1-2 No responses.

3. One part is a reflection of the other.

4. No response.

5. One part is a reflection of the other.

6. One is rotated about the center of the rectangle to get the other
1. Identify the rigid motion involved in the diagram below.

2. Which rigid motion is involved in the diagram below?

Use the diagrams below to answer questions 3 and 4.

3. Identify a rigid motion present in the diagrams above which preserves the orientation of the object.

4. Identify the rigid motion present in the diagrams above which does not preserve the orientation of the object.
5. Study the setup below and identify the rigid motion shown below.

6. Name three properties of an object that are preserved under translation.

Study the diagrams below and use them to answer questions 7 and 8.

7. Which rigid motion is shown in the diagram above?

8. Give a reason for your answer in No. 7 above.

9. Identify the rigid motion which maps \( \triangle ABC \) onto \( \triangle DEF \).
10. Which all rigid motions can map the two equal squares shown below?

![Two equal squares]

11. In the setup below identify the rigid motion involved.

![Setup with two pentagons]

12. A student noticed that a car was moved in straight line for ten meters. Which rigid motion could describe the movement of the car?

13. Identify the rigid motion involved in the setup below.

![Setup with two parallelograms]

Study the setup below and use it to answer questions 14 and 15.

![Triangle setup]
14. Which rigid motion is involved in the diagram above?

15. What does the line AB represent?

16. Which rigid motion can describe how the two main triangles (differentiated with colors) below can map onto each other?

17. State the rigid motion which can describe how two opposite faces of a cuboid can be mapped onto each other.

18. Which rigid motion can describe how two adjacent faces of a cube can be mapped onto each other?

19. If a square plane paper is cut through the center from one side to the opposite side, which rigid motion can describe how one piece can be mapped onto the other?

20. Which rigid motion can describe how rectangle A is transformed to rectangle B.
Answer Keys

Day 12.

1. Translation
2. Reflection
3. Translation
4. Reflection
5. Glide translation
6. Shape
   Orientation
   Size
7. Reflection
8. A line of symmetry can be identified between the two rectangles
9. Glide reflection
10. Reflection, translation, and rotation
11. Translation
12. Translation
13. Reflection
14. Reflection
15. Mirror line
16. Rotation
17. Reflection, translation
18. Reflection, rotation
19. Translation, reflection
20. Rotation, reflection
1. Which rigid motion will map $\triangle ABC$ onto $\triangle DEF$ in the figure below?
**Answer Keys**

**Day 12:**

A rotation of $+90^\circ$ about the origin will map $\triangle ABC$ onto $\triangle DEF$. 
1. The figures below show the pre-images and the corresponding images under given transformations. Identify whether each transformation appears to be a rigid motion or not, followed by a brief explanation.

(a) 

(b) 

(c)
2. State whether the following transformations appear to be rigid motions or not.

(a) \((x, y) \rightarrow (x + 5, y)\)

(b) \((x, y) \rightarrow (2x, 2y)\)

(c) \((x, y) \rightarrow (-x, -y)\)
Answer Keys

Day 13:

1. (a) Rigid motion. The transformation does not change the size or shape of the figure.
   
   (b) Non-rigid transformation. The transformation changes the size of the figure.
   
   (c) Rigid motion. The transformation does not change the size or shape of the figure.
   
   (d) Rigid motion. The transformation does not change the size or shape of the figure.

2. (a) Rigid motion

   (b) Non-rigid motion

   (c) Rigid motion
1. On the squared paper or the graph paper provided draw a coordinate plane with both positive and negative axes.

2. Label the axes and draw a suitable triangle of your choice on the first quadrant. Label this as ‘Pre-image.’

3. Reflect the pre-image taking the x-axis as your mirror line and the label the resulting triangle as ‘Image 1.’

4. Measure the corresponding sides of the pre-image and image 1 using a ruler and write them down.

5. Compare the lengths of the sides of the pre-image and image 1. What happens to the corresponding sides after the reflection?

6. Measure the corresponding angles of the pre-image and image 1 using a protractor and write them down.

7. Compare the sizes of the angles of the pre-image and image 1. What happens to the corresponding angles after the reflection?

8. Now, translate image 1 six units to the left and three units up and label the resulting triangle as ‘Image 2’.

9. Measure the corresponding sides of image 1 and image 2 using a ruler and write them down.

10. Compare the lengths of the sides of image 1 and image 2. What happens to the corresponding sides after the translation?

11. Measure the corresponding angles of image 1 and image 2 using a protractor and write them down.

12. Compare the sizes of the angles of image 1 and image 2. What happens to the corresponding angles after the reflection?

13. What do you say about the size of Image 1 in relation to the pre-image?
14. What do you say about the shape of Image 1 in relation to the pre-image?

15. Take a closer look at the pre-image, image 1 and image 2. What do you say about their shapes collectively?

16. Take a closer look at the pre-image, image 1 and image 2. What do you say about their sizes collectively?

17. What feature of the pre-image changes when it is mapped onto image 1 after the reflection?

18. What feature of the image 1 changes when it is mapped onto image 2 after the translation?

19. In case the pre-image was rotated about a given center, would the size and shape be preserved?

20. Do we always have the resulting images after a transformation having the same size and shape as the pre-image?
In this activity, students will discover the effects of rigid motion on a plane figure using a glide reflection. The students will work in pairs. Each pair will require either a squared paper or graph paper, a pencil, a ruler and a protractor.

**Answer Keys**

**Day 13:**

1-4: No responses

5. Corresponding sides have equal length. The length of the sides is preserved.

6. No response

7. Corresponding angles are equal. Angle measure is preserved.

8-9: No responses

10. Corresponding sides have equal length. The length of the sides is preserved.

11. No response

12. Corresponding angles are equal. Angle measure is preserved.

13. They both have the same size

14. They both have the same shape

15. All have the same shape

16. All have the same size

17. Orientation

18. Position

19. Yes

20. No, in cases of dilations the size is altered.
The following word phrases describe the effects of certain rigid transformations on the pre-images. Identify the type of rigid transformation in each case for questions 1-10.
1. The image has the same orientation as the pre-image

2. All line segments joining the corresponding vertices of the image and pre-image are equal in length.

3. All line segments joining the corresponding vertices of the image and pre-image are parallel

4. All line segments joining the corresponding vertices of the image and pre-image are equal in length

5. Corresponding angles in the pre-image and image are equal

6. Parallel lines in the pre-image remain parallel after the transformation

7. The points of the pre-image are usually the same distance from the mirror line as the corresponding points of the image.

8. Lettering order remains the same before and after the transformation

9. The image fits exactly on the pre-image when slid back after the transformation

10. The image resembles the mirror image of the pre-image.

11. Under any given rigid motion, identify two features of the image that are preserved after the transformation.
For questions 12-17 give the effect of the transformation on the plane figure.

12. A rigid motion applied to a figure under the rule \((a, y) \rightarrow (-a, -y)\).

13. A rigid motion applied to a figure under the rule \((p, c) \rightarrow (p, -c)\).

14. A rigid motion applied to a figure under the rule \((l, m) \rightarrow (-l, m)\).

15. A rigid motion applied to a figure under the rule \((p, q) \rightarrow (-q, -p)\).

16. A rigid motion applied to a figure under the rule \((r, s) \rightarrow (s, -r)\).

17. A rigid motion applied to a figure under the rule \((v, w) \rightarrow (v + 4, w - 5)\).

18. What happens to the x-coordinates of a plane figure after a translation?

19. What happens to the y-coordinates of a plane figure after a translation?

20. In a glide reflection, which transformation changes the orientation of the pre-image?
**Answer keys**

**Day 13:**

1. Translation/Rotation of 360°
2. Translation
3. Translation/Reflection
4. Translation
5. Translation/Rotation/Reflection
6. Translation/Rotation/Reflection
7. Reflection
8. Translation/360°
9. Translation
10. Reflection
11. Angle measure and lengths (distance)
12. 180° Rotation about the origin
13. Reflection along the x-axis
14. Reflection along the y-axis
15. Reflection along the line $y = -x$
16. +270° rotation about the origin
17. A translation of 4 units to the right followed by 5 units downwards
18. All the x-coordinates are decreased or increased by the same amount
19. All the y-coordinates are decreased or increased by the same amount
20. Reflection
The following composition represents a glide-reflection, use it to answer the following questions.

(a) Identify a feature on the pre-image that changes when it is mapped onto Image 1.

(b) Identify the image(s) that has the same size as the pre-image.

(c) What happens to the size of the pre-image after the two transformations?

(d) What happens to the shape of the pre-image after the two transformations?

(e) Identify one feature on image 1 that changes when it is translated to Image 2.
Answer Keys

Day 13:

(a) Orientation

(b) Image 1 and Image 2

(c) Size is preserved

(d) Shape is preserved

(e) Position
1. Identify the rigid motion involved in the following below.

2. State whether the following transformations are rigid motions or not.
   a) 
   b) 

3. Study the setup below and answer the questions that follow.
   a) Which transformation is represented by the diagram above?
   b) Explain if the answer above is rigid or not.
**Answer Key**

**Day 14.**

1. Translation.
2. a) It is not a rigid motion.
   b) It is a rigid motion.
3. a) Dilation.
   b) There is an increase in size after transformation, hence not rigid
1. Cut two squares of sides 4 in on each plain paper as shown. Label them A and B.

![Square A and B](image)

2. Draw the line at 2 in as the one (dotted) shown below.

![Dotted line](image)

3. Using the scalpel cut the square paper through the dotted line into two pieces as shown.

![Cut pieces](image)

4. Move the pieces until they coincide with each other. What can you say about the size of the two pieces?

5. Draw a dotted line through the diagonal of the squared paper labeled B as shown.

![Dotted diagonal](image)
6. Cut the square through the dotted line into two pieces as shown below.

7. Move and rotate the pieces until they coincide with each other. What can you say about the size of the two pieces?
In this activity we are required to cut a plain paper into two squares then cut each square into different shapes. Students are required to divide themselves into groups of at least three. Each group is required to have two plane papers, a pencil, a scalpel and a ruler.

Answer Keys

Day 14:

1-3. No response

4. They are congruent to each other.

5-6. No response.

7. They are congruent to each other.
1. Is $\triangle RST \cong \triangle MNO$? Explain.

Use the following diagram to answer questions 2 and 3.

2. Are the triangles congruent to each other?

3. Give the reason for your answer in 2 above.
Use the following diagram to answer questions 4 and 5.

4. Are the two trapeziums congruent to each other?

5. Give a reason for your answer in 4 above.

6. By definition of congruence state whether $\triangle ABC \cong \triangle DEF$.

7. Are the two circles below congruent to each other? Explain
8. Is $\triangle MNO \cong \triangle XYZ$? Explain.

9. Are the two figures below congruent to each other?
10. Is $\triangle DEF \cong \triangle MNO$?

11. Are the top and the bottom of a uniform closed cylinder congruent to each other?

Use the setup below to answer question 12 and 13.
12. Which rigid will map one rhombus onto the other?

13. Are the two rhombuses congruent to each other?

14. A student noticed that her closed bucket was in the shape of a frustum. Which rigid motion could map the top and the bottom of the bucket?

15. Is the top and the bottom of the bucket in 14 above congruent?

16. Are the two figures below congruent to each other? Explain
17. Are the rectangles below congruent to each other?

18. Is $\triangle HIJ \cong \triangle RST$?

19. Are the two pentagons below congruent to each other?

20. Are the pentagons in the following diagram congruent to each other?
**Answer key.**

**Day 14.**

1. A rotation of $180^\circ$ will map $\Delta RST$ onto $\Delta MNO$. Thus $\Delta RST \cong \Delta MNO$.
2. No.
3. The triangles have different sizes.
4. Yes.
5. A translation of the first trapezium to the right will make it coincide with the second one.
6. A translation of $\Delta ABC$ to the left will make it coincide with $\Delta DEF$. Thus $\Delta ABC \cong \Delta DEF$.
7. They are not congruent with each other since no rigid motion can map one circle onto the other.
8. A reflection about $y$-axis will make $\Delta MNO$ coincide with $\Delta XYZ$ thus $\Delta MNO \cong \Delta XYZ$.
9. A reflection about a vertical line halfway between them will make one figure map onto the other, thus they are congruent.
10. A rotation of $+90^\circ$ about the origin will make $\Delta DEF$ map onto $\Delta MNO$ making $\Delta DEF \cong \Delta MNO$.
11. They are congruent since a translation over the central axis will make the bottom map on the top of the cylinder.
12. No.
13. No.
14. None.
15. No.
16. A translation of the first trapezium to the left will make the two figures coincide making them congruent with each other.
17. A reflection over an imaginary vertical line halfway between the two rectangles will make one rectangle map onto the other. Thus they are congruent.
   Even a translation can map the two images.
18. A reflection over an imaginary line halfway between the two triangles followed by movement of the image to the left will make $\Delta HIJ$ map onto $\Delta RST$. Making $\Delta HIJ \cong \Delta RST$.
19. They are congruent to each other since a translation of the first pentagon to the left will make it map onto the other.
20. They are congruent to each other since moving the first pentagon to the right will make it coincide with the other pentagon.
1. Is $\triangle ABC \cong \triangle QRS$?
Day 14 Exit Slip

Answer Keys

Day 14:

By definition of congruence, we need to find a rigid motion that will map \( \Delta ABC \) onto \( \Delta QRS \).

The rigid motion is reflection or translation

Thus \( \Delta ABC \cong \Delta QRS \)
High School Math Teachers
Geometry
Weekly Assessment Package
Week 3
Week 3
Weekly Assessments
1. Identify the rigid motion involved in each of the following diagrams.
   a) [Diagram]
   b) [Diagram]
   c) [Diagram]

2. By definition of congruence in terms of rigid motion, state whether the following figures are congruent or not.
   a) [Diagram]
   b) [Diagram]
   c) [Diagram]
3. Draw the images of the following figures. (The mirror line is shown)
   a) 
   b) 

4. Identify the transformation involved in each of the following figures.
   a) 
   b) 

5. Which rigid motion makes the following figures congruent?
   a) 
   b) 

6. State the rigid motion described in each case.
   a) The pre-image is moved along a certain distance, and its orientations remain unchanged.
   b) Every point of the pre-image is turned by the same amount around a fixed point.
Week 3 - KEYS

Weekly Assessments
**Week #3 KEY**

1. Identify the rigid motion involved in each of the following diagrams.
   a) Glide reflection
   b) Reflection
   c) Translation

2. By definition of congruence in terms of rigid motion, state whether the following figures are congruent or not.
   a) They are congruent
   b) They are not congruent
   c) They are not congruent
3. Draw the images of the following figures. (The mirror line is shown)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>b)</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
</tbody>
</table>

4. Identify the transformation involved in each of the following figures.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>b)</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
</tbody>
</table>

5. Which rigid motion makes the following figures congruent?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>b)</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>

**Translation**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>a)</td>
<td><img src="image7.png" alt="Image" /></td>
</tr>
<tr>
<td>b)</td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
</tbody>
</table>

**None**

6. State the rigid motion described in each case.

<p>| | |</p>
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<tbody>
<tr>
<td>a)</td>
<td>The pre-image is moved along a certain distance, and its orientations remain unchanged.</td>
</tr>
<tr>
<td></td>
<td><strong>Translation</strong></td>
</tr>
<tr>
<td>b)</td>
<td>Every point of the pre-image is turned by the same amount around a fixed point.</td>
</tr>
<tr>
<td></td>
<td><strong>Rotation</strong></td>
</tr>
</tbody>
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Questions:

1. Measure the following angles using a protractor and give their approximated values to the nearest 1 degree.
   
   a) 
   
   b) 

2. At what time does the hour arm and minute arm form a straight line when the minute arm is pointing at 3?
3. Draw and label the following using the notation of a point, a line, and a ray.

   a) \[ \overline{RS} \]

   b) \[ \overrightarrow{ST} \]

4. Identify \( MN \) on the following image:
5. State whether the pairs of angles are perpendicular or not.

a)

b)

6. Write properties of perpendicular lines!
7. Identify all acute angles.

8. Jessica realizes that after performing the instructed transformation, the image becomes smaller than the pre-image. Which kind of transformation is she performing?

9. What transformation preserves orientation?

10. Find the coordinates of the image of points with the following coordinates after a rotation of $-360^\circ$ about the origin:
   
   a) $(-3, 3)$

   b) $(12, -1)$
11. Draw:
   a) Equilateral triangle
   b) Rhombus
   c) Trapezoid

12. Define:
   a) Transformation
   b) Rotation
   c) Reflection

13. Find the image of (6, 3) after rotation of 180 about the origin.
14. Identify the following transformations:
   a) 
   ![Image 1] 
   ![Image 2]
   b) 
   ![Image 3]

15. Translate the following figure to the indicated point.
   ![Image 4]
16. Find the image of the following figure under reflection about the given line.

17. What is a rigid motion?

18. Which rigid motion can describe how the two main triangles (differentiated with colors) below can map onto each other?
19. What is happening in this picture?

20. Is \( \triangle ABC \cong \triangle QRS \)?
Answers:

1. 
   a) 135 degrees  
   b) 33 degrees

2. 9 o’clock

3. 
   a)

4. Chord

5. 
   a) No  
   b) Yes

6. 
   - They intersect, or meet each other, at 90°.
   - If two lines intersect at 90° they form four right angles at the point of intersection.

7. Only (i).

8. Dilation

10.
  a)  (-3, 3)
  b)  (12, -1)

11.
  a)

![Triangle]

b)

![Parallelogram]

c)

![Trapezoid]

12.
  a) Transformation is a change in either size, position, shape or both of a plane figure. Conventionally, we name images using the by adding a prime (′) to same letters used to name the pre-image.
  b) Rotation is a transformation which turns a plane figure about a fixed point called the center of rotation.
c) Reflection is a transformation where a plane figure is reflected about a line, called the line of reflection or the mirror line to form an image.

13. (-6, -3)

14.
   a) Reflection
   b) Rotation

15.

16.
17. Rigid motion is a transformation which changes the position of a plane figure without changing the figure’s shape or size. It is also called a rigid transformation. A rigid motion is simply an isometry.

18. Rotation

19. \( \Delta PQR \) is translated to \( \Delta \hat{P} \hat{Q} \hat{R} \)

20. By definition of congruence, we need to find a rigid motion that will map \( \Delta ABC \) onto \( \Delta QRS \). The rigid motion is reflection or translation, so \( \Delta ABC \cong \Delta QRS \).