

SUMMER SCHOOL TEACHER GUIDE



Geometry

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Summer School Teacher Guide

The Summer High School Program will be 20 days for full credit and 10 days for semester half (½) credit). First Semester will be days 1-10 and Second Semester will be days 11-20. Breakdown of days will have the following per semester / half (½) credit:

- Nine (9) days of daily lessons
- One (1) day post-test review and post-test

All Students and staff will use Grade Results for their summer curriculum. Each lesson will open daily, and students will not be able to work ahead; however, students can work on previously opened lessons per semester. Students can retake a daily post-test 3 times before it locks. If a student needs to retake a daily lesson post-test for a 4th time, then the teacher will have to open the lesson post-test again. Teachers should not delete any prior lesson post-test. Grade Results will post the highest grade from each students' lesson post-test.

Classroom Schedule – Time below is an approximate breakdown of time.

- Attendance in PowerSchool – 5 minutes
- Lesson Introduction (I Do) – 5 minutes
- Lesson Activities (We Do) – 60 minutes
- **Break – 10 Minutes** (*Site Administrator will work with teachers on breaks*)
- Teacher Lesson Review – 5 minutes
- Independent Work – Student Lesson Review*/Post-test (They Do) – 40 minutes
- Closing/Wrap Up– 5 minutes
- **Total Time: 2 hours 10 minutes**

***Lesson Review** – Students will review lessons for essential knowledge/information prior to the daily test.

The following will be used within **Grade Results**:

- Lessons with Content Area, Videos, and Activities
- Supplemental Teacher Resources App– Some lessons will have a Supplemental resource (Example – Flocabulary)
- Post-Test – Each lesson will have a daily post-test.

Graded Work – The Posttest will be the daily graded work. Graded work is automatically calculated by the Grade Results Software.

Anchor Charts – Some HS teachers will have Anchor Charts available with their lesson.

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 1

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 1: Basic Concepts of Geometry

Objective(s): Students will

- Define, use, and represent the undefined terms of geometry: point, line, and plane.
- Define and describe geometric notation for ray, line segment, and angle.
- Define and describe parallel lines, perpendicular lines, and circles.

Guiding Question(s):

How can undefined notions be used to create precise mathematical definitions?

What are the precise definitions of angle, circle, perpendicular line, parallel line, and line segment?

TN Curriculum Standard(s): G.CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Key Vocabulary/Terms (Slide 21):

- **Angle:** An angle is formed by two rays that share the same endpoint.
- **Arc:** A curved line which is part of the circumference of a circle.
- **Circle:** A set of all points in a plane that are equidistant from a special point called center.
- **Line segment:** A part of a line that consists of two distinctive endpoints and all points between them.
- **Line:** A collection of points along a straight path that extends forever in both directions.
- **Parallel lines:** Distinct lines lying in the same plane that never intersect each other.
- **Perpendicular lines:** Lines that intersect at right angles.
- **Plane:** A flat surface that extends without end and has no thickness.
- **Point:** A point has an exact location, and it does not have size, length, or width.
- **Ray:** A part of a line that begins at a particular point (called the endpoint) and extends endlessly in one direction.

Attendance in PowerSchool: 5 minutes

Lesson Introduction (I Do): 15 minutes

The teacher will tell students: *We are going to precisely define basic geometric concepts we will need to use throughout the course.* The teacher will guide students to the lesson in Grade Results. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson by modeling how to identify points, lines (or part of lines), and planes (or part of planes) in the geometric representation of a house illustration in GradeResults to explain how points, lines and planes are the building blocks of geometry.

Slide 3-4 Students will read the descriptions of point, line, and plane with matching examples in GradeResults. Teacher will explain each term and assist students with the activity. Student complete matching activity about undefined terms.

Slide 5-Teacher will explain the definition for ray, opposite rays, and line segment. Students will complete the practice activities about line segment and rays with teacher assistance.

Slide 6- Student will complete practice activity about ray.

Slide 7- 8: Teacher will explain (the extension our understanding of line segments with) the Segment Addition Postulate and tell students: *A postulate is a statement that is accepted as true without proof.* Students will complete the activity on segment addition.

Slide 9-10: Teacher will explain the definition of angle, discuss the examples in Grade Results about different types of angles and their measures. Students will watch the embedded Khan Academy video about Angle Basics and complete the practice activities about naming angles and types of angles with their teacher.

Slide 11: Student will complete activity to match types of angles.

Slide 12-13: Students read (the extension our understanding of angle measures with) the Angle Addition Postulate. Students will complete the activity on angle addition. Teacher will assist students if necessary.

Slide 14-15: Teacher will explain and discuss the definition of circles. Students will complete the embedded practice/matching activities with their teachers.

Slide 16: Teacher will explain, discuss, and compare the definitions of parallel lines and perpendicular lines. Students will complete the embedded Identifying Activity with their teacher.

Slide 18-19: Student will complete practice activities about lines and basic concepts of geometry.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Student will watch the Mathispower4u Introduction of Circles video in GradeResults (length – 4:59)

Page 2: Student will watch the KhanAcademy Parallel and Perpendicular Lines video in GradeResults (length – 3:34)

Page 3: Students will watch Mathispower4u Points, Lines, and Plane video in GradeResults (length – 8:22)

Lesson Review: (5 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 20).

- A point has an exact location, but no size, length, or width.
- A line is a collection of points along a straight path that extends forever in both directions.
- A plane is a flat surface that extends without end and has no thickness.
- A ray is a part of a straight line that starts at a point and extends infinitely in one direction.
- A line segment is a part of a line that consists of two distinctive endpoints and all points between them.
- An angle is formed by two rays that share the same endpoint.
- A circle is a set of all points in a plane that are equidistant from a specific point called the center.
- Parallel lines are distinct lines lying in the same plane that never intersect each other.
- Perpendicular lines are lines that intersect at right angles.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up- 5 minutes

Take a moment to reflect on the lesson of the day by repeating the Lesson Review. Ask students to explain one of the undefined terms (point, line, or plane) or one of the defined terms (segment, angle, circle, parallel lines, perpendicular lines) on their own word.

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 2

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 2: Transformations, and Rotation and Reflection of Regular Polygons

Objective(s): Students will

- Define transformations and know the different types of transformations.
- Explain how to translate, rotate, reflect, and dilate geometric figures in the coordinate plane.

Guiding Question(s):

- What effects do transformations have on geometric figures?
- How do we know which transformation would map a figure onto another?
- How can we describe/represent transformations that take place in the coordinate plane?

TN Curriculum Standard(s): G.CO.A.2 Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch).

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMs meeting (if applicable)

Key Vocabulary/Terms for Lesson A (Slide 22):

- **Image:** The resulting figure after transformation.
- **Preimage:** The original figure.
- **Transformation:** A change in the position, orientation, or size of a geometric figure.
- **Translation:** A transformation in which figure changes its position either horizontally or vertically.
- **Rotation:** A transformation in which the figure is turned about a fixed point.
- **Reflection:** A transformation in which the figure is reflected over a line and creates a mirror image.
- **Dilation:** A transformation in which the original figure is enlarged or reduced using a scale factor $\neq 0$, without altering its center.
- **Scale Factor:** A positive integer by which the geometric figure is enlarged or reduced.
- **Center of Dilation:** A fixed point about which a figure is enlarged or reduced.

Key Vocabulary/Terms for Lesson B (Slide 16):

- **Polygon:** A closed plane figure made up of several line segments that are joined together.
- **Regular polygon:** A polygon in which all angles are equal and all sides are of same length.
- **Irregular polygon:** A polygon in which all sides are not equal.
- **Reflection:** A transformation that flips a figure across a line and creates a mirror image.
- **Rotation:** A transformation that turns a figure around a common point.
- **Symmetry:** An object or shape has symmetry when one half is the mirror image of the other half.
- **Line of symmetry (Reflection symmetry):** A line which divides a figure into two equal halves.
- **Rotational symmetry:** A center point around which the object is rotated less than 360° and the figure looks the same.

Attendance in Powerschool: 5 minutes**Lesson Introduction (I Do): 15 minutes.**

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *We are going to learn to represent transformations that map one figure onto another in the plane. We will use real-world connections to describe each transformation and represent them with coordinate values.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities for Lesson A (We Do): 25 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson by modeling how a real-world object can be transformed using (turning) movement with illustration in Grade Results.

Slide 3-6: Teacher will explain, discuss, and demonstrate what is a translation. Students will complete the embedded practice activities with their teacher on each side.

Slide 7: Students will complete practice activities applying translations.

Slide 8-10: Teacher will explain, discuss, and demonstrate what is a rotation. Students will complete the practice activities on each side.

Slide 11: Students will complete practice activities applying rotations.

Slide 12-14: Teacher will explain, discuss, and demonstrate what is a reflection. Students will complete the practice activities on each side.

Slide 15: Students will complete practice activities applying reflections.

Slide 16-18: Teacher will explain, discuss, and demonstrate what is a dilation. Students will complete the practice activities on each side.

Slide 19: Students will complete practice activities to find the scale factor of a dilation.

Slide 20: Students will complete the practice activity about transformations.

Supplemental Video for Lesson A: Teacher will instruct students (if needed) to watch the instructional video(s) in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch Math's Cool Module 11 Video in Grade Results about performing transformations on two-dimensional figures.

Lesson Activities for Lesson B (We Do): 20 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will present and explain the introduction of the lesson by modeling how a figure like the rectangle in Grade Result can be moved onto itself by a 180° rotation or a vertical or horizontal flip because a specific vertical line or a specific horizontal line can separate it in equal/congruent parts.

Slide 3: Teacher will explain regular polygons. Students will complete the embedded practice activity with their teacher. [Recommendation: have students watch the Math'sCool video on page 2 of the Supplemental section now before moving on to the next slide].

Slide 4-6: Teacher will introduce line symmetry and have students try to connect the idea to the real-world using the given illustrations of butterfly and planes. Teacher will demonstrate line symmetry in polygons using Grade Results illustrations. Students will practice identifying the number of lines of symmetry of various polygons.

Slide 7: Students will complete practice activity about number of lines of symmetry in various polygons.

Slide 8-9: Teacher will explain and discuss rotational symmetry. Students will complete embedded pair-matching quick review activity about Regular Polygons and Line of Symmetry.

Slide 10-12: Students will read and complete practice activities about rotating a figure onto itself with their teacher.

Slide 13-15: Teacher will explain that some figures may be mapped onto themselves by more than one transformation. Students will complete practice activities to rotate or reflect a polygon onto itself.

Supplemental Video for Lesson B: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Teacher will guide students to supplemental video on page 1. Students will watch video on Rotations

Page 2: Teacher will guide students to supplemental video on page 2. Students will watch first 12 minutes only of Math'sCool video about identifying and model regular and polygons in GradeResults.

Page 3: Teacher will guide students to supplemental video on page 3. Students will watch first 12:48 minutes only of Math'sCool video about rotational symmetry in GradeResults.

Page 4: Teacher will guide students to supplemental video on page 4. Students will watch OER video about line symmetry in GradeResults.

Lesson Review for Lesson A: (5 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 21).

- In geometry, a change in position, size, or shape of a figure is called transformation. The four types of transformations are:
 - Translation (or) Slide
 - Reflection (or) Flip
 - Rotation (or) Turn
 - Dilation
- The original object or figure is called as pre-image, and the translated object is called as image.
- A translation is a type of transformation in which a figure or object is moved to another location without any change in its size or shape.
- A rotation is a transformation that turns a figure about a fixed point called the center of rotation. The number of degrees a figure rotates is called the angle of rotation. Rotations can occur in clockwise or anticlockwise direction.
- Reflection is a type of transformation that creates a mirror image. The original figure is reflected across a line and that line is called line of reflection.
- Dilation is a transformation that produces an image that is of the same shape as the original figure but of a different size. The figure is either stretched or shrunk.
- Dilation of scale factor "k" is given by $D_k \rightarrow (k * x, k * y)$.
- If the scale factor "k" is greater than 1, then the image is enlarged or stretched. If the scale factor "k" is between 0 and 1, then the image is reduced or shrunk.
- Have students review the slides and their notes to prepare for the posttest.

Lesson Review for Lesson B: (5 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 15).

- Polygon is a closed plane figure made up of line segments joined together.
- If all the sides and angles of a shape are equal in measure, then it is a regular polygon.
- If all the sides of a shape are different in measure, then it is an irregular polygon.
- The line which divides the figure or object into identical shapes is called the line of symmetry.
- When a figure is rotated less than 360° about a center point to obtain the original figure, then the figure is said to have rotational symmetry.
- The minimum angle through which the figure has to be rotated to get the original figure is called the angle of rotation.
- If a figure is rotated about a point by 180° and looks identical to the original, then that point is called the point of symmetry.
- A regular polygon carries onto itself when it is reflected across a line of symmetry.

1. If n is odd, the lines of symmetry pass through a vertex and the midpoint of the opposite side.
 2. If n is even, the lines of symmetry either pass through two opposite vertices or pass through the midpoints of two opposite sides.
- A regular polygon carries onto itself when it is rotated by a multiple of $\frac{360^\circ}{n}$
 - Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes

Take a moment to reflect on the lesson of the day. Use an exit ticket: Ask students which transformation can be described as a turn? A slide? A flip?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 3

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 3: Sequence of Transformations

Objective(s): Students will

- Define transformation and list down the different types of transformations.
- Identify and perform sequence of transformations on a given figure.

Guiding Question(s):

What does it mean to compose transformations?

How do we describe/represent sequence of transformations that take place in the coordinate plane?

TN Curriculum Standard(s): G.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.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results.

Technology: Computer, Whiteboard, TEAMs meeting (if applicable)

Key Vocabulary/Terms (Slide 18):

- **Transformation:** A function or mapping that results in changing the position, shape, or size of a figure.
- **Translation:** A transformation in which every point of a figure is moved to the same distance in the same direction.
- **Rotation:** A transformation that turns a figure about a fixed point called the center of rotation.
- **Reflection:** A transformation in which a figure is reflected across a line and creates a mirror image.

Attendance in Powerschool: 5 minutes

Lesson Introduction (I Do): 15 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *We are going study sequence of transformation (also known as, compositions of transformations). A sequence of transformation happens when we combine two or more transformations to form a new transformation.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will present and explain the introduction of the lesson by explaining the connection between a bird's reflection and composition of transformations as illustrated in Grade Results.

Slide 3-6: Teacher will explain and discuss sequence of transformations with examples in GradeResults. Students will complete embedded practices along with their teacher.

Slide 7: Students will complete practice activities to find coordinates after a sequence of transformations.

Slide 8-9: Teacher will explain how to perform sequence of transformations with examples in GradeResults. Students will complete embedded practices along with their teacher.

Slide 10: Students will complete practice activities about performing a sequence of transformations on a line segment.

Slide 11-13: Teacher will explain and discuss strategy to identify transformations in a sequence of transformations the examples in GradeResults. Students will complete embedded practices along with their teacher.

Slide 14: Students will watch the embedded KhanAcademy video in GradeResults about preserved properties after sequence of transformations.

Slide 15-16: Students will complete practice activities about sequence of transformations.

Supplemental: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Student will watch only the first 10:35 minutes OER video about sequence of transformations in GradeResults.

Page 2: Student will watch only the first 6:50 minutes OER video of example of sequence of transformation in Grade Results.

Page 3: Student will watch the KhanAcademy transformations in the plane video in GradeResults.

Lesson Review: (5 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 17)

- A transformation is a function or mapping that results in changing the position, shape, and size of a figure.
- Rotation is a transformation that turns a figure about a fixed point called the center of rotation.
- Reflection is a transformation in which a figure is reflected across a line and creates a mirror image.
- Translation is a transformation in which an object is moved to a fixed distance in each direction.
- When two or more transformations are combined to form a new transformation, the result is called a composition of transformations (or) sequence of transformations.
- Glide reflection is a composition of a translation along a line with a reflection across the line parallel to the direction of translation.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only **one** of the following 3 options]

Take a moment to reflect on the lesson of the day:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we can about this lesson? Have students explain relevancy of the concept to their life or how they might use it.

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 4

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 4: Rigid Transformations and Congruence

Objective(s): Students will

- Understand rigid transformations.
- Use the definition of congruence in terms of rigid motions to describe congruency.
- Explain congruent triangles in terms of rigid motion

Guiding Question(s):

How do we define and explain congruence in terms of rigid motions?

Which transformation (or sequence of transformations) would produce an image that is congruent to its preimage?

TN Curriculum Standard(s): G.CO.B.6, G.CO.B.7 * 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 determine informally if they are congruent.

* Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 17):

- **Congruent Figures:** Two figures are congruent if and only if the corresponding sides and angles are equal in both the figures.
- **Pre-image:** Original figure before transformation.
- **Image:** The resulting figure after transformation.
- **Transformation:** A change in position and size of a geometric figure.
- **Translation:** A transformation in which the figure changes its position.
- **Rotation:** A transformation in which the figure is turned about a fixed point.
- **Reflection:** A transformation in which the figure is reflected over any line and creates a mirror image.
- **Composition of Transformation:** A combination of two or more transformations.
- **Rigid Motion:** A transformation that preserves length and angle.
- **Isometry:** A transformation that preserves distance or length.

Lesson Introduction (I Do): 15 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *Today, we will define congruence using the properties of rigid transformations. A transformation is a rigid transformation (or a rigid motion) when it preserves distance (or length) and angle measures; that is, the shape and the size of the preimage and the image are the same.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson by reviewing rigid motions using real-world illustration of fishes in a fish tank in Grade Results.

Slide 3-4: Students will read about rigid transformations or isometries and complete embedded practice activity to sort transformations that are rigid.

Slide 5-8: Teacher will explain and demonstrate the definition of congruence in terms of rigid motions using Grade Results illustration. Teacher will model the examples and the non-examples in GradeResults to explain rigid motions (or isometries).

Slide 9-11: Students will practice determining and explaining rigid motions (or isometric transformations), discuss the examples in Grade Results, and complete Sorting Activity to determine whether given transformations are rigid or non-rigid.

Slide 12: Teachers will explain CPCTC using the illustration in Grade Results, teach students how to identify corresponding parts base on their relative locations in figures or in congruence statements, and discuss how to identify congruence parts using measures of matching marks.

Slide 13-15: Students complete activities to practice listing corresponding parts and identify congruence using congruent parts.

Supplemental video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch only the first 5:30 minutes of Common Core Math video in Grade Results about rigid transformations in the plane.

Page 2: Students will watch KhanAcademy video about congruent shapes and transformations

Page 3 and Page 4: Students will watch OER video in Grade Results about rigid transformations.

Page 5: Students will watch KhanAcademy video in Grade Results about transformations that map a figure onto another.

Lesson Review: (5 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 16).

- A function or mapping that results in changing the position, shape, and size of a figure.
- Rotation is a transformation that turns a figure about a fixed point called the center of rotation.
- Reflection is a transformation in which a figure is reflected across a line and creates a mirror image.
- Translation is a transformation in which an object is moved to a fixed distance in a given direction.
- When two or more transformations are combined to form a new transformation, the result is called a composition of transformations (or) sequence of transformations.
- Glide reflection is a composition of a translation along a line with a reflection across the line parallel to the direction of translation.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only **one** of the following 4 options]

Take a moment to reflect on the lesson of the day:

1) Repeat the Lesson Review.

- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: How are the following definitions for congruence related? a) objects with the same shape and the same size. b) objects that can be mapped onto each other using only rigid motions.

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 5

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 5: Angles of a Triangle

Objective(s): Students will

- Define the interior angle and exterior angle of a triangle
- Find the interior and exterior angle of a triangle (SM 7)
- Show that the sum of the angles in a triangle is the angle formed by a straight line (SMP 3, SMP 5)
- Explain about the angle-angle criterion for similarity of triangles (SMP 6)
- Construct triangles from three measures of angles (SMP 4)

Guiding Question(s):

How do I know which method to use to prove two triangles congruent?

How do the criteria for triangle congruence follow from the definition of congruence in terms of rigid motions?

Under what condition are similar figures congruent?

What strategies can I use to determine missing side lengths of similar figures?

TN Curriculum Standard(s): G.SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMs meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 20):

- **Interior Angle:** The angle formed by two adjacent sides inside a polygon
- **Irregular Polygon:** A polygon that does not have all sides equal and all angles equal
- **Polygon:** A closed two-dimensional figure having three or more sides
- **Regular Polygon:** A polygon with all sides equal and all angles equal
- **Triangle:** A polygon with three sides and three angles

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *Today, we will learn to find the interior and exterior angle of a triangle and show that the sum of the angles in a triangle is the angle formed by a straight line.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will present and explain the introduction of the lesson by guiding students to look at the 4 angles marked on the blackboard in the illustration.

Slide 3-4: Teacher will go over the definitions of interior and exterior angles. Teacher will go over the names of different types of polygons (classified by the number of sides). Teacher will explain the differences between Regular and Irregular polygons and show the examples.

Slide 5: Teacher will go over Interior Angles in detail and students will answer a Quick check question.

Slide 6: Teacher will go over Exterior Angles in detail and discuss linear pairs and exterior angle sum.

Slide 7-8: Students will watch the video on the Triangle Angle Sum Theorem (length – 5:09). Teacher will go over interior and exterior angles in a triangle in more detail.

Slide 9: Teacher will go over a few more facts about Exterior Angles we will discuss the Practice example

Slide 10: Students will watch the Triangle Angle Example video (length – 6:02) and the Sum of Interior Angles video (length – 4:37)

Slide 11-12: Teacher will go over 3 examples on finding the measures of interior and exterior angles.

Slide 13-14: Teacher will go over the AA Similarity Criterion and explain how to use it and go over an example about finding missing angles using AA Criterion

Slide 15: Students will watch a video on how to Determine Similar Triangles using AA Criterion (length – 6:25) and complete a practice example

Slide 16: Teacher will go over the steps to construct Triangles from Three Measures of Angles

Slide 17: Students will watch a video on Constructing Triangles with Angle Measures (length – 2:15) and do a Practice Now example

Slide 18: Students will complete an activity/task using a writing board or scientific calculator

Supplemental Video: Teacher will instruct students (as needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Student will watch the Mathispower4u video in GradeResults on Complementary, Supplementary, and Vertical Angles (length – 8:42)

Page 2: Students will watch the Khan Academy video on Angle Measures formed by two Transversals (length – 4:54)

Lesson Review: (5 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 19).

- The number of interior angles in any polygon is equal to the number of vertices it holds.
- The alternate interior angles formed by a transversal with the parallel lines are equal
- The sum of the interior angles in a triangle is 180°

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 10 minutes [teacher, choose only **one** of the following 4 options]

Take a moment to reflect on the lesson of the day:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we can about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: How do we find the measures of interior angles and exterior angles?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 6

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 6: Similarity and Congruence

Objective(s): Students will

- Define similar and congruent figures.
- List the different congruence criteria or postulates used in congruency.
- Use the properties of similarity and congruency to find the missing lengths and angles in a triangle

Guiding Question(s):

How do I know which method to use to prove two triangles congruent?

How do the criteria for triangle congruence follow from the definition of congruence in terms of rigid motions?

Under what condition are similar figures congruent?

What strategies can I use to determine missing side lengths of similar figures?

TN Curriculum Standard(s): G.CO.B.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 22):

- **Congruent Figures:** Figures which are similar in shape and size.
- **Polygon:** A closed plane figure formed with straight lines.
- **Postulate:** A true statement which does not require any proof.
- **Similarity Figures:** Figures which are similar in shape and different in size.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *Today, we will learn to determine the minimum conditions necessary for two triangles to be congruent (having the same shape and the same size) or similar (having the same shape but not necessarily the same size). From the studies of rigid motion, we know that corresponding parts of congruent triangles are congruent (CPCTC).* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will present and explain the introduction of the lesson by guiding students to compare the size and shape of household items in the illustration in Grade Results.

Slide 3-4: Teacher will explain similar and congruent figure using real-world references in Grade Results.

Slide 4: Students will compare congruence and similarity with a comparison table. Students will complete the embedded matching practice activity about similarity and congruence.

Slide 6: Teacher will introduce the triangle congruence theorems and demonstrate ASA with illustration and example in Grade Results.

Slide 7-8: Students will watch ASA Postulate video, discuss the example in Grade Results, and complete the Pairs Activity to practice using the postulate.

Slide 9: Teacher will demonstrate SAS Postulate using the Example in Grade Results.

Slide 10-14: Students will watch SAS and SAS Postulate video, discuss the example in Grade Results, and complete matching activity to practice using the postulates.

Slide 15: Teacher will tell students about other congruence theorems and explain with the examples in Grade Results.

Slide 16-17: Students will practice identifying congruence theorems and how to apply congruence and similarity relationships between pairs of corresponding angles.

Slide 18-19: Teacher will introduce proportional relationship between sides of similar figures and model the examples in Grade Results about corresponding side lengths and angle measures.

Slide 20: Students will solve three practice questions to find proportional side lengths in similar figures. Teacher will support students to set up and explain their solutions.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Student will watch the KhanAcademy Congruence Criteria video in GradeResults.

Page 2: Students will watch the first 11:40 minutes of Math’sCool properties of congruence video in Grade Results.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 21).

- Two figures are similar if they have the same shape, but different size.
- Two figures are congruent if they have the same shape and size.
- ASA postulate states that if two angles and the included side of one triangle are equal to two angles and the included side of another triangle, then the two triangles are congruent.
- SAS postulate states that if two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the two triangles are congruent.
- SSS postulate states that if three sides of one triangle are congruent to three sides of another triangle, then the two triangles are congruent.
- AAS postulate states that if two angles and the non-included side of one triangle are congruent to the two angles and non-included side of another triangle, then the two triangles are congruent.
- HL postulate states that if the hypotenuse and one leg of a right-angled triangle are equal to the hypotenuse and one leg of another right-angled triangle, then the two triangles are congruent.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today’s lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 10 minutes [teacher, choose only **one** of the following 4 options]

Take a moment to reflect on the lesson of the day:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: How does CPCTC relate to SSS, ASA, and SAS congruence criteria?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 7

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 7: Parallel Lines Cut by a Transversal and Angle Relationships

Objective(s): Students will

- Define parallel lines and transversal.
- List down the different types of angles formed by parallel lines and transversal.
- Prove theorems regarding the pair of congruent angles formed between parallel lines and transversal.
- Explain perpendicular bisector theorem and vertical angle theorem.

Guiding Question(s):

How do we prove theorems about angle pairs and parallel lines that are crossed by a transversal line?
What is a perpendicular bisector?

TN Curriculum Standard(s): G.CO.C.9 Prove theorems about lines and angles.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMs meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 18):

- **Angle:** Amount of turn formed by two rays sharing an endpoint.
- **Adjacent Angles:** Two angles share a common side and a common vertex, and do not overlap.
- **Vertical Angles:** The angles formed opposite to each other when two lines cross or intersect. They are equal in measure.
- **Supplementary Angles:** Two angles are supplementary when they add up to 180° .
- **Linear Pair:** Two angles are said to be linear pair if they are adjacent angles and the sum of their measure is 180° .
- **Parallel lines:** Two or more straight coplanar lines that do not intersect.
- **Transversal:** A line that intersects two or more coplanar lines at distinct points.
- **Perpendicular Bisector:** A line segment which is perpendicular to and passing through the midpoint of the line.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *In today's lesson, we are going to prove theorems about pairs of angles, parallel lines, and congruent relationships created by perpendicular bisectors. We will identify and prove angles created when one line crosses another line at a point and corresponding angles created when a line crosses two or more parallel lines. We will use properties of congruence and perpendicular bisectors to solve missing distance (or length) of segments.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will present and explain the introduction of the lesson by highlighting various geometric shapes in the real-world illustrations in Grade Results.

Slide 3: Teacher will have students watch embedded video about vertical angle in Grade Results and model the example question in Grade Results. Teacher will model problem about linear angle pairs in Grade Results.

Slide 4-5: Students will solve problems and complete practice activities about angle pairs.

Slide 6: Teacher will explain and help students to compare angle pairs and relationships. Students will note and discuss easy methods to remember each concept.

Slide 7: Students will complete Drag-N-Drop practice activity about angle relationships.

Slide 8: Teacher will review the definition of parallel lines using real-world references in Grade Results. Students will watch introductory video about angle relationships and angle pairs created when a transversal crosses parallel lines.

Slide 9: Students will practice identifying angle pairs and complete matching activity about angle pairs and relationships.

Slide 10-11: Teacher will tell students: *a theorem is a statement that can be proven*. Teacher will demonstrate and guide students through the proofs of Angle Pairs and Parallel Lines theorems using Tabbed Info activities in Grade Results.

Slide 12-13: Student will complete practice activities to solve problems with Angle Pairs in Parallel Lines theorems.

Slide 14-16: Teacher will teach the Perpendicular Bisector Theorem and model the proof using Tabbed Info activity in Grade Results. Students will complete practice activities about perpendicular bisectors and angle pairs in parallel lines.

Supplemental Video: Teacher will instruct students (as needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1-3: Students will watch the video on Parallel Lines Intersected by a Transversal, Angles and Corresponding Angles

Page 4: Students will watch Math'sCool video in Grade Results about using parallel lines and transversals to build a garden.

Page 5: Students will watch brief OER video clip about Z-strategy to identify and solve angle pairs in parallel lines.

Page 7: Students will watch ModuMath OER video to see examples of the can use the measure of one angle to find the measure of the seven other angles in parallel lines.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 17).

- Two lines are parallel if they lie in the same plane and never intersect.
- A transversal is a line that intersects two or more coplanar lines at distinct points.
- Angles that lie on the opposite sides of the transversal and that lies outside the parallel lines are called alternate exterior angles and their measures are equal.
- Angles that lie on the opposite sides of the transversal and that lies inside the parallel lines are called alternate interior angles and their measures are equal.
- Angles that lie on the same side of the transversal on two different parallel lines and in corresponding positions are called corresponding angles and their measures are equal.
- Interior angles that lie on the same side of the transversal are called same side interior angles and their measures are supplementary.
- If two lines intersect each other, then the vertically opposite angles are congruent.
- If a transversal intersects two parallel lines, then same side interior angles are supplementary.
- If a transversal intersects two parallel lines, then the alternate exterior angles are congruent.
- If a transversal intersects two parallel lines, then the corresponding angles are congruent.
- If a transversal intersects two parallel lines, then the alternate interior angles are congruent.
- If a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only **one** of the following 4 options]

Take a moment to reflect on the lesson of the day:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: How do angle pairs created by a transversal line help us determine if two lines are parallel?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 8

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 8: Prove Theorems about Triangles

Objective(s): Students will

- Recall the basic terminologies involved in geometry.
- Prove the angle sum theorem and use it to find the measure of missing angle in a triangle.
- Explain the base angle theorem involved in finding the measure of missing angles in isosceles triangle.
- Prove the midsegment theorem and median concurrence theorem and use them to find the length of the missing segments in a triangle.

Guiding Question(s):

How do we determine the measure of a missing angle in a triangle?

How do we use special segments in triangles to solve problems and prove theorems about triangles?

TN Curriculum Standard(s): G.CO.C.10, G.SRT.B.4, G.SRT.B.5 *Prove theorems about triangles.

*Prove theorems about similar triangles. *Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 18):

- **Triangle:** A closed polygon with three sides.
- **Isosceles triangle:** A triangle that has two sides of equal length.
- **Median of a triangle:** A line segment joining a vertex to the midpoint of opposite side. Every triangle has exactly three medians.
- **Transversal:** A line that passes through two or more lines in the same plane at distinct points.
- **Quadrilateral:** A four-sided polygon.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *In this lesson, we are going to prove angle measures and relationships created by special segments in triangles.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will present and explain the introduction of the lesson by highlighting the triangle in geometric shapes students see in playground illustration in Grade Results and teaching the definition for a triangle.

Slide 3-4: Teacher will guide students through identifying interior angles in a triangular cake, let students watch the embedded video of the proof that the sum of the interior angles of a triangle is 180 degrees and model the proof with the Tabbed Activity and practice question in Grade Results.

Slide 5-6: Students will discuss practice example of finding missing angle in triangles and Drap-N-Drop activity to match properties of triangles.

Slide 7: Teacher will explain and model the proof of the Isosceles Triangle Theorem using illustration and Tabbed Activity proof in Grade Results. Student will watch KhanAcademy video about the proof of the theorem.

Slide 8-9: Students will complete practice activities in Grade Results to use the Isosceles Triangle Theorems.

Slide 10: Teacher will explain and model the proof of the Mid-segment theorem using illustration and Tabbed Activity proof in Grade Results. Student will watch Mathispower4u video with detailed explanation and illustration of the theorem.

Slide 11: Students will discuss an example problem and complete two practice activities in Grade Results with the Mid-segment theorem.

Slide 12: Teacher will explain and model the proof of the Median Concurrence Theorem. Teacher will demonstrate examples practice problems using illustrations and example activities in Grade Results.

Slide 13-16: Students will complete practice activities in Grade Results using Median Congruence Theorem, Mid-segment Theorem, and Isosceles Triangle Theorem.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch KhanAcademy video in Grade Results that demonstrate an equilateral triangle is a special isosceles triangle that have three congruent sides and three congruent angles.

Page 2: Students will watch first 16:35 minutes Common Core Math video to review special angle relationships and see more example of solutions to problems involving angles in triangles.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 17).

- The sum of the measures of the three angles of a triangle is 180° . This is known as the angle sum property of a triangle.
- If two sides of a triangle are congruent, then the angles opposite to those sides are congruent. This is known as base angle theorem.
- The line segment joining the midpoints of two sides of a triangle is parallel to the third side and half its length. This is known as midsegment theorem.
- Medians of a triangle are divided in the ratio 2:1 by the point called centroid. This is known as median concurrence theorem.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only **one** of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: What is consistent and what is not consistent about the interior angles of any triangle?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 9

Topic/Lesson Title & Grade Results #: Geometry (Part I) Lesson 9: Properties of Similarity Transformations

Objective(s): Students will

- Define similarity.
- Explain the properties of a similarity transformations.
- Apply the AA (Angle-Angle) similarity criterion for similar triangles in real life situations.
- Find the missing side or angle in the similar triangle using properties.

Guiding Question(s):

How do we explain the AA criterion for two triangles to be similar?

How do we apply the properties of AA similarity to solve real-world problems?

TN Curriculum Standard(s): G.SRT.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 17):

- **Congruent:** Figures are same in shape and size.
- **Dilation:** A type of transformation that stretches or shrinks the original figure.
- **Similarity:** Two figures or objects are similar if they have the same shape, but not necessarily the same size.
- **Transformation:** The change of position or size of objects or figures in the coordinate plane.
- **Triangle:** A closed figure with three sides.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *Today, we will learn how solve real-world measurements with similar figures. Two figures are similar if they have the same size but not necessarily the same shape. In other words, similar figures have corresponding angle measures that are congruent and corresponding side lengths that are proportional (with equal ratios).* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 45 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson and explain similarity using real-world reference in Grade Results about similar leaves and given examples of similar triangles.

Slide 3-4: Teacher will review definition of similarity using Photo Album Activity in Grade Results along with students. Teacher will explain and model AA similarity using the example in Grade Results and the practice Activity.

Slide 5-7: Students will discuss and complete practice activity in Grade Results to apply AA similarity.

Slide 8: Teacher will model solving the measures of similar triangle with example problem and guide students to complete Pair Activity about the measures of side of similar triangles.

Slide 9-11: Students will watch the embedded video about real-life application of similar triangle. Students will discuss example problems and complete related practice activities.

Slide 12: Teacher will explain and model real-life application problems using similar triangle.

Slide 13-15: Students will complete four practice activities/problems to master applying similarity to solve real-world problems.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch OER video in Grade Results about the application of similarity to solve real-world problems.

Page 2: Students will watch OER video in Grade Results that demonstrates how to solve similar triangles.

Page 3-7: Students will watch videos on Scale, similarity, enlargement, and similar triangles

Page 8: Students will watch videos on Scale factor in Similar triangles

Page 9-14: Students will watch videos on Similarity, Scale Factor, and Transformations

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 16).

- If a triangle is dilated with a scale factor of k , then the side measures of the dilated triangle are obtained by multiplying the side measures of the original triangle by k .
- If two triangles are similar, then their corresponding sides are proportional and corresponding angles are congruent.
- AA similarity criterion states that if two angles of a triangle are respectively equal to two angles of another triangle, then the two triangles are similar.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 45 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only **one** of the following 4 options]

Take a moment to reflect on the lesson of the day:

1) Repeat the Lesson Review.

2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?

3) Ask student: Why do we can about this lesson? Have students explain relevancy of the concept to their life or how they might use it.

4) Ask students: How does similarity make it easier to solve real-world measurements?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 10

Topic/Lesson Title & Grade Results #: Final Post-Test Review & Post-Test

Objective(s):

- Students will review lessons to prepare for final Post-Test.
- Final Post-test will open. All students must complete the final Post-Test

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Lesson Introduction (I Do):

Identify the purpose of the course

Connect the course to missing or future coursework and Post-test

Lesson Activities and Review (We Do): 40 minutes

Check Grade Results and have students to review activities/lesson that they have not completed or need assistance with. Hold an open Q&A for students to ask questions regarding the activities/lessons they are reviewing.

Independent Work – Posttest (They Do): 80 minutes

Students will review and complete any incomplete/missed/failed coursework and complete the post-test

Closing/Wrap Up: N/A

SEMESTER 2

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 11

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 1: Writing Equations of Parallel and Perpendicular Lines

Objective(s): Students will

- Find the equation of a parallel line that passes through a given point.
- Find the equation of a perpendicular line that passes through a given point.

Guiding Question(s):

How are the slopes of lines used to determine if the lines are parallel, perpendicular, or neither?

How do you write the equation of line that goes through a given point and is parallel or perpendicular to another line?

How can I prove properties of geometric figures algebraically?

TN Curriculum Standard(s): G.GPE.B.3 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 23):

- **Parallel Lines:** Lines that will never intersect each other.
- **Perpendicular Lines:** Lines that intersect at right angles.
- **Slope:** Steepness of a straight line.
- **Slope-intercept Form:** A linear equation of the form $y = mx + b$, where m is the slope and b is the y -intercept.
- **y -intercept:** The y -coordinate of the point where the graph cuts the y -axis.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *The slope of a line is a ratio that indicates the steepness and the direction of the line. You are going to use slopes to determine when lines are parallel, perpendicular, neither. You will use coordinates and equations to prove relationships between lines or to write the equation of lines.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 45 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson by reviewing the definition for parallel and perpendicular lines with real-world illustrations in Grade Results.

Slide 3-4: Teacher will explain parallel lines, perpendicular lines, intersecting lines that are not perpendicular, and slope. Teacher will model examples that are in Grade Results.

Slide 5: Students will review computing slopes with Grade Results activities.

Slide 6-7: Teacher will explain and model writing equation of lines. Students will complete practice activity in Grade Results about slope and equation of line.

Slide 8: Students will watch embedded video about slope criteria.

Slide 9: Teacher will model writing the equation of line that goes through a given point and is parallel to another line.

Slide 10-12: Students will complete activities in Grade Results to practice writing equation of line that goes through a given point and is parallel to another line.

Slide 13: Teacher will model writing the equation of line that goes through a given point and is perpendicular to another line.

Slide 14-17: Students will watch embedded video and activities in Grade Results to practice writing equation of line that goes through a given point and is perpendicular to another line.

Slide 18: Teacher will model how to use slope criteria to determine relationships between lines in the coordinate plane.

Slide 19-21: Students will complete activities in Grade Results to slope criteria.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch OEC video in Grade Results about using coordinates to find slopes.

Page 2-5: Students will watch Mathispower4u video on Determining the Equation of a Parallel Lines

Page 7-11 : Students will watch videos on Determining the equation of a Perpendicular Line

Page 12-13: Students will watch videos on Writing Equations in Slope Intercept Form

Page 14-17: Students will watch videos on Slopes of Parallel and Perpendicular Lines

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 22).

- Lines that never intersect each other and lie in the same plane are called parallel lines.
- Lines that intersect at right angles and lie in the same plane are called perpendicular lines.
- The slope-intercept form of a line is $y = mx + b$, where m is the slope and b is the y -intercept.
- The point-slope form of a line is $y - y_1 = m(x - x_1)$, where (x_1, y_1) is a point on the line and m is the slope.
- The slopes of the parallel lines are equal. That is, $m_1 = m_2$.
- The slopes of the perpendicular lines are negative reciprocals of each other. That is, $m_1 = \frac{-1}{m_2}$ or $m_1 \times m_2 = -1$.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 45 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only one of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options:

1) Repeat the Lesson Review.

2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?

3) Ask student: Why do we can about this lesson? Have students explain relevancy of the concept to their life or how they might use it.

4) Ask students: How do slopes help us to determine if two lines in the plane are parallel, perpendicular, or neither?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 12

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 2: Trigonometric Ratios

Objective(s): Students will

- Define trigonometric ratios and similar right triangles.
- Find the measure of missing side using trigonometric ratios.
- Find the measure of missing angle using inverse trigonometric functions.
- Define complementary angles.
- Find the sine and cosine of complementary angles using special right triangles.

Guiding Question(s):

How are the sides and angles of right triangles related to each other?

How do we use trigonometric ratios in a right triangle to solve a missing side length and a missing angle measure?

How can right triangle relationships be used to solve practical problems?

TN Curriculum Standard(s): G.SRT.C.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 22):

- **Acute angle:** An angle with a measure between 0° and 90° .
- **Complementary angles:** A pair of angles whose sum is 90 degrees.
- **Right triangle:** A triangle whose one of the interior angles is 90° .
- **Similar triangles:** Triangles whose corresponding angles are equal and the corresponding sides are in proportion.
- **Trigonometric ratios:** Ratios which compare the lengths of the sides of a right-angled triangle.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *In the word trigonometry, “trigono” is from the Greek word for triangle and “-metry” means measures. Trigonometry deals with the relationship between the measures of the sides and the angles of triangles.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 45 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson using illustration of right triangle in Grade Results and help students review how to identify a right triangle and its hypotenuse.

Slide 3: Teacher will demonstrate how to identify and use the hypotenuse of a right triangle and the side opposite or adjacent to a specific acute angle in the triangle as they apply to the definition of each trigonometric ratio.

Slide 4-5: Students will watch embedded video about trigonometric ratios and the use of SOH CAH TOA to recall each definition. Students will learn about the equality of trigonometric ratios of similar right triangles. Teacher will help students review key facts about triangles.

Slide 6-7: Students will watch video with examples of the application of SOH CAH TOA (the definitions). Teacher will demonstrate defining trigonometric ratios with matching activity in Grade Results demonstrate reciprocal relationship between pairs of the ratios (sin- csc, cos - sec, & tan - cot).

Slide 8-9: Students will complete activities in Grade Results to define trigonometric ratios.

Slide 10: Teacher will model the use of trigonometric ratios to solve missing measures and to check answers.

Slide 11-14: Students will complete activities in Grade Results to solve missing measures and discuss the use of the inverse of a ratio when solving for an angle measure.

Slide 15: Teacher will review complementary angles.

Slide 16: Students will complete activity in Grade Results about complementary angles.

Slide 17: Teacher will explain the relationship between trigonometric ratios of complementary angles in right triangle and demonstrate how to determine the ratio of complementary angles.

Slide 18-20: Students will complete practice activities in Grade Results about trigonometric ratios.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1-4: Students will watch only the first 20 minutes Trigonometry, Pythagorean Theorem and Similar Triangles video in GradeResults.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 21).

- If two right triangles are similar, then the corresponding trigonometric ratios are equal, and the corresponding angles are congruent.
- The sum of the measures of the interior angles of a triangle is 180° .
- The acute interior angles of a right triangle are complementary.
- If the sum of the measure of two angles is equal to 90° , then they are called complementary angles.
- The sine and cosine of complementary angles are equal. i.e., $\sin \theta^\circ = \cos (90 - \theta)^\circ$ and $\cos \theta^\circ = \sin (90 - \theta)^\circ$.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 45 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only **one** of the following 4 options]

Take a moment to reflect on the lesson of the day:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: How can the acronym SOH CAH TOA help you recall the definition of each trigonometric ratio?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 13

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 3: Application of Right Triangles

Objective(s): Students will

- Define Pythagorean theorem.
- Solve real-life situations involving trigonometric ratios and Pythagorean Theorem.

Guiding Question(s):

What is the Pythagorean Theorem, and when is this theorem used?

How can right triangle relationships be used to solve practical problems?

What is the Law of Sines and the Law of Cosines?

TN Curriculum Standard(s): G.SRT.C.8 Solve triangles.

a. Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

b. Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 23):

- **Adjacent Side:** The side adjacent to angle θ .
- **Hypotenuse:** The side opposite to the right angle in a right triangle.
- **Legs:** The sides that form a right angle in a right triangle.
- **Opposite Side:** The side opposite to angle θ .
- **Pythagorean Theorem:** It states the relationship between three sides of a right triangle.
- **Right triangle:** A triangle with one of the interior angle 90° .
- **Trigonometric Ratios:** Ratios which compare the lengths of any two sides of a right triangle.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *Today, you are going to use right triangles to model and solve applied problems about distance (width, height, length) and directions (angle of elevation and angle of depression).* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 45 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson by explaining illustrations in Grade Results of real-world situations that are modeled with right triangles.

Slide 3: Students will review properties of right triangle and trigonometric ratios with activity in Grade Results.

Slide 4: Teacher will explain and demonstrate the use of right triangle and trigonometry to solve applied problem with the given example and activity.

Slide 5-7: Students will watch embedded video about an applied solution with right triangle and discuss practice problems.

Slide 8: Teacher will explain the Pythagorean theorem and how it can be used to find missing lengths.

Slide 9-14: Students will watch embedded video about Pythagorean Theorem, discuss practice problems, and complete activities in Grade Results with applied problems.

Slide 15: Teacher will explain and model the use of the Law of Sines.

Slide 16: Students will discuss practice problems using the Law of Sines.

Slide 17: Teacher will explain and demonstrate the use of the Law of Cosines.

Slide 18-21: Students will complete practice activities with applied in Grade Results using Pythagorean Theorem, Law of Sines and Law of Cosines.

Supplemental Video: Teacher will instruct students(if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1-10: Students will watch Flocabulary video in Grade Results about Pythagorean Theorem and solution to applied problems.

Students will watch Khan Academy video about solving an applied problem with a right triangle.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 22).

- Trigonometric ratios describe the relationship between any two sides and an angle of a right triangle.
- The side opposite to the angle ϑ is called as opposite side; the side adjacent to angle ϑ is called as adjacent side.
- The side opposite to right angle is called as the hypotenuse.
- The Pythagorean Theorem states that the sum of the squares of the two sides of a right triangle is equal to the square of the hypotenuse.
- If a right triangle ABC is right angled at B , then $AB^2 + BC^2 = AC^2$.

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = \frac{\text{length of any side}}{\text{sine of its opposite angle}}$$

- Law of sines: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
- Law of cosines: In a triangle ABC , $a^2 = b^2 + c^2 - 2bc \cos A$, $b^2 = a^2 + c^2 - 2ac \cos B$, and $c^2 = a^2 + b^2 - 2ab \cos C$.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 45 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only one of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we can about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: When can you use the Pythagorean Theorem to solve a real-world problem?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 14

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 4: Area and Perimeter on Coordinate Plane

Objective(s): Students will

- Recall coordinate plane and distance formula.
- Represent polygons on the coordinate plane.
- Use distance formula to find the area and perimeter of the polygon on the coordinate plane.

Guiding Question(s):

How do we determine length of segments and perimeter of polygon using coordinates?

How are areas of triangles and rectangles in the coordinate plane calculated?

How can I prove properties of geometric figures algebraically?

TN Curriculum Standard(s): G.GPE.B.5 Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 21):

- **Area:** The amount of space inside the boundary of a closed figure.
- **Coordinate plane:** A plane in which a horizontal number line and a vertical number line intersect at zero.
- **Distance formula:** The distance between two points (x_1, y_1) and (x_2, y_2) is given by the formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
- **Perimeter:** The distance around the plane figure.
- **Polygon:** A closed plane that is formed by three or more line segments.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *We are going to review what is a polygon and derive the distance formula to solve perimeter and area of polygons in the coordinate plane.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson by explaining how polygons that model real-world situations can be represented in the coordinate plane.

Slide 3-4: Students will review how locations and common polygons are represented in the coordinate plane.

Slide 5-7: Teacher will teach the distance formula and demonstrated how it is derived from the Pythagorean Theorem. Students will complete Tabbed Info activity and practice question in Grade Results.

Slide 8-9: Students will watch embedded video with the use of coordinate to find lengths and complete practice activities in Grade Results.

Slide 10: Teacher will teach how to find midpoints with coordinates.

Slide 11: Students will complete practice activity in Grade Results to use coordinates.

Slide 12-13: Teacher will demonstrate how to find the area and perimeter of polygons with coordinates. Students will discuss and complete practice problems.

Slide 14-19: Students will complete activities using coordinates to find areas and perimeters.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch video in Grade Results about knowing how to use coordinates.

Page 2: Students will watch video in Grade Results about using coordinates to find distance.

Page 3-6: Students will watch videos in Grade Results about applications of coordinates with polygons.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 20).

- In a coordinate plane, a horizontal number line and a vertical number line intersect at a point called the origin.
- Polygons can be represented on the coordinate plane.
- Area and perimeter of a polygon can be determined using the distance formula.

- The distance between any two points is calculated using the formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only one of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options:

1) Repeat the Lesson Review.

2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?

3) Ask student: Why do we can about this lesson? Have students explain relevancy of the concept to their life or how they might use it.

4) Ask students: How do we use coordinates to calculate the perimeter and the area of polygons in the plane?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 15

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 5: Equation of the Circle

Objective(s): Students will

- Derive the equation of a circle when the center and radius are given.
- Derive the equation of a circle when the center and a point on the circle are given.
- Find an equation of a circle when the endpoints of the diameter are given.

Guiding Question(s):

How can I use the Distance Formula (or the Pythagorean theorem) to derive the equation of a circle?

How are equation of a circle and its graph related?

How can I prove properties of geometric figures algebraically?

TN Curriculum Standard(s): G.GPE.A.1 Know and write the equation of a circle of given center and radius using the Pythagorean Theorem.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 20):

- **Center of a circle:** The fixed point of a circle.
- **Circle:** A set of points on a plane that is equidistant from a fixed point.
- **Radius:** The distance from the center of a circle to any point on its circumference.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *A circle is a set of points that are the same distance from a fixed point called center. The radius of a circle is any segment (or length of segment) with one endpoint on the circle and the other at the center of the circle. In this lesson, you are going to write and use equations that describe the graph of circles.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 45 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson using real-world illustration in in a Grade Results.

Slide 3: Teacher will model and explain the equation of circle using center and radius with examples in Grade Results.

Slide 4-6: Students will discuss examples and complete practice activities in Grade Results to find equation of circles using center and radius.

Slide 7: Teacher will model and explain the equation of circle using center and a point on the circle with examples in Grade Results.

Slide 8-12: Students will watch example videos and complete practice activities in Grade Results to find equation of circles using center and a point on the circle.

Slide 13: Teacher will model and explain the equation of circle using given endpoints of the diameter with examples in Grade Results.

Slide 14-18: Students will watch example videos and complete practice activities in Grade Results to find equation of circles using given endpoints of the diameter. Teacher will assist students to expanding equation of circles using $(a + b)^2 = (a + b)(a + b)$ and *FOIL* or $(a + b)^2 = a^2 + 2ab + b^2$.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch Mathispower4u video in Grade Results about finding equation of a circle.

Page 6: Students will watch OER video in Grade Results about equation of a circle in standard form.

Page 7: Students will watch OER video in Grade Results about representing equation of a circle.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 19).

- A circle is the set of all points in a plane that are equidistant from a fixed point in the plane.
- The fixed point is called the center of the circle, and the fixed distance is called the radius of the circle.
- The standard equation of a circle with the center (h, k) and radius, r , is $(x - h)^2 + (y - k)^2 = r^2$.
- The standard equation of a circle with center at origin and radius, r , is $x^2 + y^2 = r^2$.
- The standard equation of the circle when the endpoints of the diameter are given is $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$.
- The general equation of the circle is $x^2 + y^2 + 2gx + 2fy + c = 0$.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 45 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only one of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we can about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: How do we represent a circle with an algebraic equation (or information about its graph)?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 16

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 6: Relationships Among Inscribed Angles, Radii, and Chords

Objective(s): Students will

- Define a circle and name its part.
- Find the measures of central, inscribed, and circumscribed angles of a circle.
- Demonstrate the relationship between inscribed angle and circumscribed angle with the central angle.
- Prove that the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

Guiding Question(s):

How is the measure of a central angle, an inscribed angle, and their intercepted arc related?

How is the measure of a circumscribed angle related to its central angle and its major and minor arcs?

What angle is formed at the intersection of a radius and a line tangent to its circle?

How do you show the relationships amongst the properties of circles?

TN Curriculum Standard(s): G.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 26):

- **Arc:** A part of the circumference of a circle.
- **Central angle:** Angle formed at the center of a circle by two radii.
- **Chord:** A line segment whose endpoints lie on the circle.
- **Circle:** A set of all points in a plane that are equidistant from a fixed point in the plane.
- **Circumscribed angle:** Angle whose vertex is outside the circle and its rays are tangents to the circle.
- **Diameter:** A straight line passing through the center of the circle connecting two points on the circle.
- **Inscribed angle:** Angle formed by two intersecting chords such that its vertex is on the circle.
- **Intercepted arc:** Arc that is formed when segments intersect portions of a circle and create arcs.
- **Radius:** The length of the line from the center to any point on the circle.
- **Secant:** A line that intersects a circle at two points.
- **Supplementary angles:** Angles whose sum is 180° .
- **Tangent:** A line that touches a circle at only one point.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *In today's lesson, you will determine the measure of angles created by segments in circles and segments that intersect circles.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson by reviewing the definition of a circle and the name of segments in circles using illustration and Tabbed Info activity in Grade Results.

Slide 3: Teacher will teach and explain angles in circles using Tabbed Info activity in Grade Results.

Slide 4: Students will complete activity in Grade Results about angles in circles.

Slide 5: Teacher will explain and demonstrate inscribed angle and intercepted arc using illustrations in Grade Results.

Slide 7-11: Students will discuss and complete activities about measures of inscribed angles and intercepted arcs.

Slide 12: Teacher will explain and demonstrate central angle using illustrations in Grade Results.

Slide 13-15: Students will watch video, discuss, and complete activities about central angles.

Slide 16: Teacher will explain and demonstrate circumscribed angles using illustrations in Grade Results.

Slide 17-20: Students will discuss and complete activities about measures of circumscribed angles and central angles. Teacher will support students to make the connection between the two types of angles using given examples.

Slide 21: Teacher will example the relationship between radius and tangent of a circle.

Slide 22-24: Students will complete practice problems and activities about relationships in circles.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch Khan Academy video about perpendicular segment relationships in circles.

Page 2-4: Students will watch OER video about inscribed angle and tangent relationships in circles and tangents and chords

Page 5-7: Students will watch OER video about measures of inscribed angle and central angles

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 25).

- An inscribed angle is an angle whose vertex is on a circle and whose sides are chords of the circle.
- The arc that lies in the interior of an inscribed angle is called the intercepted arc of the angle.
- An inscribed angle measures half of its intercepted arc.
- Two or more inscribed angles intercepted by the same arc are congruent.
- An inscribed angle subtends a semicircle if and only if the angle is a right angle.
- A central angle is an angle formed by two intersecting radii such that its vertex is at the center of the circle.
- A central angle has the same measure as the arc it subtends.
- The measure of the central angle is twice that of the measure of an inscribed angle intercepting the same arc.
- A circumscribed angle is an angle which has the vertex outside the circle, and its rays (sides) are tangents to the circle.
- The measure of the circumscribed angle is half of the difference between the intercepted arcs.
- The measure of the circumscribed angle and the central angle formed by the same arc are supplementary to each other.
- The radius of a circle is perpendicular to the tangent where the radius intersects the circle.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 45 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only one of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options: 1) Repeat the Lesson Review. 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear? 3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it. 4) Ask students: How does the measure of the intercepted arc related to a central angle and an inscribed angle?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 17

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 7: Area of a Sector

Objective(s): Students will

- Define the sector of a circle.
- Derive the formula used to find the area of a sector of a circle.
- Solve problems on finding the area of a sector of a circle.
- Define the arc length of a sector.
- Find the arc length of a circle.

Guiding Question(s):

How is a central angle related to the area of its sector or the length of its arc?

How do you show the relationships amongst the properties of circles?

TN Curriculum Standard(s): G.C.B.4 Know the formula and find the area of a sector of a circle in a real-world context.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMs meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 17):

- **Arc:** A curved line which is a part of the circumference of the circle.
- **Arc length:** The distance along the arc.
- **Area:** The amount of space inside the plane figure.
- **Central angle:** The angle formed when two radii meet at the center of a circle.
- **Circle:** The set of all points in a plane that are equidistance from a fixed point in the plane.
- **Sector:** The part of a circle enclosed by two radii and their intercepted arc.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: : *Today, we will use geometric methods to describe real-world situations involving parts of circles and derive formulas we can use to solve their measures.*

Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 45 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson with Grade Results illustration to make to connection between sector, arc, and a slice of pizza.

Slide 3-4: Students will complete activity to review parts of circles and the formula for area of a circle. Teacher will explain and demonstrate how to derive the formula for area of a sector.

Slide 5: Teacher will tell students sometimes angle measures are given in *radian* instead of *degree* and teach how to convert between radian and degree for the measure of angles. Students will watch video about conversion of radian and degree measures.

Slide 6: Student will complete practice activities to convert between radian and degree measures.

Slide 7: Teacher will model how to find the area of a sector and guide students with using the area of a sector to find angle measure in an activity.

Slide 8-9: Students will discuss examples and complete activity about area of sectors.

Slide 10: Students will review parts of circles and complete activity to review the formula for circumference of a circle. Teacher will explain and demonstrate how to derive the formula for arc length of a sector.

Slide 11-15: Students will discuss examples and complete activities about arc length of a sector and its area.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1-5: Students will watch Mathispower4u video about finding arc length in applied problem.

Page 6-14: Students will watch Mathispower4u video about finding arc length and area of sectors.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 16).

- A central angle is an angle whose vertex is at the center of a circle and two sides are radii of the circle intersecting the circle in two distinct points.
- A sector is a part of the circle bounded by two radii and an arc. It is a pie-shaped portion of a circle.
- Area of a sector and arc length of a circle are calculated using the formulas:

- Arc length
$$= \frac{\theta}{360^\circ} \times 2\pi r$$
 units.

- Area of sector
$$= \frac{\theta}{360^\circ} \times \pi r^2$$
 square units.

- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 45 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only one of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options: 1) Repeat the Lesson Review. 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear? 3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it. 4) Ask students: How do we use a central angle to solve the area of its sector or the length of its arc?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 18

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 8: Applying Geometric Methods - Word Problems

Objective(s): Students will

- Define geometric figures and their types.
- Recall the formulas used for the plane and solid figures.
- Apply geometric methods to solve design problems.

Guiding Question(s):

How can I solve real-world designed problems using geometric methods?

TN Curriculum Standard(s): G.MG.A.2 Apply geometric methods to solve real-world problems.

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms (Slide 20):

- **Area:** Amount of space inside a plane figure.
- **Geometric Model:** Mathematical model constructed using simple geometric figures.
- **Perimeter:** Distance around the closed geometric figure.
- **Surface Area:** Total area of all the faces in the solid figure.
- **Volume:** Amount of space occupied by an object.

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *Today, we will practice solving real-world measures using geometric methods to find area, perimeter, and volume. We will use what we know about geometric figures to solve the size of objects.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities (We Do): 50 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson with Grade Results illustration of real-world objects and the application of geometric methods to find their size/value.

Slide 3: Teacher will explain that shapes can be classified as plane shapes and solid shapes and demonstrate using Grade Results illustrations.

Slide 4-7: Students will discuss and complete Tabbed Info and matching activities to determine formula to use to solve the measure of geometric figures.

Slide 8-9: Teacher will explain and demonstrate strategy to use to solve world problems with geometric methods.

Slide 10-13: Students will discuss examples and complete activities to practice using learned strategy to solve world problems with geometric methods.

Slide 14: Students will watch video that demonstrate how to think about and find the volume of a cone.

Slide 15-18: Students will discuss examples and complete activities to practice applying geometric methods to solve word problems.

Supplemental Video: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1 and 4: Students will watch video on Diagonals of a Rhombus

Page 2, 3, and 5: Students will watch videos on Borromean Olympic Rings and Most Mathematical Flag

Page 6: Students will watch OER video in Grade Results about shape in math.

Page 7: Students will watch videos on 3D figures

Page 8: Students will watch OER video in Grade Results about connecting between 2D and 3D shapes with word problems.

Page 9: Students will watch OER video in Grade Results about 2D and 3D Geometry which explains formula used with geometric methods.

Lesson Review: (10 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 19).

- Shapes which have two dimensions namely length and width (breadth) are called plane shapes.
- Shapes which have three dimensions namely length, width, and height (depth) are called solid shapes.
- Geometric methods can be applied to the real-life situations to find its related geometric value.
- Have students review the slides and their notes to prepare for the posttest.

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today's lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only one of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options:

1) Repeat the Lesson Review.

2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?

3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it.

4) Ask students: How does geometry contribute to our understanding of the world-around us?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 19

Topic/Lesson Title & Grade Results #: Geometry (Part II) Lesson 9 – Surface Area and Volume of Solids

Objective(s): Students will

- (Lesson A) Calculate the volume of a prism, a cylinder, and a cone
- (Lesson A) Calculate the surface area of a prism, a cylinder, and a cone
- (Lesson B) Find the surface area and volume of pyramids
- (Lesson B) Find the surface area and volume of spheres

Guiding Question(s):

How can I solve real-world designed problems using geometric methods?

TN Curriculum Standard(s): G.GMD.A.2 – Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Key Vocabulary/Terms for Lesson A (Slide 23):

- **Base area:** The sum of the areas of the bases of the prism
- **Cone:** A solid figure that has one circular base and a vertex that is not on the base
- **Cylinder:** A solid figure that has two parallel circular bases, and a curved surface connects it
- **Perimeter:** The distance around a plane figure
- **Prism:** A polyhedron with two congruent parallel faces called bases. The other faces are rectangle, square, and parallelogram
- **Surface Area:** The sum of the areas of all the faces of the solid figure
- **Volume:** The amount of space inside a solid figure or object

Key Vocabulary/Terms for Lesson B (Slide 23):

- **Height of the pyramid:** Perpendicular distance between the base and the point where the triangular faces meet.
- **Pyramid:** A solid figure that has a base of any polygon and 3 or more triangular faces that meet at a point above the base.
- **Radius of the sphere:** Distance between the center and any point on the surface of the sphere
- **Slant height of the pyramid:** Height of the triangular faces of the pyramid
- **Sphere:** A solid figure which is spherical
- **Surface Area:** Sum of the areas of all the faces of the solid figure
- **Volume:** Amount of space inside the solid

Lesson Introduction (I Do): 10 minutes

Teacher will guide students to the lesson in GradeResults. Teacher will tell students: *Today, we will practice solving for the volume and surface area of different solids.* Teacher will guide students to the lesson in GradeResults. Teacher will present the TN State Standard(s) for the lesson, the Guiding Question(s), and teach the **Key Vocabulary/Terms**.

Lesson Activities for Lesson A (We Do): 25 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson with Grade Results.

Slide 3: Teacher will explain what a prism is and how to find the surface area and volume.

Slide 4-5: Students will take a look at a specific type of prism (rectangular prism) and identify the parts of it and find the surface area and volume of a rectangular prism.

Slide 6-7: Students will look at another type of prism, a triangular prism. Students will then look at an example showing how to find the surface area and volume of a triangular prism.

Slide 8-11: Teacher will go over regular square prisms, regular pentagonal prisms, regular hexagonal prisms, and cubes and how to find the surface area and volume of each.

Slide 12: Students will discuss cylinders and how to find the surface area and volume

Slide 13-14: Students will watch a video that demonstrates how to find the Volume of a cylinder and then look at an example of finding the surface area and volume of a cylinder.

Slide 15: Teacher will discuss cones and how to find the surface area and volume

Slide 16-19: Students will watch a video that demonstrates how to find the Volume of a cone and then look at examples of finding the surface area and volume of a cone

Slide 20-21: Students will complete the Practice Activity on finding the Surface Area of Solid Figures on slide 20 and the Practice Activity on finding the Volume of Solid Figures

Supplemental Video for Lesson A: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch Math'scool Module 13 video about the differences in surface area and volume

Page 2: Students will watch the Flocabulary video with a song that makes it easier to remember the volume formulas

Lesson Activities for Lesson B (We Do): 25 minutes

All activities are within the grade results lesson and should be completed as they appear in the lesson. As a whole group, complete the Practice Activities:

Slide 1-2: Teacher will have a student read the objective. Teacher will discuss the objective with the class using embedded illustrations. Teacher will introduce the lesson.

Slide 3-4: Teacher will discuss pyramids and its different parts and go over different types of pyramids (classified according to the shape of their base)

Slide 5-6: Teacher will discuss how to find the surface area and go over an example of finding the surface area of pyramids.

Slide 7: Students will complete the Practice Activity on Finding the Surface Area of a Pyramid with the help of the teacher.

Slide 8-9: Teacher will go over a few examples on finding the slant height of a pyramid given the Surface Area

Slide 10: Teacher will go over how to find the Volume of a Pyramid and demonstrate using the illustration on the slide

Slide 11-12: Students will watch a video on finding the Volume of a Pyramid and teacher will demonstrate how to find the volume of rectangular pyramid

Slide 13-14: Students will watch a video on Volume of a Pyramid: Examples and Concepts and teacher will demonstrate an example on finding the Volume of a Pyramid

Slide 15-16: Teacher will go over spheres and examples on how to find the surface area of a sphere. Students will also learn how to find the radius of a sphere given the surface area.

Slide 17-18: Teacher will go over the formula for finding the volume of a sphere and do an example. Next, students will watch a video on Volume of a Sphere

Slide 19-20: Students will complete a Practice Activity with the help of the teacher and students will watch a video with an application on finding Volume of spheres

Slide 21: Students will complete a Practice Activity with the help of the teacher.

Supplementary Video for Lesson B: Teacher will instruct students (if needed) to watch the instructional videos in the Supplemental tab of the lesson in Grade Results as listed here:

Page 1: Students will watch the Flocabulary video on volume of cones, cylinders, and spheres

Lesson Review for Lesson A: (5 minutes) Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 22).

- Volume is the amount of space occupied by an object. It is measured in cubic units
- Surface Area is the total area of the surfaces of a three-dimensional object. It is measured in square units.
- A prism is a polyhedron with two congruent parallel faces called the bases
- A cylinder is a prism with two circular bases
- A cone is a pyramid with a circular base
- The following formulas are used to find the volume and surface area of a cone and prism

Solid	Volume	Surface Area
Prism	Bh	$2B + Ph$
Cone	$\frac{1}{3}\pi r^2 h$	$\pi r(r + s)$

Lesson Review for Lesson B: (5 minutes): Teacher will summarize the lesson with the Lesson Review page in GradeResults (Slide 22).

- Volume of a pyramid = $\frac{1}{3} \times \text{Area of the base} \times \text{Height}$ cubic units
- Total surface area of a regular pyramid = $\text{base area} + (\frac{1}{2} \times \text{Perimeter of the base} \times \text{Slant height})$ square units
- Lateral surface area of a regular pyramid = $(\frac{1}{2} \times \text{Perimeter of the base} \times \text{Slant height})$ square units
- Surface Area of a sphere = $(4\pi r^2)$ square units
- Volume of a sphere = $(\frac{4}{3} \times \pi r^3)$ cubic units

Independent Work – Posttest / Notes Review (They Do): 40 minutes

Teacher will explain that students will work independently to complete the post-test. The post-test will count as the grade for today’s lesson. Students will complete the daily posttest for this lesson.

Closing/Wrap Up/Notes Review: 5 minutes [teacher, choose only one of the following 4 options]

Take a moment to reflect on the lesson of the day using **one** of the following options:

- 1) Repeat the Lesson Review.
- 2) Use an exit ticket. Ask students: What did you learn? What surprised you? What is still unclear?
- 3) Ask student: Why do we care about this lesson? Have students explain relevancy of the concept to their life or how they might use it.
- 4) Ask students: How does geometry contribute to our understanding of the world-around us?

Summer School Lesson Plan

Subject/Grade: Geometry

Day: 20

Topic/Lesson Title & Grade Results #: Final Post-Test Review & Post-Test

Objective(s):

- Students will review lessons to prepare for final Post-Test.
- Final Post-test will open. All students must complete the final Post-Test

Materials/Resources Needed: Grade Results Online Platform, Grade Results video, paper, pencil or notes in Grade Results

Technology: Computer, Whiteboard, TEAMS meeting (if applicable)

Attendance in Powerschool: 5 minutes

Lesson Introduction (I Do):

Identify the purpose of the course

Connect the course to missing or future coursework and Post-test

Lesson Activities/Supplemental (We Do) – **35 minutes**

Lesson Activities and Review (We Do):

Check Grade Results and have students to review activities/lesson that they have not completed or need assistance with. Hold an open Q&A for students to ask questions regarding the activities/lessons they are reviewing.

Independent Work – Posttest (They Do): 75 minutes

Students will review and complete any incomplete/missed/failed coursework.

Closing/Wrap Up: 5 minutes. Make sure students know what lessons they still need work on