Introduction

In 2014, the Shelby County Schools Board of Education adopted a set of ambitious, yet attainable goals for school and student performance. The District is committed to these goals, as further described in our strategic plan, Destination 2025. **By 2025,**

* **80% of our students will graduate from high school college or career ready**
* **90% of students will graduate on time**
* **100% of our students who graduate college or career ready will enroll in a post-secondary opportunity**

In order to achieve these ambitious goals, we must collectively work to provide our students with high quality, college and career ready aligned instruction. The Tennessee State Standards provide a common set of expectations for what students will know and be able to do at the end of a grade. College and career readiness is rooted in the knowledge and skills students need to succeed in post-secondary study or careers. The TN State Standards represent three fundamental shifts in mathematics instruction: **focus, coherence and rigor**.

The Standards for Mathematical Practice describe varieties of expertise, habits of minds and productive dispositions that mathematics educators at all levels should seek to develop in their students. These practices rest on important National Council of Teachers of Mathematics (NCTM) “processes and proficiencies” with longstanding importance in mathematics education. Throughout the year, students should continue to develop proficiency with the eight Standards for Mathematical Practice.

This curriculum map is designed to help teachers make effective decisions about what mathematical content to teach so that, ultimately our students, can reach Destination 2025. To reach our collective student achievement goals, we know that teachers must change their practice so that it is in alignment with the three mathematics instructional shifts.

Throughout this curriculum map, you will see resources as well as links to tasks that will support you in ensuring that students are able to reach the demands of the standards in your classroom. In addition to the resources embedded in the map, there are some high-leverage resources around the content standards and mathematical practice standards that teachers should consistently access:

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| --- | --- |
| The TN Mathematics Standards | |
| The Tennessee Mathematics Standards:  <https://www.tn.gov/education/article/mathematics-standards> | Teachers can access the Tennessee State standards, which are featured throughout this curriculum map and represent college and career ready learning at reach respective grade level. |
| Standards for Mathematical Practice | |
| Standards for Mathematical Practice <https://drive.google.com/file/d/0B926oAMrdzI4RUpMd1pGdEJTYkE/view> | Teachers can access the Mathematical Practice Standards, which are featured throughout this curriculum map. This link contains more a more detailed explanation of each practice along with implications for instructions. |

**Purpose of the Mathematics Curriculum Maps**

This curriculum framework or map is meant to help teachers and their support providers (e.g., coaches, leaders) on their path to effective, college and career ready (CCR) aligned instruction and our pursuit of Destination 2025. It is a resource for organizing instruction around the TN State Standards, which define what to teach and what students need to learn at each grade level. The framework is designed to reinforce the grade/course-specific standards and content—the major work of the grade (scope)—and provides a *suggested* sequencing and pacing and time frames, aligned resources—including sample questions, tasks and other planning tools. Our hope is that by curating and organizing a variety of standards-aligned resources, teachers will be able to spend less time wondering what to teach and searching for quality materials (though they may both select from and/or supplement those included here) and have more time to plan, teach, assess, and reflect with colleagues to continuously improve practice and best meet the needs of their students.

The map is meant to support effective planning and instruction to rigorous standards; it is *not* meant to replace teacher planning or prescribe pacing or instructional practice. In fact, our goal is not to merely “cover the curriculum,” but rather to “uncover” it by developing students’ deep understanding of the content and mastery of the standards. Teachers who are knowledgeable about and intentionally align the learning target (standards and objectives), topic, task, and needs (and assessment) of the learners are best-positioned to make decisions about how to support student learning toward such mastery. Teachers are therefore expected--with the support of their colleagues, coaches, leaders, and other support providers--to exercise their professional judgment aligned to our shared vision of effective instruction, the Teacher Effectiveness Measure (TEM) and related best practices. However, while the framework allows for flexibility and encourages each teacher/teacher team to make it their own, our expectations for student learning are non-negotiable. We must ensure all of our children have access to rigor—high-quality teaching and learning to grade-level specific standards, including purposeful support of literacy and language learning across the content areas.

**Additional Instructional Support**

Shelby County Schools adopted our current math textbooks for grades 6-8 in 2010-2011.  The textbook adoption process at that time followed the requirements set forth by the Tennessee Department of Education and took into consideration all texts approved by the TDOE as appropriate.  We now have new standards; therefore, the textbook(s) have been vetted using the Instructional Materials Evaluation Tool (IMET). This tool was developed in partnership with Achieve, the Council of Chief State Officers (CCSSO) and the Council of Great City Schools. The review revealed some gaps in the content, scope, sequencing, and rigor (including the balance of conceptual knowledge development and application of these concepts), of our current materials.

The additional materials purposefully address the identified gaps in alignment to meet the expectations of the CCR standards and related instructional shifts while still incorporating the current materials to which schools have access.  Materials selected for inclusion in the Curriculum Maps, both those from the textbooks and external/supplemental resources (e.g., engageny), have been evaluated by district staff to ensure that they meet the IMET criteria.

**How to Use the Mathematics Curriculum Maps**

**Overview**

An overview is provided for each quarter. The information given is intended to aid teachers, coaches and administrators develop an understanding of the content the students will learn in the quarter, how the content addresses prior knowledge and future learning, and may provide some non-summative assessment items.

**Tennessee State Standards**

The TN State Standards are located in the left column. Each content standard is identified as the following: Major Work, Supporting Content or Additional Content.; a key can be found at the bottom of the map. The major work of the grade should comprise 65-85% of your instructional time. Supporting Content are standards that supports student’s learning of the major work. Therefore, you will see supporting and additional standards taught in conjunction with major work. It is the teacher’s responsibility to examine the standards and skills needed in order to ensure student mastery of the indicated standard.

**Content**

Teachers are expected to carefully craft weekly and daily learning objectives/ based on their knowledge of TEM Teach 1. In addition, teachers should include related best practices based upon the TN State Standards, related shifts, and knowledge of students from a variety of sources (e.g., student work samples, MAP, etc.). Support for the development of these lesson objectives can be found under the column titled ‘Content’. The enduring understandings will help clarify the “big picture” of the standard. The essential questions break that picture down into smaller questions and the objectives provide specific outcomes for that standard(s). Best practices tell us that clearly communicating and making objectives measureable leads to greater student mastery.

**Instructional Support and Resources**

District and web-based resources have been provided in the Instructional Resources column. Throughout the map you will find instructional/performance tasks, i-Ready lessons and additional resources that align with the standards in that module. The additional resources provided are supplementary and should be used as needed for content support and differentiation.

**Topics Addressed in Quarter**

|  |  |
| --- | --- |
| **Slope**  **Functions**  **Compare and Construct Functions** | **Qualitative Graphs**  **Simultaneous Equations** |

**Overview**

During quarter 3 is the first time that students are introduced to congruency and similarity of two-dimensional figures (8.G.1-4). Students show that angles in a triangle form a straight line and that various configurations of lines produce similar triangles because of the angles created when a transversal cuts parallel lines (8.G.5). Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons (8.G.7-9). These skills are especially important for students when they enter high school geometry. Not only will students deal with congruence and similarity of figures, they will define congruence and similarity in terms of transformations or rigid motions of those figures.

[**Year at a Glance Document**](https://drive.google.com/file/d/0B7EG2snqrtxHMVdNZ1VDZ2t1QUU/view?usp=sharing)

|  |  |  |  |
| --- | --- | --- | --- |
| Grade Level Standard | Type of Rigor | Foundational Standards | Sample Assessment Items |
| 8.G.1 | Procedural Skill | 7.G.2, 7.G.5 | [OrgLib Assessment and Question Bank](https://www.orglib.com/8.g-geometry-displayFolderContents_0d1520c2bb_E1BED14F7E2A4C9288954373DB152FC3.html) |
| 8.G.2 | Conceptual Understanding | 8.G.1 | [NAEP Items](https://www.educateiowa.gov/sites/files/ed/documents/NAEP%20-%20Grade%208%20Tasks%20-%20Geometry.pdf) |
| 8.G.3 | Conceptual Understanding | 6.G.3 | [Math Shell Summative Items](http://map.mathshell.org/tasks.php?collection=9&unit=HE15#task287) |
| 8.G.4 | Conceptual Understanding | 8.G.2, 8.G.3 | [NAEP Items](https://www.educateiowa.gov/sites/files/ed/documents/NAEP%20-%20Grade%208%20Tasks%20-%20Geometry.pdf) |
| 8.G.5 | Conceptual Understanding & Procedural Skill | 8.G.2, 8.G.4 | [Math Shell Summative Items](http://map.mathshell.org/tasks.php?collection=9&unit=HE15#task287) |
| 8.G.6 | Conceptual Understanding | 7.G.6 | [NAEP Items](https://www.educateiowa.gov/sites/files/ed/documents/NAEP%20-%20Grade%208%20Tasks%20-%20Geometry.pdf) |
| 8.G.7 | Application & Procedural Skill |  | [OrgLib Assessment and Question Bank](https://www.orglib.com/8.g-geometry-displayFolderContents_0d1520c2bb_E1BED14F7E2A4C9288954373DB152FC3.html) |
| 8.G.8 | Application & Procedural Skill | 6.G.3, 6.NS.8 | [OrgLib Assessment and Question Bank](https://www.orglib.com/8.g-geometry-displayFolderContents_0d1520c2bb_E1BED14F7E2A4C9288954373DB152FC3.html) |
| 8.EE.2 | Procedural Skill | 6.EE.5, 7.NS.3 | [Math Shell Summative Items](http://map.mathshell.org/tasks.php?collection=9&unit=HE15#task287) |
| 8.EE.6 | Conceptual Understanding | 7.G.1, 7.RP.2, 8.G.5 | [NAEP Items](https://www.educateiowa.gov/sites/files/ed/documents/NAEP%20-%20Grade%208%20Tasks%20-%20Geometry.pdf) |

**Fluency**

**NCTM Position**

Procedural fluency is a critical component of mathematical proficiency. Procedural fluency is the ability to apply procedures accurately, efficiently, and flexibly; to transfer procedures to different problems and contexts; to build or modify procedures from other procedures; and to recognize when one strategy or procedure is more appropriate to apply than another. To develop procedural fluency, students need experience in integrating concepts and procedures and building on familiar procedures as they create their own informal strategies and procedures. Students need opportunities to justify both informal strategies and commonly used procedures mathematically, to support and justify their choices of appropriate procedures, and to strengthen their understanding and skill through distributed practice.

The fluency standards for 8th grade listed below should be incorporated throughout your instruction over the course of the school year. Click [engageny Fluency Support](https://www.engageny.org/resource/mathematics-fluency-support-grades-6-8/file/133021) to access exercises that can be used as a supplement in conjunction with building conceptual understanding.

* 8. EE.7 Solve one-variable linear equations, including cases with infinitely many solutions or no solutions.
* 8.G.9 Solve problems involving volumes of cones, cylinders, and spheres together with previous geometry work, proportional reasoning and multi-step problem solving in grade 7.

**References:**

* [*https://www.engageny.org/*](https://www.engageny.org/)
* [*http://www.corestandards.org/*](http://www.corestandards.org/)
* [*http://www.nctm.org/*](http://www.nctm.org/Standards-and-Positions/Position-Statements/Procedural-Fluency-in-Mathematics/)
* <http://achievethecore.org/>

| **TN STATE STANDARDS** | **CONTENT** | **INSTRUCTIONAL SUPPORT & RESOURCES** | |
| --- | --- | --- | --- |
| **Congruence, Similarity and Transformations**  **(Allow approximately 5 weeks for instruction, review and assessment)** | | | |
| **Domain**: Geometry  **Cluster:** Understand congruence and similarity using physical models, transparencies or geometry software.  ■[8.G.A.1](http://www.tn.gov/education/standards/math/std_math_gr_8.pdf): Verify experimentally the properties of rotations, reflections, and translations:  a. Lines are taken to lines, and line segments to line segments of the same length.  b. Angles are taken to angles of the same measure.  c. Parallel lines are taken to parallel lines.  ■[8.G.A.2](http://www.tn.gov/education/standards/math/std_math_gr_8.pdf):Understand that a two-dimensional figure is **congruent** to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.  ■ [8.G.A.4](http://www.tn.gov/education/standards/math/std_math_gr_8.pdf): Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two dimensional figures, describe a sequence that exhibits the similarity between them.  ■8.EE.6 Use similar triangles to explain why the slope *m* is the same between any two distinct points on a non-vertical line in the coordinate plane. (This standard shows an application of using similar triangles).  ■ [8.G.A.3](http://www.tn.gov/education/standards/math/std_math_gr_8.pdf): Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. | **Enduring Understanding(s):**   * Geometric images provide the content in relation to which properties can be noticed.   **Essential Question(s):**   * What are the different ways a segment (or figure) may be transformed and how do you know if a transformation produces figures that are similar or congruent to the original figure?   **Objective(s):**   * Students will graph translations, reflections and rotations on a coordinate grid. * Students will use scale factor to graph dilations on the coordinate grid. * Apply a sequence of rotations, reflections, and transitions to prove that two dimensional figures are congruent * Use the coordinate plane to locate pre-images of two-dimensional figures and determine the coordinates of a resultant image after applying dilations, rotations, reflections, and translations.   **Additional Information: 8.G.1-2**   * Students should use compasses, protractors and rulers or technology to explore figures created from translations, reflections and rotations. Characteristics of figures, such as lengths of line segments, angle measures and parallel lines, are explored before the transformation (pre-image) and after the transformation (image). Students understand that these transformations produce images of exactly the same size and shape as the pre-image and are known as rigid transformations. * Use tasks/exercises that require the use of coordinates in the coordinate plane. * Tasks/exercises should elicit student understanding of the connection between congruence and transformations i.e., tasks may provide two congruent figures and require the description of a sequence of transformations that exhibits the congruence or tasks may require students to identify whether two figures are congruent using a sequence of transformations.   **Example(s):**   1. Is Figure A congruent to Figure A’? Explain how you know.     *Solution:* These figures are congruent since A’ was produced by translating each vertex of Figure A 3 to the right and 1 down.   1. Describe the sequence of transformations that results in the transformation of Figure A to Figure A’.     *Solution:* Figure A’ was produced by a 90º clockwise rotation around the origin.  **Additional Information: 8.F. 3-4**   * Students identify resulting coordinates from translations, reflections, and rotations (90º􀀍 180º and 270º both clockwise and counterclockwise), recognizing the relationship between the coordinates and the transformation. * Students understand similar figures have congruent angles and sides that are proportional. Similar figures are produced from dilations. Students describe the sequence that would produce similar figures, including the scale factors. Students understand that a scale factor greater than one will produce an enlargement in the figure, while a scale factor less than one will produce a reduction in size.   **Definitions**   * **Translations** move the object so that every point of the object moves in the same direction as well as the same distance. In a translation, the translated object is *congruent* to its pre-image.      * A **reflection** is the “flipping” of an object over a line, known as the “line of reflection”. In the 8th grade, the line of reflection will be the *x*-axis and the *y-*axis. Students recognize that when an object is reflected across the *y*-axis, the reflected *x*-coordinate is the opposite of the pre-image x-coordinate. A reflection across the *x-*axis would change a pre-image coordinate (3, -8) to the image coordinate of (3, 8) -- note that the reflected *y*-coordinate is opposite of the pre-image *y*-coordinate.      * A **rotation** is a transformation performed by “spinning” the figure around a fixed point known as the center of rotation. The figure may be rotated clockwise or counterclockwise up to 360º (at 8th grade, rotations will be around the origin and a multiple of 90º). In a rotation, the rotated object is *congruent* to its pre-image.      * A **dilation** is a non-rigid transformation that moves each point along a ray which starts from a fixed center, and multiplies distances from this center by a common scale factor. Dilations enlarge (scale factors greater than one) or reduce (scale factors less than one) the size of a figure by the scale factor. In 8th grade, dilations will be from the origin. The dilated figure is *similar* to its pre-image.     For items involving dilations, tasks/exercises must state the center of dilation.  Elicit student understanding of the connection between similarity and transformations  **Examples:**  Is Figure A similar to Figure A’? Explain how you know.    *Solution*: Dilated with a scale factor of ½ then reflected across the *x*-axis, making Figures A and A’ similar.  Students need to be able to identify that triangles are similar or congruent based on given information.  Describe the sequence of transformations that results in the transformation of Figure A to Figure A’.    *Solution*: 90° clockwise rotation, translate 4 right and 2 up, dilation of 1/2. In this case, the scale factor of the dilation can be found by using the horizontal distances on the triangle (image = 2 units; pre-image = 4 units). | **Glencoe**  8-1B Similar Polygons (pp. 464-469)  This lesson provides a definition of similar polygons but **it does not** satisfy the outcomes of standards 8.G.1-4.  8-3A Translations (pp. 508-511)  8-3B Reflections (pp. 512-516)  8-3D Rotations (pp. 518-522)  8-3E Dilations ( pp. 523-526)  **CCSS Course 3 Properties of Transformations pp. 42-44 (Located in the online TE – click CCSS)**  **Additional Lesson 8 Congruence and Transformation p. 800-804**  **Additional Lesson 9 p. 805-810 Similarity of Transformations**  8-3F Composition of Transformations( pp. 527-528)  **Holt**  Hands-On Lab Explore Similarity (pp. 244-245)  5-5 Similar Figures (pp. 246-249)  This lesson provides a definition for similarity but it discusses similarity using proportional relationships and this is not the intent of 8.G.1-4)  5-6 Hands-On Lab – Dilations (pp. 250-251)  5-6 Dilations (pp. 252-255)  7-6 Congruence (pp. 360-363)  7-7 Transformations (pp. 364-368)  Hands-On Lab Combine Transformation (p. 369)  **Building Conceptual Understanding:**  [Math Shell: Representing and Combining Transformations](http://map.mathshell.org/lessons.php?unit=8310&collection=8)  [CMP CCSS Investigations 3 & 4 Transformations, Geometry Topics](http://secondarymath.cmswiki.wikispaces.net/file/view/CMP2_CC_G8TG.pdf)  **Choose from the following resources and use them** **to deepen students' conceptual understanding of mathematical content and develop their ability to apply that knowledge to non-routine problems.**  **Suggested Additional Lessons:**  [engageny Lessons: 8.G.1](https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-lesson-1)  [engageny Lessons: 8.G.2](https://www.engageny.org/ccls-math/8g2)  [engageny Lessons: 8.G.3](https://www.engageny.org/ccls-math/8g3)  [engageny Lessons: 8.G.4](https://www.engageny.org/ccls-math/8g4)  [CMP Kaleidoscopes, Hubcaps & Mirrors (KHM) Investigations 1-5](http://blogs.monashores.net/buboltzm/math-8-textbook-pages-kaleidoscopes-hubcaps-and-mirrors/)  [CMP KHM Answers](http://www.wayzata.k12.mn.us/cms/lib/MN01001540/Centricity/Domain/940/8KHPWKAN.pdf)  [Math Shell: Identifying Similar Triangles](http://map.mathshell.org/lessons.php?unit=8320&collection=8)  [Math Shell: Aaron's Design](http://map.mathshell.org/materials/tasks.php?taskid=361&subpage=apprentice) 8.G.3  [Math Shell: Identifying Similar Triangles](http://map.mathshell.org/lessons.php?unit=8320&collection=8)  [Illustrative Math: Triangle Congruence with Coordinates](https://www.illustrativemathematics.org/content-standards/8/G/A/2/tasks/1232)  [Learnzillion 8.G.A.3](http://learnzillion.com/lessonsets/534-describe-the-effect-of-dilations-translations-rotations-and-reflections-on-twodimensional-figures-using-coordinates)  [UEN Lesson Angles, Triangles, Distance Section 10.1](http://eq.uen.org/emedia/items/75327d82-da20-4bca-a609-b943362a8b79/1/Grade_8_Ch10_Parent.pdf?.vi=save)  **Suggested Tasks**  [Illustrative Math: Origami Silver Rectangle](https://www.illustrativemathematics.org/content-standards/8/G/A/1/tasks/1488)  [Illustrative Math: Congruent Rectangles](https://www.illustrativemathematics.org/content-standards/8/G/A/2/tasks/1228)  [Illustrative Math: 2-D Figures Transformations](https://www.illustrativemathematics.org/content-standards/8/G/A/3/tasks)  [Illustrative Math: Similar 2-D Figures](https://www.illustrativemathematics.org/content-standards/8/G/A/4/tasks)  **Correlated iReady Lesson(s):** The iReady program includes a variety of resources that can be used to support teacher-led instruction in Tier 1 and guided small-group Tier 1, 2 or 3 instruction.   * Properties of Translations and Reflections * Properties of Dilations | **Vocabulary**: congruent figures, congruence (≈), A’ is read “A Prime”, similar figures, transformation, rigid transformations, reflection, translation, dilation, clockwise, counterclockwise, rotation, center of rotation, pre-image, image, center of dilation    **Writing in Math:**   * Students will define and describe the properties of rotations, reflections and translations. * Students will describe the similarities and differences among the different types of transformations. * Students will identify and explain orally the relationship between an image and pre-image using the properties of rotation.   **Graphic Organizer(s):**   * Have students make flash cards with symbols and/or pictures of the concepts related to congruence, transformations, and similar figures. They may use the flash cards with a partner. * Have students create a word web listing the terms they already know or think they know about transformations.   [Foldable: Transformations](https://thenumbertwentyone.wordpress.com/category/foldable/) |
| **Angles**  **( Allow approximately 1 weeks for instruction, review and assessment )** | | | |
| **Domain:** Geometry  **Cluster:** Understand congruence and similarity using physical models, transparencies or geometry software.  ■ 8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. | **Enduring Understanding(s):**  Parallel lines exist in nature and in real-world situations.  **Essential Question(s):**   * What relationships exist between angles formed by parallel lines that are cut by a transversal and what conclusions can be made about angles of a triangle? * How can you use properties of parallel lines to solve real-life problems?   **Objective(s):**   * Students will examine and identify the relationship between angles formed by parallel lines and a transversal.   **Additional Information:**  Students use exploration and deductive reasoning to determine relationships that exist between the following: a) angle sums and exterior angle sums of triangles, b) angles created when parallel lines are cut by a transversal, and c) the angle-angle criterion for similarity of triangle.  Students can informally prove relationships with transversals.  **Examples:**  In the figure below show that m∡3+ *m*∡4+ *m*∡5= 180˚ if *l* and *m* are parallel lines and t1& t2 are transversals.    *Solution:* ∡1+ ∡2+ ∡3= 180˚. Angle 1 and Angle 5 are congruent because they are corresponding angles (∡5≅∡1). ∡1 can be substituted for ∡5. ∡4≅∡2 because alternate interior angles are congruent. ∡4can be substituted for ∡2. Therefore m∡3+ m∡4+ m∡5= 180˚  Students can informally conclude that the sum of a triangle is 180º (the angle-sum theorem) by applying their understanding of lines and alternate interior angles.  In the figure below, line x is parallel to line yz. Prove that the sum of the angles of a triangle is 180º.    *Solution:* Angle *a* is 35º because it alternates with the angle inside the triangle that measures 35º. Angle *c* is 80º because it alternates with the angle inside the triangle that measures 80º. Because lines have a measure of 180º, and angles *a + b + c* form a straight line, then angle b must be 65 º (180 – 35 + 80 = 65). Therefore, the sum of the angles of the triangle are 35º + 65 º + 80 º | **Glencoe**  7-2A Explore Parallel Lines (p. 408)  7-2B Lines (pp. 409-414)  7-3A Explore Triangles (p. 416)  7-3B Triangles (pp. 418-423)  8-1C Extend Similar Triangles (p. 470)  **Holt**  7-2 Parallel and Perpendicular Lines (pp. 336-339)  7-3 Triangles (pp. 342-346)  Technology Lab Exterior Angles of a Polygon p. 352  **Building Conceptual Understanding:**  [engageny: Angles Associated with Parallel Lines](https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-c-lesson-12)  [engageny: Angle Sum Theorem of Triangles](https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-c-lesson-13)  **Choose from the following resources and use them** **to deepen students' conceptual understanding of mathematical content and develop their ability to apply that knowledge to non-routine problems.**  **Suggested Additional Lesson(s):**  [engageny: More on Angles of a Triangle](https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-c-lesson-13)  [CMP CCSS Investigation 4 Geometry Topics](http://secondarymath.cmswiki.wikispaces.net/file/view/CMP2_CC_G8TG.pdf)  [Ohio DOE Lesson](https://ims.ode.state.oh.us/ODE/IMS/Lessons/Content/CMA_LP_S03_BC_L08_I01_01.pdf)  [Khan Academy: Angles, Parallel Lines and Transversals](https://www.khanacademy.org/math/geometry/hs-geo-foundations/hs-geo-angles/v/angles-formed-by-parallel-lines-and-transversals)  **Suggested Task(s):**  [Illustrative Math Find the Missing Angle](https://www.illustrativemathematics.org/content-standards/tasks/56)  [Illustrative Math: 8.G.5 Tasks](https://www.illustrativemathematics.org/content-standards/8/G/A/5/tasks)  [Lunch Lines](http://math8commoncore.weebly.com/uploads/8/6/8/9/8689580/angles_performance_task.pdf)  **Suggested Additional Resources:**  [Math Open Reference: Exterior Angles of a Polygon](http://www.mathopenref.com/polygonexteriorangles.html)  [Special Angle Pairs Discovery Activity](http://www.cpalms.org/Public/PreviewResource/Preview/26664)  [Math Warehouse Interactive](http://www.mathwarehouse.com/geometry/angle/parallel-lines-cut-transversal.php)  **Correlated iReady Lesson(s):** The iReady program includes a variety of resources that can be used to support teacher-led instruction in Tier 1 and guided small-group Tier 1, 2 or 3 instruction.   * Geometric Properties Involving Angles * Angle Sums Properties | **Vocabulary:** transversal, parallel, exterior angles, alternate exterior angles, interior angles, alternate interior angles, angle-angle criterion, vertical angles, adjacent angles, supplementary and complementary angles, corresponding angles  **Writing in Math:**  Explain why a triangle must always have at least two acute angles. Include drawings in the explanation.  **Graphic Organizer:**  [When Two Parallel Lines are Cut by a Transversal](http://www.cnusd.k12.ca.us/cms/lib/CA01001152/Centricity/Domain/3175/When_Two_Parallel_Lines_Are_Cut_By_a_Transversal.pdf) |
| **Pythagorean Theorem**  **( Allow approximately 3 weeks for instruction, review and assessment )** | | | |
| **Domain**: Geometry  **Cluster:** Understand and apply the Pythagorean Theorem.  ■ [8.G.B.6](http://www.tn.gov/education/standards/math/std_math_gr_8.pdf): Explain a proof of the Pythagorean Theorem and its converse.  ■ [8.G.B.7](http://www.tn.gov/education/standards/math/std_math_gr_8.pdf): Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.  ■ [8.G.B.8](http://www.tn.gov/education/standards/math/std_math_gr_8.pdf): Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.  ■8.EE.2 Use square root symbols to represent solutions to equations x2=p, where p is a positive rational number. Evaluate square roots of small perfect squares. (This standard supports 8.G.B.8 because it involves calculating the square roots of values.) | **Enduring Understanding(s):**   * The Pythagorean Theorem is used to calculate the lengths of the legs and hypotenuse of a right triangle. * The Distance Formula is derived using the Pythagorean Theorem. Both are used for finding missing information in the real-world and on a coordinate grid. * Squares and square roots are inverse operations that can reverse each other’s effect. * Right triangles have a special relationship among the side lengths that can be represented by a model and a formula.   **Essential Questions(s):**   * What is the relationship between the lengths of the sides of a right triangle and how this relationship be used to find the distance between two points? * How can tools such as patty paper, miras, protractors, and dynamic geometric software be used to demonstrate the properties of transformation? * How can the Pythagorean Theorem be used to make conjectures about triangles?   **Objective(s):**   * Students will determine if a triangle is a right triangle using the converse of the Pythagorean Theorem. * Students will apply the Pythagorean Theorem to determine unknown side lengths in right triangles in order to solve real-world and mathematical problems. * Students will use the Pythagorean Theorem to determine the distance between two points in the coordinate plane.   **Additional Information:**  Using models, students explain the Pythagorean Theorem, understanding that the sum of the squares of the legs is equal to the square of the hypotenuse in a right triangle.  [Braining Camp Pythagorean Theorem Model](https://www.brainingcamp.com/content/pythagorean-theorem/) [Math Open Reference: Pythagorean Theorem Model](http://www.mathopenref.com/pythagorastheorem.html)  Students also understand that given three side lengths with this relationship forms a right triangle.  Students will apply the Pythagorean Theorem to calculate unknown side lengths for right triangles.  **Example(s):**  The Irrational Club wants to build a tree house. They have a 9-foot ladder that must be propped diagonally against the tree. If the base of the ladder is 5 feet from the bottom of the tree, how high will the tree house be off the ground?  *Solution*:  *a*2 + 52 = 92  *a*2 + 25 = 81  *a*2 = 56  √a2 = √56  *a* =√56 or ~7.5    Students will use the Pythagorean Theorem to calculate the distance between two points on a coordinate plane. Students build on work from 6th grade (finding vertical and horizontal distances on the coordinate plane) to determine the lengths of the legs of the right triangle drawn connecting the points. Students understand that the line segment between the two points is the length of the hypotenuse.  **Use of the distance formula is not an expectation for this standard.**  **Examples:**  Find the length of line segment AB.    Solution: 1. Form a right triangle so that the given line segment is the hypotenuse.  2. Use Pythagorean Theorem to find the distance (length) between the two points.    62 + 72 = *c*2  36 + 49 = c2  85 = c2  √85 = c  Find the distance between (-2, 4) and (-5, -6).  *Solution*:  The distance between -2 and -5 is the horizontal length; the distance between 4 and  -6 is the vertical distance.  Horizontal length: 3  Vertical length: 10  102 + 32 = *c*2  100 + 9 = *c*2  109 = *c*2  √109 =√*c*2  √109 = *c*  . | **Glencoe**  8-2A Explore Right Triangles Relationships (p. 481)  8-2B The Pythagorean Theorem (pp. 482-486)  8-2C Use the Pythagorean Theorem (pp487-492)  8-2D Distance on the Coordinate Plane (pp. 493-498)  **Holt**  Lab Explore Right Triangles p. 199  4-8 The Pythagorean Theorem (pp. 200-203)  4-9 Applying the Pythagorean Theorem (pp. 204-207)  Building Conceptual Understanding:  [CMP Lessons: Looking for Pythagoras Investigations 2, 3 & 4](http://blogs.monashores.net/buboltzm/math-8-textbook-pages-looking-for-pythagoras/)  **Choose from the following resources and use them** **to deepen students' conceptual understanding of mathematical content and develop their ability to apply that knowledge to non-routine problems.**  **Suggested Additional Lessons:**  [engageny Lessons: 8.G. 6-7 The Pythagorean Theorem](https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-d-overview)  [engageny : 8.G.6-7 The Pythagorean Theorem](https://www.engageny.org/resource/grade-8-mathematics-module-3-topic-c-overview)  [engageny : 8.G.8 Distance on the Coordinate Plane](https://www.engageny.org/resource/grade-8-mathematics-module-7-topic-c-lesson-17)  [engageny : 8.G.7-8 Applications of the Pythagorean Theorem](https://www.engageny.org/resource/grade-8-mathematics-module-7-topic-c-lesson-18)  [Math Shell: Jane’s TV](http://map.mathshell.org/materials/tasks.php?taskid=372&subpage=apprentice)  [Pythagorean Lesson (Includes Writing Prompts)](http://www.doe.virginia.gov/testing/solsearch/sol/math/8/mess_8-10ab.pdf)  **Suggested Tasks:**  [Illustrative Math Tasks: Pythagorean Theorem](https://www.illustrativemathematics.org/8.G.B)  [Inside Mathematics Patterns in Prague](http://www.insidemathematics.org/assets/common-core-math-tasks/patterns%20in%20prague.pdf)  [Inside Mathematics Pugs](http://www.insidemathematics.org/assets/common-core-math-tasks/rugs.pdf)  **Suggested Additional Resources:**  [Math Shell: The Shortest Route](http://map.mathshell.org/lessons.php?collection=8&unit=8305#task584)    **Correlated iReady Lesson(s):** The iReady program includes a variety of resources that can be used to support teacher-led instruction in Tier 1 and guided small-group Tier 1, 2 or 3 instruction.   * The Pythagorean Theorem * Applications of the Pythagorean Theorem | **Vocabulary:** right triangle, hypotenuse, legs, Pythagorean Theorem, Pythagorean Theorem Converse, Pythagorean Triple  **Writing in Math:**  Explain how to determine which side of a right triangle is the hypotenuse.  Explain why you can use the lengths of any two sides of a right triangle to calculate the length of the third side.  **Graphic Organizer:**  [Pythagorean Theorem GO Samples](http://a-sea-of-math.blogspot.com/2013/05/pythagorean-theorem.html) |

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| **RESOURCE TOOLBOX**  The Resource Toolbox provides additional support for comprehension and mastery of grade-level skills and concepts. While some of these resources are imbedded in the map, the use of these categorized materials can assist educators with maximizing their instructional practices to meet the needs of all students. | | |
| **NWEA MAP Resources:** <https://teach.mapnwea.org/assist/help_map/ApplicationHelp.htm#UsingTestResults/MAPReportsFinder.htm> - Sign in and Click the Learning Continuum Tab – this resources will help as you plan for intervention, and differentiating small group instruction on the skill you are currently teaching. (Four Ways to Impact Teaching with the Learning Continuum)  <https://support.nwea.org/khanrit> - These Khan Academy lessons are aligned to RIT scores. | | |
| **Textbook Resources**  [www.my.hrw.com](http://www.my.hrw.com/)  [www.connected.mcgraw-hill.com](http://www.connected.mcgraw-hill.com)  [Holt, Course 3 Text Resources](http://go.hrw.com/gopages/ma/msm3_10.html) | **Standards Support**  [TNReady Math Standards](http://tn.gov/education/article/mathematics-standards)  [Achieve the Core](http://achievethecore.org/category/854/mathematics-lessons)  [Edutoolbox](http://www.edutoolbox.org) | **Videos**  [Khan Academy](http://www.khanacademy.org/)  [Watch Know Learn](http://ccss6.watchknowlearn.org/Category.aspx?CategoryID=15865)  [Learn Zillion](https://learnzillion.com/login)  [Virtual Nerd](http://www.virtualnerd.com/)  [Math Playground](http://www.mathplayground.com/)  [StudyJams](http://studyjams.scholastic.com/studyjams/index.htm) |
| **Calculator Activities**  [TI-73 Activities](http://education.ti.com/en/us/activity/search/subject?d=E6BF78EF098644A8A458D8D1B4AA1A44&s=B843CE852FC5447C8DD88F6D1020EC61&sa=3702C4C225D647AD888ECE38B4EB90A2)  [CASIO Activities](http://www.casioeducation.com/educators/activities)  [TI-Inspire for Middle Grades](http://education.ti.com/en/timathnspired/us/middle-grades-math) | **Interactive Manipulatives**  [National Library of Interactive Manipulatives](http://nlvm.usu.edu/en/nav/category_g_4_t_2.html)  [Glencoe Virtual Manipulatives](http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html) | **Additional Sites**  [PBS: Grades 6-8 Lesson Plans](http://www.learner.org/resources/lessonplanbrowse.html?g%5b%5d=6-8&d%5b%5d=MATH)  [Frayer Model Template](http://wvde.state.wv.us/strategybank/FrayerModel.html)  [**Grade 8 Flip Book**](http://community.ksde.org/LinkClick.aspx?fileticket=F2AYEhO1ZMs%3d&tabid=5646&mid=13290)  **(This book contains valuable resources that help develop the intent, the understanding and the implementation of the state standards)** |