

Tennessee Tutorials are designed specifically for the Tennessee Academic Standards to prepare students for the Tennessee Comprehensive Assessment Program (TCAP) and the TNReady assessments.

Math Tutorials offer targeted instruction, practice and review designed to develop computational fluency, deepen conceptual understanding, and apply mathematical practices. They automatically identify and address learning gaps down to elementary-level content, using adaptive remediation to bring students to grade-level no matter where they start. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing the ability to apply their knowledge in abstract and real world scenarios, students build the depth of knowledge and higher order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, modeled logic and process, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

1. POINTS, LINES, AND ANGLES 1

● POINTS, RAYS, LINE SEGMENTS, LINES, AND FIGURES

- **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, plane, distance along a line, and distance around a circular arc.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

● PARALLEL AND PERPENDICULAR LINES

- **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, plane, distance along a line, and distance around a circular arc.
- **G.GPE.B.3** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.

2. POINTS, LINES, AND ANGLES 2

● PARALLEL LINES AND ANGLE RELATIONSHIPS

- **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, plane, distance along a line, and distance around a circular arc.
- **G.CO.C.9** Prove theorems about lines and angles.

● PERPENDICULAR BISECTOR AND ANGLE BISECTOR THEOREMS

- **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, plane, distance along a line, and distance around a circular arc.
- **G.CO.C.9** Prove theorems about lines and angles.
- **G.CO.C.10** Prove theorems about triangles.

3. COORDINATE GEOMETRY

● LENGTH AND THE DISTANCE FORMULA

- **G.GPE.B.4** Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
- **G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.

- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

- **MIDPOINT FORMULA ON THE COORDINATE PLANE**

- **G.GPE.B.4** Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.
- **G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.

- **CONJECTURES IN COORDINATE GEOMETRY**

- **G.CO.C.10** Prove theorems about triangles.
- **G.GPE.B.2** Use coordinates to prove simple geometric theorems algebraically.

4. PERIMETER AND AREA ON THE COORDINATE PLANE

- **PERIMETER ON THE COORDINATE PLANE**

- **G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.
- **G.GPE.B.2** Use coordinates to prove simple geometric theorems algebraically.

- **AREA ON THE COORDINATE PLANE**

- **G.GPE.B.5** Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

5. TRANSFORMATIONS ON THE COORDINATE PLANE

- **TRANSFORMATIONS ON THE COORDINATE PLANE**

- **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).
- **G.CO.A.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry the shape onto itself.
- **G.CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.
- **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another.
- **G.SRT.A.2** Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
- **G.SRT.A.1** Verify informally the properties of dilations given by a center and a scale factor.

- **DILATIONS, TRANSLATIONS, ROTATIONS, AND REFLECTIONS**

- **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).
- **G.CO.A.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry the shape onto itself.
- **G.CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.

- **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another.
- **G.SRT.A.2** Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
- **G.SRT.A.1** Verify informally the properties of dilations given by a center and a scale factor.

6. CONGRUENCE AND SIMILARITY OF TRIANGLES

• TRIANGLES AND CONGRUENCE TRANSFORMATIONS

- **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.
- **G.CO.B.7** 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.
- **G.CO.B.8** Explain how the criteria for triangle congruence (ASA, SAS, AAS, and SSS) follow from the definition of congruence in terms of rigid motions.
- **G.CO.C.10** Prove theorems about triangles.
- **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.

• TRIANGLES AND SIMILARITY TRANSFORMATIONS

- **G.CO.C.10** Prove theorems about triangles.
- **G.SRT.A.2** Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
- **G.SRT.B.4** Prove theorems about similar triangles.
- **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.
- **G.SRT.A.3** Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

7. CONGRUENCE AND SIMILARITY OF POLYGONS

• CONGRUENCE OF OTHER POLYGONS

- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.
- **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.
- **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).
- **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another.
- **G.CO.A.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry the shape onto itself.

• SIMILARITY OF OTHER POLYGONS

- **G.SRT.A.2** Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

8. TRIANGLES

• TRIANGLE ANGLE THEOREMS

- **G.CO.C.10** Prove theorems about triangles.

- **TRIANGLE BISECTORS**

- **G.CO.C.9** Prove theorems about lines and angles.
- **G.CO.C.10** Prove theorems about triangles.
- **G.CO.A.5** Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another.
- **G.SRT.B.4** Prove theorems about similar triangles.
- **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.
- **G.C.A.3** Construct the incenter and circumcenter of a triangle and use their properties to solve problems in context.
- **G.CO.D.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

- **MEDIANS AND ALTIITUDES OF TRIANGLES**

- **G.CO.C.10** Prove theorems about triangles.

9. QUADRILATERALS AND CONSTRUCTIONS

- **PARALLELOGRAMS AND RECTANGLES**

- **G.CO.C.11** Prove theorems about parallelograms.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

- **SQUARES AND RHOMBI**

- **G.CO.C.11** Prove theorems about parallelograms.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

- **CONSTRUCTIONS**

- **G.CO.D.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

10. TRIANGLES AND TRIGONOMETRY

- **PYTHAGOREAN THEOREM**

- **G.SRT.C.8.a** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.
- **G.SRT.B.4** Prove theorems about similar triangles.
- **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.
- **G.CO.C.10** Prove theorems about triangles.

- **TRIGONOMETRIC RATIOS**

- **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.
- **G.SRT.C.8.a** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
- **G.SRT.C.7** Explain and use the relationship between the sine and cosine of complementary angles.
- **G.SRT.B.5** Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

11. TRIGONOMETRY

- **LAWS OF SINE AND COSINE**

- **G.SRT.C.8.a** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
- **G.SRT.C.8.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.

- **RADIANS AND THE UNIT CIRCLE**

- **G.SRT.C.8.a** Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

12. CIRCLES 1

- **CIRCLE BASICS**

- **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, plane, distance along a line, and distance around a circular arc.
- **G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords.

- **CENTRAL ANGLES, INSCRIBED ANGLES, AND CHORDS**

- **G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords.
- **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, plane, distance along a line, and distance around a circular arc.
- **G.CO.C.9** Prove theorems about lines and angles.

13. CIRCLES 2

- **SECANTS, ANGLES, AND INTERCEPTED ARCS**

- **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, plane, distance along a line, and distance around a circular arc.
- **G.CO.C.9** Prove theorems about lines and angles.
- **G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords.

- **TANGENTS, ANGLES, AND INTERCEPTED ARCS**

- **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, plane, distance along a line, and distance around a circular arc.
- **G.CO.C.9** Prove theorems about lines and angles.
- **G.C.A.2** Identify and describe relationships among inscribed angles, radii, and chords.

14. PROPERTIES OF CIRCLES 1

- **CONGRUENT AND SIMILAR CIRCLES**

- **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, plane, distance along a line, and distance around a circular arc.
- **G.C.A.1** Recognize that all circles are similar.
- **G.CO.A.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- **G.CO.B.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.
- **G.SRT.A.2** Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

- **CIRCUMFERENCE AND ARC LENGTH**

- **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, plane, distance along a line, and distance around a circular arc.
- **G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of

a cylinder, cone, prism, and pyramid.

- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

15. PROPERTIES OF CIRCLES 2

• AREA OF CIRCLES AND SECTORS

- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.
- **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, plane, distance along a line, and distance around a circular arc.
- **G.C.B.4** Know the formula and find the area of a sector of a circle in a real-world context.
- **G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid.

• CIRCLES

- **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, plane, distance along a line, and distance around a circular arc.
- **G.GPE.A.1** Know and write the equation of a circle of given center and radius using the Pythagorean Theorem.

16. VOLUME 1

• VOLUME OF PRISMS AND PYRAMIDS

- **G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid.
- **G.GMD.A.2** Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

• VOLUME OF CYLINDERS AND CONES

- **G.GMD.A.1** Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid.
- **G.GMD.A.2** Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

17. VOLUME 2

• SURFACE AREA AND VOLUME OF SPHERES

- **G.GMD.A.2** Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.
- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

• MODELING SITUATIONS WITH GEOMETRY

- **G.MG.A.2** Apply geometric methods to solve real-world problems.

18. COMPOSITE SHAPES

• SURFACE AREA OF COMPOSITE SOLIDS

- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.
- **G.GMD.A.2** Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.

• VOLUME OF COMPOSITE SOLIDS

- **G.MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.
- **G.GMD.A.2** Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.