OHEOC Tutorials for Ohio are designed specifically for the Ohio Learning Standards to prepare students for the Ohio End Of Course assessments. EOC Categories are at the heart of OHEOC Tutorial structure – bringing category-based learning to the student experience, and category-based performance and progress tracking to the teacher experience.

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.

Test-Taking Strategies for EOC Tutorials allow students to practice and apply learning approaches that will hone their test-taking skills and focus them for success on the day of their EOC test.

Unit 1: Points, Lines, and Angles

- **POINTS, RAYS, LINE SEGMENTS, LINES, AND FIGURES**
  - OH.Math.HSG.CO.1: Congruence Experiment with transformations in the plane. Know precise definitions of ray, angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and arc length.
- **PARALLEL AND PERPENDICULAR LINES**
  - OH.Math.HSG.GPE.5: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements. Justify the slope criteria for parallel and perpendicular lines, and use them to solve geometric problems, e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point.

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- **PARALLEL LINES AND ANGLE RELATIONSHIPS**
  - OH.Math.HSG.CO.9: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about lines and angles.
- **PERPENDICULAR BISECTOR AND ANGLE BISECTOR THEOREMS**
  - OH.Math.HSG.CO.9: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about lines and angles.

Unit 2: Coordinate Geometry

- **SLOPE-INTERCEPT FORM OF A LINEAR EQUATION**
  - OH.Math.HSG.GPE.5: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements. Justify the slope criteria for parallel and perpendicular lines, and use them to solve geometric problems, e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point.
- **LENGTH AND THE DISTANCE FORMULA**
  - OH.Math.HSG.GPE.6: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
  - OH.Math.HSG.GPE.7: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
- **MIDPOINT FORMULA ON THE COORDINATE PLANE**
  - OH.Math.HSG.GPE.6: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
- **CONJECTURES IN COORDINATE GEOMETRY**
  - OH.Math.HSG.CO.10: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about triangles.
  - OH.Math.HSG.GPE.4: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements. Use coordinates to prove simple geometric theorems algebraically and to verify geometric relationships algebraically, including properties of special triangles, quadrilaterals, and circles.

Unit 3: Perimeter, Area, and Transformations on the Coordinate Plane

- **PERIMETER ON THE COORDINATE PLANE**
  - OH.Math.HSG.GPE.7: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

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- OH.Math.HSG.MG.1: Modeling with Geometry Apply geometric concepts in modeling situations. Use geometric shapes, their measures, and their properties to describe objects, e.g., modeling a tree trunk or a human torso as a cylinder.

- **AREA ON THE COORDINATE PLANE**
  - OH.Math.HSG.GPE.7: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
  - OH.Math.HSG.MG.1: Modeling with Geometry Apply geometric concepts in modeling situations. Use geometric shapes, their measures, and their properties to describe objects, e.g., modeling a tree trunk or a human torso as a cylinder.
- **TRANSFORMATIONS ON THE COORDINATE PLANE**
  - OH.Math.HSG.CO.5: Congruence Experiment with transformations in the plane. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using items such as graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
  - OH.Math.HSG.CO.2: Congruence Experiment with transformations in the plane. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not, e.g., translation versus horizontal stretch.
  - OH.Math.HSG.CO.4: Congruence Experiment with transformations in the plane. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
  - OH.Math.HSG.SRT.1a: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations. Verify experimentally the properties of dilations given by a center and a scale factor: A dilation takes a line not passing through the center of the dilation to a parallel line and leaves a line passing through the center unchanged.
  - OH.Math.HSG.SRT.1b: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations. Verify experimentally the properties of dilations given by a center and a scale factor: The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
- **DILATIONS, TRANSLATIONS, ROTATIONS, AND REFLECTIONS**
  - OH.Math.HSG.CO.5: Congruence Experiment with transformations in the plane. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using items such as graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
  - OH.Math.HSG.CO.2: Congruence Experiment with transformations in the plane. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs.

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Compare transformations that preserve distance and angle to those that do not, e.g., translation versus horizontal stretch.

- OH.Math.HSG.SRT.1b: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations. Verify experimentally the properties of dilations given by a center and a scale factor: The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

Unit 4: Triangles

- **TRIANGLES AND CONGRUENCE TRANSFORMATIONS**
  - OH.Math.HSG.CO.6: Congruence Understand congruence in terms of rigid motions. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
  - OH.Math.HSG.CO.7: Congruence Understand congruence in terms of rigid motions. 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.
  - OH.Math.HSG.CO.8: Congruence Understand congruence in terms of rigid motions. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
- **TRIANGLES AND SIMILARITY TRANSFORMATIONS**
  - OH.Math.HSG.SRT.2: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations. 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.
  - OH.Math.HSG.SRT.5: Similarity, Right Triangles, and Trigonometry Prove and apply theorems both formally and informally involving similarity using a variety of methods. Use congruence and similarity criteria for triangles to solve problems and to justify relationships in geometric figures that can be decomposed into triangles.
  - OH.Math.HSG.GMD.5: Geometric Measurement and Dimension Understand the relationships between lengths, area, and volumes. Understand how and when changes to the measures of a figure (lengths or angles) result in similar and non-similar figures.
  - OH.Math.HSG.SRT.3: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
  - OH.Math.HSG.CO.10: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about triangles.
- **PYTHAGOREAN THEOREM**
  - OH.Math.HSG.SRT.8a: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios, and solve problems involving right triangles. Solve problems involving right triangles. Use trigonometric

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ratios and the Pythagorean Theorem to solve right triangles in applied problems if one of the two acute angles and a side length is given.

- OH.Math.HSG.CO.10: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about triangles.
- OH.Math.HSG.SRT.4: Similarity, Right Triangles, and Trigonometry Prove and apply theorems both formally and informally involving similarity using a variety of methods. Prove and apply theorems about triangles.

Unit 5: Congruence of Polygons

- **CONGRUENCE OF OTHER POLYGONS**
  - OH.Math.HSG.CO.5: Congruence Experiment with transformations in the plane. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using items such as graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
  - OH.Math.HSG.CO.6: Congruence Understand congruence in terms of rigid motions. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

Unit 6: Similarity of Polygons

- **SIMILARITY OF OTHER POLYGONS**
  - OH.Math.HSG.GMD.5: Geometric Measurement and Dimension Understand the relationships between lengths, area, and volumes. Understand how and when changes to the measures of a figure (lengths or angles) result in similar and non-similar figures.
  - OH.Math.HSG.SRT.2: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations. 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.
  - OH.Math.HSG.SRT.3: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Unit 7: Properties of Triangles

- **TRIANGLE ANGLE THEOREMS**
  - OH.Math.HSG.CO.10: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about triangles.
- **MEDIANS AND ALTITUDES OF TRIANGLES**
  - OH.Math.HSG.CO.10: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about triangles.

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Unit 8: Triangle Bisectors

- **TRIANGLE BISECTORS**
  - OH.Math.HSG.CO.10: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about triangles.
  - OH.Math.HSG.C.3: Circles Understand and apply theorems about circles. Construct the inscribed and circumscribed circles of a triangle; prove and apply the property that opposite angles are supplementary for a quadrilateral inscribed in a circle.

Unit 9: Quadrilaterals and Constructions

- **PARALLELOGRAMS AND RECTANGLES**
  - OH.Math.HSG.CO.11: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about parallelograms.
- **SQUARES AND RHOMBI**
  - OH.Math.HSG.CO.11: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about parallelograms.
- **CONSTRUCTIONS**
  - OH.Math.HSG.CO.13: Congruence Make geometric constructions. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
  - OH.Math.HSG.CO.12: Congruence Make geometric constructions. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

Unit 10: Trigonometric Ratios

- **TRIGONOMETRIC RATIOS**
  - OH.Math.HSG.SRT.8a: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios, and solve problems involving right triangles. Solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems if one of the two acute angles and a side length is given.
  - OH.Math.HSG.SRT.7: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios, and solve problems involving right triangles. Explain and use the relationship between the sine and cosine of complementary angles.
  - OH.Math.HSG.SRT.6: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios, and solve problems involving right triangles. 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.

Unit 11: Circles

- **CIRCLE BASICS**
  - OH.Math.HSG.C.2: Circles Understand and apply theorems about circles. Identify and describe relationships among angles, radii, chords, tangents, and arcs and use them to solve problems.

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- **CENTRAL ANGLES, INSCRIBED ANGLES, AND CHORDS**
  - OH.Math.HSG.C.2: Circles Understand and apply theorems about circles. Identify and describe relationships among angles, radii, chords, tangents, and arcs and use them to solve problems.
  - OH.Math.HSG.C.3: Circles Understand and apply theorems about circles. Construct the inscribed and circumscribed circles of a triangle; prove and apply the property that opposite angles are supplementary for a quadrilateral inscribed in a circle.
- **SECANTS, ANGLES, AND INTERCEPTED ARCS**
  - OH.Math.HSG.CO.9: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about lines and angles.
  - OH.Math.HSG.C.2: Circles Understand and apply theorems about circles. Identify and describe relationships among angles, radii, chords, tangents, and arcs and use them to solve problems.
- **TANGENTS, ANGLES, AND INTERCEPTED ARCS**
  - OH.Math.HSG.CO.9: Congruence Prove geometric theorems both formally and informally using a variety of methods. Prove and apply theorems about lines and angles.
  - OH.Math.HSG.C.2: Circles Understand and apply theorems about circles. Identify and describe relationships among angles, radii, chords, tangents, and arcs and use them to solve problems.

Unit 12: Properties of Circles

- **RADIANS AND THE UNIT CIRCLE**
  - OH.Math.HSG.C.5a: Circles Find arc lengths and areas of sectors of circles. Find arc lengths and areas of sectors of circles. Apply similarity to relate the length of an arc intercepted by a central angle to the radius. Use the relationship to solve problems.
  - OH.Math.HSG.SRT.8a: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios, and solve problems involving right triangles. Solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems if one of the two acute angles and a side length is given.
- **CIRCUMFERENCE AND ARC LENGTH**
  - OH.Math.HSG.GMD.1: Geometric Measurement and Dimension Explain volume formulas, and use them to solve problems. Give an informal argument for the formulas for the circumference of a circle, area of a circle, and volume of a cylinder, pyramid, and cone.
- **AREA OF CIRCLES AND SECTORS**
  - OH.Math.HSG.C.5b: Circles Find arc lengths and areas of sectors of circles. Find arc lengths and areas of sectors of circles. Derive the formula for the area of a sector, and use it to solve problems.
  - OH.Math.HSG.GMD.1: Geometric Measurement and Dimension Explain volume formulas, and use them to solve problems. Give an informal argument for the formulas for the circumference of a circle, area of a circle, and volume of a cylinder, pyramid, and cone.

Unit 13: Congruence, Similarity, and Equations of Circles

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- **CONGRUENT AND SIMILAR CIRCLES**
  - OH.Math.HSG.C.1: Circles Understand and apply theorems about circles. Prove that all circles are similar using transformational arguments.
- **CIRCLES**
  - OH.Math.HSG.GPE.1: Expressing Geometric Properties with Equations Translate between the geometric description and the equation for a conic section. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

Unit 14: Introduction to Three-Dimensional Solids

- **RELATING TWO-DIMENSIONAL FIGURES TO THREE-DIMENSIONAL SOLIDS**
  - OH.Math.HSG.GMD.4: Geometric Measurement and Dimension Visualize relationships between two-dimensional and three-dimensional objects. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
- **SURFACE AREA AND VOLUME OF SPHERES**
  - OH.Math.HSG.GMD.3: Geometric Measurement and Dimension Explain volume formulas, and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Unit 15: Volume

- **VOLUME OF CYLINDERS AND CONES**
  - OH.Math.HSG.GMD.3: Geometric Measurement and Dimension Explain volume formulas, and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
  - OH.Math.HSG.GMD.1: Geometric Measurement and Dimension Explain volume formulas, and use them to solve problems. Give an informal argument for the formulas for the circumference of a circle, area of a circle, and volume of a cylinder, pyramid, and cone.
- **VOLUME OF PRISMS AND PYRAMIDS**
  - OH.Math.HSG.GMD.3: Geometric Measurement and Dimension Explain volume formulas, and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
  - OH.Math.HSG.GMD.1: Geometric Measurement and Dimension Explain volume formulas, and use them to solve problems. Give an informal argument for the formulas for the circumference of a circle, area of a circle, and volume of a cylinder, pyramid, and cone.
- **VOLUME OF COMPOSITE SOLIDS**
  - OH.Math.HSG.GMD.3: Geometric Measurement and Dimension Explain volume formulas, and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

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Unit 16: Volume of Similar Solids

- **VOLUME OF SIMILAR SOLIDS**
  - OH.Math.HSG.GMD.6: Geometric Measurement and Dimension Understand the relationships between lengths, area, and volumes. When figures are similar, understand and apply the fact that when a figure is scaled by a factor of , the effect on lengths, areas, and volumes is that they are multiplied by , , and , respectively.

Unit 17: Surface Area

- **SURFACE AREA OF COMPOSITE SOLIDS**
  - OH.Math.HSG.MG.1: Modeling with Geometry Apply geometric concepts in modeling situations. Use geometric shapes, their measures, and their properties to describe objects, e.g., modeling a tree trunk or a human torso as a cylinder.
- **SURFACE AREA OF SIMILAR SOLIDS**
  - OH.Math.HSG.GMD.6: Geometric Measurement and Dimension Understand the relationships between lengths, area, and volumes. When figures are similar, understand and apply the fact that when a figure is scaled by a factor of , the effect on lengths, areas, and volumes is that they are multiplied by , , and , respectively.
- **MODELING SITUATIONS WITH GEOMETRY**
  - OH.Math.HSG.MG.2: Modeling with Geometry Apply geometric concepts in modeling situations. Apply concepts of density based on area and volume in modeling situations, e.g., persons per square mile, BTUs per cubic foot.
  - OH.Math.HSG.MG.3: Modeling with Geometry Apply geometric concepts in modeling situations. Apply geometric methods to solve design problems, e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios.

Unit 18: Probability Concepts

- **INTRODUCTION TO PROBABILITY**
  - OH.Math.HSS.CP.2: Conditional Probability and the Rules of Probability Understand independence and conditional probability, and use them to interpret data. Understand that two events A and B are independent if and only if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
  - OH.Math.HSS.CP.1: Conditional Probability and the Rules of Probability Understand independence and conditional probability, and use them to interpret data. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (or, and, not).
  - OH.Math.HSS.CP.7: Conditional Probability and the Rules of Probability Use the rules of probability to compute probabilities of compound events in a uniform probability model. Apply the Addition Rule, P(A or B) = P(A) + P(B) P(A and B), and interpret the answer in terms of the model.
- **CONDITIONAL PROBABILITY**

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- OH.Math.HSS.CP.2: Conditional Probability and the Rules of Probability Understand independence and conditional probability, and use them to interpret data. Understand that two events A and B are independent if and only if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
- OH.Math.HSS.CP.3: Conditional Probability and the Rules of Probability Understand independence and conditional probability, and use them to interpret data. Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
- OH.Math.HSS.CP.4: Conditional Probability and the Rules of Probability Understand independence and conditional probability, and use them to interpret data. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.
- OH.Math.HSS.CP.6: Conditional Probability and the Rules of Probability Use the rules of probability to compute probabilities of compound events in a uniform probability model. Find the conditional probability of A given B as the fraction of Bs outcomes that also belong to A, and interpret the answer in terms of the model.
- OH.Math.HSS.CP.5: Conditional Probability and the Rules of Probability Understand independence and conditional probability, and use them to interpret data. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

Unit 19: Test-Taking Strategies

- **STUDY HABITS**
- **BEING PREPARED AND GETTING STARTED**
- **WORDING IN TEST QUESTIONS**
- **WORDING IN ANSWER CHOICES**
- **QUESTIONS WITH PASSAGES AND VISUAL DATA**
- **ESSAY AND SHORT ANSWER QUESTIONS**
- **WORD PROBLEMS**

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