Keystone Exams: Geometry

Assessment Anchors and Eligible Content

Pennsylvania Department of Education

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PENNSYLVANIA DEPARTMENT OF EDUCATION

General Introduction to the Keystone Exam Assessment Anchors

Introduction

Since the introduction of the Keystone Exams, the Pennsylvania Department of Education (PDE) has been working to create a set of tools designed to help educators improve instructional practices and better understand the Keystone Exams. The Assessment Anchors, as defined by the Eligible Content, are one of the many tools the Department believes will better align curriculum, instruction, and assessment practices throughout the Commonwealth. Without this alignment, it will not be possible to significantly improve student achievement across the Commonwealth.

How were Keystone Exam Assessment Anchors developed?

Prior to the development of the Assessment Anchors, multiple groups of PA educators convened to create a set of standards for each of the Keystone Exams. Enhanced Standards, derived from a review of existing standards, focused on what students need to know and be able to do in order to be college and career ready. (Note: Since that time, PA Core Standards have replaced the Enhanced Standards and reflect the college- and career-ready focus.) Additionally, the Assessment Anchors and Eligible Content statements were created by other groups of educators charged with the task of clarifying the standards assessed on the Keystone Exams. The Assessment Anchors, as defined by the Eligible Content, have been designed to hold together, or *anchor*, the state assessment system and the curriculum/instructional practices in schools.

Assessment Anchors, as defined by the Eligible Content, were created with the following design parameters:

- **Clear:** The Assessment Anchors are easy to read and are user friendly; they clearly detail which standards are assessed on the Keystone Exams.
- **Focused:** The Assessment Anchors identify a core set of standards that could be reasonably assessed on a large-scale assessment; this will keep educators from having to guess which standards are critical.
- **Rigorous:** The Assessment Anchors support the rigor of the state standards by assessing higher-order and reasoning skills.
- **Manageable:** The Assessment Anchors define the standards in a way that can be easily incorporated into a course to prepare students for success.

How can teachers, administrators, schools, and districts use these Assessment Anchors?

The Assessment Anchors, as defined by the Eligible Content, can help focus teaching and learning because they are clear, manageable, and closely aligned with the Keystone Exams. Teachers and administrators will be better informed about which standards will be assessed. The Assessment Anchors and Eligible Content should be used along with the Standards and the Curriculum Framework of the Standards Aligned System (SAS) to build curriculum, design lessons, and support student achievement.

The Assessment Anchors and Eligible Content are designed to enable educators to determine when they feel students are prepared to be successful in the Keystone Exams. An evaluation of current course offerings, through the lens of what is assessed on those particular Keystone Exams, may provide an opportunity for an alignment to ensure student preparedness.

How are the Assessment Anchors organized?

The Assessment Anchors, as defined by the Eligible Content, are organized into cohesive blueprints, each structured with a common labeling system that can be read like an outline. This framework is organized first by module, then by Assessment Anchor, followed by Anchor Descriptor, and then finally, at the greatest level of detail, by an Eligible Content statement. The common format of this outline is followed across the Keystone Exams.

Here is a description of each level in the labeling system for the Keystone Exams:

- **Module:** The Assessment Anchors are organized into two thematic modules for each of the Keystone Exams. The module title appears at the top of each page. The module level is important because the Keystone Exams are built using a module format, with each of the Keystone Exams divided into two equal-size test modules. Each module is made up of two or more Assessment Anchors.
- **Assessment Anchor:** The Assessment Anchor appears in the shaded bar across the top of each Assessment Anchor table. The Assessment Anchors represent categories of subject matter that anchor the content of the Keystone Exams. Each Assessment Anchor is part of a module and has one or more Anchor Descriptors unified under it.
- **Anchor Descriptor:** Below each Assessment Anchor is a specific Anchor Descriptor. The Anchor Descriptor level provides further details that delineate the scope of content covered by the Assessment Anchor. Each Anchor Descriptor is part of an Assessment Anchor and has one or more Eligible Content statements unified under it.
- **Eligible Content:** The column to the right of the Anchor Descriptor contains the Eligible Content statements. The Eligible Content is the most specific description of the content that is assessed on the Keystone Exams. This level is considered the assessment limit and helps educators identify the range of the content covered on the Keystone Exams.
- **PA Core Standards:** In the column to the right of each Eligible Content statement is a code representing one or more Pennsylvania Core Standard that correlate to the Eligible Content statement. Some Eligible Content statements include annotations that indicate certain clarifications about the scope of an Eligible Content.
    - "e.g." ("for example")—sample approach, but not a limit to the Eligible Content.

How do the K–12 Pennsylvania Core Standards affect this document?

Assessment Anchors and Eligible Content statements are aligned to the PA Core Standards; thus, the former enhanced standards are no longer necessary. Within this document, all standard references reflect the PA Core Standards.

Standards Aligned System — http://www.pdesas.org/ **Pennsylvania Department of Education —** www.education.state.pa.us

ASSESSMENT ANCHOR
G.1.1 Properties of Circles, Spheres, and Cylinders

Anchor Descriptor	Eligible Content	PA Core Standards
G.1.1.1 Identify and/or use parts of circles and segments associated with circles, spheres, and cylinders.	**G.1.1.1.1** Identify, determine, and/or use the radius, diameter, segment, and/or tangent of a circle. **G.1.1.1.2** Identify, determine, and/or use the arcs, semicircles, sectors, and/or angles of a circle. **G.1.1.1.3** Use chords, tangents, and secants to find missing arc measures or missing segment measures. **G.1.1.1.4** Identify and/or use the properties of a sphere or cylinder.	**CC.2.3.HS.A.8** Apply geometric theorems to verify properties of circles. **CC.2.3.HS.A.9** Extend the concept of similarity to determine arc lengths and areas of sectors of circles. **CC.2.3.HS.A.13** Analyze relationships between two-dimensional and three-dimensional objects.

Eligible Content may be assessed using problem-solving situations.

ASSESSMENT ANCHOR

G.1.2 Properties of Polygons and Polyhedra

Anchor Descriptor	Eligible Content	PA Core Standards
G.1.2.1 Recognize and/or apply properties of angles, polygons, and polyhedra.	**G.1.2.1.1** Identify and/or use properties of triangles.	**CC.2.3.8.A.2** Understand and apply congruence, similarity, and geometric transformations using various tools. **CC.2.3.HS.A.3** Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.13** Analyze relationships between two-dimensional and three-dimensional objects.
	G.1.2.1.2 Identify and/or use properties of quadrilaterals.	
	G.1.2.1.3 Identify and/or use properties of isosceles and equilateral triangles.	
	G.1.2.1.4 Identify and/or use properties of regular polygons.	
	G.1.2.1.5 Identify and/or use properties of pyramids and prisms.	

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ASSESSMENT ANCHOR
G.1.3 Congruence, Similarity, and Proofs

Anchor Descriptor		Eligible Content		PA Core Standards
G.1.3.1	Use properties of congruence, correspondence, and similarity in problem-solving settings involving two- and three-dimensional figures.	**G.1.3.1.1**	Identify and/or use properties of congruent and similar polygons or solids.	**CC.2.3.HS.A.1** Use geometric figures and their properties to represent transformations in the plane. **CC.2.3.HS.A.2** Apply rigid transformations to determine and explain congruence. **CC.2.3.HS.A.5** Create justifications based on transformations to establish similarity of plane figures. **CC.2.3.HS.A.6** Verify and apply theorems involving similarity as they relate to plane figures.
		G.1.3.1.2	Identify and/or use proportional relationships in similar figures.	

Anchor Descriptor		Eligible Content		PA Core Standards
G.1.3.2	Write formal proofs and/or use logic statements to construct or validate arguments.	**G.1.3.2.1**	Write, analyze, complete, or identify formal proofs (e.g., direct and/or indirect proofs/proofs by contradiction).	**CC.2.2.HS.C.9** Prove the Pythagorean identity and use it to calculate trigonometric ratios. **CC.2.3.HS.A.3** Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.6** Verify and apply theorems involving similarity as they relate to plane figures. **CC.2.3.HS.A.8** Apply geometric theorems to verify properties of circles.

Eligible Content may be assessed using problem-solving situations.

ASSESSMENT ANCHOR
G.2.1 Coordinate Geometry and Right Triangles

Anchor Descriptor	Eligible Content	PA Core Standards
G.2.1.1 Solve problems involving right triangles.	**G.2.1.1.1** Use the Pythagorean theorem to write and/or solve problems involving right triangles.	**CC.2.2.HS.C.9** Prove the Pythagorean identity and use it to calculate trigonometric ratios. **CC.2.3.HS.A.7** Apply trigonometric ratios to solve problems involving right triangles.
	G.2.1.1.2 Use trigonometric ratios to write and/or solve problems involving right triangles.	

Anchor Descriptor	Eligible Content	PA Core Standards
G.2.1.2 Solve problems using analytic geometry.	**G.2.1.2.1** Calculate the distance and/or midpoint between two points on a number line or on a coordinate plane.	**CC.2.3.8.A.3** Understand and apply the Pythagorean theorem to solve problems. **CC.2.3.HS.A.11** Apply coordinate geometry to prove simple geometric theorems algebraically.
	G.2.1.2.2 Relate slope to perpendicularity and/or parallelism (limit to linear algebraic equations).	
	G.2.1.2.3 Use slope, distance, and/or midpoint between two points on a coordinate plane to establish properties of a two-dimensional shape.	

Eligible Content may be assessed using problem-solving situations.

ASSESSMENT ANCHOR
G.2.2 Measurements of Two-Dimensional Shapes and Figures

Anchor Descriptor	Eligible Content	PA Core Standards
G.2.2.1 Use and/or compare measurements of angles.	**G.2.2.1.1** Use properties of angles formed by intersecting lines to find the measures of missing angles.	**CC.2.3.8.A.2** Understand and apply congruence, similarity, and geometric transformations using various tools. **CC.2.3.HS.A.3** Verify and apply geometric theorems as they relate to geometric figures.
	G.2.2.1.2 Use properties of angles formed when two parallel lines are cut by a transversal to find the measures of missing angles.	

Anchor Descriptor	Eligible Content	PA Core Standards
G.2.2.2 Use and/or develop procedures to determine or describe measures of perimeter, circumference, and/or area. (May require conversions within the same system.)	**G.2.2.2.1** Estimate area, perimeter, or circumference of an irregular figure.	**CC.2.2.HS.C.1** Use the concept and notation of functions to interpret and apply them in terms of their context. **CC.2.3.HS.A.3** Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.9** Extend the concept of similarity to determine arc lengths and areas of sectors of circles.
	G.2.2.2.2 Find the measurement of a missing length, given the perimeter, circumference, or area.	
	G.2.2.2.3 Find the side lengths of a polygon with a given perimeter to maximize the area of the polygon.	
	G.2.2.2.4 Develop and/or use strategies to estimate the area of a compound/composite figure.	
	G.2.2.2.5 Find the area of a sector of a circle.	

Anchor Descriptor	Eligible Content	PA Core Standards
G.2.2.3 Describe how a change in one dimension of a two-dimensional figure affects other measurements of that figure.	**G.2.2.3.1** Describe how a change in the linear dimension of a figure affects its perimeter, circumference, and area (e.g., How does changing the length of the radius of a circle affect the circumference of the circle?).	**CC.2.3.HS.A.8** Apply geometric theorems to verify properties of circles. **CC.2.3.HS.A.9** Extend the concept of similarity to determine arc lengths and areas of sectors of circles.

Anchor Descriptor	Eligible Content	PA Core Standards
G.2.2.4 Apply probability to practical situations.	**G.2.2.4.1** Use area models to find probabilities.	**CC.2.3.HS.A.14** Apply geometric concepts to model and solve real-world problems.

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ASSESSMENT ANCHOR
G.2.3 Measurements of Three-Dimensional Shapes and Figures

Anchor Descriptor		Eligible Content		PA Core Standards
G.2.3.1	Use and/or develop procedures to determine or describe measures of surface area and/or volume. (May require conversions within the same system.)	**G.2.3.1.1**	Calculate the surface area of prisms, cylinders, cones, pyramids, and/or spheres. Formulas are provided on a reference sheet.	**CC.2.3.8.A.1** Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems. **CC.2.3.HS.A.12** Explain volume formulas and use them to solve problems. **CC.2.3.HS.A.14** Apply geometric concepts to model and solve real-world problems.
		G.2.3.1.2	Calculate the volume of prisms, cylinders, cones, pyramids, and/or spheres. Formulas are provided on a reference sheet.	
		G.2.3.1.3	Find the measurement of a missing length given the surface area or volume.	

Anchor Descriptor		Eligible Content		PA Core Standards
G.2.3.2	Describe how a change in one dimension of a three-dimensional figure affects other measurements of that figure.	**G.2.3.2.1**	Describe how a change in the linear dimension of a figure affects its surface area or volume (e.g., How does changing the length of the edge of a cube affect the volume of the cube?).	**CC.2.3.HS.A.13** Analyze relationships between two-dimensional and three-dimensional objects.

Eligible Content may be assessed using problem-solving situations.