

Standard 3: Geometry Benchmark 3: Transformational Geometry

| Organizer | Indicator lead in phrase/wording | Kindergarten | First Grade | Second Grade | Third Grade | Fourth Grade | Fifth Grade | Sixth Grade | Seventh Grade | Eighth Grade | Ninth and Tenth Grade |
|--|--|---|---|---|---|---|--|---|---|--|---|
| Cardinal Points and Directions | describes, knows, and/or uses... | K.1...the spatial relationship between two concrete objects using appropriate vocabulary | K.1...the spatial relationship between two concrete objects using appropriate vocabulary | K.1...the cardinal points (north, south, east, west) | K.1...cardinal points (north, south, east, west) and intermediate points (northeast, southeast, northwest, southwest) | K.1...a transformation using cardinal points or positional directions | | | | | |
| | follows, uses, and/or describes... | A.2...directions to move concrete objects from one location to another using appropriate vocabulary | K.3 & A.2...movement of concrete objects using appropriate vocabulary and directions to move concrete objects from one location to another using appropriate vocabulary | A.2...directions to move objects from one location to another using appropriate vocabulary and the cardinal points (north, south, east, west) | A.2...directions to move from one location to another on a map and follows directions including the use of cardinal and intermediate points | A.2...cardinal points or positional directions to move from one location to another on a map or grid | | | | | |
| Transformations and Tessellations | recognize, identify, describes, draws, and/or performs... | | | K.3...when a shape has undergone one transformation (flip/reflection, turn/rotation, slide/translation) | K.2 & A.1...one transformation (reflection/flip, rotation/turn, and translation/slide) on a two-dimensional figure and real-world transformations (reflection/flip, rotation/turn, and translation/slide) | ▲K.2 & A.1...one transformation (reflection/flip, rotation/turn, translation/slide) on a two-dimensional figure or concrete object and real-world transformations (reflection/flip, rotation/turn, translation/slide) | K.1 & A.1...through two transformations (reflection, rotation, translation) on a two-dimensional figure and a two-dimensional figure after performing one transformation (reflection, rotation, translation) | ▲K.1...one or two transformations (reflection, rotation, translation) on a two-dimensional figure | K.1...single and multiple transformations [reflection, rotation, translation, reduction (contraction/shrinking), enlargement (magnification/growing)] on a two-dimensional figure | K.1 & A.2...single and multiple transformations [reflection, rotation, translation, reduction (contraction/shrinking), enlargement (magnification/growing)] on a two-dimensional figure after undergoing two specified transformations without using a concrete object | K.1 & A.2...single and multiple transformations [reflection, rotation, translation, reduction (contraction/shrinking), enlargement (magnification/growing)] on two- and three-dimensional figures and a simple three-dimensional shape after undergoing one specified transformation without using concrete objects to perform the transformation |

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| Transformations and Tessellations | recognizes and/or describes... | | | | | | K.2...when an object is reduced or enlarged | A.1...a transformation of a given two-dimensional figure that moves it from its initial placement (pre-image) to its final placement (image) | A.1...the impact of transformations [reflection, rotation, translation, reduction (contraction/shrink ing), enlargement (magnification/gro wing)] on the perimeter and area of squares and rectangles | K.2...a reflection of a given two-dimensional figure that moves it from its initial placement (pre-image) to its final placement (image) in the coordinate plane over the x- and y-axis | K.2...a three-dimensional figure created by rotating a simple two-dimensional figure around a fixed line |
| | recognize, generate, determines, and/or creates... | | | | | | | K.4...which figures will tessellate | K.4...a tessellation | K.4...where and how an object or a shape can be tessellated using single or multiple transformations | K.4...where and how an object or a shape can be tessellated using single or multiple transformations and creates a tessellation |
| | generalize, analysis's, and/or explains... | | | | | | | | | A.1...the impact of transformations on the area and perimeter of any two-dimensional geometric figure | ▲A.1 & A.4...the impact of transformations on the perimeter and area of circles, rectangles, and triangles and volume of rectangular prisms and cylinders and transformations using such things as sketches and coordinate systems |

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| Congruence and Similarity | identifies, shows, describes, and/or investigates... | K.2 & A.1... two like objects or shapes from a set of four objects or shapes and two concrete objects or shapes are congruent by physically fitting one object or shape on top of the other | A.1...two concrete objects or shapes are congruent by physically fitting one object or shape on top of the other | A.1...two concrete objects or shapes are congruent by physically fitting one shape or object on top of the other | | A.3...the properties of geometric shapes or concrete objects that stay the same and the properties that change when a transformation is performed | | | A.2...congruency and similarity of geometric figures using transformations | A.3...congruency, similarity, and symmetry of geometric figures using transformations | |
| | recognizes... | | K.2...that changing an object's position or orientation does not change the name, size, or shape of the object | K.2...recognizes that changing an object's position or orientation including whether the object is nearer or farther away does not change the name, size, or shape of the object | | | | | | | |
| Perspective and Scale | recognizes, identifies, or draws (generates)... | | | | | K.3...three-dimensional figures (rectangular prisms, cylinders) and concrete objects from various perspectives (top, bottom, sides, corners) | ▲K.3...three-dimensional figures (rectangular prisms, cylinders, cones, spheres, triangular prisms, rectangular pyramids) from various perspectives (top, bottom, side, corners) | K.3...three-dimensional figures from various perspectives (top, bottom, sides, corners) | K.2 & K.3...three-dimensional figures from various perspectives (top, bottom, sides, corners) | K.3.a...three-dimensional figures from a variety of perspectives (top, bottom, sides, corners) | K.3...a two-dimensional representation of a three-dimensional figure |
| | makes/draws, reduces/enlarges, or uses... | | | | | | A.2...scale drawings of two-dimensional figures using a simple scale and grid paper | K.2 & A.2...(contracts/shrinks) and (magnifies/grows) simple shapes with simple scale factors and a scale drawing of a two-dimensional figure using a simple scale | | K.3.b A.4 ...a scale drawing of a two-dimensional figure | A.3...a variety of scales to view and analyze two- and three-dimensional figures |

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| Perspective and Scale | determines, draws, or uses... | | | | | | | | ▲ A.3...the actual dimensions and/or measurements of a two-dimensional figure represented in a scale drawing | K.3.c & A.4...a two-dimensional drawing of a three-dimensional figure and a scale drawing to determine the actual dimensions and/or measurements of a two-dimensional figure represented in a scale drawing | |

| Organizer | Algebra I | Geometry | Algebra II | Trigonometry | Statistics | Calculus | Applied Math I | Applied Math II |
|--|---|----------|--|--|------------|----------|--|-----------------|
| Cardinal Points and Directions | | | | | | | <p>K.3 & A.2...movement of concrete objects using appropriate directions to move concrete objects from one location to another</p> | |
| Transformations and Tessellations | <p>K.1 & A.2...single and multiple transformations [reflection, rotation, translation, reduction (contraction/shrinking), enlargement (magnification/ growing)] on two dimensional figures transformation</p> | | <p>K.1 & A.2...single and multiple transformations [reflection, rotation, translation, reduction (contraction/shrinking), enlargement (magnification/ growing)] on two- and three-dimensional figures after undergoing several transformations</p> | <p>K.1 & A.2...single and multiple transformations (Amplitude, Period, Phase Shift, and Vertical Shift) on graphs of trigonometrics functions.</p> | | | <p>K.2 & A.1...one transformation (reflection/flip, rotation/turn, and translation/slide) on a two-dimensional figure and real-world transformations (reflection/flip, rotation/turn, and translation/slide)</p> | |

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|--|-----------|----------|------------|--------------|------------|----------|----------------|-----------------|
| Transformations and Tessellations | | | | | | | | |
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| Organizer | Algebra I | Geometry | Algebra II | Trigonometry | Statistics | Calculus | Applied Math I | Applied Math II |
|----------------------------------|-----------|----------|------------|--------------|------------|----------|---|-----------------|
| Congruence and Similarity | | | | | | | <p>K.2...recognizes that changing an object's position or orientation including whether the object is nearer or farther away does not change the name, size, or shape of the object</p> | |
| Perspective and Scale | | | | | | | <p>K.3...a two-dimensional representation of a three-dimensional figure</p> | |
| | | | | | | | <p>A.3...a variety of scales to view and analyze two- and three-dimensional figures</p> | |

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|------------------------------|
| Organizer |
| Perspective and Scale |

Algebra I

Geometry

Algebra II

Trigonometry

Statistics

Calculus

Applied Math I

Applied Math II

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| <p>K.3.c & A.4...a two-dimensional drawing of a three-dimensional figure and a scale drawing to determine the actual dimensions and/or measurements of a two-dimensional figure represented in a scale drawing</p> |
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