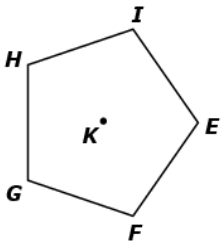
MAFS.912.G-CO.1.5 Also assesses MAFS.912.G-CO.1.3	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
Item Types	Equation Editor – May require creating an algebraic description for a transformation. GRID – May require constructing a transformed figure or graphing a figure or a line of reflection. Hot Text – May require reordering steps of a transformation. Matching Item – May require choosing transformations that will carry a figure onto another. Multiple Choice – May require selecting a value or an expression from a list. Multiselect – May require selecting responses. Open Response – May require describing rotations and reflections. Table Item – May require completing a table of values for a transformation that will carry a figure onto another figure.
Clarifications	Students will apply two or more transformations to a given figure to draw a transformed figure. Students will specify a sequence of transformations that will carry a figure onto another. Students will describe rotations and reflections that carry a geometric figure onto itself.
Assessment Limits	Items should not require the student to find the distance between points. Items may require the student to be familiar with using the algebraic description $(x, y) \rightarrow (x + a, y + b)$ for a translation, and $(x, y) \rightarrow (kx, ky)$ for a dilation when given the center of dilation. Items may require the student to be familiar with the algebraic description for a 90-degree rotation about the origin, $(x, y) \rightarrow (-y, x)$, for a 180-degree rotation about the origin, $(x, y) \rightarrow (-x, -y)$, and for a 270-degree rotation about the origin, $(x, y) \rightarrow (y, -x)$. Items that use more than one transformation may ask the student to write a series of algebraic descriptions. Items must not use matrices to describe transformations.

	In items in which the line of reflection is given, it must be in slope-intercept form. In items in which the line of reflection is given, any form of a line may be used. If the line is not a vertical line or a horizontal line, then the line of reflection must be graphed as a dotted line.
Stimulus Attributes	Items may be set in a real-world or mathematical context. Items may require the student to provide a sequence of transformations. Items may require the student to determine if an attribute of a figure is the same after a sequence of transformations has been applied.
Response Attributes	Items may require the student to use a function, e.g., $y = k(f(x + a)) + b$, to describe a transformation. Items may require the student to give a line of reflection and/or a degree of rotation that carries a figure onto itself. Items may require the student to draw a figure using a description of a transformation. Items may require the student to graph a figure using a description of a rotation and/or reflection. In items in which the student has to write the line of reflection, any line may be used. Items may require the student to be familiar with slope-intercept form of a line, standard form of a line, and point-slope form of a line. Items may require the student to write a line of reflection that will carry a figure onto itself. Items may require the student to give a degree of rotation that will carry a figure onto itself.
Calculator	Neutral

Sample Item	Item Type
	Multiselect

Regular pentagon *EFGHI* with center *K* is shown.



Select all the transformations that carry pentagon *EFGHI* onto itself.

- ☐ a reflection across line *EK*, a 180° counterclockwise rotation about point *K*, and a reflection across a vertical line through point *K*
- ☐ a 90° counterclockwise rotation about point *E*, a reflection across line *FG*, and a vertical translation
- ☐ a reflection across line *FI*, a reflection across line *GH*, and a 180° clockwise rotation about point *K*
- ☐ a reflection across a vertical line through point *K*, a 180° clockwise rotation about point *K*, and a reflection across line *EK*
- ☐ a 180° clockwise rotation about point *E*, a reflection across a vertical line through point *E*, and a reflection across a horizontal line through point *E*