Topic B
Dilations

G-SRT.A.1, G-SRT.B.4

Focus Standards: 

- **G-SRT.A.1**: Verify experimentally the properties of dilations given by a center and a scale factor:
  a. 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.
  b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
- **G-SRT.B.4**: Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.

Instructional Days: 6

- **Lesson 6**: Dilations as Transformations of the Plane (S)
- **Lesson 7**: How Do Dilations Map Segments? (P)
- **Lesson 8**: How Do Dilations Map Lines, Rays, and Circles? (S)
- **Lesson 9**: How Do Dilations Map Angles? (E)
- **Lesson 10**: Dividing the King’s Foot into 12 Equal Pieces (E)
- **Lesson 11**: Dilations from Different Centers (E)

Topic B is an in-depth study of the properties of dilations. Though students applied dilations in Topic A, their use in the ratio and parallel methods was to establish relationships that were consequences of applying a dilation, not directly about the dilation itself. In Topic B, students explore observed properties of dilations (Grade 8 Module 3) and reason why these properties are true. This reasoning is possible because of what students have studied regarding scale drawings and the triangle side splitter and dilation theorems. With these theorems, it is possible to establish why dilations map segments to segments, lines to lines, etc. Some of the arguments involve an examination of several sub-cases; it is in these instances of thorough examination that students must truly make sense of problems and persevere in solving them (MP.1).

In Lesson 6, students revisit the study of rigid motions and contrast the behavior of the rigid motions to that of a dilation. Students confirm why the properties of dilations are true in Lessons 7–9. Students repeatedly encounter **G.SRT.A.1a** and **b** in these lessons and build arguments with the help of the ratio and parallel

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1. Lesson Structure Key: **P**-Problem Set Lesson, **M**-Modeling Cycle Lesson, **E**-Exploration Lesson, **S**-Socratic Lesson
methods *(G.SRT.B.4)*. In Lesson 10, students study how dilations can be used to divide a segment into equal divisions. Finally, in Lesson 11, students observe how the images of dilations of a given figure by the same scale factor are related, as well as the effect of a composition of dilations on the scale factor of the composition.