Just In Time Quick Check

Standard of Learning (SOL) G.14a

Strand: Three Dimensional Figures

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The student will apply the concepts of similarity to two- or three-dimensional geometric figures. This will include comparing ratios between lengths, perimeters, areas, and volumes of similar figures.

Grade Level Skills:

- Compare ratios between side lengths, perimeters, areas, and volumes, given two similar figures.

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Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - G.14 - Similar Solids and Proportional Reasoning (Word) / PDF Version
- VDOE Word Wall Cards: Geometry (Word)|(PDF)
  - Similar Solids Theorem]
  - Cone
  - Cylinder
  - Sphere
  - Pyramid
- Other VDOE Resources
  - Geometry, Module 14, Topic 1 - Comparing Ratios of Measures of Similar Figures [eMediaVA]

Supporting and Prerequisite SOL: G.7, 8.1, 7.3, 7.4a, 7.4b, 6.1

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1. Two solid figures are similar. The ratio of their volumes is 64:343. The length of one side of the smaller figure is 8m. Find the length of the corresponding side of the larger figure.

2. Cube A is similar to Cube B. The ratios of the volumes of the two cubes is 125:512. Find the ratio of their surface areas.

3. The ratio of the perimeters of two regular hexagons is 3600:1. Find the ratio of the length of one side of the smaller hexagon to the length of one side of the larger hexagon.

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Common Errors/Misconceptions and their Possible Indications

1. Two solid figures are similar. The ratio of their volumes is 64:343. The length of one side of the smaller figure is 8m. Find the length of the corresponding side of the larger figure.

   A common error that some students may make is to use the ratios of the corresponding volumes provided in the problem to find the corresponding ratios of the sides of the figure. This may indicate that students do not understand how ratios vary based upon whether the relationship is linear, squared or cubic. Students making this misconception would benefit by exploring how the relationship between the sides, perimeter, surface areas and volumes change when comparing two solid figures. Teachers are encouraged to demonstrate these changes through exploratory exercises or using dynamic geometry software.

2. Cube A is similar to Cube B. The ratios of the volumes of the two cubes is 125:512. Find the ratio of their surface areas.

   A common misconception that some students may have is that the surface areas of similar solids change at the same rate as either the volume or the sides and perimeters. This may indicate that students do not understand that linear ratios must be found before area ratios when starting with volume ratios. Students making this misconception would benefit by exploring how the relationships between the sides, perimeters, areas and volumes change when comparing two cubes. Teachers are encouraged to demonstrate these changes through exploratory exercises.

3. The ratio of the perimeters of two regular hexagons is 3600:1. Find the ratio of the length of one side of the smaller hexagon to the length of one side of the smaller hexagon.

   A common misconception that some students may have when comparing two similar regular polygons is that the number of sides has an influence on the corresponding ratios.This may indicate that students believe they should divide the ratios by the number of sides to solve the problem. Since perimeter and side length are both linear measurements, ratios remain equal. Teachers are encouraged to have students investigate the side length, perimeter and surface area of a variety of regular polygons to explore how the ratios are related.Teachers could use dynamic software such as geogebra to investigate these concepts.