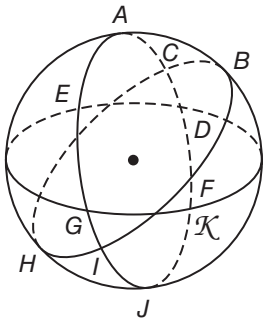
NAME _____ DATE _____ PERIOD _____

12-7 Study Guide and Intervention

Spherical Geometry

Geometry On A Sphere Up to now, we have been studying **Euclidean geometry**, where a plane is a flat surface made up of points that extends infinitely in all directions. In **spherical geometry**, a plane is the surface of a sphere.

Example **Name each of the following on sphere $\mathcal{K}$.**



a. two lines containing the point *F*

$\overleftrightarrow{EG}$ and $\overleftrightarrow{BH}$ are lines on sphere $\mathcal{K}$ that contain the point F

b. a line segment containing the point *J*

$\overline{ID}$ is a segment on sphere $\mathcal{K}$ that contains the point J

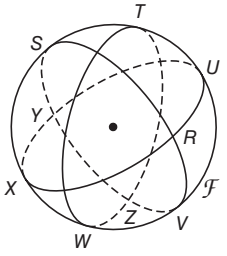
c. a triangle

$\triangle AHI$ is a triangle on sphere $\mathcal{K}$

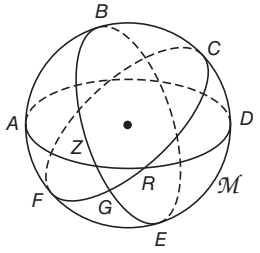
Exercises

Name two lines containing point *Z*, a segment containing point *R*, and a triangle in each of the following spheres.

1.

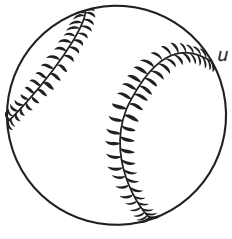


2.

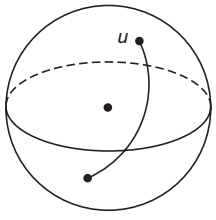


Determine whether figure *u* on each of the spheres shown is a line in spherical geometry.

3.



4.



5. GEOGRAPHY Lines of latitude run horizontally across the surface of Earth. Are there any lines of latitude that are great circles? Explain.

Lesson 12-7

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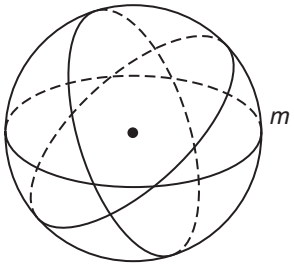
12-7 Study Guide and Intervention *(continued)*

Spherical Geometry

Comparing Euclidean and Spherical Geometries Some postulates and properties of Euclidean geometry are true in spherical geometry. Others are not true or are true only under certain circumstances.

Example **Tell whether the following postulate or property of plane Euclidean geometry has a corresponding statement in spherical geometry. If so, write the corresponding statement. If not, explain your reasoning.**

Given any line, there are an infinite number of parallel lines.



On the sphere to the right, if we are given line m we see that it goes through the poles of the sphere. If we try to make any other line on the sphere, it would intersect line m at exactly 2 points. This property is not true in spherical geometry.

A corresponding statement in spherical geometry would be: "Given any line, there are no parallel lines."

Exercises

Tell whether the following postulate or property of plane Euclidean geometry has a corresponding statement in spherical geometry. If so, write the corresponding statement. If not, explain your reasoning.

1. If two nonidentical lines intersect at a point, they do not intersect again.

2. Given a line and a point on the line, there is only one perpendicular line going through that point.

3. Given two parallel lines and a transversal, alternate interior angles are congruent.

4. If two lines are perpendicular to a third line, they are parallel.

5. Three noncollinear points determine a triangle.

6. A largest angle of a triangle is opposite the largest side.