

Subject: Math

Title: Geometric Scavenger Hunt

Author:

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School / Organization, City and State / Province:

Shoreline, WA

Grade Levels: 4th or 5th Grade

Common Core Standards Met:

Elementary School

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

- 4.G.1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
- 4.G.2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
- 4.G.3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Classify two-dimensional figures into categories based on their properties.

- 5.G.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- 5.G.4. Classify two-dimensional figures in a hierarchy based on properties.

Time needed for lesson: One to two class periods

Overarching Question and Objectives:

What kinds of geometry can we find/create using the Puzzle Maker?

- Students will utilize proper geometric vocabulary to properly describe attributes and shapes within the test chamber
- Students will describe geometric relationships between objects (example parallel lines)
- Students will explain and defend their reasoning for how various assets in the test chamber exemplify geometric concepts
- Students will enhance their spatial reasoning skills by creating a test chamber that displays the geometric concepts in an organized way

Summary of lesson:

This lesson can be a great introductory lesson or an assessment lesson in a basic elementary unit on geometry. In a scavenger hunt type format, students must demonstrate their understanding of geometric terminology. Using a test chamber, students will select objects, place them and modify the room in order to correctly demonstrate their understanding of geometric concepts. Through screenshots, first person play, discussion and partner work students will explain and defend their thinking about 2-D and 3-D geometric concepts.

Vocabulary:

A suggested list of vocabulary is given below in the scavenger hunt list. Obviously this can be modified to meet individual needs within the classroom.

Teacher materials needed:

If possible, a computer that will allow you to project the Puzzle Maker for class discussion purposes.

Student materials needed:

* The Puzzle Maker

Lesson Plan:

****Note: This plan will vary depending on whether you are using it as an assessment or as an introductory tool. As an assessment, I would suggest simply giving students the list of terms and have them find, place and describe the objects to demonstrate their understanding. The following lesson is written as an introductory example. In fact, ideally, you could use it as both an introduction and a final assessment so that students are able to track their growth throughout the unit.****

Explain to students that we are beginning a new unit focusing on geometry. Ask them to think for a minute about “math language” versus “everyday language.” See if students can give examples of how “math language” might be different than normal “daily” language.

(Some examples might be a “line”...in everyday language we say, “get in a line” and it simply means a row or something that appears straight. However, in math language, a line refers to a series of points that extends in opposite directions without end. Another example is a “sample.” In everyday life you might be referring to a small taste of something at the bakery, whereas in math a “sample” is a part of population.)

Lead students to the idea that in geometry, we use very specific definitions to refer to particular objects so that we can differentiate between them and know that we are all talking about the same thing.

For instance, in geometry we might not just say, “There is a triangle.” We could be specific and say it is an “obtuse scalene triangle” and that would give us more helpful information.

Explain that we are going to go on a virtual scavenger hunt using the Puzzle Maker to find, create, and modify objects to help us demonstrate our understanding of geometry.

Here is a sample introduction:

“You will be divided into teams and will be given a Scavenger Hunt List of geometric concepts that you will need to find, create, or modify within the Puzzle Maker. Depending on the difficulty level of the term, they will be worth different points. The more basic terms will be worth one point up to three points for the most challenging terms. You and your partner may not know all of the terms at first, and it is totally fine for you to do some research to help you figure out what they all mean. Your team’s goal is to earn the most points possible while correctly identifying and arranging objects within your test chamber. At any point (no pun intended) I can stop you and ask you to defend and explain your selection and how it represents the geometric concept.”

Here is an example you could share using your own Puzzle Maker room.

Let’s say the geometric term was **cube**. This could be a one point question, or perhaps a three point question depending on how students answer it. Students could choose to simply select a companion cube from the asset panel and then explain how it meets the definition. See below.



Possible student explanation: “I know it is a cube because it is a prism with six faces that are all squares.”

However, you could explain that if students found another way to create a cube without using the companion cube, then it would be worth more points (or additional points).

Below are two possible examples. In the first, the student actually modified the test chamber and they can now argue that the sides are clearly congruent because they are each four units wide and four units tall, with six sides.

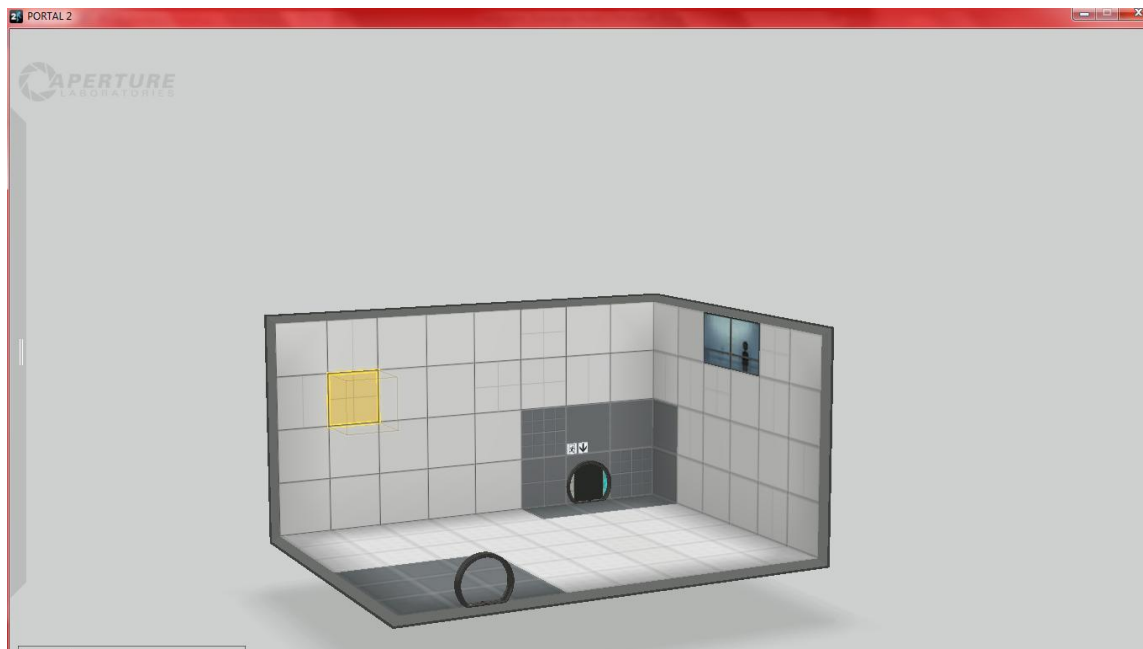


In another example, a student took a piece off of the room and moved it to create a separate cube.



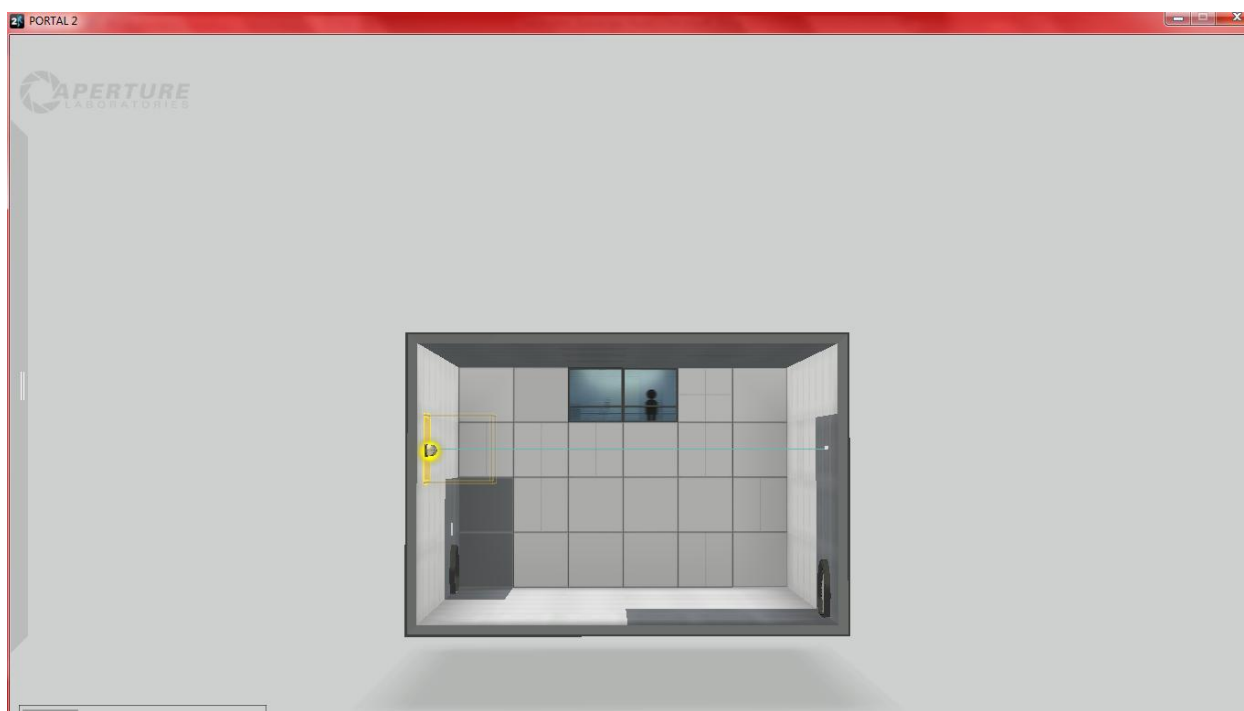
It is great to really encourage the students to be creative and to think creatively when doing their scavenger hunt.

Obviously, this lesson is designed for intermediate level students, so we wouldn't expect them to prove that lines are parallel by using any kind of geometric proof. However, again, I would strongly encourage that the students be required to make a case for why the lines appear to be parallel. For instance, if a student was placing a light bridge, they might place it against a portion of the wall that is divided into quadrants.



Note: Highlighted area shows a square divided into fourths

They could then place the light bridge in that particular square and use other elements in the room to help establish why they think the line is parallel. See below.



They could then place the bridge in a location that runs across other squares divided into quadrants or runs across to quadrants to demonstrate their point that the line stays “straight.”

The purpose of the assignment is not only for students to have fun as they place objects into their test chambers but also to push and defend their thinking as they creatively work with geometric concepts.

At this point, you have given students an example (or two) on how the scavenger hunt works. How you require students to explain their test chamber can vary. I have had students print screen shots and then highlight specific areas and write in little cartoon bubbles what various objects represent. It has also worked to have students record their thinking in a math journal, paper, list where they list the asset from the room and write a sentence about what it represents.

It is important that you point out to students that if they cram the basic test chamber with 40 different items, the room will be very cluttered and difficult to view. Another challenge to students’ spatial reasoning skills will be play around with the actual structure of their room. Ideally, they will need to expand it, stretch it and create different areas so that they can showcase the various items. If the room is a giant jumble of objects and shapes, it will be very challenging to assess their understanding.

What follows is a student introduction and a list of objects and point values. If used in an introductory manner, you may want to consider using a similar assignment later for an assessment to look for growth in understanding and ability to defend ideas (also to see if there is an increase in total points earned from one to the other). If used solely as an assessment you might ask students to create a display showing different screenshots and having them more thoroughly explain in writing how each room/object demonstrates a geometric term or concept. It is also really fun, when everyone has completed the assignment, to have students share their rooms and/or specific parts they were especially proud of (the students who were

able to create specific shapes by combining various objects together were always eager to show-off their inventions).

Puzzle Maker Scavenger Hunt

You will have one class period to design a test chamber where you will create and/or place objects that represent geometric terms. You will need to find a way to keep track of the various examples you have found and, most importantly, you must be able to explain how they represent the different geometric concepts. Your goal is to earn as many points as possible.

In order to get a point for your object, it must be clearly visible, properly identified and explained. You **MUST make sure your room is large enough and well laid-out so that the objects are not just in a giant jumble. We must be able to move through your room in player mode so that we can easily see where the various examples are. Putting all of the objects in a 6 x 6 room will not work as well as creating a larger chamber with different hallways and sections.**

You may construct the items yourself within the game by combining different assets and altering the room itself. Any disputes will be handled by your teacher with input from the class. We will have time to share special findings/creations with each other at the end of the hunt.

Good luck!

1 pointers

Line segment

Cylinder

Circle

Ray

Prism

Angle

Vertex

Diagonal

Sphere

Rhombus

Rectangle

Parallel lines

Acute angle

Perpendicular lines

Obtuse Angle

Point

Plane

Parallelogram

Square

Cube

2 pointers

Complementary angles

Collinear points

Vertical Angles

Supplementary angles

Chord

Skew lines

Congruent figures

Similar figures

Arc

Angle bisector

Perpendicular bisector

3 pointers

Any type of triangle

Rotational symmetry

Reflectional symmetry

Corresponding angles

Irregular polygon of any type

Parabola