

Math Integrated Assignment

Submitted To: Professor Daniel H. Jarvis

Submitted By: Maria R. & Jennifer G.

Section: PJ3

Mathematics Education Primary/Junior

Date: Wednesday, April 7, 2010

Grade: 4

Strand: Geometry and Spatial Sense

Specific Expectations:

Math Expectations:

Geometric Relationships

-construct skeletons of three- dimensional figures using a variety of tools (e.g., straws and modelling clay, toothpicks and marshmallows, Polyhedrons), and sketch the skeletons

Art Expectations:

Creating and Presenting

D1.1 create two- and three-dimensional works of art that express feelings and Ideas inspired by their interests and experiences (e.g., a comic strip or a Storyboard featuring a space voyage, an oil pastel drawing of peers in Sports or dance poses; a painted still life of objects related to a hobby

Language Expectations:

Speaking to Communicate

2.3 communicate in a clear, coherent manner, presenting ideas, opinions, and information in a readily understandable form

Student Version

Knowledge and Understanding

Please define the following terms

Polyhedrons:

Cube:

Cylinder:

Sphere:

Cone:

Pyramid:

Triangular Prism:

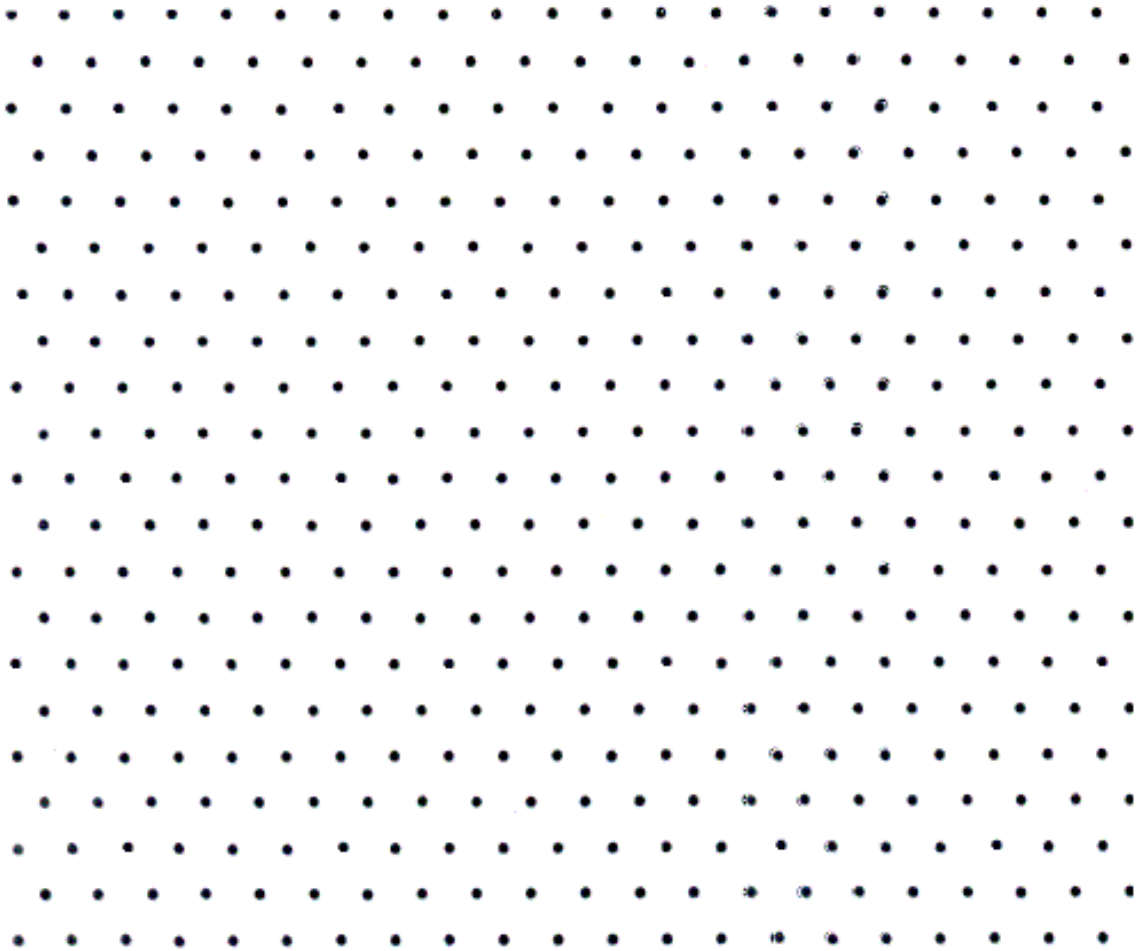
Face:

Edge:

Skeleton:

Vertex:

Using the space provided, draw a blueprint sketch of a 3-Dimensional figure (a cone, a rectangular prism, a pyramid OR a cube).



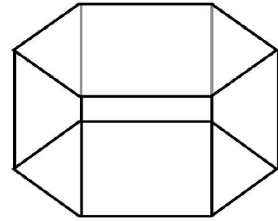
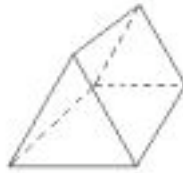
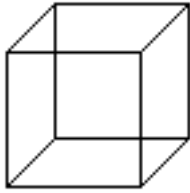
Why are spheres, cones, and cylinders not considered polyhedrons?

Inquiry and Problem Solving

Task 1

Construction challenge –students will be provided with 3 blue print drawings for their skeleton structures. The students' task is to then create the shape using straws and playdough. Students must also be able to identify the shape as well as how many faces and edges that structure has.

Blue prints



Task 2

Teach an alien about a 3-D shape-show the alien how you would make a skeleton of a 3-D shape and how to identify different geometric shapes. Help the alien solve a problem of what is this shape by using clues such as how many faces and edges the shape has to help the alien know what shape they have to build to bring back to their spaceship.

Teach an Alien!

Teach an alien about a 3-D shape. Show the alien how you would make a skeleton of a 3-D shape. It is also your job to help the alien solve a problem of what is this shape by using clues such as how many faces and edges the shape has. This is important as the alien must bring back to their spaceship an example of this shape and be able to remake it in their own planet. You are the teacher, share with the alien all that you know about this shape.

Shape that you have chosen: _____

Guess my shape clues:

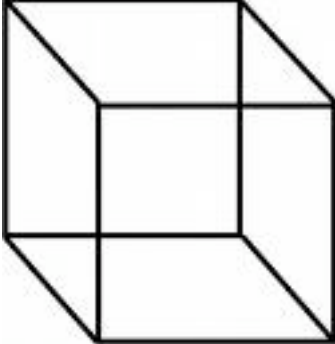
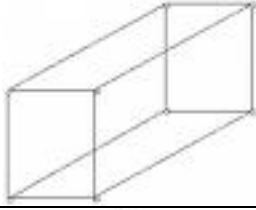

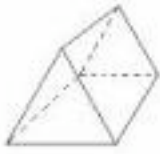
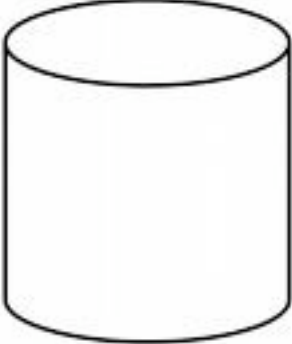
Describe how you would make a skeleton model of this shape, so that the alien has the instructions for when they are back on their planet.

Task 3

Name that figure! Students will name the following solids.

Name that Figure!

Name: _____

Solid Drawings	Name of the solid
	
	
	
	
	

At home Extension

Find examples of 3-D shapes in your home at the school and around the city. Record these shapes on the sheet provided below. Also record where you saw this shape or on what you saw this shape.

Extended learning—Scavenger hunt

Name: _____

Find examples of 3-Dimensional shapes in your home at the school and around the city. Record these shapes on the sheet provided below. Also record where you saw this shape or on what you saw this shape. Draw a rough sketch of this shape of how it is used in our daily lives (ex. Is it part of a building?). Your challenge is to find at least 5 examples of 3-Dimensional shapes in our daily lives. If you find more than 5 you can record the extra shapes in the space below the chart or on the reverse side of the paper.

Name of Solid	Where did you find this Shape?	Drawing of how this solid is used in our daily lives

Teacher version

Knowledge and Understanding

Background information on fundamental aspects of geometry for educators

Small text

Fundamental aspects of geometry:

- Recognizing, describing and making predictions about 3-D shapes including their role in building structures
- Using visualization and spatial models to explore mathematical topics
- Using reasoning to compare and contrast shapes, and to draw conclusions about them
- Using geometric models and concepts to solve problems
- Using mathematical language to communicate about geometric concepts
- Representing shapes in different ways
- Recognizing how geometric ideas connect to each other, and how they connect with other strands of mathematics and other subject areas

Answers for student version

Polyhedron: is any 3-D shape whose faces are all polygons. They can have as few as 4 faces or they can have many more. Examples of polyhedrons are prisms, and pyramids.

Cube: A 3-Dimensional solid that has 6 identical square faces.

Cylinder: A 3-Dimensional solid that has 2 congruent circular bases that are parallel to each other.

Sphere: A 3-Dimensional solid that has all closed sides, where every point of the sphere is equal distance to the centre of the solid.

Cone: A 3-Dimensional solid that has a circular base and a single vertex.

Pyramid: A 3-Dimensional solid that has a square base and 4 triangular shaped faces.

Triangular Prism: A 3-Dimensional solid that has a triangular base and 3 faces that join the corresponding sides.

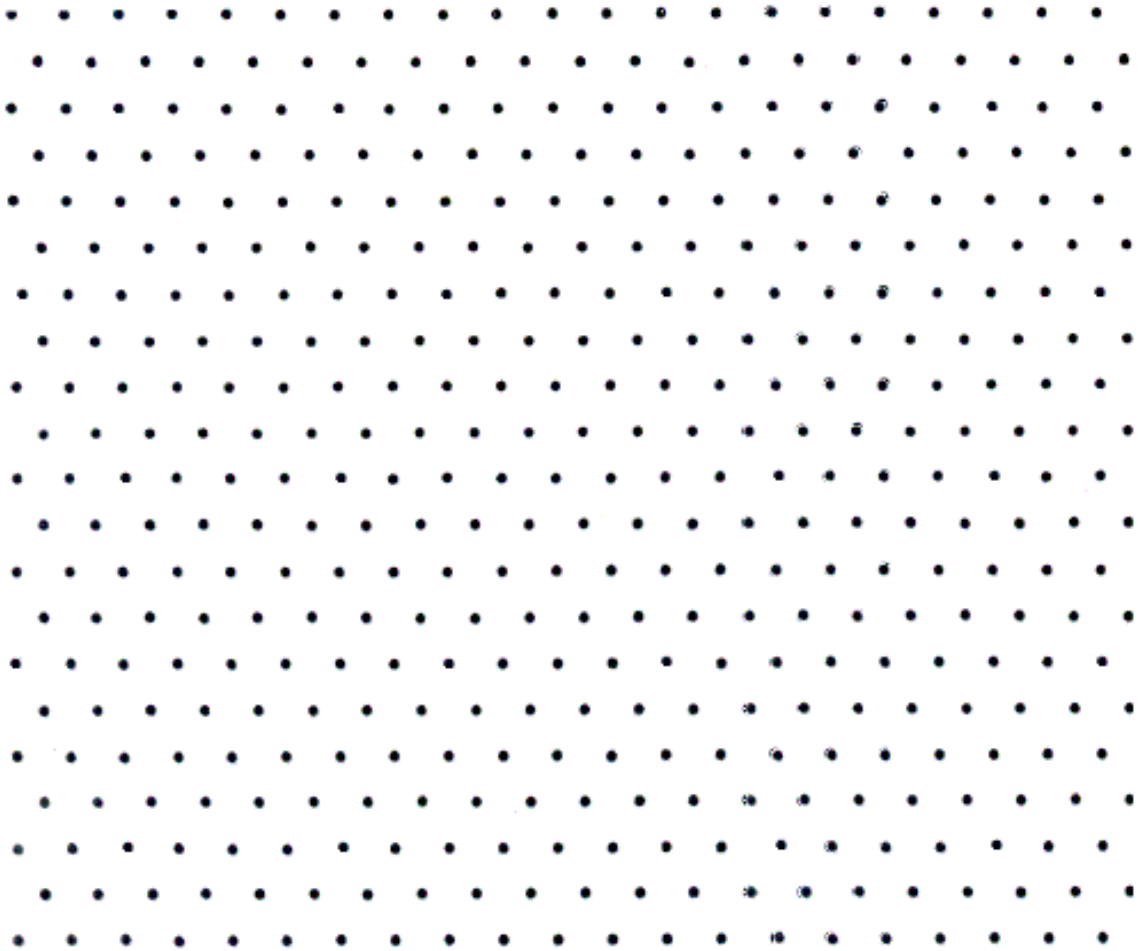
Face: flat surface of a 3-Dimensional shape

Edge: Places where faces of a solid meet

Skeletons: a physical representation of just the edges and vertices of a 3-D shape or just the sides and vertices of a 2-D shape

Vertex: A point where lines, sides of a polygon or edges of a polyhedron meet (corner).

Using the space provided, draw a blueprint sketch of a 3-Dimensional figure (a cone, a rectangular prism, a pyramid OR a cube).



Why are spheres, cones, and cylinders not considered polyhedron?

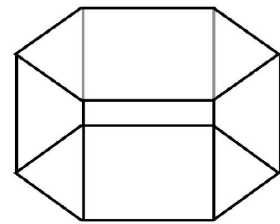
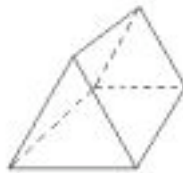
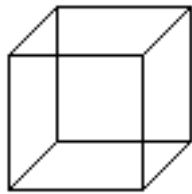
Spheres, cones and cylinders are not polyhedrons as their surfaces are not polygons.

Inquiry and Problem Solving

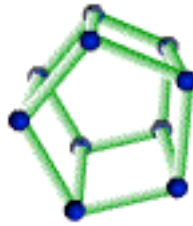
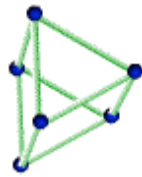
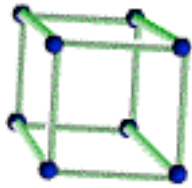
Task 1

Construction challenge –students will be provided with 3 blue print drawings for their skeleton structures. The students' task is to then create the shape using straws and plasticine. Students must also be able to identify the shape as well as how many faces and edges that structure has.

Blue prints



Skeleton sample



Task 2

Teach an alien about a 3-D shape-show the alien how you would make a skeleton of a 3-D shape and how to identify different geometric shapes. Have to help the alien solve a problem of what is this shape by using clues such as how many faces and edges the shape has to help the alien know what shape they have to build to bring back to their spaceship.

Teach an Alien!

Teach an alien about a 3-D shape. Show the alien how you would make a skeleton of a 3-D shape. It is also your job to help the alien solve a problem of what is this shape by using clues such as how many faces and edges the shape has. This is important as the alien must bring back to their spaceship an example of this shape and be able to remake it in their own planet. You are the teacher, share with the alien all that you know about this shape.

Shape that you have chosen: cube

Guess my shape clues:

I am a solid 3-Dimensional figure. All of my faces are squares. I have 6 faces. I
have 12 edges. I also have 8 corners. I look very similar to something that lives in
your freezer and keeps your drinks nice and chilled. What 3-Dimensional solid
am I?

Describe how you would make a skeleton model of this shape, so that the alien has the instructions for when they are back on their planet.

I would first warm up my plasticine in my hands, by ripping small pieces off of
the large piece and rolling them in my hands until they were soft. Then I would
make 8 small balls of plasticine because there are 8 corners on a cube. I would
then count out 12 straws because there are 12 edges of a cube. To make a
skeleton I would start by making the base. I would take 4 of my straws and
4 pieces of plasticine. I would stick a ball of plasticine on each end of one straw.
Then I would take the second straw and place it horizontally through the
plasticine. Then I would stick a ball of plasticine on the other end of the second

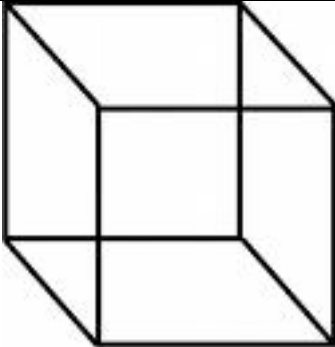
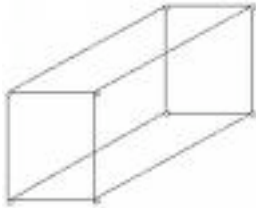
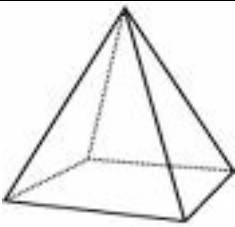
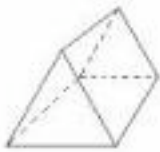
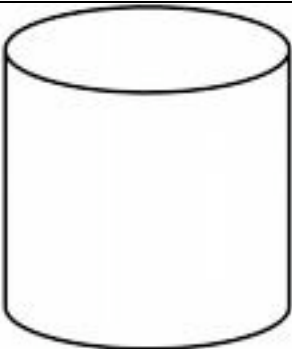
straw. I would then take the second straw and place it vertically through the
plasticine of the second straw. I would then take the final straw and place it
horizontally through the plasticine. This will make a square. Lay the square flat
on a table. Take another straw and place it upright through the plasticine.
Repeat this step for the other 3 pieces of plasticine. Take a ball of plasticine and
place it on the top of one of the upright straws. Repeat this step for the remaining
3 straws. Using the remaining 4 straws connect the pieces of plasticine so that
a square forms on the top. Congratulations you have just created a skeleton
figure of a cube, just by using straws and plasticine. Hope that this information
comes in handy for you and your spaceship.

Task 3

Name that figure! Students will name the following solids.

Name that Figure!

Name: _____

Solid Drawings	Name of the solid
	Cube
	Rectangular prism
	Square based pyramid
	Triangular prism
	Cylinder






At home Extension

Find examples of 3-D shapes in your home at the school and around the city. Record these shapes on the sheet provided below. Also record where you saw this shape or on what you saw this shape.

Extended learning—Scavenger hunt

Name: _____

Find examples of 3-Dimensional shapes in your home at the school and around the city. Record these shapes on the sheet provided below. Also record where you saw this shape or on what you saw this shape. Draw a rough sketch of this shape of how it is used in our daily lives (ex. Is it part of a building?). Your challenge is to find at least 5 examples of 3-Dimensional shapes in our daily lives. If you find more than 5 you can record the extra shapes in the space below the chart or on the reverse side of the paper.

Name of Solid	Where did you find this Shape?	Drawing of how this solid is used in our daily lives
Cylinder	On a farm	
Rectangular prism	My apartment building	
Rectangular prism	Our school	
sphere	orange	
Cylinder	Hair spray can	

Application:

Task 1.

The students will construct four three-dimensional skeletons using marshmallows and toothpicks. The students will use the skeletons as a reference for task 2. The skeletons the students will be instructed to use include: a cube, a triangular prism, a rectangular prism, and a pyramid.

Task 2.

The students will imagine that they have just returned from a family trip to a city of their choice. On their return they have been asked to create a drawing of the city they have just visited using the following 4 three-dimensional shapes: a cube, a rectangular prism, a triangular prism and a pyramid.

These two tasks relate directly to the math and art expectations, as the students need to know how to construct the skeletons of three-dimensional shapes, in order to create task 2. They need to be able to know how many faces, edges, and vertices each shape has in order to draw them correctly. The skeletons they have created will assist them in completing the art activity.

Communication:

In order to complete the tasks correctly the students will need to make the skeletons of the three-dimensional shapes figures using toothpicks and marshmallows. Once the skeletons are made the students will know how to draw the three-dimensional shapes correctly. The students will then combine the three-dimensional shapes and create a picture of a city using the following four shapes: a cube, a triangular prism, a rectangular prism, and a pyramid. Once students have completed their drawing they will write a short paragraph of approximately four sentences as to how they made their city. The students will then present their city in front of the class as an architect. The students will show their picture to the class. They will be asked to explain the city they chose and why, how they made their buildings and why they chose to make their city that way.

References:

http://www.helpingwithmath.com/by_subject/geometry/geo_shapes3D.htm

<http://www.mathleague.com/help/geometry/3space.htm>

<http://staff.argyll.epsb.ca/jreed/math8/strand3/3102.htm>

<http://www.studyzone.org/testprep/math4/e/usingmathvocab31.cfm>

Marian Small. Making Math Meaningful to Canadian Students, K-8.