



Plane and Solid Geometry

Activity Set 5

Trainer Guide

PLANE AND SOLID GEOMETRY

ACTIVITY SET #5

NGSSS K.G.2.3

NGSSS K.G.2.4

NGSSS K.G.2.5

NGSSS 1.G.3.1

Faces, Faces, And More Faces

In this activity, participants will create a “face” poster, using the multiple faces of various 3-dimensional geometric solids.

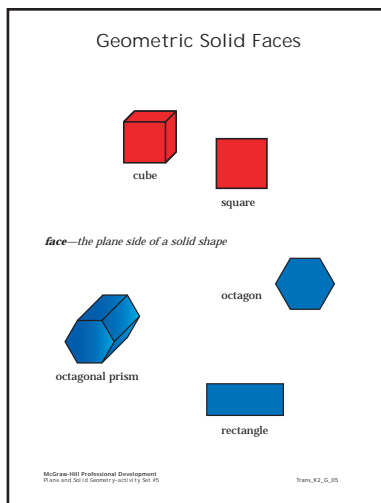
MATERIAL

- *Transparency/Page: Geometric Solid Faces*
- *Transparency/Page: Faces, Faces, and More Faces*
- blank transparency
- table blocks (set of 84 various-sized cones, prisms, cylinders, cubes, and pyramids; 28 blocks per grade-level group)
- chart paper (1 sheet for each grade-level group)
- pencils and crayons

VOCABULARY

- face
- sphere
- cube
- cone
- cylinder
- square
- triangular
- pyramid
- rectangular
- octagonal
- hexagonal
- prism

TIME: 20 minutes



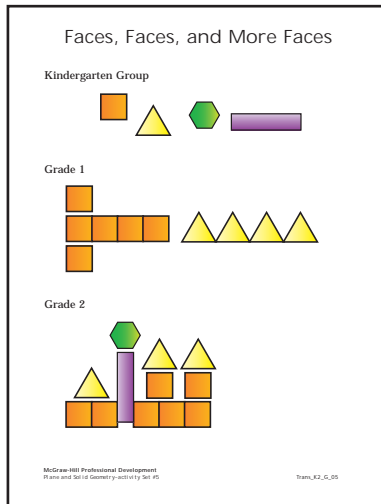
Transparency: Geometric Solid Faces

INTRODUCE

- Display *Transparency: Geometric Solid Faces*.
- Explain to participants that in this activity, they will work in groups to make a poster of geometric solid faces, such as the ones in the transparency.
- Explain that a tracing of a face of a 3-dimensional geometric solid makes a 2-dimensional plane figure.
- Demonstrate on a blank transparency, by placing a cube on the transparency and tracing around the edges of the shape, carefully following its lines.

PLANE AND SOLID GEOMETRY

ACTIVITY SET #5



Transparency: Faces, Faces, and More Faces

- Pick up the geometric solid to display the tracing and explain that you have made a 2-dimensional plane figure of 1 solid face (square).
- Explain that participants will work in grade-level groups to modify the activity for various levels of geometric awareness and skill.
- Display *Transparency: Faces, Faces, and More Faces*.
- Explain that the kindergarten group will make a face poster with a single face tracing for each geometric solid. The grade 1 poster can include multiple faces from the geometric solids. The grade 2 poster will require some planning because it will include multiple faces that form a design.
- Explain, if time allows, that after the face posters are completed, the grade-level groups will do a follow-up activity with the posters and geometric solids.

DISCUSS AND DO

- Ask participants to form grade-level groups.
- Give each group a sheet of chart paper, a bag of geometric solids, and pencils or crayons.
- Ask each group to trace at least 1 face from each geometric solid on their faces posters.
- Ask participants to name the geometric solid that they select and to discuss with each other the shape attributes and position on the poster as they work on the face poster.
- Give participants 10–15 minutes to trace the faces on the poster.

CONCLUDE

- Have a representative from each grade-level group display its faces poster with the whole group. Then, return the poster to the group table.
- Ask the groups to put back all the geometric solids into the bags, so they will not be able to see them.

PLANE AND SOLID GEOMETRY ACTIVITY SET #5

Geometric Frameworks

In this activity, participants will build frames of geometric solids with hands-on manipulatives.

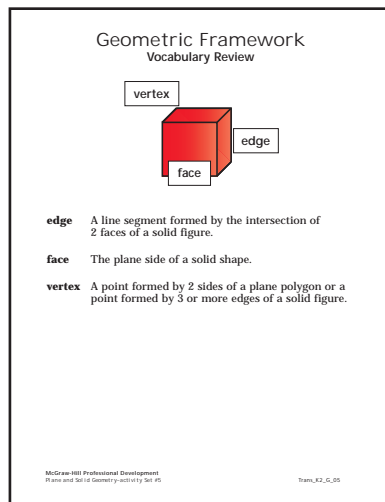
MATERIAL

- *Transparency/Page: Geometric Framework Vocabulary Review*
- *Transparency/Page: Geometric Frames*
- Frameworks, large set (5 sets, 1 per group)
- pencils and crayons

VOCABULARY

- angle
- edge
- face
- vertex (pl. vertices)

TIME: 20 minutes



Transparency: Geometric Framework Vocabulary Review

INTRODUCE

- Display *Transparency: Geometric Framework Vocabulary Review*.
- Remind participants that:
 - ◆ an *edge* is a line segment formed by the intersection of 2 faces of a solid figure
 - ◆ a *face* is the plane side of a solid shape
 - ◆ a *vertex* is a point formed by 2 sides of a plane polygon or a point formed by 3 or more edges of a solid figure
 - ◆ *vertices* is the plural of vertex

PLANE AND SOLID GEOMETRY

ACTIVITY SET #5

Geometric Frames

1. Build a geometric solid frame with the manipulatives.
2. Draw or name the solid shape.
3. Draw or name the face shapes used.
4. Count the number of faces.
5. Count the number of edges.
6. Count the number of vertices.
7. Record the information for each geometric solid frame.

Geometric Solid	Face Shape	Number of Faces	Number of Edges	Number of Vertices

McGraw-Hill Professional Development
Plane and Solid Geometry—activity Set #5
Trans_K2_G_05

Transparency: Geometric Frames

- Explain to participants that in this activity, they will work in groups to build frames of geometric solids. (Trainers should hold up an example of a geometric solid created from the framework manipulatives.)
- Explain that the plane shape frames snap together with other frames to construct a 3-dimensional frame of a geometric solid.
- Demonstrate by snapping 4 different-colored, triangle-shape frames together to build a pyramid.
- Explain that the frame allows students to see inside the solid figures to see the angles, edges, faces, and vertices.
- Display *Transparency: Geometric Frames*.
- Fill in the information on the pyramid that you made in the demonstration.
 - ◆ Draw the shape or write the name pyramid in the Geometric Solid column.
 - ◆ Draw a triangle shape in the Face Shape column.
 - ◆ Count the number of faces and record the number. (4)
 - ◆ Count the number of edges and record the number. (6)
 - ◆ Count the number of vertices and record the number. (4)

DISCUSS AND DO

- Have participants locate their *Geometric Frames* page.
- Ask them to work in groups of 6–8 people.
- Distribute the Frameworks manipulatives to each group.
- Give participants 10–15 minutes to build one or more geometric solid frames and then record the information on the handout.

PLANE AND SOLID GEOMETRY

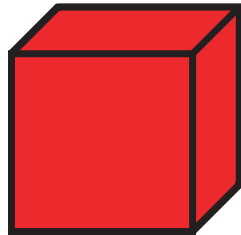
ACTIVITY SET #5

CONCLUDE

- Ask participants if anyone counted more than 6 faces on their geometric solid frames.
- Ask participants who answer to display their solid frame and share information about the number of faces, edges, and vertices of the solid.
- Ask the groups to share information about all the geometric frames that were built with others in the group.
- Point out to participants that this type of activity prepares K–2 students to construct and analyze more complex solid figures in geometry.
- Discuss, if desired, Euclid’s formula with participants. Explain the formula:
vertices + faces = edges + 2 ($V + F = E + 2$), or see if participants can derive it themselves from the data in their *Geometric Frames* recording sheets.

End of Geometric Frameworks

Geometric Solid Faces

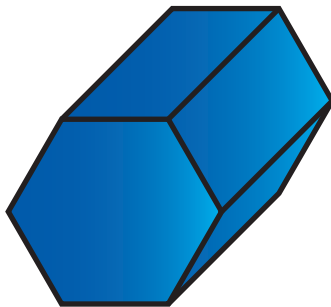


cube



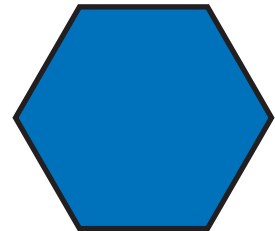
square

***face**—the plane side of a solid shape*



octagonal prism

octagon



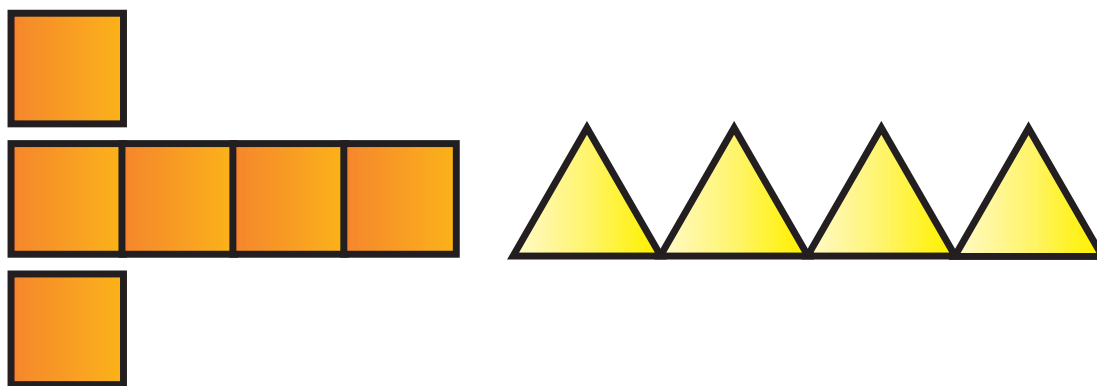
rectangle

Faces, Faces, and More Faces

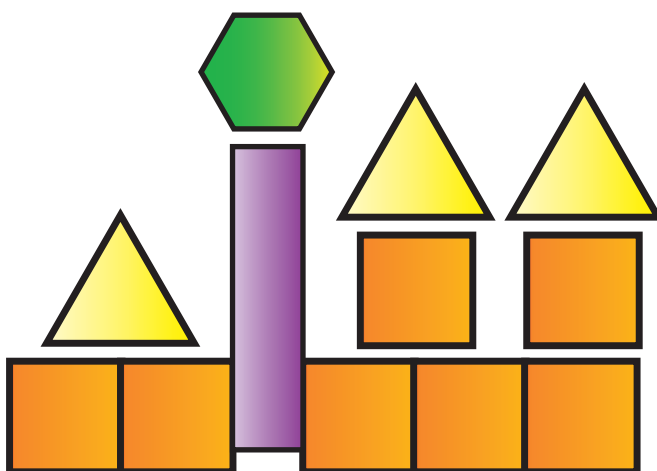
Kindergarten Group



Grade 1

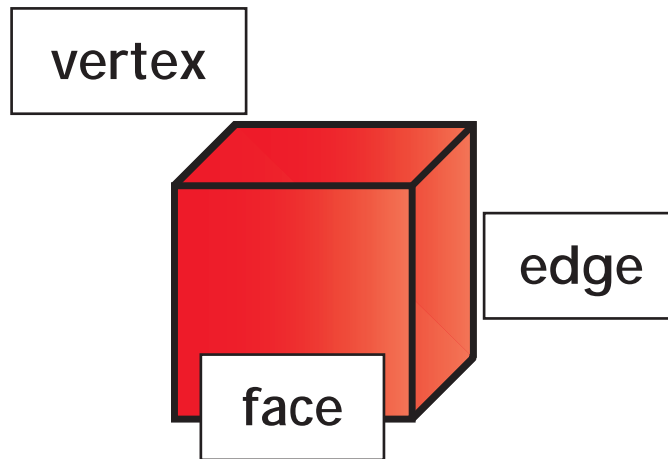


Grade 2



Geometric Framework

Vocabulary Review



edge A line segment formed by the intersection of 2 faces of a solid figure.

face The plane side of a solid shape.

vertex A point formed by 2 sides of a plane polygon or a point formed by 3 or more edges of a solid figure.

Geometric Frames

1. Build a geometric solid frame with the manipulatives.
2. Draw or name the solid shape.
3. Draw or name the face shapes used.
4. Count the number of faces.
5. Count the number of edges.
6. Count the number of vertices.
7. Record the information for each geometric solid frame.

Geometric Solid	Face Shape	Number of Faces	Number of Edges	Number of Vertices