

Part One - Getting to Know the Shapes

Have fun spinning the geometric shapes. Use the controls to get to know the shapes. See what you discover about the shapes. Tell a friend about the shapes.

Some questions that may help:

- How are the shapes alike?
- How are the shapes different?
- Find two shapes that are alike. Tell a friend about the two shapes.

Find two different shapes. Explain how they are different.

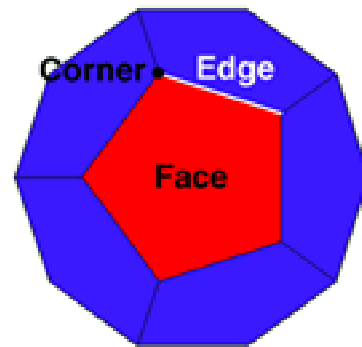
Part Two - Study the Shapes

Did you notice that:

Each solid has flat sides called a **face**.

Each solid has **edges** to connect the faces.

Each solid has **corners** that connect the edges.






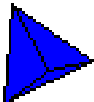


Directions:

Click **New Shape** to select a shape.

Study the shape by rotating it.

Answer the following questions. Use the chart to record what you find for each shape.

1. What shape is each face in the solid?
2. How many sides does each face have?
3. How many faces in the solid? Are all of the faces alike?
4. Guess how many edges are in the solid. Explain your thinking.
5. To help count them, press the shift key and click on each edge to color them.
6. How many edges are there?
7. Did your guess match your count of the edges?
8. What do you think about your method of guessing?
9. Guess how many corners are in the solid. Explain your thinking.
10. Hold the shift key and click on each corner to color them.
11. How many corners are there?
12. Did your guess match your count of the corners?
13. What do you think about your method of guessing?

Shape	Name of Face	Number of Sides on Each Face	Number of Faces	Number of Corners	Number of Edges
 Dodecahedron					
 Icosahedron					
 Octahedron					
 Tetrahedron					
 Irregular Polyhedron					
 Cube					

Part Three - Looking for Patterns

Look at the first shape in the table that you made.

1. Find the sum of the number of faces and the number of corners.
2. How does this sum compare with the number of edges?
3. Do you think this may be a rule for the other shapes?
4. Add the number of faces and number of corners for the other shapes in the table.
5. Compare # of Faces + # of Corners with the # of Edges.
6. What did you find out? Is there a rule for all of the shapes?




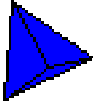


Part Four - Construct a Solid

Task 1:

Now work with a partner and construct one or more of the shapes out of coffee stirrers and twist ties, straws and pipe cleaners, toothpicks and gumdrops, or other available supplies. When you make a solid, look at one like it on the computer. Record how you constructed each solid in the table below.

Task 2:

Build a solid shape of your own. Record your shape and information about it in the two previous tables.

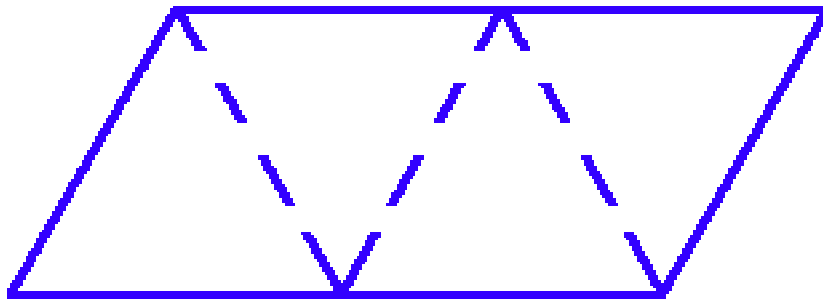
Shape	How did you construct the shape?
 Dodecahedron	
 Icosahedron	
 Octahedron	
 Tetrahedron	
 Irregular Polyhedron	
 Cube	

Part Five - Making a Shape Jacket

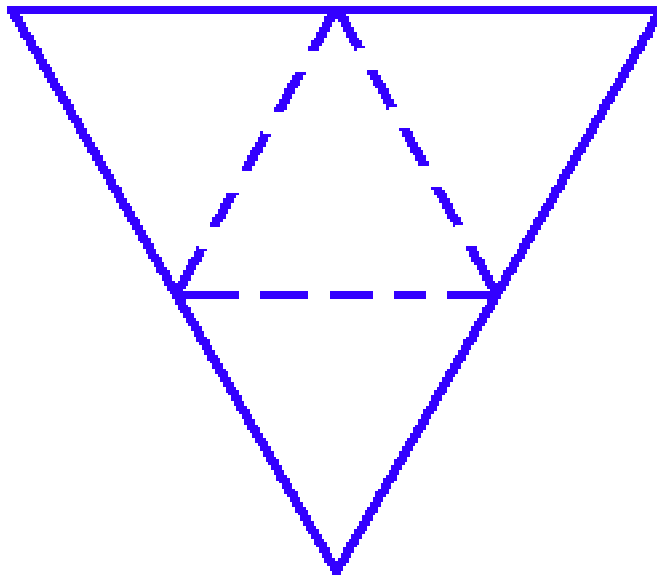
If you were going to make jackets to fit on each shape, what would they look like?

Look at these two jackets. Which solid do you think they will fit on?

Jacket #1



Jacket #2



1 - A jacket for a geometric solid that can be folded to create the surface of the solid is called a **net**. A net is a way of representing a polyhedron in two dimensions.



2 - Work with a partner. Look at the cube . Plan how you will make a net for a cube. Use graph paper to make your net. Fold your net to create a cube.

3 - Make nets for other solids.

Instructions for using the shape spinner:

Choose a Shape:	Click on the new shape button.
Rotate the Shape:	Place the mouse pointer on the shape. Move the mouse while holding down the mouse button.
Color the Shape:	Click on a color. Hold the Shift Key while clicking the mouse where you want to paint. You can paint a face, an edge or a corner.
Remove the Color:	Click on the reset shape button.
See Through the Shape:	Click the box by Transparent.
Change Shape Size:	Use the mouse to move the blue lever.

Getting to Know the Shapes

The questions are open-ended, so answers will vary. Some sample answers are given below.

"How are the shapes alike?"

All have many sides; the sides are flat. Three of the solids are made of triangles.

"How are the shapes different?"

The number of flat sides is different; the flat sides of one of the shapes (the irregular polyhedron) are different shapes...

The [Student Worksheet](#) contains a blank chart that students can fill in. A completed chart is shown below.

Shape	Name of Face	Number of Sides on Each Face	Number of Faces	Number of Corners	Number of Edges on the Solid
Tetrahedron	triangle	3	4	4	6
Cube	square	4	6	8	12
Octahedron	triangle	3	8	6	12
Dodecahedron	pentagon	5	12	20	30
Icosahedron	triangle	3	20	12	30
Irregular Polyhedron	squares & trapezoids	4	10	12	20

Looking for Patterns

1. Find the sum of the number of faces and corners of the first shape ($12 + 20 = 32$)
2. How does this sum compare with the number of edges? (The number of edges is 2 less, or the sum is 2 more than the number of edges.)
3. Do you think this may be a rule for the other shapes? (student discussion)
4. Add the number of faces and the number of corners of other shapes::

Shape	Faces + Corners	Edges
Tetrahedron	$4 + 4 = 8$	6
Cube	$6 + 8 = 14$	12
Octahedron	$8 + 6 = 14$	12
Dodecahedron	$12 + 20 = 32$	30
Icosahedron	$20 + 12 = 32$	30
Irregular Polyhedron	$10 + 12 = 22$	20

5. Compare the sum of faces and corners to the number of edges. (Students should notice that $F + C$ is 2 more than E . Students may express this pattern in different ways.)
6. What did you find out? What's the rule? (Let students come up with the rule.)