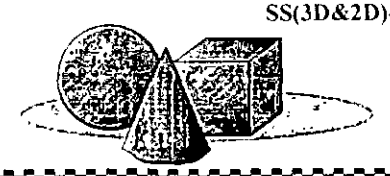
Objective: Explore faces, vertices and edges of 3-D objects.



Representation:

Materials: solids, paper, pencil.

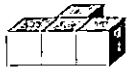
- Take your 3-D solids one at a time and trace around all of their flat surfaces (faces).

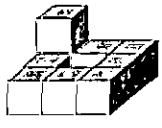
- Sort the solids into groups:
  - those which can be used to draw circles, and those which cannot.
  - those which can be used to draw squares and rectangles, and those which cannot.
  - those which can be used to draw triangles, and those which cannot.
  - those which have faces which cannot be traced and those whose faces can all be traced.

- Place the solids in order from the one with the most faces to the one with the least.
- Place the solids in order from the one with the most vertices to the one with the least.
- Place the solids in order from the one with the most edges to the one with the least.

Problem Solving

If you could walk all around (and even under) these figures how many faces could you see on each?





Can you build a figure with exactly 20 faces?

STRATEGY: *Make a Model*

ANSWER:

The first figure has 18, the second 36.

has 20 faces.

adaptations:

DOWN

Take a separate page for each solid. Trace all the faces for that solid on that page. Set the solid on top of its page.

Now try sorting the solids in the activity above.

UP

By tracing around the edges of your solids, draw a picture of:
(a) a child playing with a ball at a beach,
(b) a child sledding down a very long hill,
(c) a cat made out of only triangles.

Writing Corner:

Draw a picture of a cube. Label one vertice, one face and one edge. How does an edge help to make a face? How does an edge help to make a vertice?

Objective: Identify, name and describe specific 3-D objects as cubes, spheres, cones, cylinders, pyramids.

Representation:

Materials: solids, small boxes, cans, balls, Toblerone chocolate boxes, etc., paper, pencil.

- Begin by folding your paper in half and unfold it again. Select one object you think has the same shape. Write the name of the solid at the top of the page.

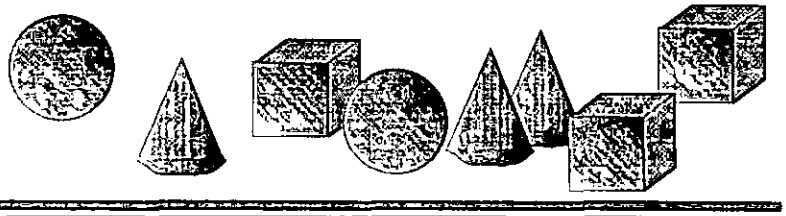
- On the left side of the page trace all sides of the solid.
- On the right side of the page trace all sides of the object selected.

- With a line, connect one face on the left side of the page with a similar face on the right side. Do the objects have the same numbers of the same kinds of faces? Do the objects have the same number of edges? of vertices?

- On the back of the page write two sentences about what your solid can do (i.e., can it stack? can it roll?). Can your chosen object do the same things?

PROBLEM SOLVING

I have 3 solids, only two of them are alike. Altogether these solids have 12 faces, 16 edges and 8 vertices. What solids do I have?



STRATEGY: *Guess & Check*

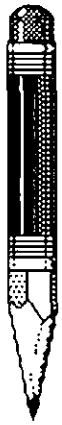
ANSWER:

I have two cylinders and one rectangular prism.

adaptations:

DOWN

Introduce the shapes one at a time. Draw the shape on a piece of paper, then add other details to make it look like a given object (e.g., draw a cylinder and then add a label to make it look like a soup can).



UP

Play a game with a friend. Cut pictures of objects from a catalog or magazine and glue them to index cards.

Place the cards in a pile face down. Take turns flipping over a single card. The first player to name the corresponding solid wins the card.

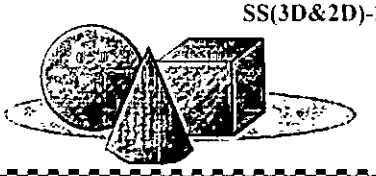
Player with the most cards at the end of the game wins.

Writing Corner:

Oh my oh me,
What can I be?
I've only one face
That you can't even trace!

Write a poem like one above that would get a friend to guess what kind of solid you are describing.

Objective: Build a skeleton of a 3-D object, and describe how the skeleton relates to the object.



Representation:

Materials: solids, toothpicks, marshmallows.

- Use toothpicks and marshmallows to construct a rectangular prism:
  - How many toothpicks did you use? How many edges does your rectangular prism have?
  - How many marshmallows did you use? How many vertices does your rectangular prism have?
- Repeat the above process, but construct a rectangular pyramid.
- Repeat the above process, but construct a triangular prism.
- Repeat the above process, but construct a triangular pyramid.

PROBLEM SOLVING

Francine wants to create a figure using toothpicks and marshmallows. She wants the figure to look like a clock tower with a cube on the bottom and a square pyramid on the top. What is the fewest number of toothpicks and marshmallows she needs?

STRATEGY: *Act it Out*

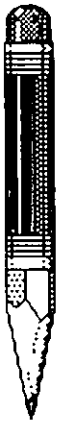
ANSWER:

Francine will need 9 marshmallows and 16 toothpicks.

adaptations:

DOWN

Use the toothpicks to create two dimensional shapes (squares and rectangles) first and then join them together to make three dimensional shapes.



UP

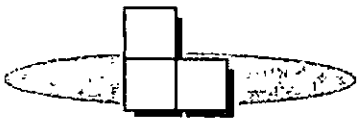
A. Build compound shapes such as a triangular prism with a triangular pyramid at each end.

B. Play a game: race to construct a cube. If you roll a 1 or 2 you can add a marshmallow. Roll a 3, 4, 5 or 6 to add a toothpick. You must start with a marshmallow.

Writing Corner:

Why are skeletons important to how an object looks?

Objective: Build and re-arrange a pattern using a set of 2-D shapes.



Representation:

Materials: color tiles.

• Work with a partner for this activity. Place 3 tiles on the table side-by-side:

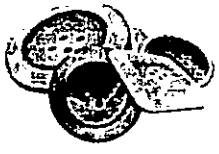
• Pretend this is the start of a pattern. Build the pattern taking turns adding blocks. See who is first to make a mistake in the pattern.

• After you have added several tiles, rearrange your train by dividing it into rows where each red tile starts a new row. How many of each color did you use?

• Repeat as above, but use each of the following to start new patterns:
Red Green Yellow Blue Green Red Green

PROBLEM SOLVING

Corey lined up several buttons in order:
blue—red—black—blue—red—black, and so on.



How many buttons of each color are there in the first 25 buttons in the pattern?

STRATEGY: *Make a List*

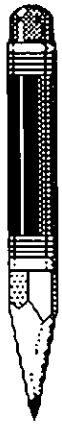
ANSWER:

Corey will use 9 blue buttons, 8 red buttons, and 8 black buttons.

adaptations:

DOWN

Begin with simpler patterns (e.g., use only an AB pattern) and have the students write several sentences about their patterns:
- how many of each color are needed?
- are there more of one color than another? etc.



UP

Have the students:
- write sentences about their patterns.
- chart their patterns.
- act their pattern out (e.g., every red tile you snap your fingers, clap for every blue tile, etc.).
- record the pattern using the ABC notation.
- look for objects in the classroom which show patterns.

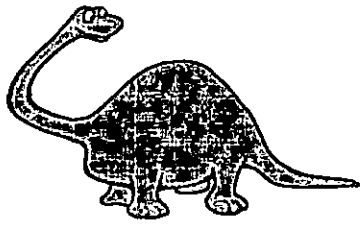
Writing Corner:

How can you tell when blocks have been arranged correctly in a pattern?

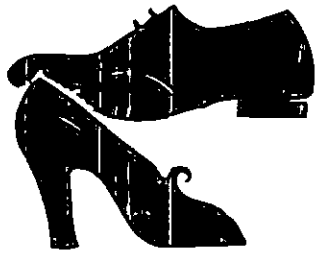
Objective: Match and make identical (congruent) 2-D shapes.

Representation:

Materials: pattern blocks.



• Use as many pattern blocks of any kind as you wish to create a shape that looks like a dinosaur. Have a friend create a second dinosaur exactly like the first. How do you know the dinosaurs are identical?

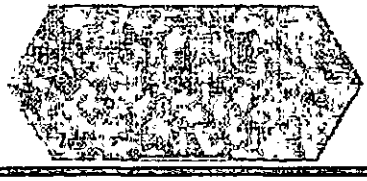


• Now use the pattern blocks to make a shoe. Make the mate to the shoe.

• Use the pattern blocks to build a tree. Make three more and pretend it is a forest. What kind of animals live in your forest?

Problem Solving

The silhouette of Teresa's shape built with pattern blocks is shown. She used exactly 7 blocks and exactly 4 of them were green. Can you build a shape like Teresa's?



STRATEGY: *Construct a Model*

ANSWER:

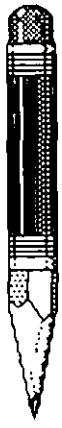
Note: other arrangements are possible.

adaptations:

DOWN

Play a game of copycat!

Work with a partner, as your partner takes out a block, you do the same to build the same shape exactly.



UP

Play a game of 20 questions:

The first player builds a shape using three pattern blocks, hidden from the second player.

The second player now tries to build the same shape of the same blocks by using clues earned by asking up to twenty yes/no questions.

Writing Corner:

Draw two congruent shapes in your journal. Describe how you know the two shapes are congruent.