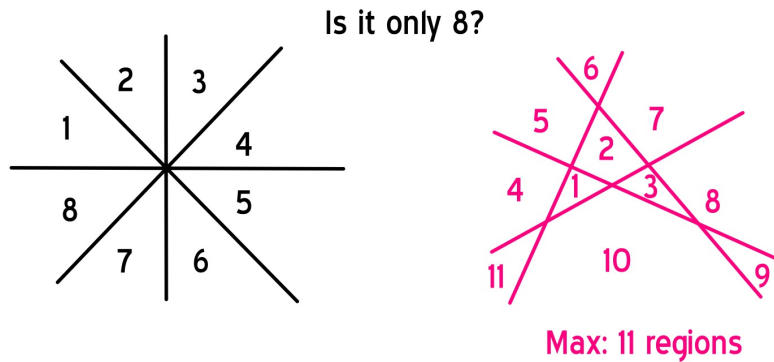


## Warm-up:

With 4 lines, what is the maximum number of regions in which you can divide a plane?



## 1.3

## Drawing and Describing Shapes

### Objectives:

- Visualize mental images in order to analyze their parts.
- Analyze visual scenes in order to draw them.
- Develop clear language to describe shapes.

## LAUNCH:

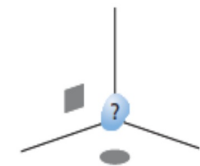
Read through Names, Features and Recipes on p.16

## In-Class Experiment

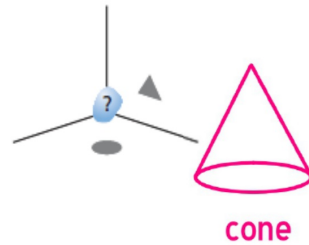
### Casting Shadows

The shape of an object's shadow usually depends on how light hits the object. In the problems below, you will think about solids and the shadows they cast. You will also deduce the properties of a solid based on its shadows.

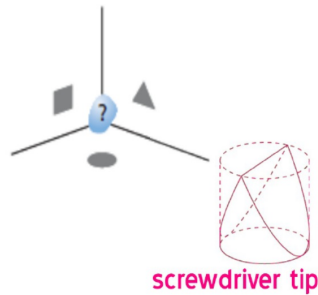
1. A solid casts a circular shadow on the floor. When the solid is lit from the front, it casts a square shadow on the back wall. What solid might it be? Try to make a model out of clay, sponge, dough, or other material. Describe the solid in words as well as you can. Then try to draw a picture of it.



2. A solid casts a circular shadow on the floor. When the solid is lit from the left, it casts a triangular shadow on the right wall. What solid might it be? Try to make a model out of clay, sponge, dough, or other material. Describe the solid in words as well as you can. Then try to draw a picture of it.



3. Suppose a solid casts a circular shadow on the floor, a triangular shadow when lit from the left, and a square shadow when lit from the front. What solid might it be? Try to make a model out of clay, sponge, dough, or other material. Describe the solid in words as well as you can. Then try to draw a picture of it.



## Check Your Understanding

Classwork: In your notes

1. Read the following directions.

Face north. Walk four feet. Turn right. Walk six feet. Turn right again. Walk four feet. Turn right again and walk six feet. Turn right again.

Suppose you follow these directions.

- What shape will your path form? **a rectangle**
- In what direction will you be facing when you finish? **north**
- The direction *turn right* does not specify how far to turn. Yet you probably made an assumption. What was your assumption? What makes it seem reasonable?

The assumption is that the right turn is a  $90^\circ$  right turn. This is reasonable because in  $90^\circ$  turns are common in everyday experience.

2. Pick a simple shape.

- Describe it by name. **Example: a square with sides 5 cm**
- Describe it with a recipe that you can use to draw it.

Draw a segment 5 cm long. At each endpoint of this segment, draw another segment. The two new segments should be perpendicular to the first, should each be 5 cm long, and should be on the same side of the original segment. Connect the other two endpoints of the two new segments to form a closed figure

3. Read the following recipe.

Draw two segments that are perpendicular at their midpoints. Connect the four endpoints in order.

- Draw a shape that the recipe above describes.
- Does the recipe describe only one shape? Explain.

a) Example:

b) Example: No; although the shape will have to be a rhombus, it can be any rhombus, or even a square.



**On Your Own**

Homework p.18 (4,5,6 & 13)

4. Read the two recipes below.

**Recipe 1:** Draw two perpendicular segments that share one endpoint. Make one segment 3 cm long and the other segment 6 cm long. Connect the other two endpoints.

**Recipe 2:** Draw a right triangle with legs of length 3 cm and 6 cm.

- Do the two recipes describe the same shape?
- Draw the shapes that each recipe describes.

- A quadrilateral has horizontal, vertical, and diagonal lines of symmetry.
  - Draw a quadrilateral that fits this description.
  - Is there only one quadrilateral that fits the description? Explain.
- What three-dimensional solid has a circle as every cross section?

The exercises below use commands from Turtle Geometry. Turtle Geometry is a computer language that moves a cursor (the turtle) forward or backward. The programmer tells the cursor how many steps to move and in what direction. The command *FD 2* means "move forward 2 steps." *RT 90* means "turn to the right 90°." *Repeat 6* means "repeat the given command 6 times."

Follow the commands below. Use a computer or a pencil and protractor to trace out a path.

13. **Standardized Test Prep** Amina entered the following commands into her Turtle Geometry program.
- RT 30 FD 20, RT 60 FD 30, RT 60 FD 20, RT 120 FD 50, RT 120 FD 20
- Which figure did the program draw for her?
- |                          |                           |
|--------------------------|---------------------------|
| A. an irregular pentagon | B. an open figure         |
| C. a triangle            | D. an isosceles trapezoid |