

# Relative Position



## PREVIEW

When we describe objects or events, we informally use *reference objects*. For instance, we may describe a classroom clock as being “above the chalkboard” or “near the door.” The chalkboard or door are reference objects for the position of the clock.

In this section, puzzles, objects from the kit and the classroom, and illustrations in the Student Journal help students learn to use both *relative position* and *reference objects* to describe the position of an object. Students are introduced also to Observer RK, a small plastic figure that acts as a “robotic observer” to help them describe the position of objects in their environment. Working with RK helps students develop the ability to describe the relative position of an object, using a point of view other than their own.

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# About This Section

## OBJECTIVES

- To select and use *reference objects* in the immediate environment for describing the *relative position* of other objects
- To use Observer RK to develop the ability to see objects from a point of view other than a personal one
- To understand and use one, two, or three basic directions (above or below, right or left, front or back) when describing relative position
- To use qualitative (close, far) and measured (2 meters, 5 paces) descriptions of distances

## OVERVIEW

Students' experiences with objects and illustrations in the kit and the classroom are used in the EXPLORATION, INVENTION, and DISCOVERY of the concepts of *relative position* and *reference object*. Using Observer RK to specify both direction and distance in relation to a reference point provides EXPLORATION experiences for the concept of *coordinate systems*.

### Chapter 3: “Inventing” Reference Objects

The concepts of *reference object* and *relative position* are introduced through classroom games.

### Chapter 4: Using Reference Objects

Student Journal illustrations are used as students identify and use reference objects and describe the relative positions of objects. Students also use reference objects to give directions.

### Chapter 5: Relative Position Puzzles

Students continue to investigate the meaning and use of *relative position* as they solve 11 Relative Position Puzzles. Using the puzzles contributes to the students' understanding of spatial relationships.

### Chapter 6: Introducing Observer RK

Observer RK helps the students describe the location of objects from a point of view other than their own.

### Chapter 7: Using Observer RK

Group activities with Observer RK, puzzles, distance overlays, and the Student Journal are used as DISCOVERY activities to help students further understand the concept of *relative position*.

# BACKGROUND INFORMATION

## Reference objects and relative position

Students are called on frequently to describe where an object is located. Reasonable answers to such questions as, **Where is your house?** or **Where is your book?** must include a description of an object's position. In sample replies (such as "My house is near the fire station." or "My book is on the kitchen table.") the fire station and the table serve as reference objects to describe the location of another object. When a reference object is used to specify the position (location) of another object, we say that the second object's *relative position* is being described.

## Practical reference objects

For practical purposes, reference objects should be easy to locate and identify. It would be hopeless, for example, to try to find a house if its position were described in this way: It is between two homes. More specific reference objects, such as a fire station, a distinctively colored house, or perhaps a street intersection, are necessary for an effective description of the house's position.

Reference objects used in everyday life are highly varied and are adapted to many special circumstances. A piece of furniture, a pointing finger, a corner of a room, a street intersection, a tall building, a railroad track, or a river may all be used as reference objects.

## Communicating relative position

Suppose that you describe the location of your home to a visitor who is not familiar with the town where you live. Because none of the local landmarks would be meaningful reference objects, you may have to use the visitor's body position and your knowledge of the direction from which he or she will enter the town to give direction. For example, you might tell the visitor to turn right at the second traffic light on the main street, then turn left after 3 blocks, and so on.



**Figure II-1.** Using Observer RK as a reference object: **The vase is to RK's right, and close.**



The problem of describing position is more difficult when there are no obvious external reference objects. For example, when astronauts inside a spaceship sight a satellite that they want to capture and repair, they first must describe the position of the satellite to each other. However, the directions north and south, up and down, do not exist in space. The astronauts need alternative methods of describing the position of an object. They might:

- Label all the portholes with letters and report: The satellite is now in the direction of Porthole F.
- Use the pilot sitting at the controls as a reference object and report: The satellite is above the pilot and to her right.
- Select a unique feature, such as an antenna on the spaceship, as a reference object.
- Select several particularly bright stars as reference objects.

### Observer RK

Observer RK is a robotic artificial observer that reports the positions of objects relative to its own body. RK's left side is marked by an antenna, and the raised round sensor identifies its front. RK describes an object's distance and direction from the cross (+) that marks the center of its round sensor. If the object is not very close, then RK may use its whole body as the reference object rather than just the center of the sensor. RK distinguishes six basic directions (front, back, right, left, above, below) relative to itself.

When RK reports the position of an object, *below* and *above* are not related to the earth and sky or to the direction of the force of gravity. RK does not use trees, furniture, or other reference objects to identify position. RK uses only itself. RK is therefore a very special reference object. A person might say, **The shoes are on the floor behind the sofa, near the radiator.** RK, however, would report, **The shoes are in front of RK and to the left, about 2 meters away.**

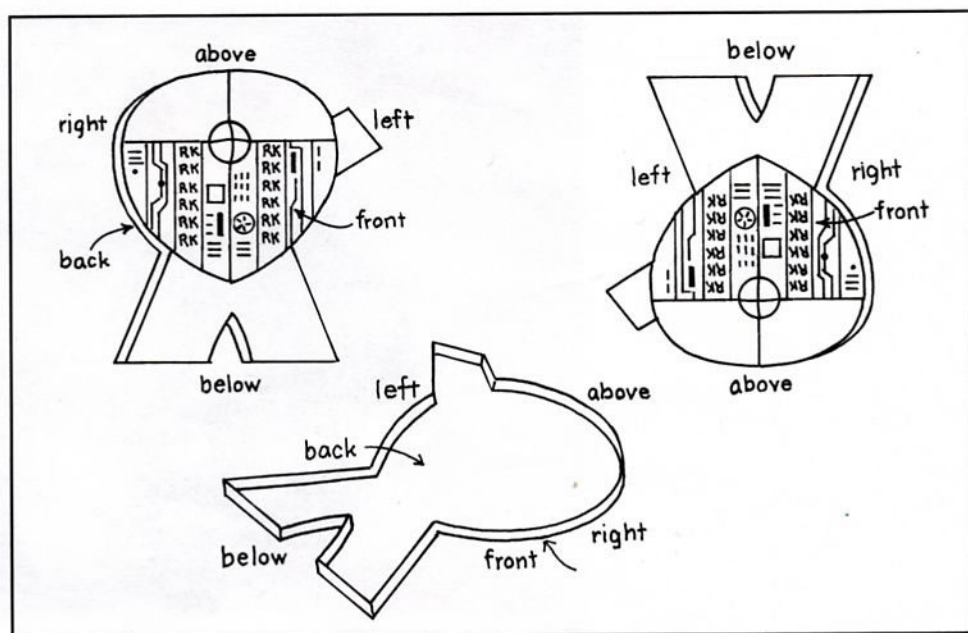
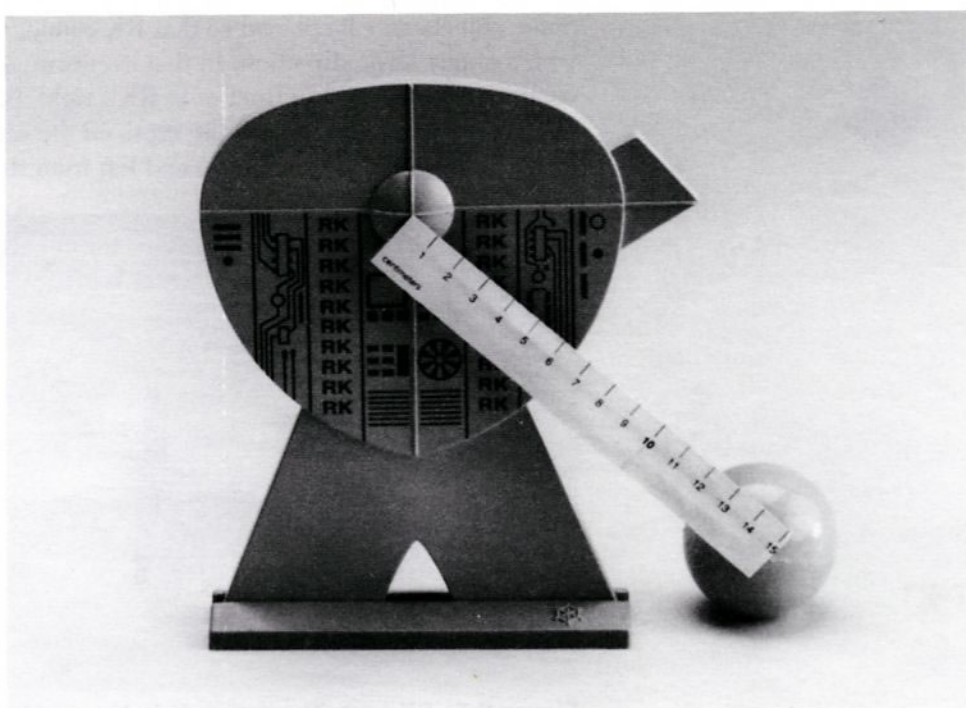


Figure II-2. RK reports the positions of all objects relative only to itself.

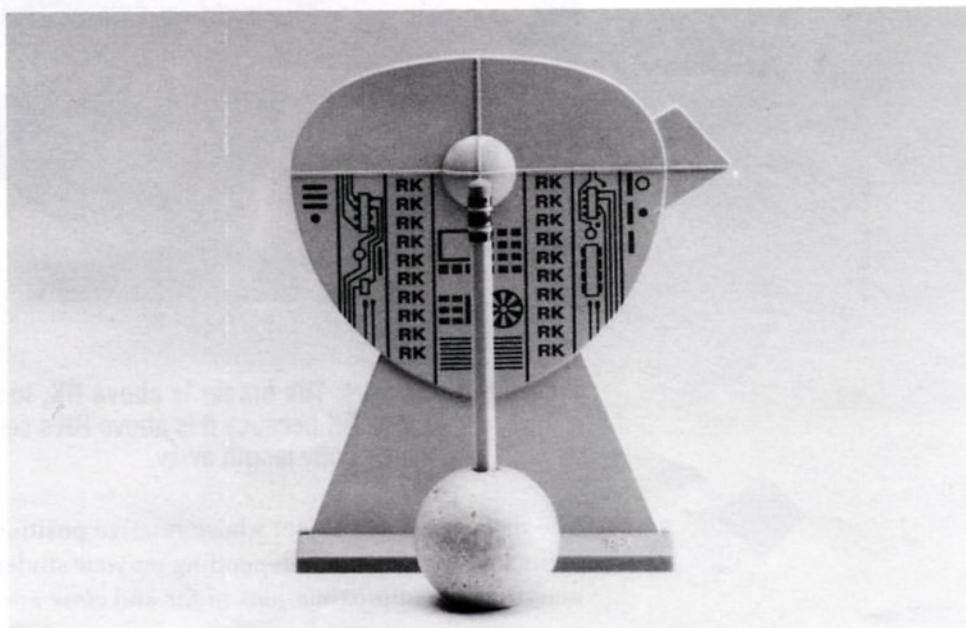
**TEACHER NOTE**  
The observer is named "RK" to honor the memory of Robert Karplus, founder of the Science Curriculum Improvement Study.



**Figure II-3.** RK describes an object's direction and distance from its top button:  
**The ball is below RK and to the left 15 centimeters.**

### Why do we use RK?

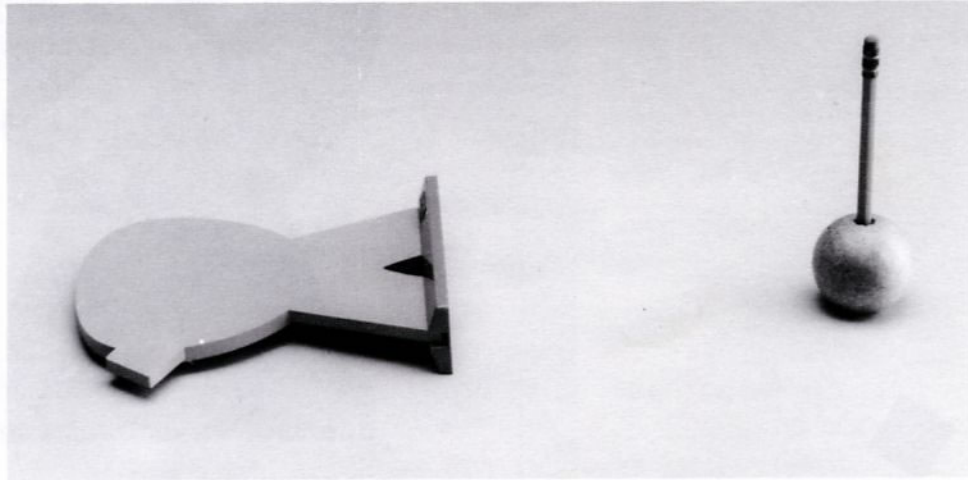
As your students use Observer RK, they must think of the relative placement of objects as seen from RK's perspective rather than from their own. Using RK in this way helps them overcome the difficulty of grasping points of view other than their own. For example, if RK is lying on its back and you hold an eraser over it, you might say, **The eraser is above RK.** RK, however, would describe the position of the eraser as, **In front of RK.**



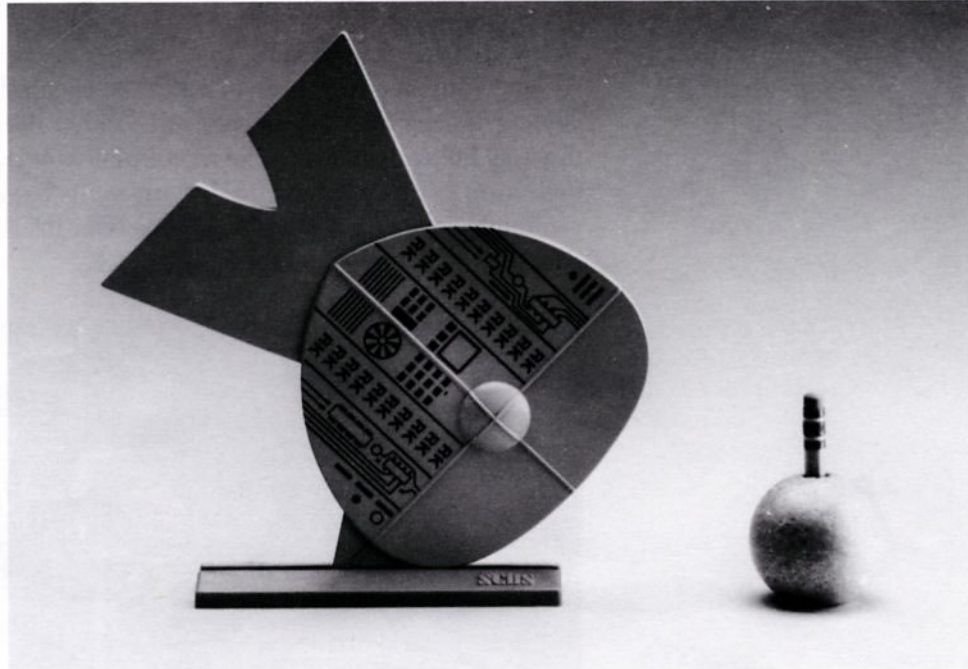
**Figure II-4.** RK reports: **The eraser is directly in front of RK's sensor and very close.**



Some objects may be placed so that RK cannot describe their relative position with a single basic direction. In that event two or three basic directions are combined (above and in front or to RK's right, in back, and below). When objects are very close to RK, the cross on the sensor serves as a starting point for separating above from below and left from right.



**Figure II-5.** RK says: **The eraser is below and in back of RK and medium far away.**



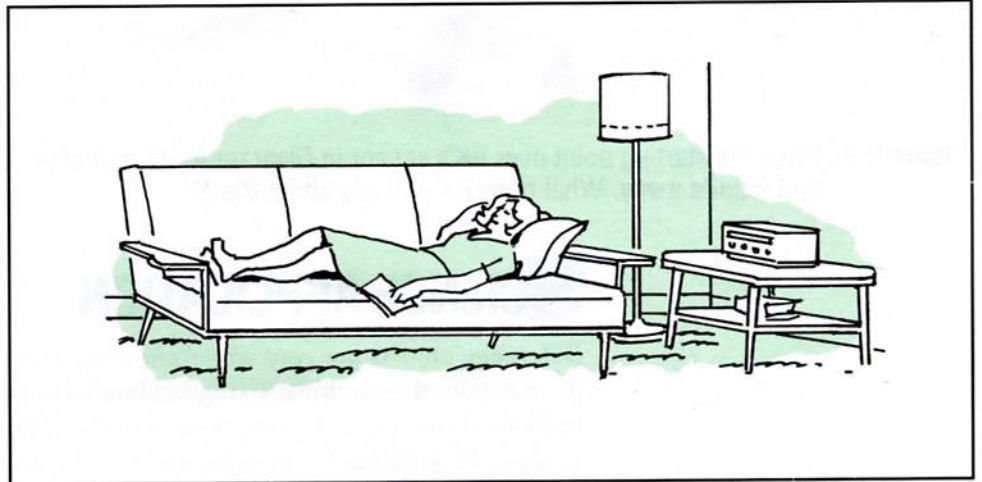
**Figure II-6.** RK says: **The eraser is above RK, to RK's right, and close.** It is above RK because it is above RK's sensor. It is close because it is less than a body length away.

The distance to the object whose relative position is being described may be estimated or measured, depending on your student's proficiency. For some activities the approximations of *far* and *close* are adequate; if the students want to qualify these terms by saying *very far*, *medium*, or *very close*, they may do so. For greater accuracy, distances may be described in meters, centimeters, or other convenient units.

### Practice with RK

The position of any object relative to RK can be described completely with reference only to RK and the directions associated with its figure. You can verify this fact by playing the role of RK in the following examples:

1. Stand up. Describe the positions of a light switch, the rug, and yourself.  
Possible answer: The light switch is to my left and slightly downward, about 3 meters away. The rug is below me and touching my feet. I am here, where I am.
2. Lie down on a sofa, on your back. Describe the position of a lamp, the sofa cushions, and yourself.  
Possible answer: The lamp is above me, slightly to my right, and about 0.5 meter away. The sofa cushions are behind me and very close. I am here, where I am.



**Figure II-7.** Where is the radio relative to the person on the sofa?

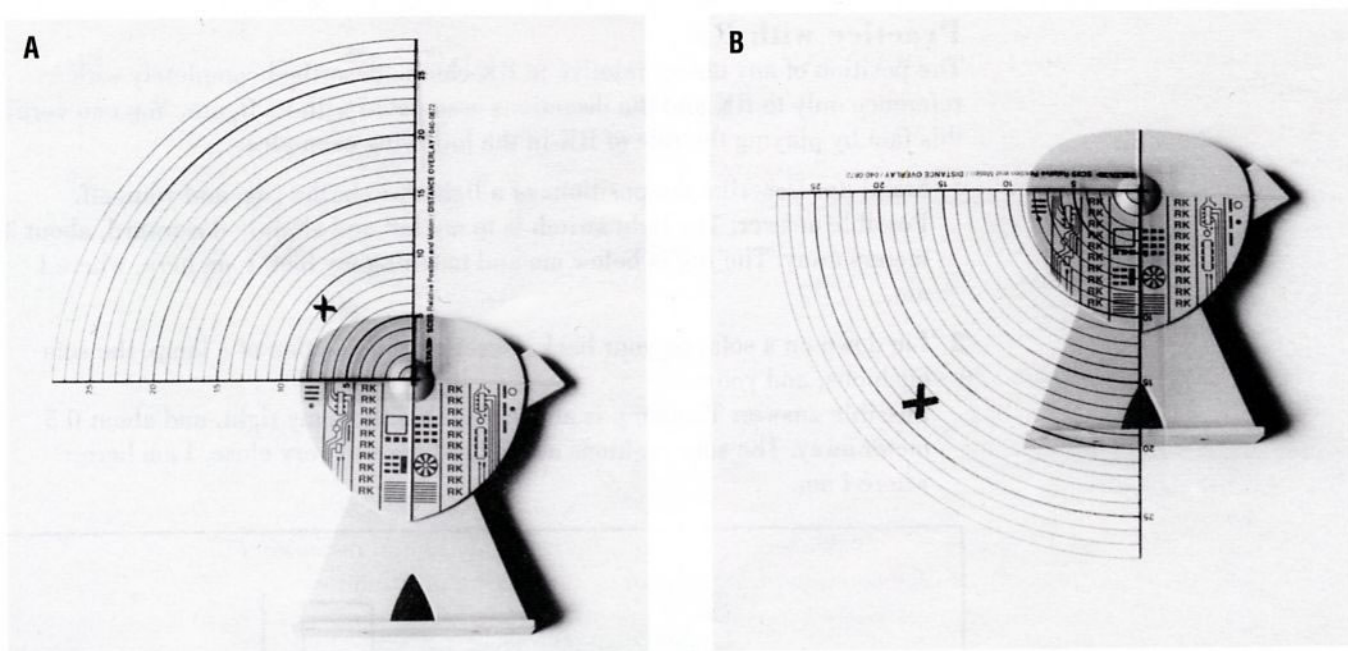
### Distance overlay

The distance overlay is a transparent plastic sheet with numbered, curved lines (sections of circles). Its starting point is at the intersection of the perpendicular heavy black lines. The units of distance on the overlay are half centimeters. By lining up the perpendicular lines with the cross on RK's sensor, you can determine both distance and direction, as shown in Figure II-8.

## ADVANCE PREPARATION

If the Relative Position puzzles in your kit have not been used before, you will need to detach the puzzle pieces from the sheets that hold them together. You may choose to have your students complete this task before they solve the puzzles. However, not all students are equally skilled in punching out perforations.





**Figure II-8.** Place the starting point over RK's sensor in Diagram A. RK in A says: **The X is above RK, to RK's right, and 9 units away.** What does RK in B say about the X?

## SCIENCE APPLICATION

Reference objects are very important when giving directions and/or describing the position of something. Using landmarks as reference objects can help an individual find his or her way to a new place. For example, responding to the request, How do I get to your house from the school? clearly illustrates the importance of reference objects when giving directions, as well as the importance of being able to describe objects from someone else's point of view.

## STUDENT DEVELOPMENT

Using common reference objects and Observer RK helps students develop the ability to identify and describe objects in their environment from someone else's point of view. This ability to look at something from a perspective not their own is extremely important if the students are to expand their view of the world from the very egocentric view, common in childhood, to a more mature one.

Using RK and the puzzles also helps students develop flexibility in language and a greater understanding of spatial relationships.

## MATERIALS MANAGEMENT

We strongly recommend that each Relative Position puzzle and its pieces be kept in its own envelope. Storing the puzzles in the Puzzle File Box is also encouraged. Although the puzzle pieces are quite sturdy, some teachers have found that laminating the most popular puzzles is a good idea.



## The Learning Cycle

This chapter includes **EXPLORATION** and **INVENTION** activities for the concepts of *reference object* and *relative position*.

# “Inventing” Reference Objects



## FOCUS

The students

- participate in games that focus on the positions of objects in the classroom
- are introduced to the terms *reference object* and *relative position*
- use compass directions to help describe position

## SCHEDULE

**Session I** - About 15-20 minutes.

**Session II** - About 15-20 minutes.

## MATERIALS

**For the class**

- |   |                    |      |        |
|---|--------------------|------|--------|
| 1 | compass, magnetic  | 4 pc | *paper |
| 1 | *crayon or marker  | 4 pc | *tape  |
| 6 | Observer RK, small |      |        |

\*provided by the teacher

## TEACHING PROCEDURES SUMMARY

**Session I**

- 1 Students describe the location of classroom objects that you identify.
- 2 Students identify classroom objects from complete descriptions of the objects' positions, and then they attempt to identify objects from incomplete descriptions of the objects' positions.
- 3 Students play the What's My Object? game by describing only the position of classroom objects.
- 4 You list reference objects on the chalkboard as students continue to play What's My Object? and then you invent the concept of *reference object* for the class.

**Session II**

- 5 Students play the Object Detective game to identify classroom objects from descriptions of their positions.
- 6 You introduce question-asking strategies to help students learn to move from general to more specific questions.
- 7 You invent *relative position* for students, using the results of the Object Detective game as examples.
- 8 Students identify north, south, east, and west in the classroom, use compass directions to help describe relative position, and then include distances in their descriptions.

# Advance Preparation

**For Session I:** Get six small Observer RKs out of the kit and set them up in the classroom.

**For Session II:** Use four pieces of paper and a crayon or marker to make one sign for each of the four compass directions, north, south, east, and west. Have tape available to attach the signs to the wall and a magnetic compass to indicate north.

## Teaching Procedures

### Session I

**1 Describing the location of objects.** Begin by asking your students where various objects are located in the classroom. Questions such as **Where is the door? Where is my desk? and Where are you?** are effective. The students will respond in a variety of ways. They may describe the position of the object you name

- in relation to other objects (The door is opposite the windows.)
- relative to themselves (The desk is in front of me.)
- by pointing (It's over there.)

The students' ability to describe directions or distances accurately as they respond to your questions will help you determine their present ideas concerning relative position.

**2 Identifying classroom objects by position.** Select a classroom object for the students to identify from your description of its position. For example, you might say, **The object I am thinking of is behind me and to my right; it is between the door and the chalkboard; and it is above the pencil sharpener.** (To discourage guesses based on incomplete information, give a fairly complete description before you let the students answer.)

When students demonstrate that they can locate an object on the basis of a complete description of the object's location, give them the same task on the basis of only partial descriptions. For example, **The object is on the bookcase** or **The object is near the window** are partial descriptions that might fit several objects: These examples are intended to illustrate the inadequacy of incomplete descriptions.

After students have struggled for a moment to identify a specific object from a partial description, begin a discussion by asking, **What is needed to make my description more precise?** (Students may make specific suggestions, but all they need to realize at this point is that additional information would help them locate the mystery object.)

### TEACHER NOTE

If your students have difficulty with right-left distinctions, use the Science Extension activity at the end of this chapter before continuing with the chapter.



**3** **Playing the What's My Object? game.** Tell the students that they now can play the What's My Object? game. Explain that the goal of the game is to describe the position—and only the position—of a mystery object so completely that others can identify it on the first try.

To begin the game, invite volunteers to describe the position of one of the six Observer RKs so that his or her classmates can identify it. Point out that because all six figures are identical, position rather than property clues will have to be used to distinguish one from the others.

If a student later gives property clues in addition to position clues when describing another object (The object is small and near the windows.), remind the class that the rules of the game require that the person giving the clues tell only where the object is, not what its properties are.

**4** **Invention of the reference objects concept.** Play the What's My Object? game two or three more times. Each time the students use a reference object to describe the position of a mystery object, write that reference object on the chalkboard. After the students identify the mystery object, write its name next to the list of reference objects. When you have several groups of names on the chalkboard, explain to the students that the objects named in the clues are called *reference objects* and write that phrase on the chalkboard.

<u>Reference Object</u>	<u>Mystery Object</u>
sink	waste paper basket
Sunshine poster	SCIS 3 kit
Mr. Johnson's desk	blue chair
middle window	

**Figure 3-1.** Inventing reference objects

Explain to the students that a reference object is an easily identified object that helps describe the position of other objects. Give an example, such as, **The Lincoln Memorial is about 1 kilometer west of the Washington Monument.** In this example the Washington Monument serves as the reference object for the Lincoln Memorial.

To give your students practice, invite volunteers to use the clock, the flag, or other prominent object in the classroom as a reference object for describing the position of any other classroom object they choose.



## Session II

### 5 Playing the Object Detective game. To play this game:

- Select one student to act as the detective and have him or her leave the room.
- In the detective's absence, have the class choose a mystery object in the classroom.
- Invite the detective back into the room and let him or her try to identify the mystery object by asking questions about its position. The detective should use only questions that can be answered yes or no (e.g., Is the object near the pencil sharpener? Is the object below the windowsill?).
- After each question, the class answers yes or no and then also identifies the reference object used by the detective. (Pencil sharpener and windowsill would be the reference objects for the examples given above).
- When it is apparent that the detective is very close to locating the mystery object, allow him or her to name the object.
- If the detective makes a wrong choice, he or she must ask another question about the position of the mystery object before attempting to name the object again.

The detective may try to ask questions about the properties of the mystery object. Remind the class that only questions about position are allowed. The detective may get fairly close to the mystery object and then be stymied. In that case identify the mystery object and commend the detective for coming close.

**6 Introducing question-asking strategies.** During the Object Detective game, the detective asks a series of questions. These questions may concern the general location of an object (Is it near the teacher's desk?), or they may be very specific (Is it on the second shelf of the tall bookcase?). The general type of question yields valuable information whether the answer is yes or no. If the answer is yes, the questioner can eliminate areas that are NOT near the teacher's desk. If the answer is no, the questioner can eliminate areas that are near the teacher's desk.

More specific questions focus attention on a particular object, perhaps before sufficient information has been gathered to make this object a likely choice. Of course, such a question may turn out to be a lucky guess if the answer is yes, but a no answer is not very helpful. Suggest to your students that they will be able to identify the mystery object more quickly if their beginning questions are general enough so that either a yes or a no answer provides useful information.

If your students are not convinced that more general questions are effective at the beginning of a game, write a mystery number between 0 and 100 on a piece of paper. Let one group of students use the trial-and-error approach of naming one number after another until the mystery number is guessed. Let a second group use a planned approach to questioning by asking first, Is the number greater than 50? Subsequent questions should narrow the numerical interval gradually and thus identify the mystery number. Compare how many questions each approach required to guess the mystery number.

### TEACHER NOTE

If you observe that the detective is asking questions without a plan or if you think that your class needs more practice with question-asking strategies, go on to step 6 now and return to the Object Detective game later.

### TEACHER NOTE

Many students will be familiar with the game Twenty Questions. Ask them to think about whether general or specific questions are more useful at the beginning of that game.

**7** **Invention of the *relative position* concept.** After the Object Detective game has been played several times, remind your students that each detective used reference objects to ask about the position of the mystery object in order to identify it. Tell them that the location of an object in relation to reference objects is its relative position. Write *relative position* on the chalkboard and define it by explaining that the relative position of an object is its location described in relation to a reference object. For example, the relative position of the Lincoln Memorial is “about 1 kilometer west of the Washington Monument,” which is the reference object in this example.

Point out that you give the relative position of an object when you use other objects to describe where it is. Give one or two examples from the Object Detective game (The pencil sharpener is between the door and the bookcase.) and ask volunteers for other examples.

**8** **Using compass directions to describe relative position.** Point out that in the example of the relative position of the Lincoln Memorial, the compass direction west was used to describe the direction from the reference object. Have your students use a magnetic compass to identify north. Then with your students’ help, post north, south, east, and west signs on the appropriate walls of your classroom. Suggest that the students use these signs to help them describe directions and the relative position of objects.

Using the classroom door as the reference object, ask students to use compass directions to describe the relative position of a variety of objects in the room. Later, you may wish to encourage them to include approximate distances in their description. For example, The light switch is one hand width east of the door.



**Figure 3-2.** Using compass directions to find the relative position



### **QUICK CHECK**

**Where is it?** Identify a reference object, such as the classroom door, and ask a student to identify where another object is in reference to it. Those who can use compass or other directions effectively are developing a good operational understanding of relative position.



# Applications and Extensions

## SCIENCE CHALLENGE

**Treasure Hunt.** Ask students to bring a small “treasure” to school in preparation for a “Reference Object Treasure Hunt”. Then have students think about where they want to hide their treasures. After they hide their treasures, they should write out directions that would help someone else find it. The directions should use reference objects in the classroom, and send the person searching in at least five places before getting to the treasure. Each step should describe a place where the searcher can find another written clue.

## SCIENCE EXTENSION

**Right-left distinctions.** Some students may have difficulty making right-left distinctions relative to themselves or to persons around them. The following group activities are designed to give your students added practice and assistance:

1. *Arm bands.* Give each student a brightly colored construction paper arm band to wear on his or her right arm to help distinguish right from left on the student, as well as on his or her classmates.
2. *Simon Says.* The game of Simon Says, in which all the students follow the instructions given by a leader only if they are preceded by the phrase “Simon says,” can be an effective device for practicing left-right distinctions. Make frequent references to actions with the right or left hand, arm, foot, or leg. For example, “Simon says touch your head with your left hand” or “Simon says lift your right foot.” You should participate in the actions at first from the back of the class to observe your students. Later move to the front of the room and face them to provide the challenge of a reversed model.
3. *Picture this.* Have the students identify and color the right and left hands or feet of people in illustrations.
4. *Follow me.* Invite two students to sit face-to-face and play Follow the Leader with hand and body movements.

## SCIENCE AND LANGUAGE ARTS

**Can you describe your room using reference objects?** Ask each student to write about his/her room at home. Ask students to use reference objects to help bring a picture to the reader’s mind. Example: the bed is on the left side of the room as you enter from the door. To further reinforce the goal, ask students to highlight or underline the reference objects they use in their written descriptions.

Students could draw or sketch a map of their room as a possible addition to this activity.



## The Learning Cycle

The activities in this chapter contribute to the DISCOVERY phase of the learning cycle for the concepts of *reference object* and *relative position*.

# Using Reference Objects



## FOCUS

The students

- use the Student Journal to identify reference objects, to describe the relative positions of objects, and to locate objects whose positions are given
- write a set of directions to help a person to find a designated location

## SCHEDULE

About 30-40 minutes.

## MATERIALS

**For each student**

1 sht \*paper, notebook  
Student Journal pp. 6-8

\*provided by the teacher

## TEACHING PROCEDURES SUMMARY

- 1** Students use the illustrations on Student Journal page 6 to review the concepts of *reference object* and *relative position*.
- 2** Students locate a bridge on the basis of reports of its relative position on Student Journal page 7 and discuss the reference objects they used for the task.
- 3** Students locate the position of a spider in an illustration on Student Journal page 8.
- 4** Students use reference objects to give directions to other students.

# Teaching Procedures

Relative Position and Motion  
Section 2 • Chapter 4

**A**

**Reference Objects**  
**Relative Position**

Jim: "The clock is on the wall above the telephone."  
 Maria: "Phil is in front of me."  
 Phil: "The telephone is behind me and beneath the clock."

- ◆ Jim, Maria, and Phil are reporting the positions of objects in their classroom.
- ◆ Where is Jim? \_\_\_\_\_
- ◆ What are the positions of some other objects in the picture? \_\_\_\_\_
- \_\_\_\_\_
- ◆ What is the position of the chalkboard relative to the clock? \_\_\_\_\_
- \_\_\_\_\_
- ◆ What is the position of the chalkboard relative to Phil? \_\_\_\_\_
- ◆ What is the position of the chalkboard relative to Maria? \_\_\_\_\_

6

**1** **Reviewing the concepts of reference object and relative position (Student Journal page 6).** Have your students examine the picture on page 6 of their journals. Invite volunteers to read the statements made by Jim, Maria, and Phil and ask them, **What reference object was used by each person?** (Jim's reference object is the telephone; Maria's is herself; Phil's is himself and the clock).

Have the students read and answer the questions on the bottom of the page. Encourage students to suggest several possible responses for each question and to identify the reference objects they used to answer the questions. Note that the first two questions on the page can be answered in a variety of ways, depending on the point of view chosen. However, the last three questions specify reference objects (the clock, Phil, and Maria) and therefore have more restricted answers.

For example: The chalkboard is below the clock and to one side of it (left or right, depending on how an observer is oriented). The chalkboard is behind and to the right of Phil. Whether it is above him or level with him is open to debate. The chalkboard is directly to Maria's left and mostly above her.

Relative Position and Motion  
Section 2 • Chapter 4

**A**

Roberto: "The bridge is that way"  
 Peggy: "It's between the mountains."

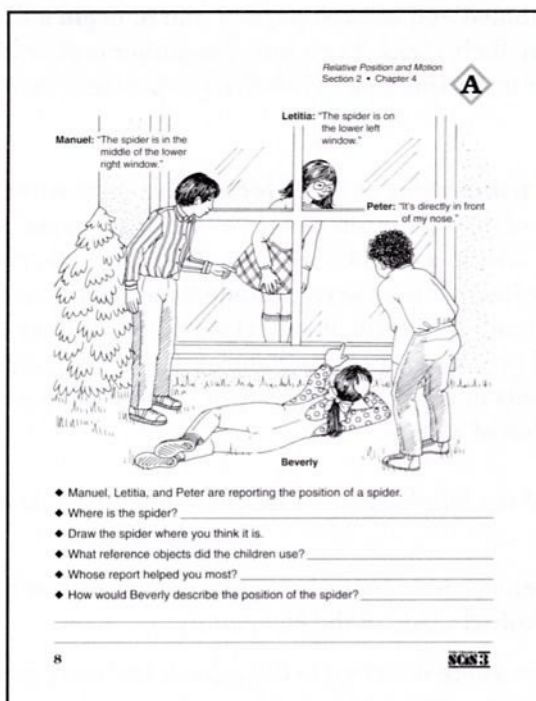
- ◆ Roberto and Peggy are reporting the position of a bridge.
- ◆ Where is the bridge? \_\_\_\_\_
- ◆ Draw the bridge where you think it is.
- ◆ What reference objects did Peggy use? \_\_\_\_\_
- ◆ What is the position of the horse relative to the large tree? \_\_\_\_\_
- \_\_\_\_\_

7

**2** **Locating a bridge on the basis of reports of its relative position (Student Journal page 7).** Ask your students to read the problem on page 7 of their journals, to complete the drawing of the bridge, and to describe the relative positions of objects in the picture.

On page 7 the bridge over the river should be drawn between the mountains, from east to west beyond the horse. Point out that Peggy used the mountains as reference objects. Ask, **What reference object did Roberto use?** (Himself)

The position of the horse relative to the large tree may be described in various ways. All make use of a reference object, such as the tree, and/or the compass directions printed on the page. Roberto might say that the horse is on the far or northern side of the tree; Peggy might say that it is in front of the left mountain to the northwest of the tree.



**3 Locating the position of a spider (Student Journal page 8).** Have your students turn to page 8 of their journals and think about how to report the relative position of the spider. In addition to other issues the reversal of what is right and left for each observer when two people face each other is presented here. Some students will need help understanding this reversal.

The reference objects used by the students on page 8 are as follows:

*Manuel:* the window, or the lower right window pane (as seen by the reader)

*Letitia:* the lower left window pane to her or the lower right window pane as seen by the reader (illustrating the right-left reversal)

*Peter:* his own nose

*Beverly:* not specified on the page (Your students can make up reports for Beverly and then state what reference object she used. An interesting challenge is to ask your students how many different reference objects Beverly could use to describe the spider.)

Some students may have difficulty identifying the pictured students' right knees. Suggest that they first look for the students' right arms. Students who incorrectly identify Letitia's knee might be asked to face you and touch their own right knee and then yours; or two students might face each other and do the same thing.



**Figure 4-1.** Locating the position of the spider on Student Journal page 8



After your students have studied and marked pages 7 and 8, begin a discussion by inviting them to compare their ideas. Their answers (either oral or written) can help you evaluate their understanding of relative position and their ability to use reference objects.

**4** **Giving directions using reference objects.** Give each student the task of writing a set of directions (on a sheet of notebook paper) to lead a person from the classroom door to a secret classroom object that you choose for each individual. After they finish, invite several students to read their instructions without identifying the secret object. Have other students attempt to follow the instructions and to identify the secret object. Use the ensuing discussion to remind students of the practical value of using reference objects to describe the relative position of objects.

You may also choose one of the following tasks for your students or design one specifically for them.

- Directions that would help a friend find where they live starting at the school or at another easily identified place in the community
- Directions for going from where they live to the school, bus stop, grocery store, or park
- Directions that would enable each student's parent—perhaps on open house night—to find the student's desk or to locate a drawing in a classroom display after starting at the classroom door



### QUICK CHECK

**Picture position.** Select any picture in the classroom (or from a magazine) that includes a combination of more than one object and/or organism. Ask the student whom you want to check to describe the position of one object or organism in the picture in relation to a reference object you choose.

Students who can describe directions from the reference object accurately and can estimate distance reasonably well have a good understanding of the ideas in this chapter. Others need further experience describing objects by their relative position. The subsequent activities in this section will give them those opportunities. Make a note to check informally on how they are progressing as you introduce subsequent chapters in this section and offer additional help if necessary.

# Applications and Extensions

## SCIENCE CHALLENGE

**Reference Point Map Challenge.** Have students work in pairs with a state map. Student A chooses a city, mountain, river, or other landmark on the map without revealing the choice to his or her partner. Student A then gives a clue to Student B using a reference point on the map. Distance estimates, direction, and other landmarks could be used as part of a clue. Student B earns 5 points if he or she guesses the correct answer with one clue, 4 points if guessed with two clues, 3 points for three clues, and so forth. Once the correct answer is guessed, the partners switch roles. The first student to reach 20 points is the winner.

## SCIENCE EXTENSIONS

**Community maps.** Consult your school district office, a local realtor, or your local election district for a large-scale map that shows the attendance area of your school. If no map is available, you can use a smaller scale map (such as one found in a telephone book) by having it enlarged photostatically so that each block on the map is 1 centimeter or larger. You may wish to have the map laminated so that it can be used in future classes.

Give each of the students an adhesive dot of the same color and have them write their initials on the dots. Help the students place their dots on the map to show where they live. (Some students may not want to reveal where they live. Encourage them instead to locate a local park or store.) Post the map where the students can see it and invite them to give each other directions from one point in the community to another.

**Drawing landmarks.** Use the map described above and adhesive dots of varying colors to represent community landmarks. Have students locate and mark a variety of landmarks, such as parks, churches, stores, and civic buildings. Invite them to write directions from where they live or from the school to several of these landmarks. This activity will enable you to find out how familiar your students are with their own community. Encourage participation, especially by students who may have moved in recently or who have for other reasons not explored their environment.

## SCIENCE AND LANGUAGE ARTS

**Live action scenes.** Give each interested student the task of designing a movie scene, such as a Wild West shootout. In a western, for example, the cast may include a sheriff, a bad guy on the street, and several townspeople (extras) watching the action. Have the class indicate the position of each cast member in the scene, as well as two or three reference objects, using only the terms *right* and *left*, *front* and *back*. Then let the class select another object (such as the sheriff's badge) and have each cast member describe the object's position from their viewpoint.