

## 1.4 Biomechanics, Energy, and Force



In this activity lesson, students will focus on direction of force while participating in a continuous relay including the strength, muscular endurance, and cardiovascular fitness components of health-related fitness.

### **Performance Outcomes Related to NASPE Standards**

- ▶ Standard 4
  - ▶ Participate in activities designed to improve or maintain muscular strength, muscular endurance, flexibility, and cardiovascular fitness inside and outside of school.
- ▶ Standard 5
  - ▶ Exhibit (verbally and nonverbally) cooperation, respect, encouragement, and the ability to work independently.
  - ▶ Through verbal and nonverbal behavior demonstrate cooperation with peers who have different characteristics (such as gender, race, ethnicity, and ability).
  - ▶ Participate with and show respect for peers of lesser skill ability.
  - ▶ Assist and encourage group members by sharing positive feedback about skill performance during practice.
  - ▶ Effectively work independently and in groups to complete assigned tasks.
- ▶ Standard 6
  - ▶ Seek personally challenging physical activity experiences.

### **Lesson Objectives**

- ▶ Students will be involved in moderate to vigorous activity for more than half of class time.
- ▶ Students will discover and apply the most effective techniques for production of force in the direction of desired movement.

### **Equipment**

- ▶ 3 cones per group of six students
- ▶ 1 medicine ball per group of six students
- ▶ CD player and music

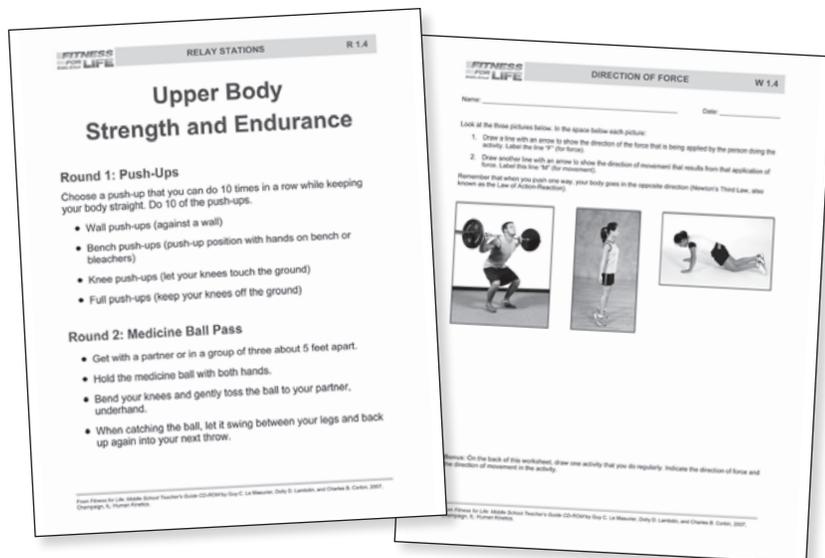
# SAMPLE

## Reproducibles

- ▶ Resource 1.4, “Relay Stations”
- ▶ Worksheet 1.4, “Direction of Force”

## Setup

1. Make a copy of resource 1.4, “Relay Stations” and worksheet 1.4, “Direction of Force,” for each student.
2. For each group of students, place three cones in a straight line about 10 yards (9 meters) apart from one another.
3. For each set of cones, place one lower-body “Relay Stations” sign on the cone at the left end, and place one upper-body “Relay Stations” sign on the cone at the right end.



## Delivering the Lesson

### Part 1: Instant Activity

#### Walk and Talk

1. Have students walk in pairs around the perimeter of the space taking turns answering the following questions:
  - ▶ What are two components of health-related fitness?
  - ▶ How can you tell if you have enough fitness?
2. Have students give their partners visual feedback on their answers using a thumbs-up or thumbs-down signal.

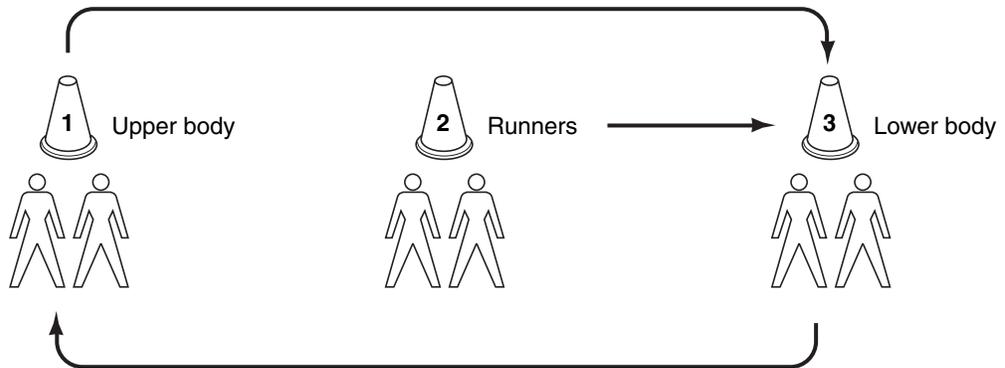
### Part 2: Lesson Launcher

1. Review the lesson objectives with students.
2. Explain to students that health-related fitness involves strength, muscular endurance, cardiovascular fitness, flexibility, and body composition. Tell them they'll be working on flexibility at the end of the lesson after their bodies are well warmed up.
3. Explain that students will not be competing or racing. The object is to go at a pace at which they can attend to the direction of force as they do each activity.
4. Ask students to pay attention to their partners and give helpful feedback on body position.

## Part 3: Lesson Focus

### Continuous Relay

1. Divide students into groups of six. Assign each group to one of the sets of cones.
2. Demonstrate the order of the relay. Two players stand by each cone.



- ▶ Players by the cone at the left end (1) are the upper-body exercisers.
  - ▶ Players by the cone in the middle (2) are the runners.
  - ▶ Players by the cone at the right end (3) are the lower-body exercisers.
  - ▶ Most exercises on the “Relay Stations” signs are to be done 10 times. Tell students that each one is called a rep (repetition) and that each group of 10 reps is called a set.
3. Start playing music to signal the beginning of the activity. The players at the end cones begin doing the Round 1 exercises for their station. Have all students switch places as follows:
    - ▶ The runners in the middle run in place for 100 steps and then run to the right end cone (3), tag the cone, and start doing the lower-body exercises.
    - ▶ The students who started at the right end cone run to the left end cone (1), tag the cone, and start doing the upper-body exercises.
    - ▶ When the new students come to the cone, the students who started at the left end cone run to the right end cone (3), and the cycle continues. Each time students get to the cone, they should pick up on the exercises where they left off on their last visit to that cone.
  4. Stop the music after 10 to 12 minutes. By that time, all students in each group should have completed all upper-body and lower-body exercises at least once (two exercises at each station).

### observe

- \* Observe students participating in the activities and working effectively in groups.
- \* Observe the use of force in each exercise (look for good examples and problems).

5. After students complete the stations, have them walk once around the activity area to cool down. If the station equipment won't be used again, have the last group to use it put it away.

# SAMPLE

6. Have students go through a series of stretching activities (including their necks, shoulders, trunks, hips, calves, and ankles).

## **Part 4: Reflection and Summary**

Ask students to share their thoughts on the following:

- ▶ Which activities were hardest for you?
- ▶ What component of health-related fitness did the activities address?
- ▶ For which activities was it easiest to determine and align your force in the direction of your movement? For which activities was it hardest?
- ▶ Did you make any corrections in your movements that made the activities easier? Harder?

## **Take It Home**

- ▶ Hand out worksheet 1.4, “Direction of Force.” On the worksheet, have the students
  - ▶ indicate the direction of force for each picture; and
  - ▶ draw one activity that they do regularly (using stick-figure people), and indicate the direction of force and the direction of movement used in a particular skill (such as throwing or volleying).
- ▶ Tell students when to return the completed worksheet to class. (Recommended: lesson 1.5.)

## **Next Time**

- ▶ Choice of physical activities that relate to the different levels on the Physical Activity Pyramid
- ▶ Remind students that worksheets 1.1, “Physical Activity Pyramid,” and 1.4, “Direction of Force,” are due next class (recommended).

## **Assessment**

- ▶ Performance check: Observe students working effectively in groups.
- ▶ Comprehension check: Throughout the lesson, ask selected students questions about the application of force during the activities to check for student understanding.
- ▶ Performance check: Observe students participating and working effectively in groups (such as actively listening to others, encouraging others, and refraining from interrupting).