

**FOCUS ON**

**Grades 5-8**

**MIDDLE SCHOOL**

# PHYSICS

**Teacher's Manual**

**Rebecca W. Keller, PhD**



## Materials at a Glance

Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 5
tennis ball yarn or string (3 meters [10 ft]) paper clip marble  <b>Optional</b> awl, penknife, or other sharp instrument to pierce tennis ball tape 1 or more small objects such as building blocks	Slinky several paper clips 1-2 apples 1-2 lemons or limes 1-2 oranges 1-2 bananas spring balance scale or food scale meter stick, yardstick or tape measure tape	small to medium size toy car stiff cardboard wooden board (more than 1 meter [3 ft] long) straight pin or tack (1-3) small scale or balance 1 banana, sliced 10 pennies meter stick, yardstick, or tape measure tape	glass marbles of different sizes (several) steel marbles of different sizes (several) cardboard tube, .7-1 meter [2.5-3 ft] long scissors black marking pen ruler letter scale or other small scale or balance	10-20 copper pennies aluminum foil paper towels salt water, 30-45 ml (2-3 Tbsp) salt per 240 ml (1 cup) water voltmeter ** 2 plastic-coated copper wires, each 10-15 cm (4-6 in) long duct tape (or other strong tape) scissors wire cutters steel wool  <b>Optional</b> vinegar (240 ml [1 cup])

Experiment 6	Experiment 7	Experiment 8	Experiment 9	Experiment 10
small glass jar with lid aluminum foil paper clip duct tape (or other strong tape) plastic or rubber rod (or balloon) silk fabric (or use hair) scissors ruler  <b>Optional</b> several dry cell batteries of different sizes and shapes for observation	1.2 meters (4 ft) insulated electrical wire 6v or larger (up to 12v) battery insulating materials (e.g., styrofoam, plastic, cloth) small light bulb (Radio Shack flashlight lamp #272-1163 with a rated voltage of 6v or comparable bulb) electrical tape several small resistors scissors wire cutters  <b>Optional</b> 2 alligator clips	metal rod (a large nail [such as an 8.9 cm [3½"] long 16d flathead nail], a screwdriver, or other) electrical wire 10-20 paper clips 6v-12v battery electrical tape scissors wire cutters magnets, bar or horseshoe (2 or more)  <b>Optional</b> thin magnet that can be cut iron filings 60 ml (¼ cup) corn syrup shallow dish iron nail alligator clips (2)	2 prisms (glass or plastic) flashlight metal can, open at both ends aluminum foil rubber band laser pointer long wooden craft stick colored pencils duct tape (or other strong tape)  <b>Optional</b> bowl filled with water styrofoam or other material that floats eyedropper	student-selected materials

\*\* An inexpensive voltmeter can be purchased at any store that supplies electrical equipment. Make sure the voltage scale is low enough to detect small voltages—about 0.5v.

## Materials at a Glance

By type with total quantities

Equipment	Materials	Materials (cont.)	Food Items
battery, 6v or larger (up to 12v) flashlight laser pointer light bulb, small (Radio Shack flashlight lamp #272-1163 with a rated voltage of 6v or comparable bulb) prisms, glass or plastic, 2 scale: spring balance, food, or letter scissors voltmeter (inexpensive, from electrical equipment store, voltage scale should read as low as .5v) wire cutters  <b>Optional</b> alligator clips (2) awl, penknife, or other sharp instrument to pierce a tennis ball	<i>Focus On Middle School Physics Laboratory Workbook</i> aluminum foil board, wooden (more than 1 meter [3 ft] long) can, metal, open at both ends cardboard, stiff, 1 piece cardboard tube, .7-1 meter (2.5-3 ft) long fabric, silk (or hair) insulating materials (e.g., styrofoam, plastic, cloth) Jar, small glass with lid magnets, bar or horseshoe (2 or more) marbles, glass, several different sizes marbles, steel, several different sizes meter stick, yardstick, or tape measure misc. materials, student selected (Exper. 10) paper clips, 10-20 paper towels, several pen, marking, black pencils, colored pennies, 10-20 pin, straight, or tack (1-3)	resistors, small, several rod, plastic or rubber (or balloon) rod, metal (a large nail [such as an 8.9 cm [3½"] long 16d flathead nail] or a screwdriver can be used for the rod) rubber band ruler sticks, craft, long wooden Slinky steel wool tape (any) tape, duct tape, electrical tennis ball toy car, small to medium size wire, plastic-coated copper, 2.5 meters (8 ft) yarn or string, 3 meters (10 ft)  <b>Optional</b> batteries, dry cell, different sizes and shapes for observation (several) dish, shallow eyedropper iron filings magnet, thin (to cut up) nail, iron objects, small, 1 or more (such as building blocks) styrofoam or other material that floats	1-2 apples 1-2 lemons or limes 1-2 oranges 1-3 bananas salt water, 30-45 ml (2-3 Tbsp) salt per 240 ml (1 cup) water  <b>Optional</b> 60 ml (1/4 cup) corn syrup vinegar water in bowl