

AKA Science: K-3 Physics of Forces and Motion Photos

CLASS 1



1) **Act. 3, Paper Columns:** Examples of triangular, square, and cylindrical columns.



2) **Act. 3, Paper Columns:** Place the Styrofoam tray on top of a paper column. Attempt to place a pebble bag weight in the center of the tray. If the column can support one bag, it may work best to add a second bag perpendicular to the first one (instead of next to it, as shown).



3) **Act. 4, Paper Tower:** Example of one possible tower structure. Let students try to design their own.



4) **Act. 5, Balance Bird:** The balance bird balances on the stand by the tip of its beak.

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CLASS 1 (cont.)

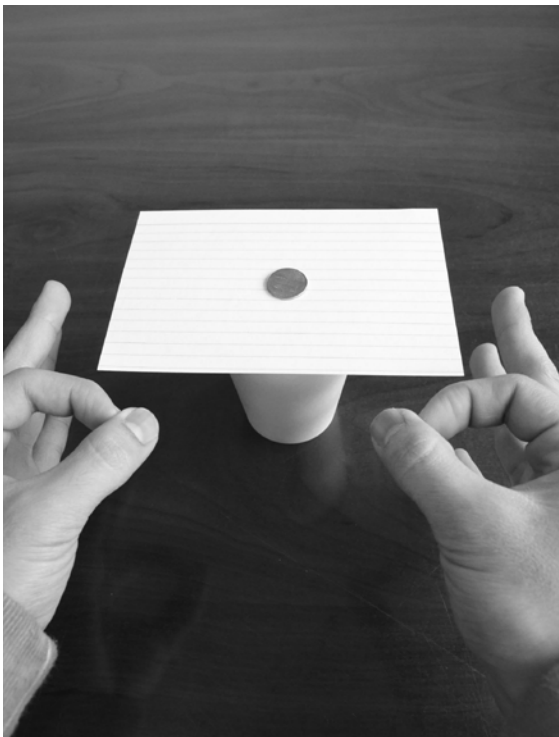


5) Act. 5, Balance Bird: The balance bird balances on the stand by the tip of its beak.

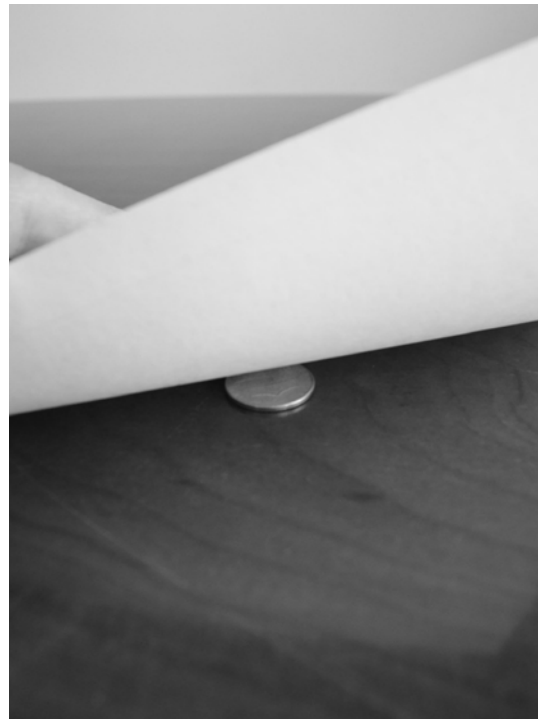


6) Act. 5, Balance Bird: The balance bird balances on the stand by the tip of its beak

CLASS 2



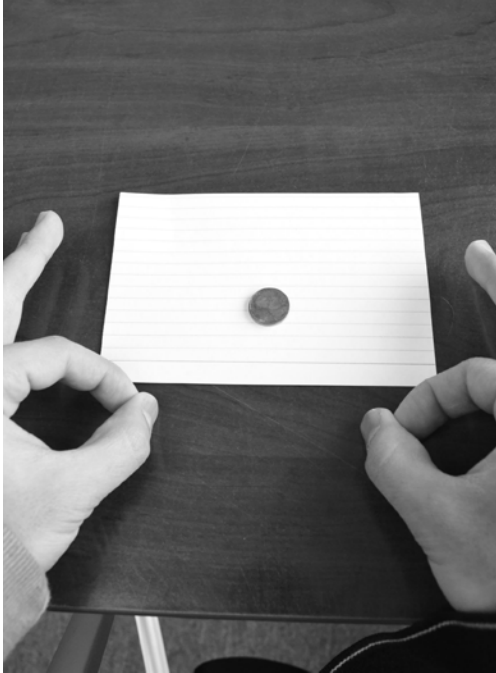
1) Act. 2, Coin Tricks: Place the index card over the mouth of the cup and place one penny in the middle of the index card. Place one hand at each bottom corner of the index card and flick the card straight forward. The penny should fall into the cup.



2) Act. 2, Coin Tricks: Set the cup aside and place one penny on the table (ideally near the edge of the table), then place the index card over the penny so that one of the long edges hangs slightly off the edge of the table.

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CLASS 2 (cont.)



3) Act. 2, Coin Tricks: Stack the other two pennies directly above the penny underneath the index card. Flick the index card forward as before.



4) Act. 2, Coin Tricks: Lift one arm up and back so the elbow is pointing straight forward. Balance a penny on the top of the elbow, cup the palm, and quickly swing the hand down to catch the penny as it falls.



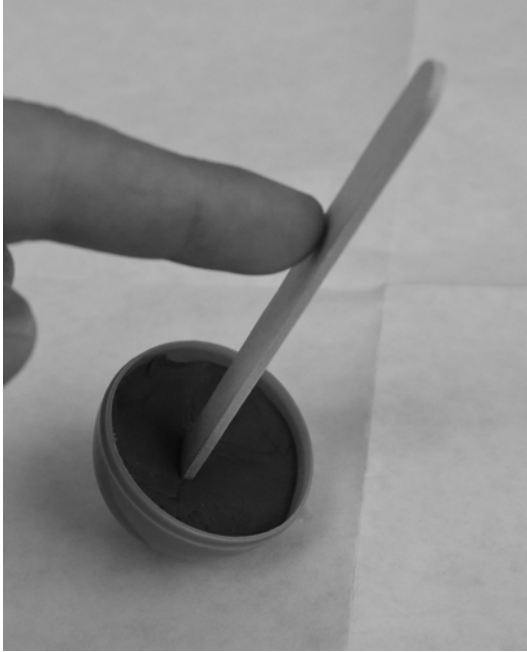
5) Act. 3, Newton's Cradle: Hold the foam track to form a loop.



6) Act. 3, Newton's Cradle: While one student holds the center marble still, have another release marbles from above on one side of the track so that they hit the center marble.

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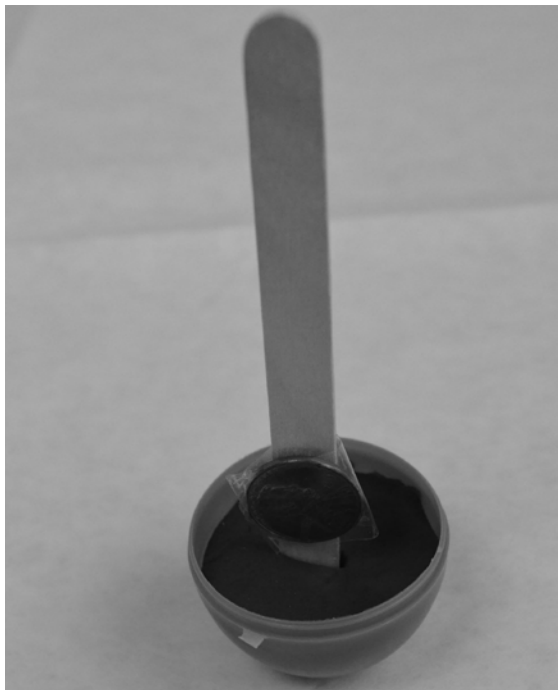
CLASS 2 (cont.)



7) Act. 4, Roly Poly: Roll the play dough into a ball and press the dough until evenly distributed into half the egg. Insert a popsicle stick into the play dough. Gently push the top of the popsicle stick sideways. The toy will return to its upright position.



8) Act. 4, Roly Poly: Tape a penny near the top of the popsicle stick. The toy will fall over when pushed.



9) Act. 4, Roly Poly: Move the penny lower on the stick to correct the balance.



10) Act. 5, Egg Roll: After removing the popsicle stick from the play dough from the previous activity, join the bottom egg half with an empty, top egg half. Roll the egg down the ramp.

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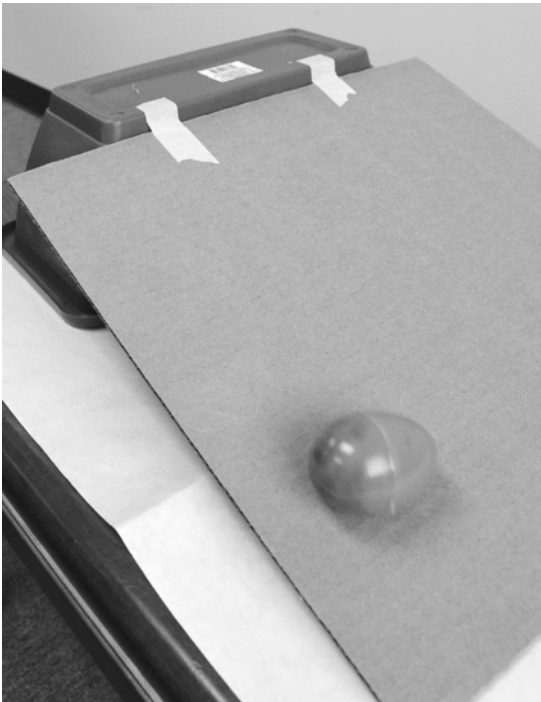
CLASS 2 (cont.)



11) Act. 5, Egg Roll: Remove the play dough from the bottom half of the plastic egg and transfer it to the top half. Roll the egg down the ramp.



12) Act. 5, Egg Roll: Example of an engineered egg that can roll down the ramp. Note: the play dough is distributed evenly. Roll the egg down the ramp.



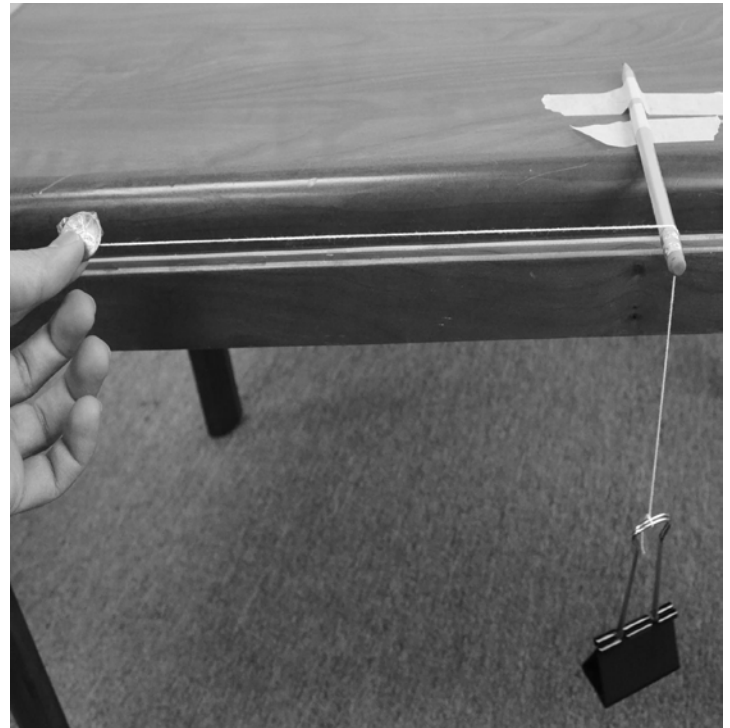
13) Act. 5, Egg Roll: Test each egg with each different play dough conformation by trying to roll it down the ramp.

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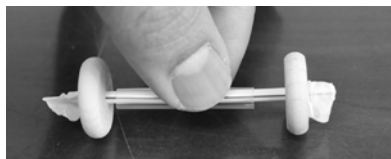
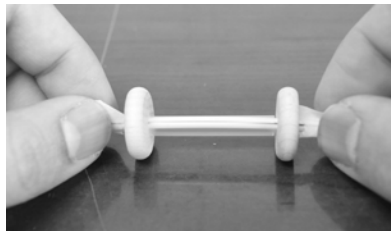
CLASS 3



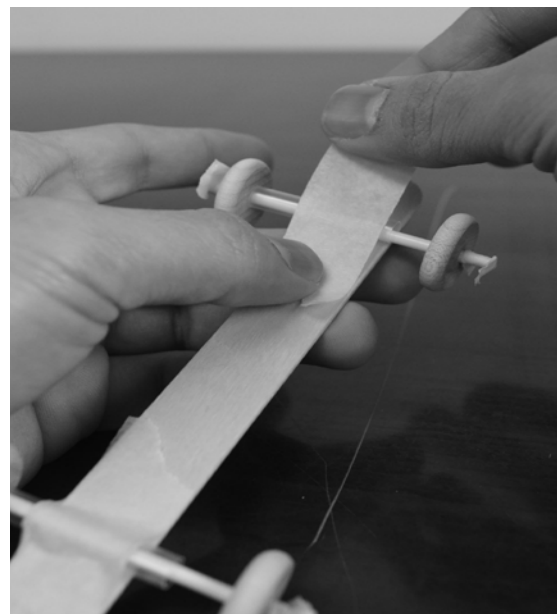
1) Act. 2, Pendulum Drop: Tape the penny to one end of the string and tie the other end of the string to the metal parts of the binder clip.



2) Act. 2, Pendulum Drop: Hold the penny in your left hand. Drape the string over the pencil (which is taped to the table). Release the penny and watch it wrap around the pencil.



3) Act. 3, The Wheels on the Bus Go: Top photo: Hold the two ends of the stir stick to roll the wheels together. Middle photo: Tape the wheels to the masking tape at the end of the stir sticks. Bottom photo: Hold the wheels by the clear straw piece to roll the wheels in sync.

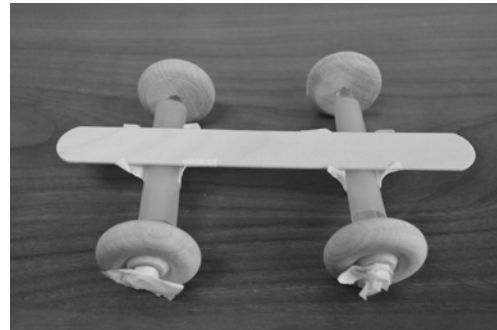
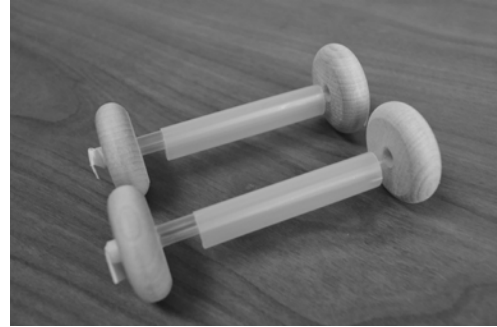


4) Act. 4, Finger Skateboard: Tape the 1" straw pieces onto the jumbo popsicle stick to create a basic vehicle with axles and wheels.

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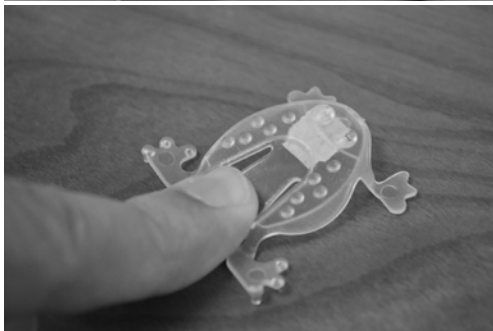
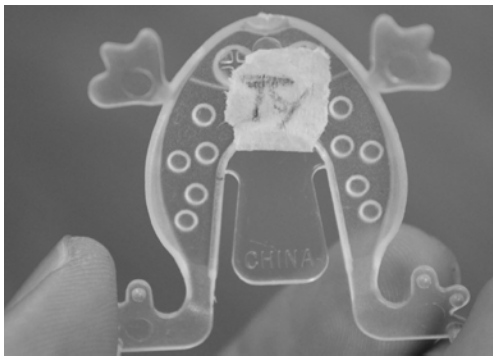


5) **Act. 4, Finger Skateboard:** Use a finger to push the skateboard on the table.



6) **Act. 5, Monster Truck:** Construct a “finger skateboard” with larger wheels to demonstrate wheel size changes distance traveled. Top photo: Finished axles with large wooden wheels, jumbo straw pieces, and regular straw halves. Bottom photo: Finished monster truck.

CLASS 4



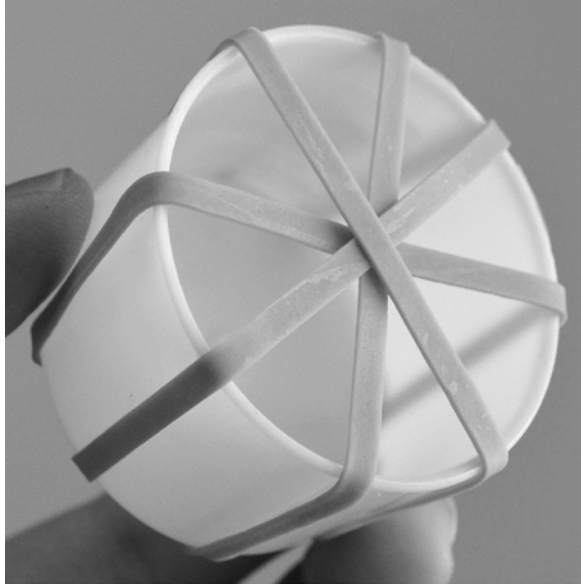
1) **Act. 2, Frog Olympics:** Top photo: Have each student label a plastic frog with their initials on a small piece of masking tape on the underside of the frog. Bottom photo: Press down on the back tab of the frog with one finger and release to make it jump.



2) **Act. 3, Balls, Bounce, & Billiards:** The “test chamber” stands upright, with one opening on a folded piece of terry cloth. Drop each ball from the top.

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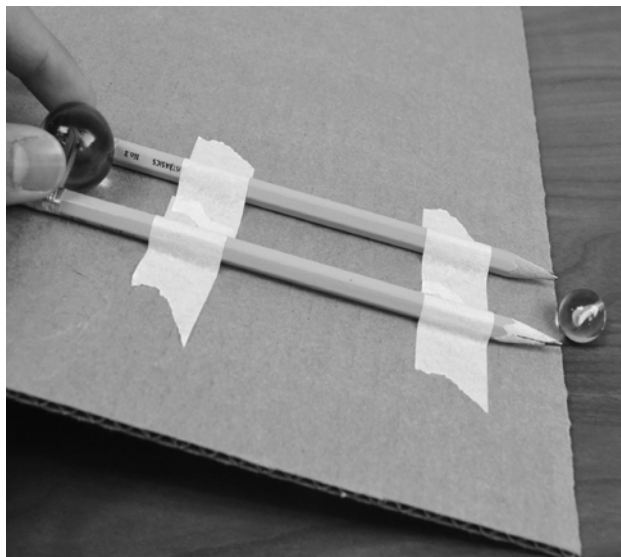
CLASS 4 (cont.)



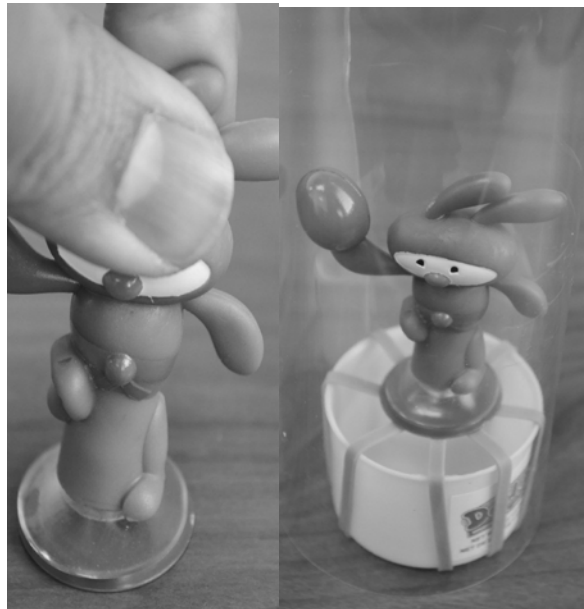
3) **Act. 3, Balls, Bounce, & Billiards:** Create a mini trampoline using four size 32 rubber bands stretched over an empty play dough container.



4) **Act. 3, Balls, Bounce, & Billiards:** Place the mini trampoline in the base of the “test chamber.” Drop each ball into the chamber one by one.



5) **Act. 3, Balls, Bounce, & Billiards:** Tape down pencils to create a “channel” on the ramp. Roll each ball down the ramp to hit the small marble.



6) **Act. 4, Once You Pop...:** Top photo: Press the pop-up toy down so that the suction cup seals around the plastic base. Let go, then wait—the pop up will jump up into the air. Bottom photo: Set the pop-up so it’s ready to spring, then drop it through the test chamber to test how high the toy jumps on the trampoline.

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CLASS 5



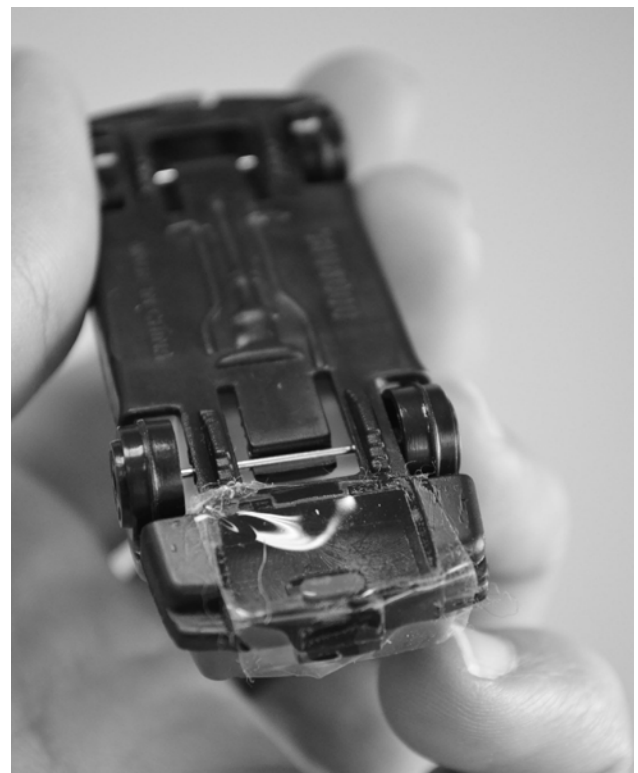
1) Act. 2, Heat it Up: Rub hands together for several seconds to produce heat.



2) Act. 3, What's Friction?: Push the tray (weighed down by the pebble bag) so it slides across the desk.



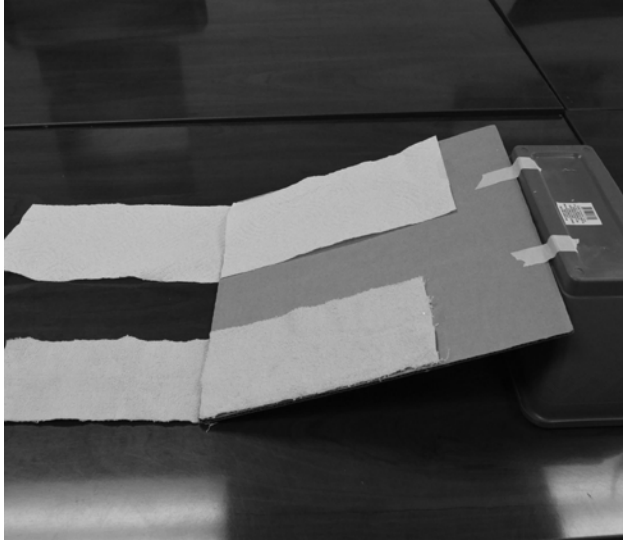
3) Act. 3, What's Friction?: Place the tray on a bed of small wooden dowels (pictured here as straw pieces). The tray should roll over the dowels when pushed.



4) Act. 4, Feel the Friction: Prep step- For toy cars with nubs on the underside, add a small piece of scotch tape that starts behind the back wheels of each car and wraps up around the trunk.

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CLASS 5 (cont.)



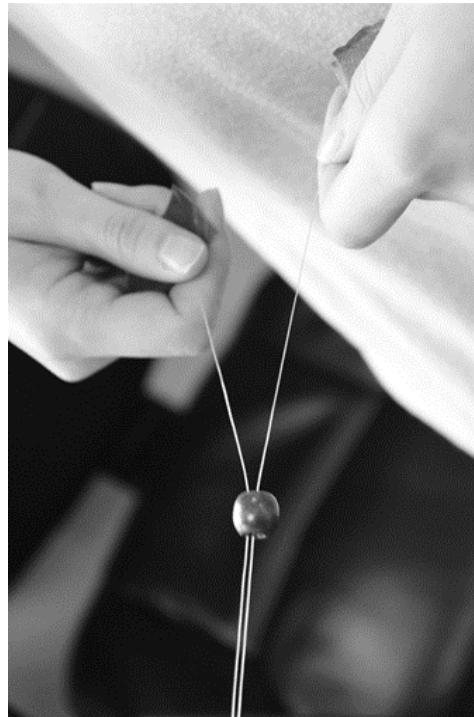
5) **Act. 4, Feel the Friction:** Create three “tracks” on the ramp: paper towel, terry cloth, and plain regular cardboard.



6) **Act. 4, Feel the Friction:** Test the car down each different surface, and use a piece of tape to mark how far the car went on each “track”.



7) **Act. 5, Zoom Bead:** Thread both pieces of fishing line through the center of the wooden bead. Fold a piece of tape on each of the four ends of the fishing line.



8) **Act. 4, Zoom Bead:** Holding the two taped ends on the same side of the bead, pull hands apart to make the bead move forward.

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CLASS 5 (cont.)

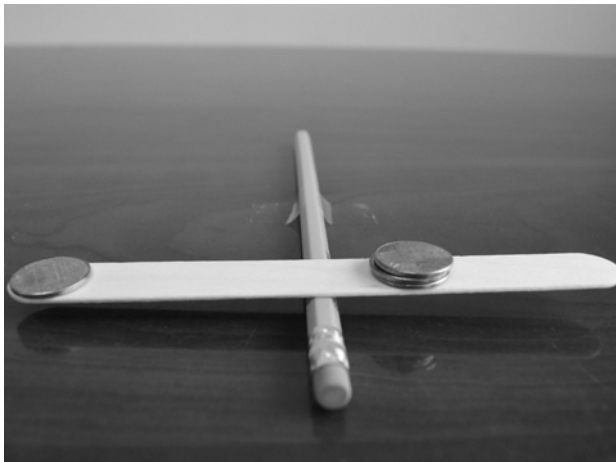


9) Act. 4, Zoom Bead: Stand with the fishing line taught with a partner. Shoot the bead back and forth along the fishing line by separating hands to make the bead move forward, and closing hands to allow the bead to travel back.

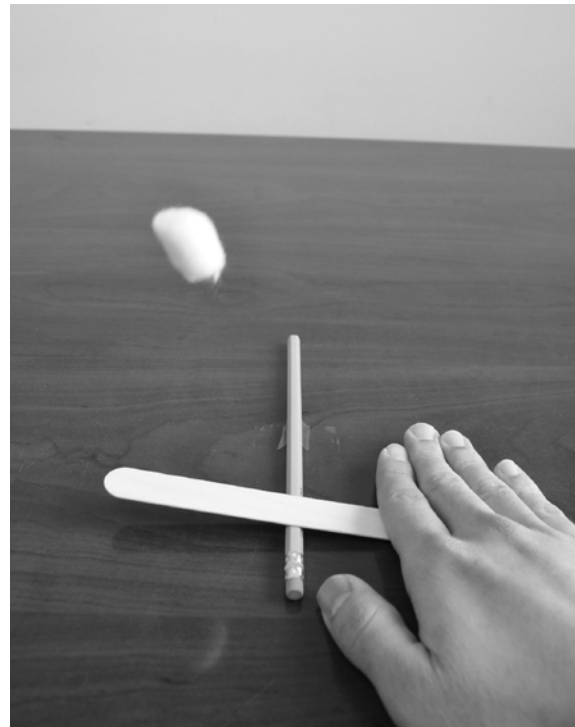


10) Act. 4, Zoom Bead: Stand with the fishing line taught with a partner. Shoot the bead back and forth along the fishing line by separating hands to make the bead move forward, and closing hands to allow the bead to travel back.

CLASS 6



1) Act. 2, Levers: Tape down a pencil, and place a jumbo popsicle stick perpendicularly across it. Place a stack of three pennies on one side of the popsicle stick near to the pencil. Balance the lever by placing a fourth penny on the far opposite side of the popsicle stick.



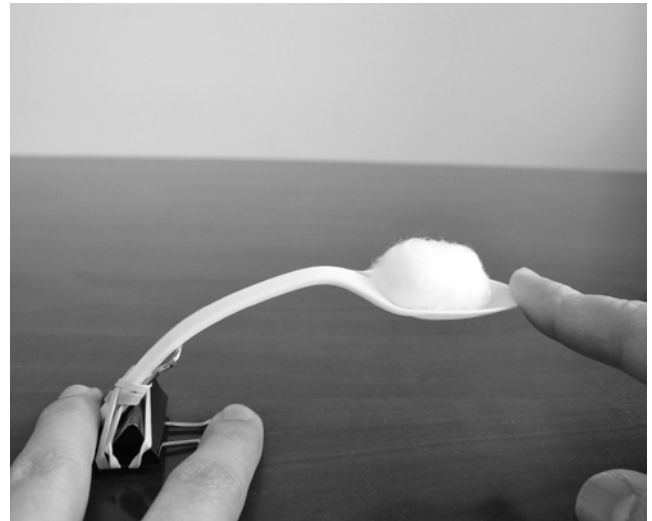
2) Act. 3, Lever Launch: Using the same popsicle stick and taped-down pencil from the last activity, place a cotton ball on one side of the popsicle stick. Push down on the opposite side of the popsicle stick to launch the cotton ball into the air.

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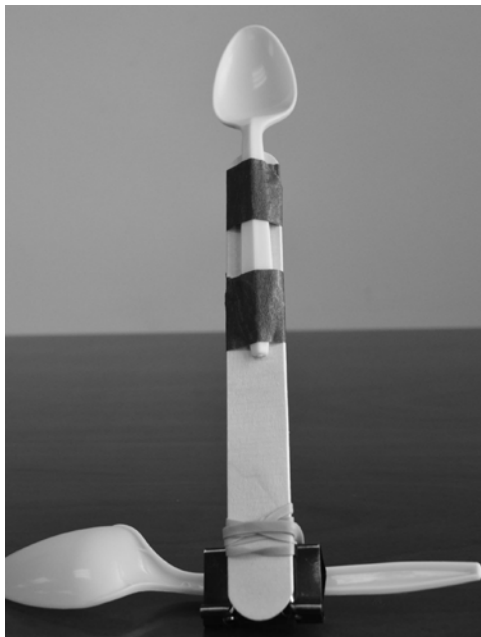
CLASS 6 (cont.)



3) Act. 4, Cotton Ball Catapult: Center the back of the spoon on the binder clip, and attach with a rubber band in a criss-cross pattern.



4) Act. 4, Cotton Ball Catapult: Place a cotton ball in the spoon and, while holding down the binder clip with one hand, bend back the spoon with the other. Release the spoon to launch the cotton ball.



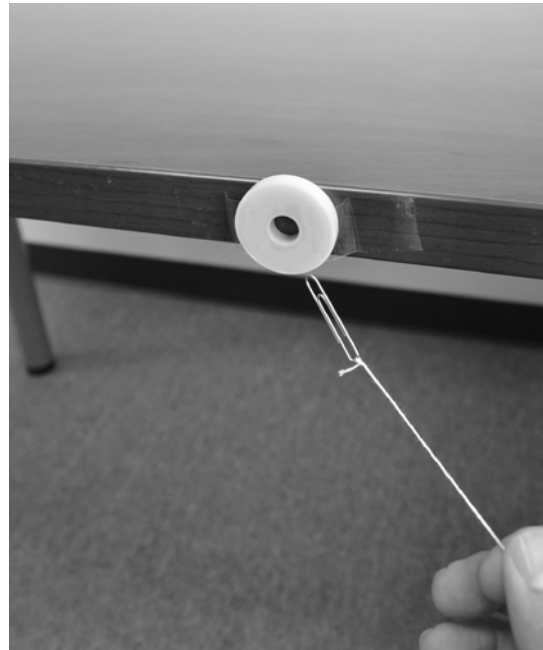
5) Act. 4, Cotton Ball Catapult: An example of a modified catapult. Make sure that, with any modification, the spoon is very well secured to the popsicle stick/binder clip.

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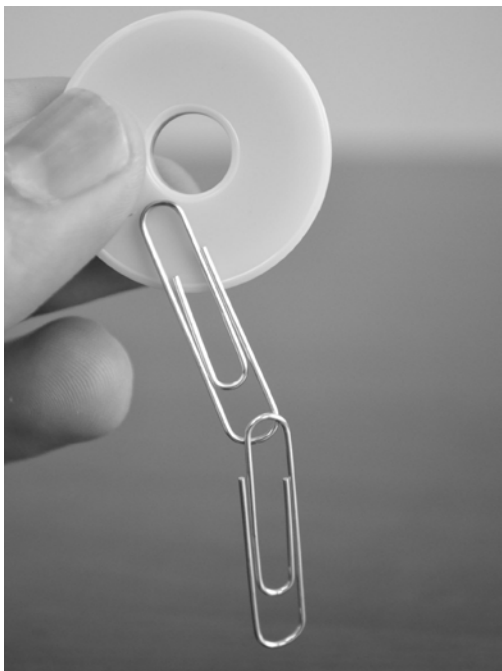
CLASS 7



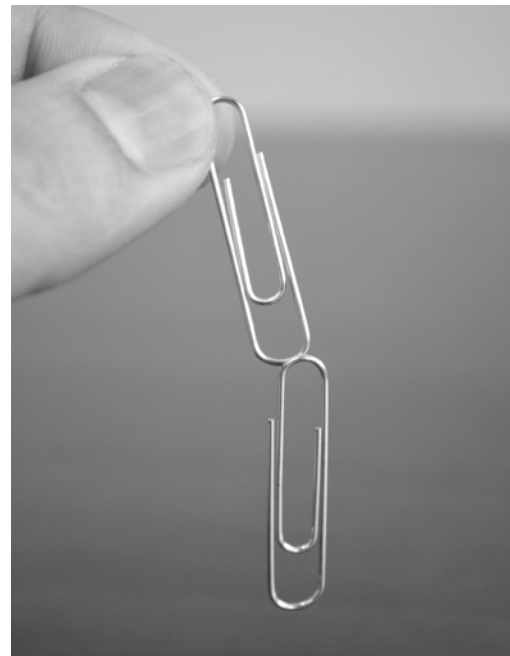
1) Act. 2, Floating on Air: Stack two ring magnets on a pencil so one floats above the other.



2) Act. 2, Floating on Air: Tape a magnet to the edge of a table (scotch tape is pictured above instead of masking/painter's for visibility of the magnet). Tie a paperclip to a piece of string. The paperclip will levitate when held near the magnet (within the magnetic field).



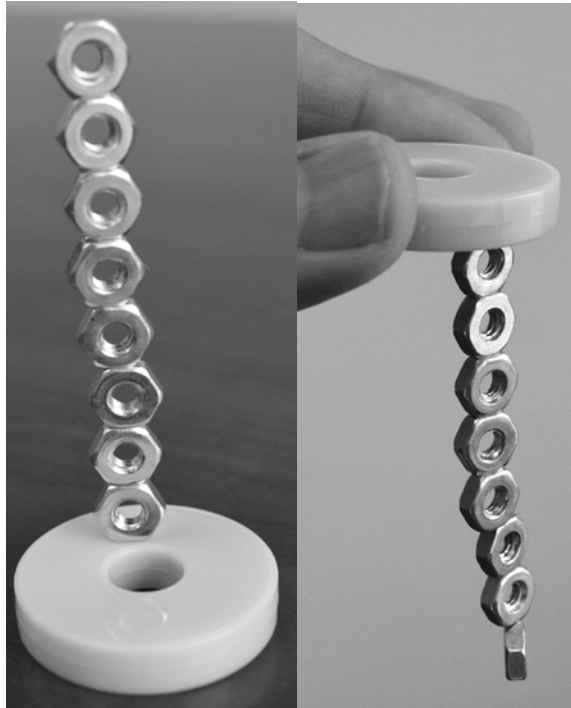
3) Act. 3, Magnet Chain & Stack: Stick a paperclip to the magnet. Touch an additional paperclip to the bottom end of the one already attached to the magnet. The new paperclip should stick to the magnetized paperclip.



4) Act. 3, Magnet Chain & Stack: Slip the paperclip chain from the magnet. The second paperclip should remain attached to the first.

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CLASS 7 (cont.)



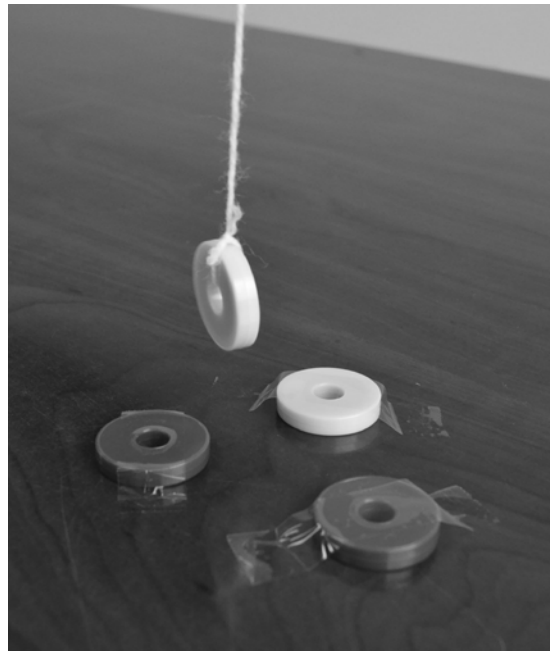
5) Act. 3, Magnet Chain & Stack: Stack small, metal nuts upwards or downwards on a magnet.



6) Act. 4, Fuzzy Face: As part of pre-class preparation-- put the Fuzzy Face worksheets into Ziploc snack bags with small pieces of pipe cleaner inside.



7) Act. 4, Fuzzy Face: Use a magnet to move the pipe cleaner pieces around on the face to create the appearance of hair. (Also: try using the magnet from underneath the cardstock to observe if the magnet works through a barrier).



8) Act. 5, Swinging Magnet: Tape three magnets in a triangle formation on the table surface (scotch tape is pictured above instead of masking/painter's for visibility of the magnet). Tie a fourth magnet to the end of a string. Dangle the magnet on the string about the triangle of taped-down magnets.

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CLASS 7 (cont.)



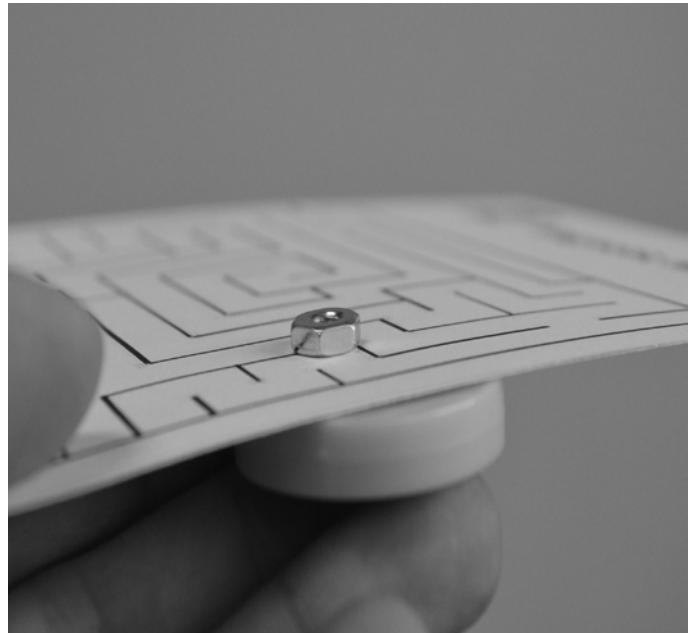
9) Act. 6, Centripetal Force: Use a pencil to poke two small holes directly across from each other near the rim of a paper cup.



10) Act. 6, Centripetal Force: Thread the yarn through the holes in the paper cup and tie the two ends into a knot.



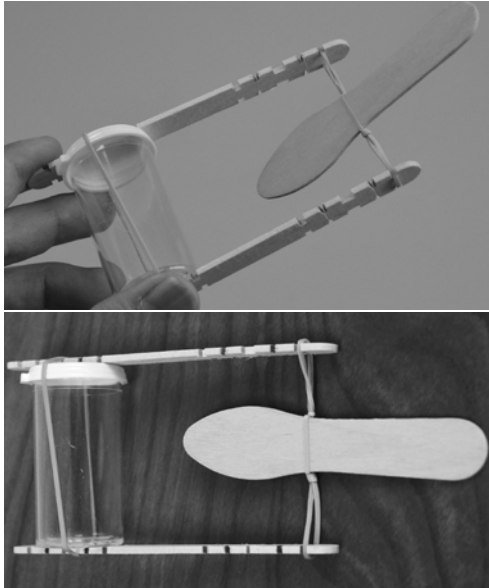
11) Act. 6, Centripetal Force: Place pennies into the cup and swing the cup around by the yarn handle. If the cup is swung with enough force in a smooth circle, the pennies should stay inside the cup.



12) Act. 7 (supplemental), Magnet Maze: Use a magnet beneath the cardstock maze to move the nut on top of the cardstock through the maze.

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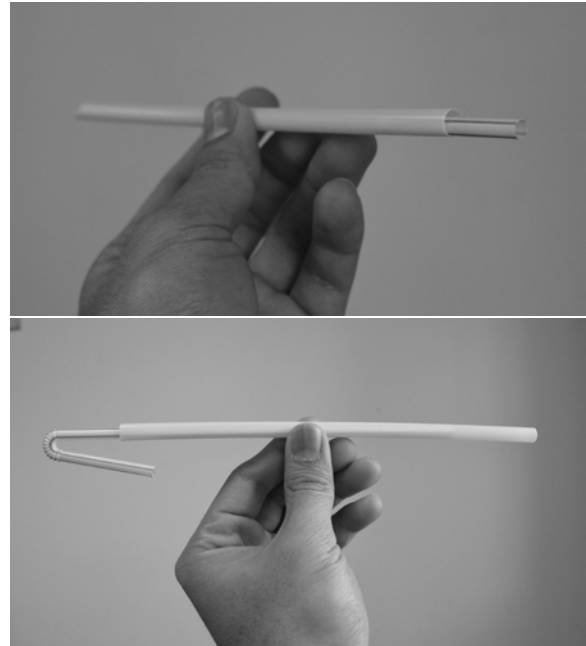
CLASS 8



1) Act. 2, Rolling on the River: Pictured: the finished boat. Place finished boat into the plastic planter with water. Wind the wooden paddle and release it to allow the boat to move through the water.



3) Act. 3, Straw Rockets: Repeat the test of blowing into the larger straw to launch the bendy straw. The bendy straw should fly farther because the air has something to push against.



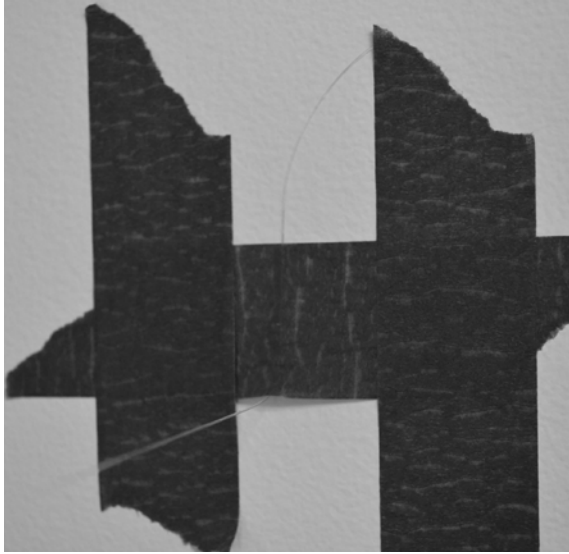
2) Act. 3, Straw Rockets: Top photo: Insert the long, straight part of the bendy straw into the colorful straw. Bottom photo: After the first attempt to shoot the bendy straw out of the larger straw, re-insert the bendy straw, and bend the top of the straw to create a hook or curve at the end.



4) Act. 4, Balloon Rocket: Attach the balloon to the half-straw piece on the fishing line with two pieces of painter's tape. Pinch the balloon neck shut until ready to let the balloon rocket fly along the fishing line.

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CLASS 8 (cont.)



5) Act. 4, Balloon Rocket: Place one piece of painter's tape perpendicular to the fishing line. Place two pieces of tape parallel to the line (one on each side of the line).