

Parent Tips

Formula for successful bouncy ball:

- ½ cup warm water
- 1 tablespoon borax
- Mix water with borax, try to break up solid that forms at bottom of cup as much as possible
- Pour elmer's glue into the water/borax mixture. The amount of glue will just determine the size of the ball
- Every few minutes, take the solidifying glue out of the mixture and squeeze it to release glue that is trapped in the middle
- After about 10 minutes, dry the glue off and roll it between your hands to shape the ball. It may take another 10 minutes before it is completely bouncy

Tips for successful car:

- Make the body a triangular shape out of popsicle sticks
- Cut up a straw and glue to the body to hold the axle
- Use a thin wooden dowel or kabob skewer as the axle and slide it through the straw opening. Other items may be used as the axle, just ensure they are completely straight and are small enough to fit through a straw
- Use bottle caps or cd's as the wheels. If the car is going to be powered by a rubber band or balloon, consider wrapping the wheels in electric tape or rubber bands to create friction and prevent the wheels from spinning out. If the wheels still are not gripping the surface, consider putting weights on the back end of the car to press the back wheels into the ground. These weights can be heavy bolts, screws, or even rocks.

Ramp Tips:

- An easy ramp material is cardboard. Another easy possibility is to use a book and have it wedged between the table and a chair

- If your kid wants to make a longer ramp but it is drooping or cannot properly support the weight of the ball, they should use cross braces to reinforce it. This can be done by taping other pieces to the table and attaching them to the ramp. Triangles make for great support.
 - To in effect decrease the distance the ball needs to travel, the ramp can be simply flat so as to extend the table or be flat and then have a ramp to have a combined effect of extending the table and further controlling the ball's motion.
- At 45 degrees, the ball should have the same x and y distance.
- Below that, it will go farther in x and above that, it will go farther in y.

Procedure Question Answers:

5a. Yes

6ai. Lighter

8a. A rubber band transmits power by turning the elastic potential energy (stored energy) from the stretching into kinetic energy (energy of motion). It causes the axle and in turn the wheels to spin. A blown up balloon transmits power by is a change in momentum. Another way to think about this is that the balloon quickly releases the air. This expulsion of air causes the car to move in the opposite direction because for every motion there is an equal and opposite motion reaction dependent on the weight of the moving objects.

8b. It goes further the more the rubber band is stretched and wrapped. It is important to keep the rubber band wraps neat and untangled for maximum power.

8c. It is important for the hole to be facing opposite of the direction they want the car to move. The more parallel to the ground the air moves, the better because the force will be transmitted more in the x plane than the y.

9b. A rubbery surface will be helpful here. A rubber band or balloon wrapped around the wheel will be helpful.