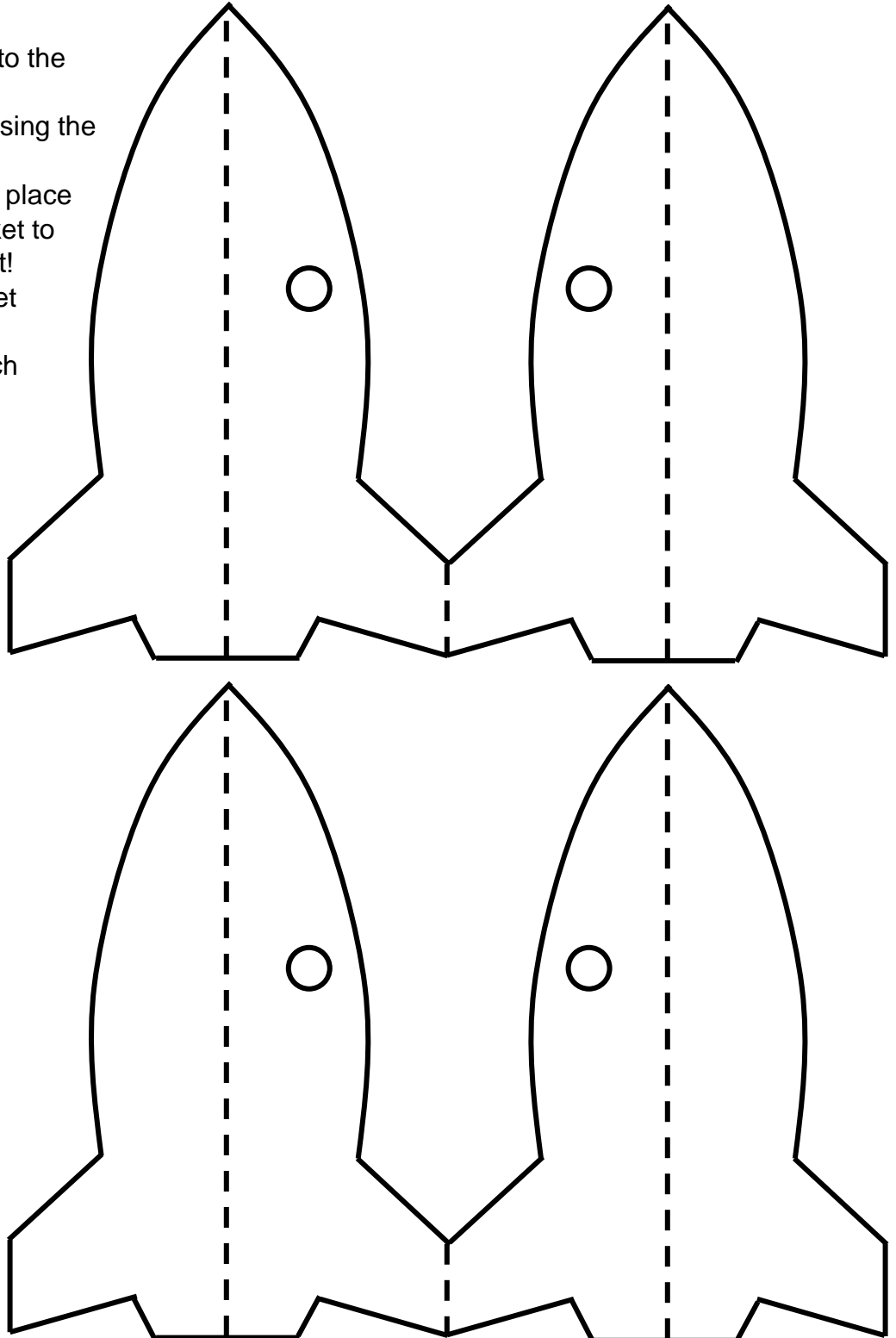
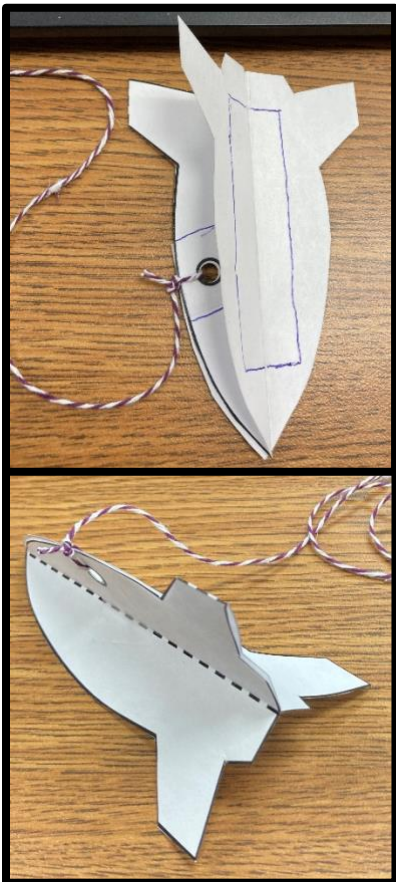


## Whiz Rocket (Stability Test)

Materials: transparent tape, scissors, rocket template (below), string (~60 cm), hole punch, paper clip

- 1) Cut out a Wizz Rocket template and double it over on itself by folding along the short dotted line.
- 2) Fold back along the long dotted lines.
- 3) Place a piece of tape over the hole punch circle, over the top of the rocket templates, and over the hole punch circle on the opposite side.
- 4) Place a piece of tape along the length of the bottom of the rocket. (See top image below.)
- 5) Hole punch the rocket where indicated.
- 6) Tie one end of the string to the rocket through the hole.
- 7) Whirl the rocket around using the string.
- 8) Try to figure out where to place the paper clip on the rocket to stabilize the rocket's flight! Once stabilized, the rocket should whirl around in a perfect circle without much effort at all.

Shared with permission from Chris Welborn from CSC Toys. Find more of his incredible rocket designs and toys here: <http://csctoys.com/products.html>



### Teacher Notes About Stability Test Rocket:

A rocket has a center of mass, the point on an object about which the object's mass is centered. You can find this point by finding the point at which an object will balance. A rocket also has a point called the center of pressure, the point on an object about which the object's surface area is centered. You can find this point by cutting out a two-dimensional scale model of the profile of your rocket and then finding the point at which it balances on the edge of a ruler placed perpendicular to the rocket's body. A rocket naturally wants to rotate around its center of mass. If the center of mass is moved in front of the center of pressure, the rocket will become stable because more air pressure will be exerted on the lower part of the rocket (away from the nose) than on the upper part (nose). This keeps the nose pointed in the correct direction.

To shift the center of mass forward on the paper test rocket, the nose should be weighted using the paper clip. Simply slide the paper clip down onto the nose of the rocket along its body. Originally, the center of mass and center of pressure of the rocket are at about the same location. When you add weight to the nose with the paper clip, this shifts the center of mass forward. When the center of mass is in front of the center of pressure, the rocket will become more stable. As soon as the rocket is stable, it will zoom around in a perfect circle at the end of the string!

