Introduction
A stable rocket flies a smooth, uniform direction without tumbling or changing directions. To achieve stability, rockets need some type of control surface to create and maintain stability in flight. With paper rockets (lesson 4), control surfaces are the index card fins at the base.

Experiment 1 (w/ Part I of student sheet)
Tie a string around the fuselage of a rocket at its center of gravity and then swing the rocket in a circular motion. This demonstrates string stability.

Experiment 2 (w/ Part II of student sheet)
To demonstrate tube stability; using a rocket you have already built, insert the section of PVC pipe into the tail of the rocket and blow through the PVC to provide thrust for the rocket.

Have students perform stability tests on rockets they have created and then have them complete questions 1 and 2 on the student observation sheet.

Experiment 3 (w/ Part III of student sheet)
Allow students the opportunity to design and build new rockets using what they have learned during the stability test flights. (Refer to lesson 4 for rocket construction guidelines.)

Vocabulary
Stability: the property of a body that causes it, when disturbed from a condition of equilibrium or steady motion, to return to its original condition.
Center of gravity: the point at which the entire weight of a body may be considered as concentrated so that if supported at this point the body would remain in equilibrium in any position.
Student Observation of Rocket Stability

Part I. The following questions pertain to the string stability test:

1. Where was the center of gravity located on your rocket? Was it closer to the nose cone or closer to the fins?

2. After watching your rocket perform this first stability test what relationship can you see between the center of gravity and the way that your rocket flies?

3. How does the size of the fins on your rocket compare to other students designs?

4. After watching your rocket design, and others, perform in this stability test, what relationship can you see between fin size and stability?

Part II. The following questions pertain to the tube stability test:

1. How did the center of gravity affect the flight path of your rocket?

2. If you could redesign your rocket, what would you do differently?

3. How did the fins affect the flight of your rocket?

4. Taking into consideration what you observed during your tube stability test, as well as the tests of your fellow students, what would be the optimal fin size and design? How many fins do you feel would be optimal?

Part III. Taking into consideration the information you have just gathered, design and build a new paper rocket that will produce better performance than your current model.