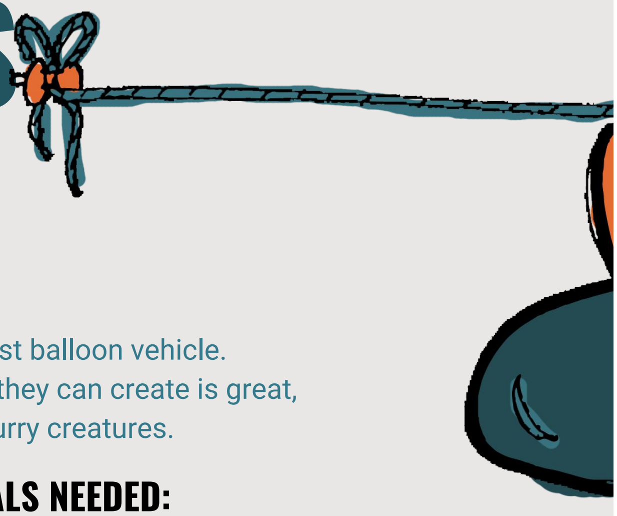
BALLOON RACES



ELEMENTARY SCHOOL LEVEL 2

Get your kids in the competitive spirit and see who can build the best balloon vehicle. Have your students design a racer to attach to a balloon. Anything they can create is great, as funky as they want to be. We hope to see propeller planes and furry creatures.

EDUCATIONAL STANDARDS:

NGSS CONNECTION:
3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

COMMON CORE CONNECTION:
ELA/Literacy
RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

W.3.7 Conduct short research projects that build knowledge about a topic.

W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Mathematics
MP.2 Reason abstractly and quantitatively.

MP.5 Use appropriate tools strategically.

DOK:
Level 4: Extended Thinking

MATERIALS NEEDED:

- ❏ Balloons
- ❏ Straws
- ❏ String
- ❏ Tape
- ❏ Your homemade vehicle

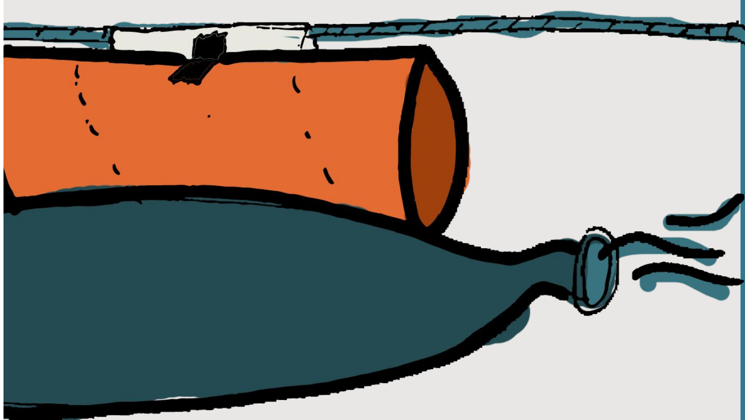
DIRECTIONS:

1. Build the track by attaching a string to the wall with a thumbtack or tape. Hold the other end of the string and walk to the far side of the room.

2. Attach the straw and balloon to your racer.

3. Thread the end of the string through the straw.

4. After threading the string, inflate the balloon and, 3,2,1, LET GO!

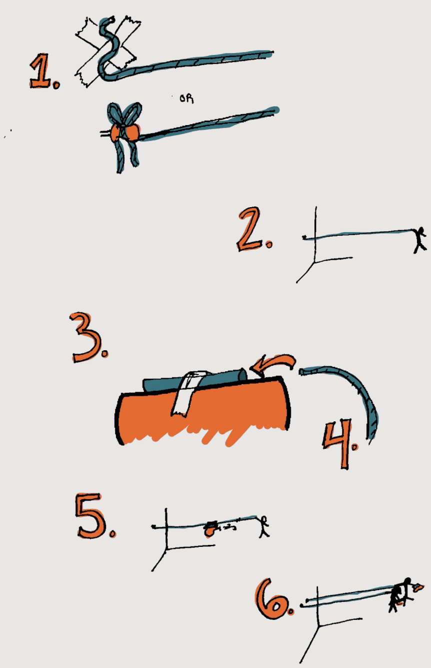


OBJECTIVE:

Students will be able to design a balloon-powered vehicle to study the motion of unbalanced and balanced forces

ESSENTIAL QUESTIONS:

- Who won the race and why?
- Which vehicles were fastest?
- Do they share common characteristics?
- How might we cause an object to move? Stop moving?
- How might we make an object move faster?



FUN FACTS

A. Balloons were invented for military use and to conduct scientific experiments in the 1820.

B. When a balloon is popped, the noise it make is a sonic boom.

C. A 100-foot-diameter balloon can lift 33,000 pounds!

ENGAGE / EXPLORE:

1. Ask students
    a. If we wanted to make a racing game, how might we get the racers to move?
    b. If we wanted them to move even faster?
2. Take the students outside and have soccer balls for them
    a. Have them make several predictions (they may shout out their predictions)
        i. What will the ball do if we leave it there?
        ii. What will happen if we kick the ball?
        iii. What will happen if it’s against the wall and we kick it?
    b. After students make their predictions they should conduct a test by doing the tasks
    c. After each task reflect with students.
        i. What did the ball do when we left it there?
        ii. What did happen when we kicked the ball?
        iii. What did happen to the ball when it was against the wall and we kicked it?
3. Evaluate
    a. Students’ predictions
    b. Students’ observations
    c. Students’ reflection

EXPLAIN:

1. Use drawings with arrows to describe forces in each scenario with students
    a. Have students practice drawing directions of the forces in various scenarios
    b. Have students identify patterns in unbalanced and balanced scenarios.
2. Demo several scenarios and have students predict the direction of the force with arrows
    a. Pencil sitting on the table
    b. Pencil pushed across the table
    c. Two students push a box against each other
    d. Two students pushing a box together
    e. Etc.
3. Evaluate
    a. Students’ responses and predictions
    b. Identification of force arrow directions.

ELABORATE:

1. Students create their own balloon racing game
    a. They may make cars or ships that attach to the straw and string guide
    b. They may mix and match their designed vehicles.
2. Students make predictions of the motion
    a. Draw pictures with arrows to show the direction of force
        i. When the balloon is not on the vehicle
        ii. When the balloon is first to let go
        iii. When the balloon runs out of air
        iv. When the vehicle comes to a stop
3. Students conduct trials of their racers
    a. Use observation to determine force arrows for the above scenarios
    b. Make a conclusion from the evidence of the applied forces
4. Let them race!
    a. Let students enjoy racing their vehicles
    b. They can make modifications to vehicles or balloons
        i. Ask for reasoning
5. Evaluate
    a. Predictions
    b. Observations
    c. Explanations
    d. Design of racing and comprehension of tasks