

PROJECT PROJECTILE



STUDENT WORKBOOK

LAUNCH





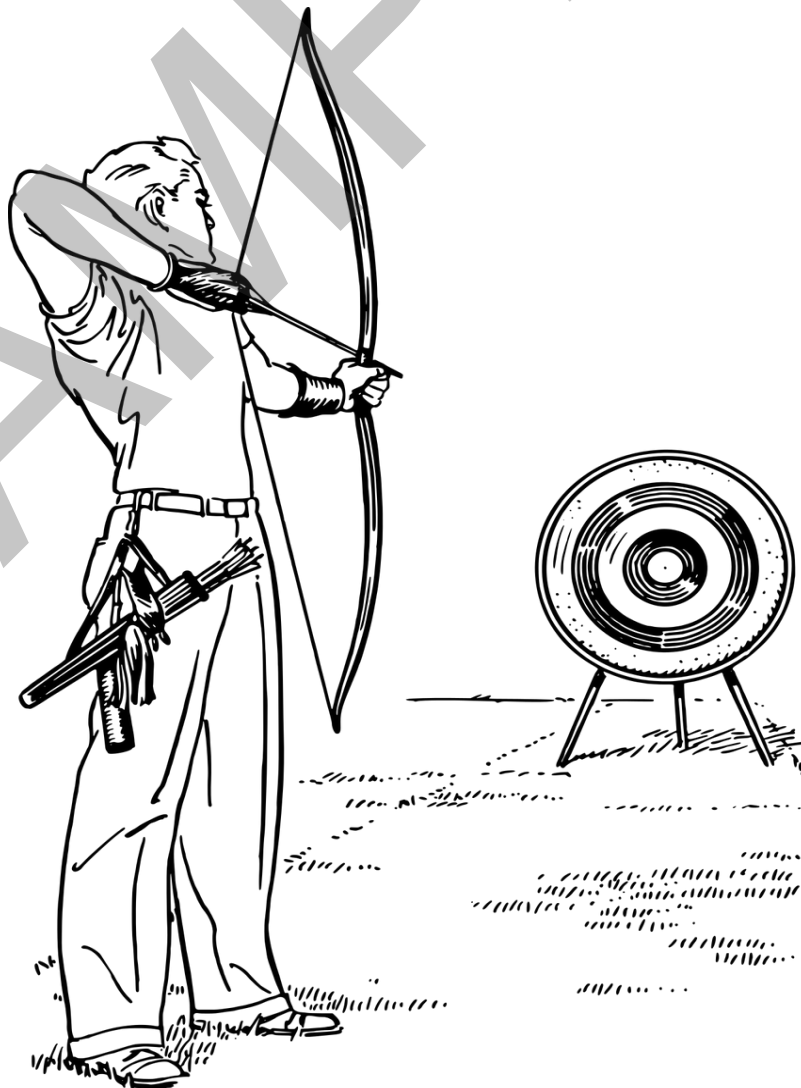
THINK ABOUT IT!

1. How did your prediction of which ball would reach the floor first compare to your results?
2. What are two ways you could modify or extend this experiment to learn more about falling objects?
3. What are two questions you have about this experiment?



JUST FOR FUN

Color the picture.

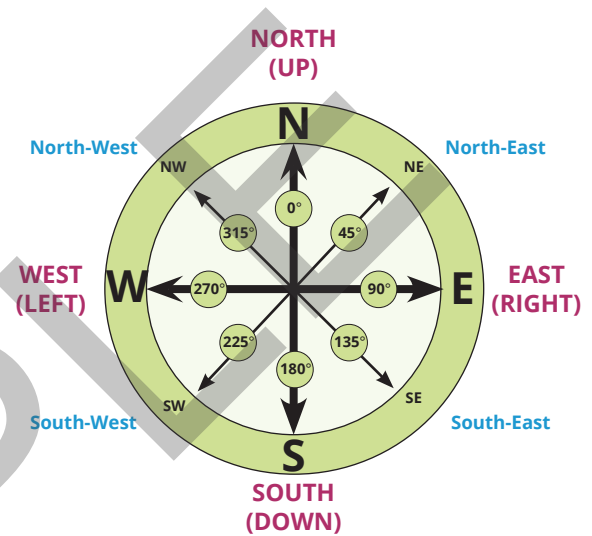


How Far Things Go

When you studied the two balls in Activity 1 and described the motion in the previous section using coordinate planes, you observed how far objects traveled. The length of the path of motion of an object can be described by two measurements: distance and displacement.

Distance is the total length traveled by an object. It includes any twists, turns, curves, backtracks, zig-zags, or loops. On the other hand, **displacement** is the shortest path from an object's starting point to its ending point. It disregards all the "extra" movements that are accounted for in distance. Displacement always includes a direction (unless the displacement is zero).

Direction can be described using several methods, including "left, right, up, down," the cardinal directions of north, south, east, and west, and the angle compared to the origin.



When labeling directions in mathematical calculations, "positive" directions like north, east, up, and right have a positive (+) sign. This makes sense because those are positive areas of a coordinate plane. "Negative" directions like south, west, down, and left have a negative (-) sign.

To understand the difference between distance and displacement, do this short movement exercise.

WHAT YOU NEED:

FROM THE KIT:

- Masking tape
- Ruler

OTHER ITEMS:

- Large room or outdoor area with empty space for walking
- Marker or pen
- Stopwatch or timer app on a computer or smartphone

DOWN THE WATER SPOUT

Now that you have mastered the essential ideas about motion, you can use those skills to describe and predict the two-dimensional motion of water.

LEARNING GOALS:

- ✓ I can use mathematical representations to describe the changes in horizontal and vertical position during projectile motion.
- ✓ I can perform investigations to determine the relationships between time, displacement, velocity, and acceleration for one-dimensional motion.

12

FORM A FOUNTAIN

WHAT YOU NEED:

FROM THE KIT:

- 2 plastic cups
- Masking tape
- Nail

OTHER ITEMS:

- Water
- Sink or large container

WHAT TO DO:



STEP 1

Use the nail to make a hole in the bottom of the side of one of the cups.



STEP 2

Stick a piece of tape tightly over the nail hole.



THINK ABOUT IT!

1. Why is launch angle important? Use a real-world example to explain.
2. Did your launcher send the ball farthest when it launched the ball at 45 degrees? Explain how you know.
3. The maximum height of a projectile is greatest for a 90 degree launch angle. Explain why.
4. The amount of time a projectile is in the air decreases as the angle of launch decreases. Explain why this is the case.



DID YOU KNOW?

A sports scientist studies many aspects of athletic contests, including how balls move through the air as projectiles based on the actions of athletes.





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Kit	SU-PROJEC
Instructions	IN-PROJEC
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