

# Physics Grade 3 Evaluation

## Teacher Section

**Overview:** Kids will demonstrate how well they understand important key concepts from this section.

**Suggested Time:** 45-60 minutes

**Objectives:** Students will be tested on the key concepts of Forces & Motion:

- An object's motion can be described by recording the change in its position over time.
- For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's Third Law).
- Electric and magnetic forces between a pair of objects do not require the objects be in contact. The size of the forces depends on the properties of the objects, their distance apart, and in the case of magnets, their orientation.
- Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun.

Students will also demonstrate these principles:

- Make observations and measurements on an object's motion to figure out the predictable pattern of motion.
- Design an experiment that shows when the arrangements of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
- Show that when the motion energy of an object changes, energy is transferred to or from the object.
- Show that gravitational interactions are attractive and depend on the masses of the objects.
- Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
- Measure and estimate the weight, length and volume of objects.
- Formulate and justify predictions based on cause-and-effect relationships.
- Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.
- Construct and interpret graphs from measurements.
- Follow a set of written instructions for a scientific investigation.

### Materials (one set for entire class)

- a ball

### Lab Preparation

1. Print out copies of the student worksheets, lab practical, and quiz.
2. Have a tub of the materials in front of you at your desk. Kids will come up when called and demonstrate their knowledge using these materials.

## **Lesson**

The students are taking two tests today: the quiz and the lab practical. The quiz takes about 20 minutes, and you'll find the answer key to make it easy to grade.

## **Lab Practical**

Students will demonstrate individually that they know how to demonstrate Newton's Three Laws of Motion. While other kids are waiting for their turn, they will get started on their homework assignment. You get to decide whether they do their assignment individually or as a group.

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## Student Worksheet

**Overview:** Today you're going to take two different tests: the quiz and the lab practical. You're going to take the written quiz first, and the lab practical at the end of this lab. The lab practical isn't a paper test – it's where you get to show your teacher that you know how to do something.

### Lab Test & Homework

1. Your teacher will call you up so you can share how much you understand about forces and motion as we've studied it in these lessons. Since science is so much more than just reading a book or circling the right answer, this is an important part of the test to find out what you really understand.
2. While you are waiting for your turn to show your teacher how much of this stuff you already know, you get to get started on your homework assignment. The assignment is due next week, and half the credit is for creativity and the other half is for content, so really let your imagination fly as you work through it. Choose one:
  - a. Write a short story or skit about Newton's Laws of Motion from the perspective of the object (like a ball or a planet). You'll read this aloud to your class.
  - b. Make a poster that teaches the main concepts of Newton's Three Laws of Motion. When you're finished, you'll use it to teach to a class in the younger grades and demonstrate each of the principles that you've learned.
  - c. Write and perform a poem or song about a ball flying through the air from the perspective of the ball as it encounters gravitational forces, magnetic forces, and forces from impacting other objects. This will be performed for your class.