



**Quarrybrook**  
EXPERIENTIAL EDUCATION CENTER

## Program Title: **Magnetic Forces**

**Theme:** Magnetism is an invisible force exacting cause-and-effect relationships between two or more objects, which can be applied for human use and exploration.

**Audience:** 3rd grade students

**Next Generation Standard:** 3-PS2-3 Ask questions to determine cause-and-effect relationships of electric or magnetic interactions between two objects not in contact with each other.

**Goals:** Students will investigate magnetism and experience the effects of the Earth's magnetic field by experimenting with magnets and test objects. Students will learn how to use a compass, and set and follow bearings. Students will then navigate our way through the forest.

### **Objectives:**

- **What are the objectives?** Students will understand that magnetism is an invisible force generated within the Earth. Students will know that, like the Earth, magnets have two poles and opposite poles are attracted to each other while like poles are repelled. Students will see that magnetic forces can act between two objects without them touching. Students will learn about and practice the use of trail compasses.
- **How will they be measured?** Students will manipulate magnets and use them on test objects to see what is and is not affected by magnetic forces. Students will use compasses to navigate through a trail challenge.

### **Program Outline:**

Activity 1: MAGNETIC FORCE (30 min.) – Students will explore a variety of magnets and test objects, giving them the opportunity to generate their own ideas about magnetism. Then they will begin a structured investigation on the properties of magnetic forces by exploring different magnet sizes and testing the push-and-pull forces of those magnets on various objects. Students will see how far a magnet can be from an object and still exert a force upon it, and how the size of a magnet is related to the force it exerts.



Teachers will be asked to divide the group into smaller sub-teams. Quarrybrook instructors will explain and demonstrate all of the activities first, and teachers and chaperones will work directly with their sub-teams to help them carry out the different steps of the investigation. Teachers are always welcome to add any connections to the classroom and previous learning experiences.

Activity 2: COMPASS INTRODUCTION (20 min.) – Now that the students have explored the physical properties of magnetism, we will look at how humans can use those properties to help us in daily life. Students will become familiar with a compass and its parts. Students will practice using a compass to identify cardinal directions and to set and follow bearings. Once students feel comfortable with compass use, we will move into the Activity 3 challenge.



Teachers and chaperones will be very helpful in checking each student’s compass settings and assisting students with proper technique, as we become familiar with compasses and how to use them.

Activity 3: “WHERE AM I?” HIKE (60 min.) – To experience how magnetism can help humans to explore the natural world, students will lead us all on an orienteering hike through the woods! There will be pre-set signs located throughout the woods with compass bearings written on them. As we find each sign, students will set the new bearing on their compasses to see which direction they should lead us in next.



Teachers and chaperones will help guide their sub-teams in precisely setting and following the compass bearings. It is a technical skill learned and reinforced by practice!

**Conclusion/Wrap-up:** Students will be asked several review questions on the main points of magnetism, with each team reviewing in pair-shares and then with the larger group.