



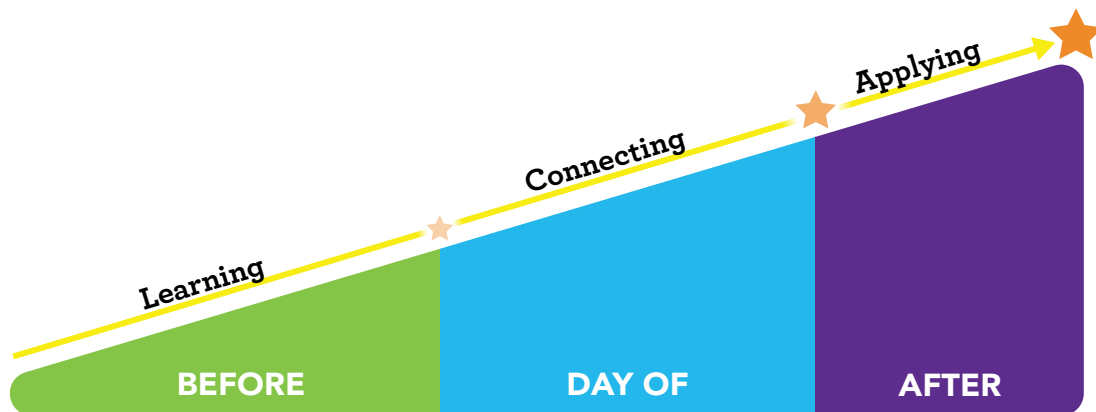
This guide accompanies
your online [field trip portal](#)

ABOUT THIS FIELD TRIP



More than Just a Field Trip

This Field Trip is designed to give the teacher a complete science experience for students. There are 3 sections to this Field Trip. We encourage you to participate in all 3 sections and try out the provided videos and activities to give your students the most enriching and educational experience.



CLASSROOM CURRICULUM: VIDEOS & ACTIVITIES

- Introduce science concepts
- Expose students to scientific terms
- Encourage curiosity and motivate learning

AT DISCOVERY CUBE: ATTEND THE FIELD TRIP

- Connect science learned to real-world problems
- Interactive hands-on play and problem solving
- Data collection sheet provided as part of the experience

CLASSROOM CURRICULUM: VIDEOS & ACTIVITIES

- Inspire students to apply their knowledge
- Check for student understanding
- Reinforce concepts through repetition



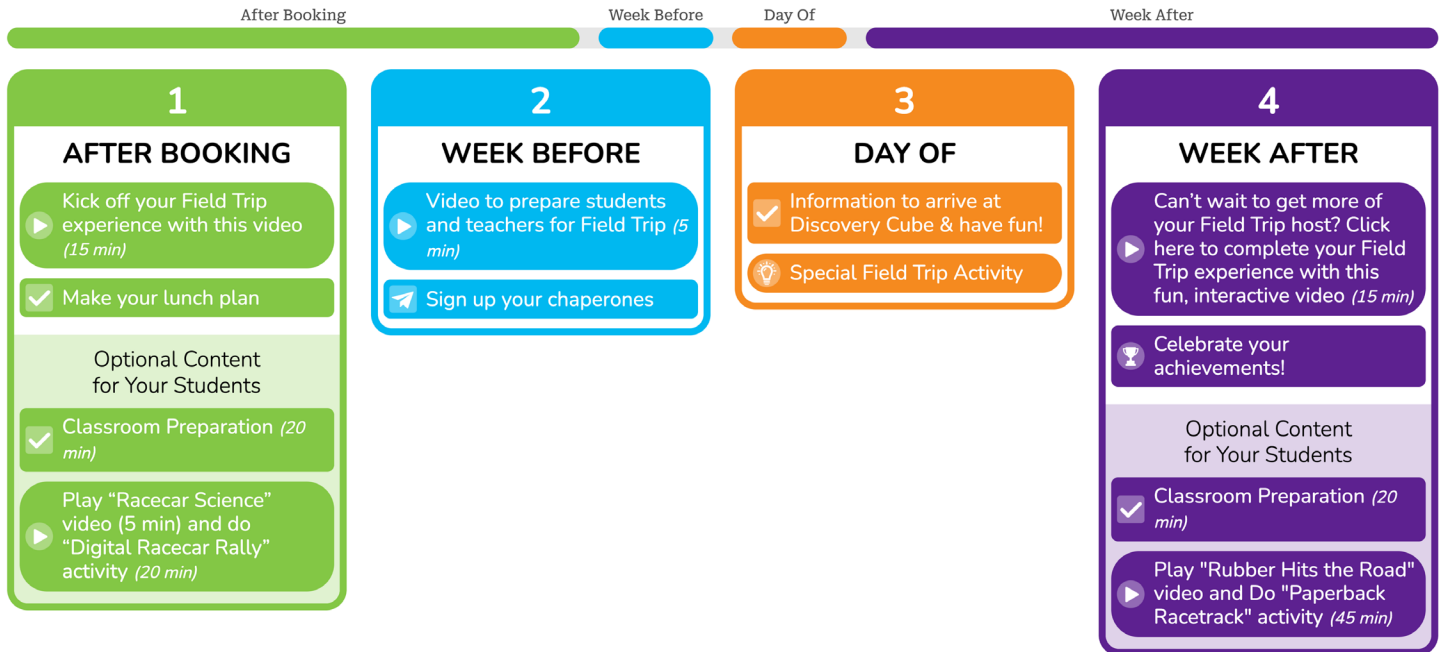
DiscoveryCube

[discoverycube.org](#)



Field Trip Content

Visit [this link](#) to access your Field Trip portal. Here you will learn all about your Field Trip and have access to videos and activities for your students. Your Field Trip portal will guide you along the way with an easy to use Timeline.



FIELD TRIP VIDEO - AFTER BOOKING, AND BEFORE VISITING

Share this special video in the classroom. It introduces science concepts, exposes your students to scientific terminology, and provides a preview of the exciting Field Trip ahead. You may choose from two options to host your video, and both deliver the same rich, educational experience you want for your students.



LOGISTICS AND PLANNING

For Orange County ONLY: You can choose to order food from our onsite food vendor, Bean Sprouts (phone: 657-247-5880).

For Orange County and Los Angeles: Make sure to sign up your chaperones. Review your arrival and parking plan. Preview the special activity your students will complete using a data collection sheet as part of this experience.





OPTIONAL CONTENT

Optional content is provided so that you, the teacher, can create a weeks-worth of science learning from this Field Trip experience. Both before and after this Field Trip, we provide you with hands-on activities with easy to find supplies, step-by-step instructions, and interactive videos that will be sure to capture your students' attention.



FIELD TRIP VIDEOS - AFTER VISITING

Complete the World of Motion Field Trip with a short video that checks for your students' understanding of the science and engineering topics covered during the field trip experience. Assessment is built right into the fun dialogue and your students will not even realize how much they are learning.

Celebrate Achievements: if you completed the pre-field trip video, you will be provided with special badges to distribute to your students at the completion of their post Field Trip experience.



Next Generation Science Standards

The World of Motion Field Trip correlates with these Next Generation Science Standards:

Physical Science

5-PS1-2: Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

5-PS1-3: Make observations and measurements to identify materials based on their properties.

5-PS2-1: Support an argument that the gravitational force exerted by Earth on objects is directed down.

MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MS-PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

MS-PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

MS-PS3-1: Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.



Snapshot: The Science of Hockey

MS-PS3-5: Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Engineering Design

3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Common Core Math Standards

Operations and Algebraic Thinking

5.OA.A.1: Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Number and Operations in Base Ten

5.NBT.A.4: Use place value understanding to round decimals to any place.

Geometry

5.G.A.1: Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

5.G.A.2: Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

The Number System

6.NS.C.5: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.



6.NS.C.6: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

6.NS.C.7: Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C .

6.NS.C.8: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Expressions and Equations

7.EE.B.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

8.EE.B.5: Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.



Vocabulary

Aerodynamics - The way air (or gas) moves over, around, and past things.

Angle - The space between two intersecting lines (measured in degrees).

Apparent Weight - Also called the "normal force." The force that supports the weight of an object on a surface, which acts in the opposite direction of gravity.

Calorie - A unit of energy. The amount of heat required to raise the temperature of one gram of water by one degree Celsius.

Cardiovascular Fitness - Exercise that involves a person's whole body at moderate to high intensity for an extended period of time.

Coefficient of Friction - The ratio between friction force and normal force (or the apparent weight).

Compound Material - A substance formed between two or more natural or simple substances or resources.

Conduction - The flow of heat inside an object.



Slapshot: The Science of Hockey

Conductor - A material that allows something to easily transfer through it (heat or electricity).

Control - In an experiment, a variable factor that has been kept constant and is used as a standard of comparison for the experiment.

Force - An action that changes or maintains the motion of a body or object.

Friction - The resistance of motion when one object rubs against another.

Glycol (Ethylene) - An organic compound with the molecular formula $(CH_2OH)_2$. A clear, viscous liquid used in antifreeze and coolant. The freezing point of ethylene glycol is $-12^{\circ}C$ / $10.4^{\circ}F$.

Hydration - The act of replacing water in the human body that has been lost.

Hypothesis - An educated guess based on your observations or known evidence.

Ice Hockey - A fast-moving contact team sport played on an ice surface called a "rink." Players quickly skate around the ice using ice skates.

Insulator - A material that resists the flow of something going through it (heat or electricity).

Kevlar - An incredibly tough and lightweight fabric that can resist bullets and is virtually fireproof.

Kinetic Energy - Energy that is moving.

Kinetic Friction - A force that acts between two moving surfaces.

Material - A substance used to make something or matter from which a thing is or can be made.

Materials Science - The study of solids.

Muscle Memory - The ability to repeat a specific muscle movement with improved efficiency and accuracy through practice and repetition.

Normal Force - The force that supports the weight of an object on a surface, which acts in the opposite direction of gravity. Also called the "Apparent Weight."

Potential Energy - Energy stored in an object.

Puck - A round, hard rubber disk that is used as the focus of play in the game of hockey.

Reaction Time - The amount of time it takes a person to respond to a stimulus.

Speed - A measurement of how fast an object moves relative to a reference point.

Stimulus - A detectable change in the environment which cause a living organism to respond to that change.

Synthetic Material - A material where at least two substances are deliberately joined together to produce a new material with different characteristics.

Temperature - The amount of heat in something.

Thermal Energy - The energy that comes from the temperature of a heated substance.

Velocity - A measure of how fast something moves in a particular direction.

Weight - The measure of the force of gravity on an object.

Zamboni - An ice resurfacing machine. Used to clean and polish the ice in an ice rink.

