

Motion and Newton's Laws Unit

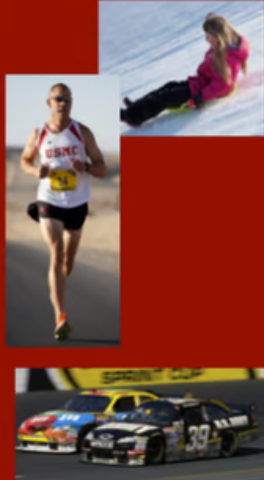
- ✓ **Multi-format Activities:** Labs, scavenger hunts, readings, projects, and quizzes.
- ✓ **Student-Centered Learning:** Hands-on tasks, research, diagrams, videos, and comprehension questions.
- ✓ **Fully Editable, Digital & Printable**



Bundle Includes

Calculating average speed, velocity, and displacement

- Motion Terms
- Scalar Quantities
- Average and Instantaneous Speed
- $v = d/t$
- Linear Motion
- Velocity
- Displacement
- Position-Time and Velocity-Time Graphs



Newton's THREE Laws of Motion

- ✓ Teaches: Newton's THREE Laws of Motion including Theory, Applications, and Student Activities for all three.
- ✓ Ideal for Middle School Science
- ✓ No-Prep Resource



Calculating Average Speed, Velocity, and Displacement Lab Station Activity



7 Lab Station Activities to get your kids out of their seats

Newton's Laws Design Challenge

Overview: In this project you will work in small groups to design and build a simple device that demonstrates one of Newton's three laws of motion. Your challenge is to plan, construct, test, measure, and explain how your design illustrates the law of motion you chose. Through this hands-on activity you will apply what you've learned about motion, forces, speed and acceleration, while practicing scientific planning and communication skills.

Objectives

- Apply Newton's first, second or third law of motion to a real-world device.
- Plan and construct a simple device using everyday materials.
- Measure the motion (speed or acceleration) of your device using appropriate tools and methods.
- Analyze data and explain how the device demonstrates the selected law of motion.
- Present your design process and results clearly using visual aids and oral explanation.

Suggested Device Ideas

- **Balloon-Powered Car (Newton's Third Law):** Attach a balloon to a lightweight car or small box. As the balloon deflates, the air pushes backward and the car moves forward.
- **Marble Ramp (Newton's First Law):** Build a ramp and let a marble roll down and across a flat surface. Observe the marble's motion and what happens when it encounters friction or obstacles.
- **Mass & Pulley System (Newton's Second Law):** Use string, pulleys and weights to study how changing mass or net force affects acceleration.
- Any other device of your choice, approved by your teacher, that clearly demonstrates one of Newton's laws.

Procedure

1. **Choose Your Law:** Decide whether your device will illustrate Newton's First Law (inertia), Second Law ($F = ma$) or Third Law (action-reaction). Briefly describe why you chose this law.
2. **Plan Your Design:** Sketch your device. List the materials you will need and write a brief plan for how you will construct it. Identify how you will measure its motion (distance and time, speed sensor, video analysis, etc.). Predict what you expect to observe.
3. **Gather Materials:** Collect safe, classroom-appropriate materials (e.g., balloons, straws, tape, cardboard, toy cars, marbles, rulers, meter sticks, stopwatches, string, pulleys, weights).
4. **Build Your Device:** Construct the device according to your plan. Be creative and adjust your design as needed to ensure it functions correctly.
5. **Test & Measure:** Test your device multiple times. Measure how far it travels and how long it takes or record its acceleration if applicable. Perform at least three trials for consistency.
6. **Analyze Data:** Calculate speed using the formula $\text{speed} = \text{distance} \div \text{time}$ or determine acceleration using appropriate formulas. Compare trials and calculate an average.
7. **Explain the Science:** Write a summary explaining how your device demonstrates your chosen law. Address how forces act on the device, why it moves (or doesn't), and how your data support the law.
8. **Prepare a Presentation:** Create a brief presentation (poster or slide deck) that shows your design process, data table, calculations, and explanation. Include photographs or drawings of your device.
9. **Present & Reflect:** Present your project to the class. Discuss what you learned, challenges you faced, and how you would improve your design. Listen to classmates' feedback and reflect on other designs.

Device-Based Scavenger Hunt Calculating Average Speed, Velocity, and Displacement

Includes



- 5 Unique Locations
- Online form submission
- Answer Key

Works on all smartphones, tablets, Chromebooks, and laptops

- 100% Digital
- Simulations
- Quizzes
- Videos
- Games



Newton's 3 Laws of Motion Lab Station Activity



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

Teaching Timeline and Resources Outlined and Explained

Motion & Newton's Laws Unit – Teaching Timeline

Day	Resource & focus	How it fits the unit
1	Calculating Average Speed, Velocity & Displacement – Lesson Package	Use this lesson to introduce motion terms. It covers scalar quantities, average & instantaneous speed, the $v = d/t$ relationship, linear motion, velocity, displacement and position-time & velocity-time graphs. The package includes teacher and student versions (with blanks to keep students engaged), an activity and a lesson outline.
2	Calculating Average Speed, Velocity & Displacement – Lab Station Activity	Reinforce learning with seven interactive stations. Students explore scalar vs. vector quantities, instantaneous vs. average speed, distance vs. displacement, velocity, GPS devices and speedometers. Each station has a task card, a reading or video and questions; students record their answers on a “passport.” An applicability reading, “Learn from the Expert,” “Test Your Knowledge” and answer keys are included.
3	Average Speed, Velocity & Displacement – Digital Scavenger Hunt	This device-based activity gets students out of their seats. They scan QR codes to complete tasks such as video analyses, simulations, auto-graded quizzes, calculations, news-article readings, opinion prompts, word scrambles, short-answer questions and web research. The scavenger hunt covers average speed, velocity and displacement and comes in Word and PDF formats, reducing paper use.
4	Newton's Three Laws of Motion Lesson	Transition into force and motion by teaching Newton's three laws. This lesson package begins with an overview of all three laws, then dives into specifics for each, with applications and a simulation.
5	Newton's Three Laws Lab Station Activity	Students rotate through stations that test their understanding of inertia and equal-and-opposite forces via building challenges, research questions, videos and multiple-choice assessments. The resource includes lab-station cards, a recording “passport,” an applicability reading, “Learn from the Expert,” “Test Your Knowledge” and answer keys.
6	Newton's Laws Design Challenge	Assign students to design and build a simple device (e.g. balloon-powered car or marble ramp) that demonstrates one of Newton's laws. They must plan, build and test the device, measure its speed or acceleration and explain which law it illustrates. Provide a rubric for planning, scientific explanation, measurements and presentation.
7	Presentations & Reflection	Students present their design challenges and reflect on how their device demonstrates a law of motion. Use remaining class time for review or reteaching as needed.

Pacing: The sequence is designed for *six to seven 50-minute class periods*. The first three days introduce and reinforce speed, velocity and displacement; Days 4–5 teach Newton's laws through a multimedia lesson and a hands-on lab station; Day 6 (or Day 7 if you separate presentations) is reserved for a student design challenge and reflection. To extend the unit, you can break the lesson on average speed and velocity into two days, add additional practice problems, or expand the design challenge across multiple periods bringing it to 7-9 days if needed.

Assessment:

- Use the **lesson package's practice questions** and the **student version's blanks** to check understanding of speed, velocity and displacement. Collect the **lab-station passports** from the speed/velocity/displacement activity and the Newton's laws lab to see how students respond to each station's prompts and whether they grasp scalar vs. vector quantities and Newton's three laws.
- The **digital scavenger hunt** automatically grades quizzes and short-answer tasks, giving you immediate feedback on students' mastery of motion concepts.
- For Newton's laws, use the **practice question set** included in the lesson package and the design-challenge **rubric** to evaluate planning, scientific explanation, measurements and presentation.

Customization: All resources are **editable**, allowing you to tailor slides, handouts, scavenger-hunt tasks and station questions to suit your curriculum or to differentiate for grades 6–8. You can simplify the data table in the design challenge for younger students, adjust the difficulty of the lab-station questions, or modify the scavenger-hunt tasks for remote learning (e.g., swapping QR codes for hyperlinks).

Who is this Bundle for?

- **Science teachers who want multiple resources at their fingertips including lessons and a variety of activities, in order to engage their students.**
- **Teachers who don't have time to develop their own resources or organize what to teach and when.**