Grade 8 Science Overview (PA STEELS Standards) [August 2025]

A guide to learning Science in Grade 8@OJRSD

In Grade 8 Science, students investigate how forces and energy explain motion, sound, heat, and interactions that occur both through contact and at a distance. Instruction follows the Pennsylvania STEELS Standards and emphasizes hands-on investigations, data analysis, modeling, and engineering design. Students apply scientific ideas to real-world problems and technologies.

Grade 8 Science prepares students for high school physical science and physics by strengthening critical thinking, collaboration, and problem-solving skills. Through hands-on investigations and real-world applications, students learn not only what happens in the physical world, but why it happens**.**

Unit 1: Contact Forces – Motion & Collisions

Students explore how forces affect motion when objects collide. Through experiments and design challenges, they learn how mass and force influence acceleration and how action-reaction force pairs work.

Students will:
Investigate collisions using experimental data and motion analysis.
Explain how forces interact during contact.
Analyze how mass and force affect changes in motion.
Apply Newton's Laws to real-world situations.

Engineering Connection: Students redesign protective equipment such as sports helmets or pads to improve safety using their understanding of forces and material properties.

Unit 2: Sound Waves – Energy Through Vibrations

Students study sound as a mechanical wave, learning how vibrations travel through matter and how wave properties affect what we hear.

Students will:
Explore frequency, wavelength, amplitude, and energy.
Use mathematical models to describe wave behavior.
Explain how louder sounds carry more energy.
Investigate how sound travels through different materials.

Real-World Application: Students develop and refine models to explain how sound from a car causes nearby windows to vibrate using simulations and investigations.

Unit 3: Thermal Energy – Heat & Energy Transfer

Students examine how heat moves through materials and how thermal energy affects particle motion, temperature, and states of matter.

Students will:
Model particle motion when thermal energy is added or removed.
Investigate conduction, convection, and radiation.
Compare thermal properties of different materials.
Evaluate how heat transfer impacts technology and the environment.

Engineering Challenge: Students investigate how surface color affects heat absorption and design solutions that increase or reduce heat transfer.

Unit 4: Forces at a Distance – Gravity, Electricity & Magnetism

Students explore forces that act without direct contact, including gravitational, electric, and magnetic forces.

Students will:
Investigate how forces and mass affect motion.
Explore how distance, charge, and materials influence electric and magnetic forces.
Provide evidence that force fields exist even when objects do not touch.
Model how object arrangements affect stored potential energy.

Technology Connection: Students dissect speakers to explore how magnets, electric currents, and vibrations work together, then engineer their own speaker systems.

Engineering & Design (Throughout the Year)

Across all units, students engage in the engineering design process by defining problems, designing and testing solutions, analyzing data, and improving designs based on evidence.