

Grade 10 Physics

NGSS Physics of the Universe — Course Syllabus

School Year: 2026–2027

Grade: 10

Course: Physics

Curriculum: California NGSS

Course Structure: Physics of the Universe — Six Instructional Segments

Course Description

Grade 10 Physics is an inquiry-based science course aligned with the **California Next Generation Science Standards (CA NGSS)**. Students investigate how matter and energy interact and use physics principles to explain natural phenomena and real-world technologies.

The course emphasizes:

- Scientific investigation
- Mathematical modeling
- Data analysis
- Evidence-based reasoning
- Problem solving
- Engineering applications
- Laboratory investigation
- Scientific communication

Students will develop an understanding of physics through phenomena, experiments, mathematical relationships, simulations, and real-world applications.

Six Major Course Segments

Segment 1 — Forces and Motion

Students investigate motion, forces, Newton's laws, momentum, and interactions between objects.

Segment 2 — Forces at a Distance

Students investigate gravitational and electromagnetic interactions and how fields explain forces acting at a distance.

Segment 3 — Energy Conservation and Renewable Energy

Students investigate energy transfer, conservation of energy, mechanical energy, power, efficiency, and renewable energy systems.

Segment 4 — Nuclear Processes and Earth History

Students investigate atomic structure, radioactive decay, nuclear processes, radiation, and the role of nuclear processes in Earth's history.

Segment 5 — Waves and Electromagnetic Radiation

Students investigate mechanical and electromagnetic waves, wave properties, sound, light, reflection, refraction, and electromagnetic radiation.

Segment 6 — Stars and the Origins of the Universe

Students investigate stellar properties, stellar evolution, gravity, galaxies, and evidence concerning the origin and evolution of the universe.

Grade 10 Physics — 2026–2027 Year-at-a-Glance

Week	Quarter	Segment	Unit / Topic	Main Concepts / Skills
1	Q1	1. Forces and Motion	Introduction to Physics	Measurement, SI units, scientific notation, variables, lab safety
2	Q1	1	Describing Motion	Position, distance, displacement, speed, velocity
3	Q1	1	Motion Graphs	Position-time and velocity-time graphs
4	Q1	1	Acceleration	Acceleration, motion equations, data analysis
5	Q1	1	Free Fall	Gravity, falling objects, motion calculations
6	Q1	1	Forces	Force, net force, balanced/unbalanced forces
7	Q1	1	Newton's Laws	Newton's 1st, 2nd and 3rd Laws
8	Q1	1	Applications of Forces	Friction, normal force, tension, free-body diagrams
9	Q1	1	Quarter 1 Review & Assessment	Lab investigation, review, test, NGSS performance task
10	Q2	1 → 2	Momentum	Momentum, impulse, conservation of momentum
11	Q2	2. Forces at a Distance	Gravity	Gravitational force, mass, weight
12	Q2	2	Gravitational Fields	Fields, field strength, gravitational interactions
13	Q2	2	Orbits & Satellites	Circular motion, orbital motion, satellites
14	Q2	2	Electric Charge	Positive/negative charge, attraction and repulsion
15	Q2	2	Electric Fields	Electric field models and interactions
16	Q2	2	Magnetism	Magnetic fields, magnetic force, field lines
17	Q2	2	Electromagnetism	Electromagnets and real-world applications
18	Q2	2	Quarter 2 Review & Assessment	Investigation, review, test, performance task
19	Q3	3. Energy Conservation & Renewable Energy	Energy	Forms of energy, energy systems, energy transfer
20	Q3	3	Kinetic Energy	Kinetic energy and its relationship to mass and velocity
21	Q3	3	Potential Energy	Gravitational and elastic potential energy
22	Q3	3	Conservation of Energy	Energy transformations and conservation
23	Q3	3	Work	Work, force and displacement

Week	Quarter	Segment	Unit / Topic	Main Concepts / Skills
24	Q3	3	Power & Efficiency	Power, efficiency, energy consumption
25	Q3	3	Renewable Energy	Solar, wind, hydroelectric, geothermal and biomass
26	Q3	3	Energy Engineering	Energy systems, engineering solutions
27	Q3	4. Nuclear Processes & Earth History	Atomic Structure	Atoms, nuclei, isotopes
28	Q3	4	Radioactivity	Alpha, beta and gamma radiation
29	Q3	4	Nuclear Processes	Half-life, fission, fusion, nuclear energy
30	Q3	4	Quarter 3 Review & Assessment	Radiation investigation, project, review, assessment
31	Q4	5. Waves & Electromagnetic Radiation	Introduction to Waves	Mechanical waves, transverse and longitudinal waves
32	Q4	5	Wave Properties	Amplitude, wavelength, frequency, period
33	Q4	5	Wave Speed	$v=f\lambda$, $v=f/\lambda$, data analysis and mathematical modeling
34	Q4	5	Sound Waves	Frequency, pitch, amplitude, loudness
35	Q4	5	Light	Reflection, refraction, diffraction, interference
36	Q4	5	Electromagnetic Spectrum	Radio, microwave, IR, visible, UV, X-ray, gamma
37	Q4	6. Stars & Origins of the Universe	Stars	Properties of stars, spectra, temperature, brightness
38	Q4	6	Stellar Evolution	Star formation, main sequence, red giants, supernovae
39	Q4	6	Galaxies & Universe	Galaxies, Milky Way, expansion of universe
40	Q4	6	Origins of the Universe	Big Bang model, redshift, cosmic background radiation
41	Q4	All Segments	Final Review	Major concepts, mathematical relationships, NGSS review
42	Q4	All Segments	Final Performance Assessment	Phenomenon-based investigation / project / presentation

Segment Distribution

Segment	Weeks	Approx. Duration
1. Forces and Motion	1–10	10 weeks
2. Forces at a Distance	11–18	8 weeks

Segment	Weeks	Approx. Duration
3. Energy Conservation & Renewable Energy	19–26	8 weeks
4. Nuclear Processes & Earth History	27–30	4 weeks
5. Waves & Electromagnetic Radiation	31–36	6 weeks
6. Stars & Origins of the Universe	37–40	4 weeks
Review & Final Assessment	41–42	2 weeks