

Reactor World

Teacher Guide · Georgia High School Physical Science (SPS1–SPS10) · tobinscience.com

In one paragraph. Reactor World is a 3D browser game that runs on a Chromebook with no account, no login and no server. Students play as Guild apprentices relighting ten dark Reactors, one per SPS standard, in the same order as the course. Each Reactor is a zone with a lesson post, four mini-game *trials* (every trial is a different game genre tied to one standard element) and an *Overload* boss fight powered by multiple-choice questions. Progress saves on the device and in a short save code the student can carry between devices, and a printable **Teacher Data** page turns the save into evidence you can grade.

Getting started (5 minutes)

- **Open the game** in Chrome or Edge on any Chromebook, laptop or desktop. Phones work but a keyboard is better. Full screen with **F**.
- **New game:** the student types a display name (first name or initials is fine), picks one of four classes (below) and watches a 20-second opening. Bolt, the helper drone, explains the Yard.
- **Controls:** **W A S D** or arrows to walk, **Shift** to run, **E** or **Enter** to interact, **Space** to jump, **J** quests, **I** gear and Forge, **M** map, **Tab** quest log, **Esc** pause menu (sound toggle, save code, Teacher Data). Every trial also accepts clicks or taps.
- **Saving:** automatic, on the device. From the pause menu a student can copy a **save code** (starts with RW1-) and paste it on any other device to continue. Encourage students to keep their code in a doc or email draft.
- **Sound:** every sound is synthesized in the browser (nothing downloads). It starts on the first click; the pause menu has **Sound: on/off** and the choice is remembered per device.

The four classes

Class	Passive	Boss-fight skill
 Chemist	Mixes, measures, names. Earns more Sparks from every trial.	Catalyst — Your next right answer counts double.
 Engineer	Builds and braces. Takes an extra helper into every boss fight.	Brace — Block the next buffet completely.
 Physicist	Sees patterns. Rarer drops find their way to a Physicist.	Resonate — Your answer streak starts at two.
 Technician	Fast hands, faster feet. Walks and runs quicker than anyone.	Patch — Restore a quarter of your Composure.

How a year plays out

The Engine Yard hub has three districts and ten portals. A portal opens at the level shown below *or* as soon as the previous Reactor's boss is beaten, so a class that moves unit by unit always has the next zone open. Inside a zone the loop is the same every time:

1. **Lesson post** — a sign by the gate opens the matching tobinscience.com unit intro (a short web lesson) inside the game. Optional, and the only "reading" in the zone.
2. **Four trials** — each a different mini-game genre on one standard element. A clear earns 1–3 stars (gold = no misses). After two misses Bolt offers a hint card. Clear any **3** to open the arena.
3. **The Overload** — the boss. Every turn is a multiple-choice question from the standard (100 questions in all, ten per standard; a wrong answer shows a one-line reason). Right answers raise the stability meter; wrong ones cost composure. Tier I is the course fight; Tiers II and III (unlocked by beating the tier below) ask harder questions on a timer and drop rarer gear.
4. **The Reactor Core** — the first Tier I win seats a Core and lights another seam of the Spire. Ten Cores open the Core Chamber and the Great Engine, a final fight that pools every standard.

#	Zone · topic	Std	Course unit	Trials (element)	Boss	Opens at
1	The Periodic Vault Atoms, ions, isotopes & periodic trends	SPS1	Unit 1	Atom Builder (SPS1.a) Trend Climb (SPS1.b) Element Sort (SPS1.b) Ion Forecast (SPS1.c)	The Unstable Isotope	open
2	Bond Street Ionic & covalent bonding, formulas, IUPAC names	SPS2	Unit 2	Charge Balance (SPS2.b) Naming Forge (SPS2.c) Bond Bridge (SPS2.a) Property Pairs (SPS2.a)	The Misnamed Compound	Lv 4 or beat Reactor 1
3	The Conservation Works Conservation of matter, balanced equations	SPS3	Unit 2	Equation Scale (SPS3.b) Mass Ledger (SPS3.a) Atom Conveyor (SPS3.b) Sealed Flask (SPS3.a)	The Unbalanced Equation	Lv 7 or beat Reactor 2

4	The Half-Life Mine Fission, fusion, decay & half-life	SPS4	Unit 3	Decay Dig (SPS4.b) Chain Control (SPS4.a) Fusion Pattern (SPS4.a) Reactor Hearing (SPS4.c)	The Runaway Reaction	Lv 10 or beat Reactor 3
5	The Phase Foundry States of matter & gas laws	SPS5	Unit 4	Particle Dance Floor (SPS5.a) Gas Law Dial (SPS5.b) Freeze Frame (SPS5.a) Piston Pinball (SPS5.b)	The Pressure Surge	Lv 13 or beat Reactor 4
6	Solution Springs Solutions, solubility, acids & bases	SPS6	Unit 5	Dissolve Race (SPS6.b) Solubility Plot (SPS6.c) pH Kitchen (SPS6.e) Conductivity Check (SPS6.a)	The Caustic Tide	Lv 16 or beat Reactor 5
7	The Power Plant Energy transformations, heat, specific heat, phase changes	SPS7	Unit 6	Energy Pipes (SPS7.a) Heat Catch (SPS7.b) Heating Curve Builder (SPS7.d) Material Pick (SPS7.c)	The Thermal Overload	Lv 19 or beat Reactor 6
8	The Proving Grounds Motion, Newton's laws, gravity, work & simple machines	SPS8	Units 9–10	Launch Control (SPS8.a) Balance Grid (SPS8.b) Drop Tower (SPS8.c) Machine Shop (SPS8.d)	The Runaway Payload	Lv 22 or beat Reactor 7
9	The Resonance Tower Wave properties, EM vs mechanical, media, Doppler	SPS9	Unit 7	Wave Workshop (SPS9.a) Medium Relay (SPS9.d) Ripple Maze (SPS9.c) Doppler Run (SPS9.e)	The Feedback Loop	Lv 25 or beat Reactor 8

10	Voltaic Row Ohm's law, circuits, electromagnetism	SPS10	Unit 8	Circuit Workshop (SPS10.a) Current Orbit (SPS10.b) Coil Survival (SPS10.c) Voltspire Field (SPS10.b)	The Short Circuit	Lv 28 or beat Reactor 9
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Standards coverage

Every SPS element is assessed by a dedicated trial, by boss questions, or both. Elements marked "boss questions only" are covered in the Overload fights and again in the Core Chamber.

Element	Standard text	Trial(s)	Boss
SPS1.a	Develop and use models to compare and contrast the structure of atoms, ions and isotopes.	Atom Builder	The Unstable Isotope
SPS1.b	Analyze and interpret data to determine trends: valence electrons, ions formed, metals / nonmetals / metalloids, phases at room temperature.	Trend Climb Element Sort	The Unstable Isotope
SPS1.c	Use the Periodic Table as a model to predict properties of main group elements.	Ion Forecast	The Unstable Isotope
SPS2.a	Analyze and interpret data to predict properties of ionic and covalent compounds.	Bond Bridge Property Pairs	The Misnamed Compound
SPS2.b	Develop and use models to predict formulas for stable, binary ionic compounds based on balance of charges.	Charge Balance	The Misnamed Compound
SPS2.c	Use IUPAC nomenclature to translate between chemical names and chemical formulas.	Naming Forge	The Misnamed Compound
SPS3.a	Plan and carry out investigations to generate evidence that mass is conserved during a chemical reaction.	Mass Ledger Sealed Flask	The Unbalanced Equation
SPS3.b	Develop and use a model of a chemical equation to illustrate how the total number of atoms is conserved.	Equation Scale Atom Conveyor	The Unbalanced Equation
SPS4.a	Develop a model that illustrates how the nucleus changes as a result of fission and fusion.	Chain Control Fusion Pattern	The Runaway Reaction
SPS4.b	Use mathematics and computational thinking to explain half-life as it relates to radioactive decay.	Decay Dig	The Runaway Reaction
SPS4.c	Construct arguments based on evidence about the applications, benefits, and problems of nuclear energy.	Reactor Hearing	The Runaway Reaction
SPS5.a	Compare and contrast models of particle arrangement and motion in solids, liquids, gases, and plasmas.	Particle Dance Floor Freeze Frame	The Pressure Surge
SPS5.b	Identify the relationships among temperature, pressure, volume, and density of gases in closed systems.	Gas Law Dial Piston Pinball	The Pressure Surge
SPS6.a	Develop and use models to explain the properties (solute/solvent, conductivity, concentration) of solutions.	Conductivity Check	The Caustic Tide
SPS6.b	Determine how temperature, surface area, and agitation affect the rate solutes dissolve.	Dissolve Race	The Caustic Tide
SPS6.c	Analyze a solubility curve to determine the effect of temperature on solubility.	Solubility Plot	The Caustic Tide

SPS6.d	Explain the relationship between the structure and properties (pH, indicator color change) of acids and bases.	boss questions only	The Caustic Tide
SPS6.e	Classify common household substances as acidic, basic, or neutral.	pH Kitchen	The Caustic Tide
SPS7.a	Construct explanations for energy transformations within a system.	Energy Pipes	The Thermal Overload
SPS7.b	Describe how molecular motion relates to thermal energy changes: conduction, convection, and radiation.	Heat Catch	The Thermal Overload
SPS7.c	Analyze specific heat data to justify the selection of a material for a practical application.	Material Pick	The Thermal Overload
SPS7.d	Explain the flow of energy during phase changes using heating/cooling curves.	Heating Curve Builder	The Thermal Overload
SPS8.a	Analyze the motion of an object using mathematical and graphical models.	Launch Control	The Runaway Payload
SPS8.b	Construct an explanation based on evidence to support Newton's three laws of motion.	Balance Grid	The Runaway Payload
SPS8.c	Identify the relationship between mass and gravitational force for falling objects.	Drop Tower	The Runaway Payload
SPS8.d	Identify the relationships between work, mechanical advantage, and simple machines.	Machine Shop	The Runaway Payload
SPS9.a	Identify the relationships among wavelength, frequency, and energy in EM waves and amplitude and energy in mechanical waves.	Wave Workshop Relay Station: The Array Relay Station: Control Room	The Feedback Loop
SPS9.b	Compare and contrast the characteristics of electromagnetic and mechanical waves.	Relay Station: Silence Line	The Feedback Loop
SPS9.c	Develop models that illustrate reflection, refraction, interference, and diffraction.	Ripple Maze Relay Station: Water Farm Relay Station: Shadow Corridor	The Feedback Loop
SPS9.d	Explain how different media affect the speed of sound and light waves.	Medium Relay Relay Station: Density Deck	The Feedback Loop
SPS9.e	Explain the changes in sound waves associated with the Doppler Effect.	Doppler Run Relay Station: Observatory Relay Station: Workshop	The Feedback Loop
SPS10.a	Support a claim regarding relationships among voltage, current, and resistance.	Circuit Workshop	The Short Circuit

SPS10.b	Illustrate and explain conventional current (DC and AC) and electron flow in series and parallel circuits.	Current Orbit Voltspire Field	The Short Circuit
SPS10.c	Determine the relationship between magnetism and the movement of electrical charge.	Coil Survival	The Short Circuit

Rewards, replay and why students keep playing

- **Sparks** ⚡ (currency): first trial clear 60 (+25 for gold), replays 20–30; first boss win 200 + 40 per tier, replays 90 + 40 per tier. Chemists earn 10% more.
- **XP and levels:** 100 XP per first clear, 400 per first boss, 250 XP per level. Levels gate portals and nothing else.
- **Gear:** every boss drops from its own 11-item catalog (head, back, hands, tool, charm). Gear is visible on the character and adds Focus, Shield, Luck, Sparks or Speed. Duplicates turn into Sparks. Five kills without an epic guarantees one.
- **The Quartermaster shop:** gear, helpers (Hint Chip, Second Chance, Composure Tonic, Lucky Fuse, Spark Magnet), mounts, companion looks and titles, all for Sparks. The Forge sells back at 60%.
- **Daily quests** (seeded by the date, no server): Flash Challenge (double Sparks on one trial), Daily Circuit, Boss of the Day (+200).
- **Side quests:** 20 zone quests (each zone's Keeper asks for five lost parts) plus 5 Yard quests (waystones, the twelve brass cogs, the Tycho Relay).
- **Relay Stations** (Resonance Tower only): eight Signal Lost stations with 45 puzzle levels on SPS9. Certifying all eight earns a title and shows on the Teacher Data page.
- **Boss Rush** (Core Chamber): all ten bosses back to back for a Sparks jackpot.

Drop odds	Common	Uncommon	Rare	Epic	Legendary
Tier I	50%	30%	14%	5%	1%
Tier II	35%	32%	20%	10%	3%
Tier III	20%	30%	27%	17%	6%

Relay Stations (SPS9)

Station	Focus	Levels
Silence Line	EM vs mechanical · SPS9.b	undefined
The Array	the spectrum · SPS9.a	undefined
Control Room	amplitude & frequency · SPS9.a	undefined
Water Farm	reflect & refract · SPS9.c	undefined
Shadow Corridor	diffraction & interference · SPS9.c	undefined
Density Deck	waves in media · SPS9.d	undefined
Observatory	redshift · SPS9.e	undefined
Workshop	sirens & Doppler · SPS9.e	undefined

Title ladder (earned automatically)

- Vault Opener — your first Reactor Core
- Reactor Tech — three Reactors relit
- Grid Engineer — six Reactors relit
- Engine Master — every Reactor relit
- Lab Rat — ten trials cleared
- Gold Standard — ten gold stars
- Perfectionist — gold on all forty trials
- Overload Hunter — five Tier III stabilizations
- Yard Hand — every district waystone attuned
- Cog Collector — all twelve brass cogs
- Signal Found — all eight Relay Stations certified

Teacher Data: turning play into evidence

Pause (**Esc**) → **Teacher Data (print)**. The page is built on the student's device from their save; nothing is sent anywhere. Students can show it on screen, print it, or **Save as PDF** and upload it to your LMS assignment. The date printed on it is the day it was generated.

Column	What it means	Suggested use
Trials cleared	Trials passed for that element (any star count) out of the trials that target it.	Completion credit per element.
Boss beaten	✓ once the zone's Overload has been stabilized at Tier I.	Mastery check for the whole standard.
Gold stars	Trials for the element cleared with zero misses.	Honours or extra credit.
Boss tier	Highest Overload tier beaten (0–3).	Differentiation: Tier III is a stretch goal.

Below the table: Guild level, lifetime Sparks, Reactor Cores relit (x / 10), Overload wins across all tiers, Great Engine status, Relay Stations certified, titles and gear counts, and total time played.

Grading ideas. (1) One zone per unit: "Reactor relit" is the unit's game grade. (2) A semester grade from Cores relit (five by midterm, ten by the end). (3) Replay credit: Tier II wins and gold stars for students who finish early. (4) The save code as a sign-in sheet: students paste it into a form each Friday and you keep the codes; pasting a code restores their exact game anywhere.

Pacing against the course

Reactor World mirrors the unit order of the tobinscience.com HS Physical Science course, so the simplest plan is **one zone per unit**, played during the unit. A zone takes a typical student 40–70 minutes of total play across the trials and the Tier I boss; two 20-minute sessions a week keep a class on pace. Units 9–10 (motion and forces) share one zone, The Proving Grounds. Everything beyond Tier I is optional depth for the students who want it.

When	Zone	Standard
Unit 1	The Periodic Vault	SPS1
Unit 2	Bond Street	SPS2
Unit 2	The Conservation Works	SPS3
Unit 3	The Half-Life Mine	SPS4
Unit 4	The Phase Foundry	SPS5
Unit 5	Solution Springs	SPS6
Unit 6	The Power Plant	SPS7

Units 9–10	The Proving Grounds	SPS8
Unit 7	The Resonance Tower	SPS9
Unit 8	Voltaic Row	SPS10
End of year	The Core Chamber · The Great Engine · Boss Rush	SPS1–SPS10

Classroom notes

- **Content:** every question explains its answer; bosses are "stabilized", never attacked; no chat, no names shown to other players, no accounts.
- **Resets:** a student who wants a fresh start can choose New Game from the title screen; the old save is overwritten (keep a save code first if you want it back).
- **Performance:** built for school Chromebooks (batched geometry, no dynamic lights). If a device struggles, the game lowers its own graphics quality.
- **Offline:** once the page has loaded, the game needs no connection except for the optional lesson posts.
- **Support:** derek.tobin@cherokeek12.net · tobinscience.com

Reactor World © Tobin Science · generated from the game's data files on October 23, 2026 · 10 zones · 40 trials · 100 boss questions · 45 relay levels