

Life and Physical Middle School Science Problem Based Learning Bundle

- ✓ Designed for Middle School Science
- ✓ Includes 20 Life and Physical Science PBLs Activities
- ✓ Engaging, Student-Led Problem-Based Learning Projects



No Prep - Ready to Go!

10 Life Science PBL Activities

- PBL – Classification Keys- Build an ID Guide
- PBL – Decomposer Derby- Build a Mini-Compost
- PBL – Ecosystem in a Bottle- Model Matter Cycles
- PBL – Enzyme Action- Catalase Reaction Lab
- PBL – Heart Rate & Recovery- Body Systems in Balance
- PBL – Light and Leaves- Photosynthesis Design Test
- PBL – Organelle Operations- Build a Working Analogy
- PBL – Osmosis in Action- Potato Core Lab
- PBL – Schoolyard Bioblitz- Map Our Biodiversity
- PBL – Traits & Probability- Model Inheritance

10 Physical Science PBL Activities

- PBL – Bright Ideas- Wire a Mini-Room with Series & Parallel
- PBL – Coaster Physics- Marble Roller Coaster Optimization
- PBL – Crash Cushion- Packaging for a Safe Landing
- PBL – Electromagnet Lifter- Maximize Pick-Up Strength
- PBL – Energy Audit- Cut Classroom Power Waste
- PBL – Light Work- Build a Periscope or Camera Obscura
- PBL – Motion Mapper - Design Safe Crosswalk Timing
- PBL – Pendulum Timekeeper- Build & Calibrate
- PBL – Sound Studio- Design and Tune a Cardboard Instrument
- PBL – Strong Span- Build & Test a Paper Bridge

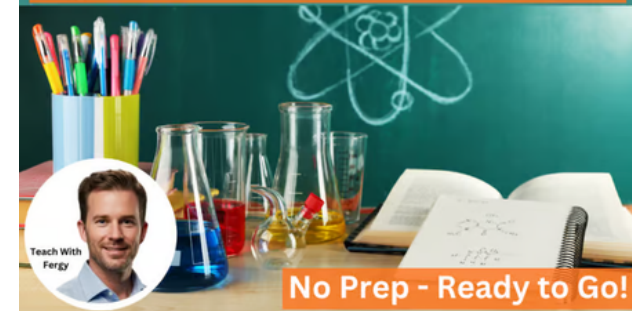
Life Science Problem-Based Learning (PBL) Bundle

- ✓ Designed for Middle School Science
- ✓ Complete Chemistry PBL Bundle
- ✓ Engaging, Student-Led Problem-Based Learning Projects



Physical Science Problem-Based Learning (PBL) Bundle

- ✓ Designed for Middle School Science
- ✓ Complete Physical Science PBL Bundle - 10 PBL Activities
- ✓ Engaging, Student-Led Problem-Based Learning Projects



All PBLs include

- Background for Students
- Full Instructions Sets
- Guiding Questions

PBL – Ecosystem in a Bottle: Model Ma

Driving Question
How can a closed terrarium support life over several weeks?

Background
Matter cycles (water, carbon, nitrogen) and energy flows sustain e...
should recycle resources and stay stable.

Materials (or simple substitutes)

- Clear bottle/jar with lid
- Gravel, activated charcoal, potting soil
- Small plants or moss (teacher-approved)
- Measuring cup, spray bottle
- Labels, camera

Instructions
Step 1: Design layout and water volume; justify choices for draina...
Step 2: Build terrarium layers; plant and lightly water; seal as direc...
Step 3: Monitor weekly: temperature, condensation, plant growth...
permitted.
Step 4: Explain how observed changes show cycling and energy flo...

Final Product

- Observation log with photos.
- Short explanation of water/carbon cycles operating in your...

Rubric (20 points)

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs Work (1)
Design Rationale	Layering and volumes justified	Some justification	Basic ch	
Care & Safety	Gentle handling; clean setup	Minor lapses	Occasio	
Observations	Regular, detailed records	Mostly regular	Sporadi	
Systems Reasoning	Accurate cycles/energy links	Mostly correct	Basic	
Communication	Clear log & photos	Mostly clear	Some cl	

PBL – Heart Rate & Recovery: Body Systems in Balance

Driving Question
How does activity level affect heart rate and recovery time?

Background
Circulatory and respiratory systems work together to deliver oxygen. Heart rate rises during activity and returns toward baseline during recovery.

Materials (or simple substitutes)

- Timer, heart rate measurement (manual pulse or app)
- Space for safe light exercise (teacher-approved)
- Data table

Instructions
Step 1: Measure resting heart rates; plan safe, brief activity (e.g., step-ups).
Step 2: Record heart rate immediately after and every minute for 5 minutes.
Step 3: Graph recovery curves; compare different activity intensities or durations.
Step 4: Discuss body system interactions and factors that affect recovery.

Final Product

- Line graph of heart rate vs. time with analysis.
- Short explanation of system interactions.

Rubric (20 points)

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs Work (1)
Safety	Appropriate, teacher-approved activity	Minor issues	Occasional lapses	Unsafe
Data	Consistent timing; clear records	Mostly consistent	Some gaps	Sparse
Analysis	Well-labeled graph; trends explained	Mostly clear	Basic	Incorrect
Reasoning	Accurate systems explanation	Mostly correct	Basic	Incorrect
Communication	Neat graph & summary	Mostly neat	Some clutter	Unclear

PBL – Osmosis in Action: Potato Core Lab

Driving Question
How does solute concentration affect water movement in plant cells?

Background
Osmosis moves water across membranes from low solute concentration to high. Plant tissues gain or lose mass depending on surrounding solution.

Materials (or simple substitutes)

- Potatoes, cork borer or knife to make similar cores (teacher-supervised)
- Cups with different salt (NaCl) solutions, one with plain water (control)
- Balance for mass measurements, labels, paper towels
- Timer, ruler (optional for length change)
- Goggles, cutting board

Instructions
Step 1: Cut equal-size potato cores; blot dry; measure initial mass for each core.
Step 2: Place cores in labeled solutions for a set time (e.g., 20–30 minutes).
Step 3: Remove, blot, and measure final mass; calculate % mass change.
Step 4: Graph % change vs. solution concentration and interpret net water movement.

Final Product

- Graph of percent mass change versus solute concentration.
- Brief explanation using the terms hypertonic, hypotonic, and isotonic (age-appropriate).

Rubric (20 points)

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs Work (1)
Measurement Quality	Equal core sizes; careful blotting; accurate masses	Mostly careful	Some inconsistencies	Inaccurate/unequal
Data & Graphs	Complete table and accurate graph	Mostly complete	Basic	Sparse/incorrect
Safety & Technique	Knife use supervised; tidy lab	Minor lapses	Occasional lapses	Unsafe
Reasoning	Correct osmosis interpretation	Mostly correct	Basic	Incorrect
Communication	Clear labels and explanation	Mostly clear	Some clutter	Unclear

Marking Rubrics

Who is it for?

- **Middle School Life and Physical Science Teachers**
- **Teachers who want to increase their student engagement and retention**
- **Teachers who want low-prep and student-led classroom projects**

Save yourself the **STRESS AND TIME**



TWF

Spend your time WISELY

