

Motion and Forces Unit Plan

GRADE LEVEL EXPECTATION:

Identify and calculate the direction and magnitude of forces that act on an object, and explain the results in the object's change of motion

BIG IDEAS:

Systems, Models, Explanation, Measurement, Change

STUDENTS WILL (KNOW):

Direction and magnitude	Changes over time
Causes for Changes in motion	Resources
Size and speed	Mass vs. Weight
Acceleration AND $F = MA$	Calculate speed and describe + or - acceleration.
Forces and Net forces	
Data collection	
Evidence	

Need to know Vocab: Motion, Force, Speed, Acceleration

Nice to know Vocab: Net Force, Mass, Magnitude.

IF NOT, THEN WHAT?

Mixed Grouping by ability. Put lots of responsibility on group members. Revisit/Review concepts individually and have students create final product based on their own level/strengths. Review each lab by coll. Group at start of new lab.

IF SO, THEN WHAT?

- ✓ Challenge each individual to test a hypothesis for how speeds could change in space, given certain forces. Challenge individual to find speeds of various animals in various climates/setting/under certain stimuli.
- ✓ Use Vernier Probes with graphing Calculators.

STUDENTS WILL (DO):

- Predict and evaluate the movement of an object by examining the forces applied to it **(DOK 1)**
- Calculate speed and describe motion of an object. **(DOK 3)**
- Recognize that motion is caused by forces. **(DOK 1)**
- Develop and design a scientific investigation to collect and analyze speed and acceleration data to determine the net forces acting on an object. **(DOK 3)**
- Recognize that our force understanding has changed over time and we continue to do experiments and collect data to further understand. **(DOK 1)**
- Find and evaluate sources to answer sci. questions about motion and acceleration. **(DOK 1)**

Unit Comments:

- ✓ Check for ties to math curriculum with Rate = Speed and motion graphs (linear, inverse relationship for graphs).
- ✓ High School Math connections for highs.

ACTIVITIES FOR LEARNING : (NOTEBOOK PG.1-25)

LAUNCH: Title Page-Vocab. Poem or Comic, picture examples, non-examples. Olympic Speed Trials, Curiosity Landing, Travel for trips.

EXPLORE (Inquiry):

1. Small Group – (8/27-8/28) Bunny Hopper Speed Lab. Using a bunny wind-up toy, timer. Paper, colored pencils, and ruler/string. Find speed of bunny.
2. Mini-Lesson: Collecting and Organizing Data, and Measurement (See Master Notebook)
3. LABS: 1. (8/29-8/30) Ramp racer speed lab (finding speed/graphing motion). 2. 9/4-9/5) Human Speeds Lab (Graphing, Evaluating/calculating speeds, motion graphs.) (2 handouts) Homework: Olympic Speeds
4. LABS: Where are the Net Forces (What Causes Motion?)
 - a. 9/6-9/7 – Acceleration/Momentum Lab: Calculating Speed (velocity) And Acceleration (ANGRY BIRD PHYSICS)
 - b. 9/10 & 9/12 Crater Lab (Distance and Size of forces)
 - c. Formative Quiz on 9/11
5. FORCES INTRO: 9/13-9/14
 - a. Video Clip: Bill Nye: Motion and Forces 9/13 9/14
 - b. Focus Lesson: Notes: Types of Forces. FOLDABLE (1picture/2 examples.) ANGRY BIRDS
6. FORCES Stations Lab (9/17-9/18): 7 Stations where students test forces on objects. See Handout (Arrows for net forces!)
7. FORCES RELECTION CHOICE: student choice in notebook. (Formative)
8. FORCES Animation Lab: (With COW computers: (9/19-9/21)
 - a. Mini Assessment: How do these forces affect motion of objects?

Summary:

10. FORCES/MOTION PROJECT: (9/24-9/27) Projects due 10/1-10/2.
 - b. Design a lab to identify speed and acceleration to determine forces within a system.
 - c. Calculate speeds. Identify the push/pull factors and collect data on speeds and positive/negative acceleration. Demonstration to class (RUBRIC) – group.
11. Benchmark Assessment and Review BA.
12. Additional Summative Questions
13. Review/Enrich.

GRADUAL RELEASE OF RESPONSIBILITY

FOCUS LESSONS:

GUIDED INSTRUCTION:

COLLABORATIVE LEARNING:

INDEPENDENT LEARNING:

MY UNIT REFLECTION:

FINAL PROJECT:

Angry Bird Physics: Predictions. Do a Lab (final lab?)

Green Bottles, milk cartons, paper balls, sew some birds?

Acceleration of Yellow one. Bryan's nook article (The Physics of Angry Birds)! 📄

Video tape and put in force vector arrows to describe forces. ☠☠