Grade 3-4 Measuring mass

Materials: 2 balance scales, gram weights, objects, discrepant event sheet.
Vocabulary: unit of measure, balance scale, grams, mass

TP: Discover the need for a standard unit for measuring mass by:

- Using a balance scale with gram weights.
- Communicating measurements using numbers and appropriate units.
- Observing, communicating, comparing and organizing data.

Engage:

- Entry Slip: Have students paste the **table of contents** page and label the first section with a sticky note:
- Have students go to the final page of the notebook and paste the Glossary, then with a sticky note.
    - Have students add the following terms: length, width, meter, centimeter, kilometer, distance.
- **Discrepant Event:** Demonstrate how a bowling ball sinks in the water, but a basketball and soccer ball do not. (http://adventure.howstuffworks.com/outdoor-activities/water-sports/life-jacket1.htm)
    - Students stop and jot testable and researchable questions.
    - Explain the inquiry question—why is that a bowling ball sinks in water but a basketball does not?

Explore:
Students use their discrepant event sheets to conduct the investigation.

- Discussion leaders identify the variables, and review the procedure with their group.
- Students collect data and organize it into the charts in their discrepant event sheets.

Explain: Ask, Based on your data, what **claim** could you make about how some objects float and others do not?

- Student groups discuss their claims and support them by evidence using accountable talk stems.

Elaborate: Students support their claim with evidence from the reading by determining importance.

- **Model:** Read the introductory paragraph of "Buoyancy" and think aloud: what is the writer telling me here about buoyancy? Does it help me to explain why a bowling ball floats and a basketball or soccer ball do not?
- **Student repeats the procedure** for paragraphs 2-3 of the article.

Evaluate: Student complete the science review sheets: Measurement.

http://adventure.howstuffworks.com/outdoor-activities/water-sports/life-jacket1.htm

How Life Jackets Work

by Molly Edmonds

Buoyancy

If you were to fall off a boat, it's unlikely that your first thoughts would involve the ancient Greek philosopher Archimedes. However, Archimedes' principle helps to explain what is happening to your submerged body. As an object is submerged in water, it moves, ordisplaces, water according to how much it weighs. Archimedes found that the water will push upward against the object with a force equal to the weight of water that is displaced.

How much water is displaced is determined by the density of the object. Density is the measure of how much mass is in an object, related to its volume. A bowling ball and a beach ball may have the same volume, but the bowling ball weighs much more, and is much denser, than the beach ball. Meanwhile, a block of solid steel and a steel ship may both be heavy, but the steel ship has a greater volume of steel (in addition to weightless air). It displaces enough water to match its own mass, so it floats.

When that solid, heavy bowling ball is dropped in water, the water pushes up on it with a force equal to the weight of water it displaced. The ball weighs more than the amount of water it displaced and will sink. The beach ball, meanwhile, displaces very little water, and the air inside is much lighter than the weight of the water that was displaced. The buoyant force from below keeps the beach ball afloat. If you were to try to push the beach ball down into the water, the push back that you would feel is the buoyant force of the water at work. Objects that displace an amount of liquid equal to their weight will float because they receive that upward push from the water. You can read more about buoyant forces in How Hot Air Balloons Work.

Buoyancy is the upward force we need from the water to stay afloat, and it's measured by weight. Buoyant forces are why we feel so much lighter when we're in a swimming pool or bathtub. Our bodies are mostly water, so a person's density is fairly close to that of water. Because of this, an average person needs only about seven to 12 pounds of additional buoyancy to float [source: Personal Flotation Device Manufacturers Association]. A life jacket provides this extra lift.

Discrepant event sheet

Name : _____ Class: _____ Seat #_____

Inquiry Question: why is that a bowling ball sinks in water but a basketball does not?
Procedure: • Write the name of each object in your data chart. • Find an estimate of the object's mass using the gram weights. • Find the mass of each object using the balance scale. • Record your data.
Observations: Collect your data in the chart below.

Object	Estimate	Mass	Float or Sink

Claim: Based on your data, what **claim** could you make about how some objects float and others do not?

_____
_____
_____
_____

Evidence: What evidence from your data and article helps to prove that your claim is true?

_____
_____
_____
_____
_____
____

Grade 4 Living and non living things—soil samples

Materials: blue trays, soil samples, science journals, and plastic spoons.
Vocabulary: decomposing, living, non living, producer, consumer, ecosystem.

TP: Classify populations of organisms as producers, consumers, or decomposers by the role they serve in the ecosystem (food chains and food web).
We will do this by:
1. Exploring soil samples for evidence of living things, non-living things, and decomposing objects.
2. Classify our observations into living, non-living, and decomposing objects.
3. Sketch our findings.
4. Scan an article for text based evidence related to how living and nonliving things interact.

Engage:

- Entry Slip: Scientists will **Quick Write** a response to the following—**What type of measuring tools would we need to make observations of living and non living things?**
- **Inquiry Question:** Demonstrate how living and non living things interact in a habitat (Encyclopedia of Science p.23 Prezi)
    - Have scientists to stop and jot any wonderings about how living and non living things interact.
    - Explain the inquiry question—In what ways do living and non living things interact in a habitat?

Explore:

- **Students** observe the living and non living things in their soil samples.
- Students use their plastic spoons to separate the soil into living and non living things:
- Discussion leaders discuss the properties of each sample.
- Students collect data and organize it into the charts in their discrepant event sheets.

Explain: Ask, Based on your data, what **claim** could you make about how living and non living things interact.

- Student groups discuss their claims and support them by evidence using accountable talk stems.

Elaborate: Students support their claim with evidence from the reading by determining importance.

- **Model:** Read the introductory paragraph of "Animal Homes" and think aloud: How is the writer using visuals to help me understand that living and non-living things interact?
- **Student repeats the procedure** for paragraphs 2-3 of their articles.

Evaluate: Student complete the science review sheets: Food Webs

Investigation: Soil Samples

Name : _____ Class: _____ Seat #_____

Inquiry Question: In what ways do living things interact in a habitat?
Procedure: • Use plastic spoons to separate the different materials in the soil into living and non living things. • Write the name of each object in the chart. • Describe the properties of each object • Sketch each object in your science journal.
Observations: Collect your data in the chart below.

Non-Living		Living	
Object	Properties	Object	Properties

Claim: Based on your data, what **claim** could you make about how living and non living things need each other to survive?

_____
_____
_____
_____
_____

Evidence: What evidence from your data and article helps to prove that your claim is true?

_____
_____
_____
_____

Grade 5

Materials: Hole puncher, 100 25-cm square piece of cotton fabric, 400 25-cm pieces of string, 25 scissors 4 metal washers

Vocabulary: variable, dependent variable, independent variable

TP: Scientists record experiences, observation, and thinking in their science notebooks by keeping organized records because notebooks helps organize their learning.
We will do this by:

- Creating sections for each part of the notebook.
- Creating a log of learning activities.
- Using our word walls to help explain science vocabulary.

Engage:

- Have students create a **table of contents** page and label the first section:

Date	***Activity***	***Page#***
9-23-13	How do Independent and dependent variables interact under controlled environments?	*1*

- Have students go to the back of the notebook and count 15 pages: have students label it Glossary/Index with a sticky note.
    - Have students add the following terms: Dependent Variable, independent variable, variable with page numbers.
- Use the brain pop illustration to explain the difference between independent and dependent variables:
    - *Read the following scenario: we've got 4 healthy fig plants "A, B, C, and D." They have the same type of pot, and soil, and they're getting the same amount of sunlight. The only variable, or thing that changes will be the amount of water they receive.*
    - Students will use the anchor chart *"Figure out unkown words"* explain the difference between independent and dependent variables.

Explore: Students create a parachute by
- Measuring and cutting a 30cm square.
- Measuring and cutting a 15 cm square.
- Measuring and cutting 8 pieces of 15 cm string.
- Tying 4 pieces of string to each corner of the squares.
- Tying each piece of string to 4 washers.

Explain: Ask, based on your variables and data, what claim could you make about the size of parachutes?

Elaborate: Students test their parachutes.
Evaluate: Discuss the topic question: How do Independent and dependent variables interact under controlled environments? How did the writer's notebook help us as scientists?

Inquiry Question: The first attempt to land on Mars with the Mars Polar Lander failed. Scientists hypothesized that the size of the parachute affects how it falls to the ground. **Does the size of the parachute affect how an object falls to the ground?**

Procedure:
- Measuring and cutting a 30cm square.
- Measuring and cutting a 15 cm square.
- Measuring and cutting 8 pieces of 15 cm string.
- Tying 4 pieces of string to each corner of the squares.
- Tying each piece of string to 4 washers.

Observations: Collect your data in the chart below.

32 cm Parachute		15 cm Parachute	
Height	Fall Time	Height	Fall Time

Claim: Based on your data, what **claim** could you make about how the size of a parachute affects how fast something falls?

_____
_____
_____
_____
_____

Evidence: What evidence from your data and article helps to prove that your claim
is true?

_____
_____
_____
_____

Investigation: Parachutes to Mars

Name : _____ Class: _____ Seat #_____