How to use the Lesson Inventory:

CTRL+F a topic of your interest

If you want to search for lessons relating to the topic of "light", search with a space before/after the word like "_light" otherwise you will find words like "slightly" or "flight" in your search.

Also, a tip is to search for lessons with materials you might want to use.

Once you find your topic, read the whole lesson report for that topic. Some lesson reports have lesson plans attached as well.

If you're really stuck on a topic for your lesson, just scroll through until you find something interesting!

SCIENCE DETECTIVES

Date: 1/23/12

Location: Broadmor Elementary

Team Leader: Tom Osborn Popp

Members: Humza Salim, Ali Benson, Tyler Miyazaki, Hanna Ramsey

This week's lesson leader: Tom Osborn Popp

Number of students: 7

Grade: 3rd

Question: What candy is making the soda explode?

Materials: Diet Coke, Mentos, Gummy Bears, Skittles, plastic cup

Total Cost: $13.39

Agenda:

- Introductions, names, rules
- Explanation of Scientific method
- Observe candy(all together) and soda mixture
- Come up with hypothesis to explain what is causing the fizz
- "Come up with" experiment to test
- Explain independent and dependent variables
- Go outside to test
- Come back inside to analyze results
- Case closed!

Good teaching strategies:

- Breaking down the scientific method into 5 simple steps was very understandable for the kids
- Constant question-asking kept them engaged
- Behavior was excellent, they responded well to directions
- Were extremely into the experiment. Like, jumping up and down excited. I kept their interest by working by the comedy/theatre rule of three's. Started with gummy bears, least explosion, next skittles, bigger explosion. Then finally the mentos.
- Good analysis of results
- Eating leftover candy in the end made everyone happy!
- Play games while waiting for parents kept it constantly fun

Things to note/possible problems:

- There are some very good friends in the class- if the class gets bigger they may need to be split up to avoid talking during the lesson. They were okay today though
- One girl loved to answer questions- good, but an effort should be made to involve more students
- I could have said more about independent and dependent variables, however I thought the lesson ended at 4:30 and not 4:45.

SCIENCE DETECTIVES

Date: 1/30/12

Location: Broadmor Elementary

Team Leader: Tom Osborn Popp

Members: Humza Salim, Ali Benson, Tyler Miyazaki, Hanna Ramsey

This week's lesson leader: Ali Benson

Number of students: 7

Grade: 3rd

Question: Why do some things float and others sink?

Materials: Clear plastic cups, water, oil, food coloring, detergent, shampoo

Agenda:

- Roll call and "warm up chat" (ask the kids how their day went, etc.)
- Re-cap of scientific method, ask about the 5 main steps, what we did last week etc.
- Ali starts the lesson- intro about density
- Kids come up with observations, hypotheses for first experiment
- Perform experiment, analyze results
- Perform a more complicated experiment based on the results of the first
- Analyze results
- To finish up, questions were asked to test comprehension of density, and scientific method
- Case closed!
- "Zip-zap-zop" game to use up remaining time

Good teaching strategies:

- Keeping things simple made the lesson very easy to understand- 5 steps for scientific method, (Observation, Question, Hypothesis, Experiment, Results/Conclusion), one main concept – Density.
- For the most part, the kids are very good behavior-wise. Small discipline issues here and there were easily dealt with.
- Ali handled a particular student very well—the student was telling a story that was slightly irrelevant to the lesson. Ali acknowledged the story but effortlessly brought it back on topic.
- The kids were extremely engaged in the lesson.
- The kids were using prior observations and experimental observations to come up with hypotheses and conclusions on their own. This may be due to our effort to try to make every lesson grounded in a "real-life" observation. This week's "observation" was some things float and sink in the bathtub/pool etc., which led us to ask why.

- Quiz at the end showed that they have an incredibly good understanding of the scientific method after just two lessons. They also understand density very well.
- Games at the end kept the fun going.

Things to note/possible problems:

- One concern is that our class is so small. It would be nice to have more students so that we could make a bigger impact.
- We should constantly be focusing on ways to get everyone more involved, although everyone's input was pretty equally represented today.
- Another thing of note is that we ended class early again. We should make a better effort to design lessons that take up the entire class time.
- If we finish early, games are fun, but we don't want them to eclipse the lesson. Currently, I do not believe that the games we play at the end of class detract from the educational experience; in fact I think they enhance it by continuing the fun all the way to the end of the time allotted. That being said, it would be ideal if our games had a science theme.

SCIENCE DETECTIVES

Date: 2/6/12

Location: Broadmor Elementary

Team Leader: Tom Osborn Popp

Members: Humza Salim, Ali Benson, Tyler Miyazaki, Hanna Ramsey

This week's lesson leader: Tyler Miyazaki

Number of students: 7 (out of 7)

Grade: 3rd

Question: What can we do to prevent a falling egg from cracking?

Materials: Eggs, Dixie cups, trash bags, newspaper, tape, floss, empty trashbin

Agenda:

- Roll call
- Re-cap of previous lessons, scientific method
- Introduce Prediction, Analysis as new steps
- Tyler begins experiment – starts with observation of eggs dropped from different heights
- What can we do to prevent the eggs from cracking?
- Hypotheses- Need a pillow-like structure, or something to slow it down as it falls
- Prediction/experiment- design an egg protection
- Egg drop!
- Analyze what worked, what didn't
- Case closed!

Good teaching strategies:

- Introduction of new concepts was easy since they had the background on previous parts of the scientific method
- Again, kids were behaving well. A quick "shh" keeps the kids from talking when they haven't been called on.
- Small class size allowed every student to make a design for an egg, which increased the diversity of predictions/designs and made for better results to analyze.
- Tyler was able to get our most shy student to get excited and answer many questions—very even participation today, there was no one student that stood out as the "answerer"
- Good analysis of results
- Finished on time

Things to note/possible problems:

- I was up there way too much. I spent a lot of time at the beginning recapping old lessons, and spent time at the end concluding the lesson.
- Not enough time at end to test comprehension of concepts learned in lesson.

SCIENCE DETECTIVES

Date: 2/13/12

Location: Broadmor Elementary

Team Leader: Tom Osborn Popp

Members: Humza Salim, Ali Benson, Tyler Miyazaki, Hanna Ramsey

This week's lesson leader: Hanna Ramsey

Number of students: 7 (out of 7)

Grade: 3rd

Question: How are our hands unique, and how does this help in forensic science?

Materials: Tape, pencils, paper

Agenda:

- Roll call
- Re-cap of previous lessons, scientific method
- Hanna begins experiment
- Forensic science- what it is
- Fingerprints-what are they, what types
- Predictions- what will be the most common type of fingerprint?
- Experiment- use tape and graphite to collect fingerprint
- Collect and analyze graphically (and with tables) the overall fingerprint data
- What was the most common type?
- Did any of us have similar prints?
- How might these be used in forensic science?
- Case closed!

Good teaching strategies:

- Recap of scientific method showed they have retained their knowledge of the scientific method very well. This lesson's focus was on analysis, which was good since that was the only step of the scientific method that they were unsure of.
- Hanna kept the lesson on topic very well even though the kids really wanted to digress and talk a lot about crime scenes.
- Lesson was very inexpensive, required very few materials, used up full time, and was effective at conveying principles of analysis

Things to note/possible problems:

- Kids were a little rowdy today, nothing we couldn't handle, but perhaps recapping the rules in the beginning for every lesson would be a good thing to start doing consistently
- Apparently the two of the kids did a similar lesson to this last week in Kidzone, which is not desirable. Perhaps coordination with Kidzone regarding what activities they're doing might be beneficial.

SCIENCE DETECTIVES

Date: 2/27/12

Location: Broadmor Elementary

Team Leader: Tom Osborn Popp

Members: Humza Salim, Ali Benson, Tyler Miyazaki, Hanna Ramsey

This week's lesson leader: Humza Salim

Number of students: 7 (out of 7)

Grade: 3rd

Question: How does friction work?

Materials: Paperback books

Agenda:

- Re-cap of previous lessons, scientific method
- Humza begins
- Mini-lecture on what the force of friction is and how does it work
- How might friction be useful? What do we predict will happen in certain situations (ice, asphalt, etc.)
- Hypothesize!
- Experiment- Attempting to pull apart books with interlaced pages
- Results- What happened?
- Analysis-What made it harder/easier?
- Conclusion- friction impedes motion
- Question that ties in several concepts learned throughout the semester
- Case closed!

Good teaching strategies:

- One of the best things about this lesson was the student involvement. It was almost entirely inquiry driven, with Humza asking questions and the kids responding and coming up with ideas all on their own
- When they got rowdy, warnings that friends might have to sit apart from each other worked very, very well.
- Lesson required only paperback books. +1 for thriftiness and simplicity!
- Kids had a lot of fun trying to pull apart the books
- Overall, this semester the kids really learned some science. By this lesson, they were able to answer simple conceptual questions relating gravity, density and friction all together. Not to mention, they have the scientific method completely memorized (All 7 steps!)

Things to note/possible problems:

- Next time, there will be more focus on the rules. We got by this semester without constantly enforcing the rules because we had such a small group, which made it a fun and open environment. However, with a bigger class, this would not be a good strategy.
- More consistency in lesson structure might be something worth looking into. The lessons themselves were very well structured because they were based completely on the scientific method, but beginnings and endings were always sort of impromptu, which sometimes threw the kids off-guard
- We made it so that the kids didn't have to use a single worksheet or notebook/folder across all of our lessons. This made it seem less like "school," but at the same time, it might have been nice to have the kids take a few notes so they felt more prepared when we recapped previous lessons.

Science Detectives Tuesday Team
Date: 1/17/12
Location: Rover Elementary
Members: Stephanie Kost, Niraj Patel, Caleb Volz, Kelly Miles
Number of Students: 15
Grade: 5

Question: What makes a soda explosion?

Materials:

Diet coke, mentos, jolly ranchers, gobstoppers, gummy bears

Agenda:

- Welcome: intros, roll call, rules!
- Go over scientific method
- Talk about soda explosion
- Come up with hypothesis to test and predictions (ws)
- Break up into groups
- Go outside
- Do the experiment
- Talk about hypothesis again, reactions, and surface area
- Talk about themes
- Case closed

Good teaching strategies:

- Breaking into groups to discuss hypothesis and predictions
- Doing the worksheet works better with older students
- Relating the experiment back to the scientific method
- Behavior was good. They respond well to me just saying, "be quiet".

Things to note/improve:

- I wanted to watch a video on the soda explosion before hypothesis discussions, but we were running behind schedule
- Bringing up surface area may have been too much for them
- There was a lot of material covered about the scientific method. I thought some of them would be somewhat familiar (like the 3rd graders last year), but because none of them knew, I spent the majority of the beginning of the class lecturing (boring!!!!)
- We should cover less material next time

Science Detectives Tuesday Team
Date: 1/23/12
Location: Rover Elementary
Members: Stephanie Kost, Niraj Patel, Caleb Volz, Kelly Miles
Number of Students: 18
Grade: 5

Question: What is pulse and why do we need it? Why does it change?

Materials:
Paper, pencils, bodies, excel, smartboard

Agenda:

- Welcome: roll call, rules!
- Go over scientific method again
- Talk about blood
- Take resting pulse and input data in excel on smart board (compare between several sample seizes and groups)
- Come up with hypothesis to test and predictions (ws)
- Break up into groups
- Go outside
- Exercise and take pulse
- Talk about hypothesis again, plot
- Take pulse once more
- Discuss: outliers, sample size, groups, supporting and not supporting hypothesis
- Talk about theme!
- Play competition game
- Case closed

Good teaching strategies:

- Breaking into groups to discuss hypothesis and predictions
- Interactive data with excel on smartboard (good use of tech)
- Enthusiasm of the instructor ☺
- They like the competition game

Things to note/improve:

- Use more time to discuss hypotheses
- Plan a lesson related game or discussion for extra time

Science Detectives Tuesday Team
Date: 1/31/12
Location: Rover Elementary
Members: Stephanie Kost, Niraj Patel, Caleb Volz, Kelly Miles
Number of Students: 16
Grade: 5

Questions: Why do our eyes dilate? Why do we see better in the light? Why do we need 2 eyes?

Materials:
Paper, pencils, pennies, pencils, cups, tennis balls

Agenda:

- Welcome: roll call, rules!
- Go over scientific method again
- Talk about eyes (ppt)
- Mini experiment on dilating eyes
- Talk about cones/rods
- So why do we need 2 of them?
- Break into 2 groups
    - one goes outside to throw tennis balls to each other in partners: both eyes open, one eye shit, other eye shut
    - The other group stays inside to do penny and pencil experiments: partner up and close one eye and tell partner when to drop the penny in a cup, switch eyes, then open both eyes. Try to touch 2 pencil erasers together with one eye shut
- Talk about results/data, depth perception, and stereoscopic vision
- Case closed

Good teaching strategies:

- Using ppt technology (for pictures of the eye)
- Breaking up into groups and switching "stations"
- Having several mysteries on the same topic
- Handling kids who do not want to be partners with each other

Things to note/improve:

- Have a little more time for review
- Handling the kids better when they are outside

Science Detectives Tuesday Team
Date: 2/7/12
Location: Rover Elementary
Members: Stephanie Kost, Niraj Patel, Caleb Volz, Kelly Miles, Loni Amundson
Number of Students: 18
Grade: 5

Questions: Why do you jump when a book slams on the ground?(What are reflexes and why do you need them?)

Materials:
Wooden dowels, plastic sheets, cotton balls

Agenda:

- Welcome: roll call
- Go over scientific method
- Talk about reflexes (slam book=kids jump)
- Talk about nervous system briefly
- Ask for other examples (blushing, breathing, taking hand off a hot iron)
- Experiment 1: knee jerk (explain muscle stretching and contraction)
- Experiment 2: cotton ball throwing (protecting the eyes)
- Experiment 3: catching dowels (testing the speed of your reflexes)
- Try experiment 3 with both eyes open and no "heads up", 2 eyes open with a "heads up" and the same for eyes closed
- Talk about what exactly is happening in each and why we need that to happen
- Go over data collection/confounding variables
- Case closed

Good teaching strategies:

- Having interactive experiments
- Explaining difficult concepts in simple terms
- Having multiple examples and tying in multiple concepts (data collection and scientific method)

Things to note/improve:

- Reduce the amount of talking (enthusiasm is good, but interrupting is bad)
- Some kids had difficulties finding the reflexes in their knees
- Make sure predictions are taken into account

Science Detectives Tuesday Team
Date: 2/14/12
Location: Rover Elementary
Members: Stephanie Kost, Niraj Patel, Caleb Volz, Kelly Miles
Number of Students: 18
Grade: 5

Questions: What is pain and how to we feel it?

Materials:
Rulers, washable markers, paperclips

Agenda:

- Welcome: roll call
- Review
- Talk about neurons and ask about pain/pain intensity
- Experiment 1: close eyes and have a partner put a dot with a marker on a body part. With eyes closed guess where the original mark was with another marker. Measure distance, record, and repeat with another body part
- Experiment 2: paperclip neuron differentiation. Have a partner touch you with an unfolded paperclip in the shape of a U. Without looking, tell your partner if you feel one or 2 separate points of contact. Repeat on several body parts
- Try experiment 2 with just moving the 2 ends of the paperclip farther apart and closer together
- Talk about what exactly is happening in each and why we need that to happen
- Go over data collection on board
- Review game!
- Case closed

Good teaching strategies:

- Connecting the lesson with the previous lesson
- Spreading out of team members to maintain control
- Using the scientific method!

Things to note/improve:

- Kids got slightly wild (v-day CANDY), but the "if you hear my voice clap…" tactic works well
- Have a bit more content to go over just in case they already know the science behind what you are teaching (they are so smart)
- If we play the review game, we may not want to take away points for incorrect answers (it makes kids feel bad)
-

Science Detectives Tuesday Team

Date: 2/14/12
Location: Rover Elementary
Members: Stephanie Kost, Niraj Patel, Caleb Volz, Kelly Miles
Number of Students: 18
Grade: 5

Questions: What is pain and how to we feel it?

Materials:
Rulers, washable markers, paperclips

Agenda:

- Welcome: roll call
- Review
- Talk about neurons and ask about pain/pain intensity
- Experiment 1: close eyes and have a partner put a dot with a marker on a body part. With eyes closed guess where the original mark was with another marker. Measure distance, record, and repeat with another body part
- Experiment 2: paperclip neuron differentiation. Have a partner touch you with an unfolded paperclip in the shape of a U. Without looking, tell your partner if you feel one or 2 separate points of contact. Repeat on several body parts
- Try experiment 2 with just moving the 2 ends of the paperclip farther apart and closer together
- Talk about what exactly is happening in each and why we need that to happen
- Go over data collection on board
- Review game!
- Case closed

Good teaching strategies:

- Connecting the lesson with the previous lesson
- Spreading out of team members to maintain control
- Using the scientific method!

Things to note/improve:

- Kids got slightly wild (v-day CANDY), but the "if you hear my voice clap…" tactic works well
- Have a bit more content to go over just in case they already know the science behind what you are teaching (they are so smart)
- If we play the review game, we may not want to take away points for incorrect answers (it makes kids feel bad)

Science Detectives Tuesday Team
Date: 2/28/12
Location: Rover Elementary
Members: Stephanie Kost, Niraj Patel, Caleb Volz, Kelly Miles
Number of Students: 15
Grade: 5

Questions: What is sound, and how do we make high and low sounds?

Materials:
Rulers, balloons, rubberbands

Agenda:

- Welcome: roll call
- Talk about the lungs, the anatomy of the lungs, and vibrations
- Experiment 1: feel the vibrations on your throat (observation)
- Experiment 2: hit rulers with 3, 6, and 9 inches hanging off the end off a desk
- Experiment 3: pull a rubber band different lengths and predict which lengths will make higher and deeper sounds
- Experiment 4: blow up balloons and let air out in different sized openings
- Review game!
- Hand out certificates
- Case closed

Good teaching strategies:

- Having visual representations
- Myth busters video was cool
- Predictions!

Things to note/improve:

- The kids were kind of wild. They listened when we threatened them (take away their balloons), but I would like to stay away from threats.
- We should have started handing out certificates earlier so we would have time for a picture
- For future semesters, having a tie together activity could be a good idea (tie all lessons together)

SCIENCE DETECTIVES

Date: 01/13/2012

Location: Broadmor Elementary **Leader:** Sebastian Silva

Assistants: Amrit, Mia, Weston Number of students: 15

Question: *Why does our heart rate change?*

Materials:

- Pen
- Paper

Total Cost: $0.00

Agenda:

Getting kids from KZ

Going over class rules

Brief run through of the S.M.

Propose question

Why does our heart rate change?

Go over what is a heartbeat and what your heart rate is;

then formulate a hypothesis with the kids and come up with the experiment using 3 different levels of activity. Also teach kids how to take their pulse

Meditation/resting phase and take HR. Report it to team member leading groups

Go outside and walk, then take HR. Report to team member

Play big game of tag to simulate high level of activity then HR and report to team member.

Explain the trend of HR going up with level of activity.

HR changes based on the level of activity we are at

Case Closed!

Good teaching strategies:

It was very helpful spending couple extra minutes making sure kids knew how to take their HR. This lessons was much better suited for these kids rather than first graders. Also using team members responsible for groups of kids was very efficient and a much better experience rather than one leader per class. Walking outside was done by making it a game where the kids had to stay close to another and move like a snake/ the game "snake"

To simulate running, playing tag worked very well. We encouraged that if they stopped running they would be "it" and that got them constantly running. Small groups worked well and allowed me to micromanage and teach the lesson better.

Things to note/possible problems:

Underestimated how smart these kids were so they figured out the lesson very quickly and pretty much knew the answer before we started. Also we were able to identify the possible trouble kids in this lesson. There aren't any glaring potential behavioral problems, but there were a couple kids monopolizing the answering of our questions. Next time I'll make a note to do a better job of realizing this and allowing other kids to answer/participate. We also ran out of time a little bit at the end and wasn't able to teach them how to do averages.

SCIENCE DETECTIVES

Date: 01/20/2012

Location: Broadmor Elementary

Leader: Eric VB

Assistants: Sebastian, Amy, Mia, Weston

Number of students: 11

Question: *Are any two fingerprints the same?*

Materials:

- Ink Pad
- Loupes

Total Cost: $0.00

Agenda:

Getting kids from KZ

Going over class rules

Propose question

Are any two fingerprints the same?

Show them the 3 different types and explain how we are going to fingerprint and see

After they have fingerprinted ask them to compare and they see all are different and unique

Case Closed!

Good teaching strategies:

Breaking up into groups helped a lot because the kids were trying to fingerprint and a lot of them were having difficulties. The small groups with a team member allowed all the kids to get help efficiently

Things to note/possible problems:

Hard for the kids to fingerprint had to go over in our small groups how.

SCIENCE DETECTIVES

Date: 01/27/2012

Location: Broadmor Elementary

Leader: Weston

Assistants: Sebastian, Amy, Mia, Eric

Number of students: 11

Question: *Why do we need two eyes?*

Materials:

- Tennis Balls

Total Cost: $0.00

Agenda:

Getting kids from KZ

Going over class rules

Propose question

Why do we need two eyes?

Explain what the benefits are of two eyes. Depth and blind spots

Different variations of having eyes closed and simple tossing activities with the tennis ball to notice the difficulty of using only one eye.

Case Closed!

Good teaching strategies:

Having them organized when they toss the balls was very helpful because at first we just let them do it independently and there was chaos. They were on two lines and in partners tossing the balls when we told them to and counted the number of times they dropped the ball.

Things to note/possible problems:

The music room was a little distracting for the kids, but that was because the lesson was a little short and we needed a bigger room. Overall wasn't a big problem though. Tennis balls and underhand throws were good to avoid kids pegging each other.

SCIENCE DETECTIVES

Date: 02/03/2012

Location: Broadmor Elementary

Leader: Mia

Assistants: Sebastian, Amy, Weston, Eric

Number of students: 12

Question: *How do we get sick?*

Materials:

- Cups
- Beads

Total Cost: $0.00

Agenda:

Getting kids from KZ

Going over class rules

Propose question

How do we get sick?

Explain different types of bacteria and ways it can spread

Make two circles one inside the other. Have cups with beads in them. The red beads means you're sick and they each have cups with various different colored beads. Play some music and have the circles move and every time we stop them share a handful of beads with the person inside/or outside of you in the circles. After 3 rounds see how many people have red beads then after 5 do it again.

Case Closed!

Good teaching strategies:

Getting the kids to make the circle was a little harder than expected. It really helped when we just told them exactly where to go and what to do. Making sure to not accent the red beads was important until we took tally because we didn't want to single a kid out.

Things to note/possible problems:

The lesson was a little short but otherwise it was a fairly effective lesson and a good demonstration about how easily sickness spreads. Also it was a good opportunity to teach the kids about good ways to prevent the spread of illnesses.

SCIENCE DETECTIVES

Date: 2/14/12

Location: Broadmor

Leader: Connor

Assistants: Alex, Shea, Megan

Number of students: 11

Question: Why don't water and oil mix?

Materials: baby oil, water, food coloring, plastic bottles, tape

Total Cost: $11.91

Agenda:
-Instruct children to leave their backpacks at the door
-Separate talkative groups (by sitting between, grouping by numbers, etc.)
Introduction:
-Review the 5 rules of Science Detectives
-Review the Scientific Method (have the kids look at their packets to remember the steps if necessary)
-Review density
-Give brief explanation of the experiment
-Split into groups and begin writing hypotheses (make sure we go through each step of the scientific method)
Procedure:
1. Help the kids use the sink to add water to the bottles until they are half-full.
2. Add several drops of blue food coloring to the water and shake it up. (Observations)
3. Add oil to fill up the rest of the water-bottle using the funnel. (Observations & Predictions)
4. Duct tape the top of the bottle (so it doesn't become unscrewed while the kids are using it).
5. Have the kids rotate the bottle and be mesmerized by the ocean they just created (Analyze results)*
Important:
At some point a question about why oil and water aren't mixing should arise. Oil and water do not mix because water is structured in such a way that water is charged positively on the oxygen end and negatively on the hydrogen end, while oil is neutral. This keeps the water and the oil from bonding at the molecular level. (I/We might go over charges in a later lesson, so it would be a good idea to get them thinking/questioning about it now).
-Clean up
-Regroup and go over the steps of the Scientific Method
-Reach a conclusion (oil and water do not mix because of their charges).
-Review previous lessons if there is time.
-Talk about questions about charges and electricity if there are any questions
Case Closed!

Good teaching strategies: Going over the scientific method was definitely beneficial, and we did a good job keeping the kids engaged with our leftover time.

Things to note/possible problems: Again, we had an activity that had to be stretched to fill the hour. We're not just there to babysit for an hour, let's fill up our time!! Pump up the enthusiasm; we kind of fell flat last week. Lastly, I stressed at the beginning of the semester that punctuality is vital—I have received two late reports so far. I really need you all to be considerate—I have a tight schedule just like all of you.

SCIENCE DETECTIVES

Date: January 24, 2012

Location: Broadmor

Leader: Megan

Assistants: Jen, Shea, Alex, Danielle

Number of students: 12

Question: **How do baby spiders move after they hatch?**

Materials: tissue paper, glue sticks, scissors, tape, string

Total Cost: $8.48

Agenda:
-introduce SD team
-go over scientific method
-fill out vocab sheet as a group
-ask question
-introduce lesson with background information
-break up into small groups
-perform experiment
-clean up
-go over scientific method vocab
-review lesson
-CASE CLOSED!

Good teaching strategies: Going over the scientific method and having the kids do a worksheet with vocab matching will help us reiterate the different steps throughout the semester. Everyone did great interacting with the kids, especially when we broke up into small groups to perform the experiment! The kids loved the spiderlings, so let's try to incorporate more hands-on experiments with tangible items they can take home to show off ☺

Things to note/possible problems: Have the kids drop their backpacks off at the door when they enter. Also, let's try to sit amongst the students instead of us congregating at the front of the classroom. Don't be afraid to ask Mrs. Minos to help out if behavior takes a turn for the worse. The scientific method is pretty dry, especially for 2nd graders, so we need to keep up the enthusiasm up while describing our experiments!

SCIENCE DETECTIVES

Date: January 31, 2012

Location: Broadmor

Leader: Jen

Assistants: Megan, Shea, Alex, Connor

Number of students: 11

Question: How do whales stay warm?

Materials: Crisco, buckets, plastic grocery bags, ice, water, pencils

Total Cost: $10.46

Agenda:
-review rules (while Shea and Alex set up)
-review past lesson
-lesson intro
-go outside and perform experiment
-come inside and review
-CASE CLOSED!

Good teaching strategies: Backpacks by the door = GOLDEN. Let's continue to do that. I was super impressed by everyone's enthusiasm, let's keep it up! The kids really react well to it.

Things to note/possible problems: Make sure that we are relating everything to the scientific method, even if it means having the kids write and draw observations for 45 minutes. Also, the experiment was a little too short, so we spent the last 10 minutes going over the scientific method in relation to our lessons so far. Let's try to tailor our lessons to the hour we have! We'll start having permanent teams this upcoming week; I will break up the chatty kathy's into separate groups with more appropriate pairings. Great job otherwise!

SCIENCE DETECTIVES

Date: 2/7/12

Location: Broadmor

Leader: Shea Loges

Assistants: Alex, Connor, Megan, Jen

Number of students: 12

Question: **not specified—Cartesian Diver experiment**

Materials: 4 Smart Water bottles (1 L or less), ketchup/mustard packets, kosher salt

Total Cost:

Agenda:
Introduction:
-Review the 5 rules of Science Detectives
-Quick review of last lesson
-Demonstrate the experiment to the kids and ask them why they think the packet is falling?
-Get the kids thinking about floating: what kind of things float? Why?
-Buoyancy and Density: Ask the kids if they've heard of these terms and see if they want to try and define them. Buoyancy describes whether an object will float or sink. Density is the amount of mass in an object relative to how large the object is. For example the difference between a bowling ball and a basketball, while of relatively similar sizes the basketball will float and the bowling ball will sink. The large pocket of air in the basketball makes it much less dense then the bowling ball.
-Split the kids into small groups, with different size bottles and different packets on each table, and tell the kids to write their hypotheses in their journals.

Procedure
1. Remove any labels from the bottle and fill it all the way to the top with water.
2. Add a ketchup pack to the bottle.
3. If ketchup packet doesn't float add salt to bottle in small amounts and shake until salt dissolves
4. Once ketchup pack floats consistently press on sides of bottle to add pressure and cause ketchup pack to sink, releasing the bottle will cause the pack to float back up. With the right amount of pressure you can make the packet stop in the middle.
-Clean up

Conclusion:
-Adding pressure to the sides of the bottle causes the air pocket inside the ketchup or other condiment packets to shrink and increases its density causing it to sink and releasing the sides allows the air pocket to re-expand lowering the density.
-Review the key terms with the kids
-Case Closed!

Good teaching strategies: Shea did an awesome job getting the kids excited about the lesson! Everyone did great adjusting to the shorter activity.

Things to note/possible problems: Again, the activity was too short. The groups we picked were good, but there are definitely switches to make. Keep stressing the scientific method!!

Science Detectives

Date: 2/3/12

Location: Rover Elementary

Leader: Jaclycn Avallone

Assistants: Lauren Wong, Melanie Lehnhardt, Melinda Jenner, Hayley McCrae

Number of Students: 15

Grade: 1

Question: How do the 5 senses work?

Materials: targets, pennies, food dye, cups, water, apple drawing

Total Cost: $3.09

Agenda:

1. Introduce scientific method and fill out worksheet
2. Divide class in half. One half does apple experiment and the other does the food dye
3. Apple experiment: stare at the apple for 30 seconds and then quickly look at a blank paper. You will see a green apple
4. Food dye: put different amounts of food dye in cups. Identify IV and DV and the effects
5. Penny and target experiment: try and hit a target with one eye closed verse have both eyes open and see which one is better
6. Circle game: One student is in center with eyes closed. Another claps. The student with his eyes closed identifies where the sound came from

Good teaching strategies:

The students paid attention to this lesson. They incorporated the scientific method into each of the different experiments. The food dye worked extremely well for them to understand IV and DV.

Things to note:

We didn't have time to do the circle game so this lesson might have to be adapted in order to incorporate everything.

Science Detectives:

Date: 2/17/2012

Location: Rover

Leader: Melanie Lehnhardt

Assistants: Hayley McCrae, Melinda Jenner, Amrit, Connner

Number of Students: 10

Grade: 1

What are Muscles and How Do They Work?

Materials:

Chalk

Rubber Bands

Popsicle sticks

Agenda:

How do we move?

Can you name any muscles in the body?

How many muscles? Over 640!

How many muscles to smile? 15 To frown? 40

First: Four different exercises for the different muscle groups . Have students rotate stations where they learn exercises associated with arm, leg, jaw, and stomach muscles.

Second: Rubber band exercise (kids string together a bunch of rubber bands) and act out Muscles Extending and Contracting.

Third: Go outside and trace each other.

Label Four Main Muscles in the Body:

1. Abdomen

2. Quad Thigh Muscles

3. Jaw Muscles

4. Bicep Arm Muscles

At the end: Play a game where kids can run around “using muscles” like tag!

Good teaching strategies:

It was a good idea to rotate team leaders instead of students in order to have easier transitions. Also having a team leader hold the middle of the rubber band chain to prevent students snapping each other.

Areas to Improve:

It would have been nice to draw how the muscles work on the board to help explain.

SCIENCE DETECTIVES

Date: 1/27/12

Location: Rover Elementary

Leader: Melinda Jenner

Assistants: Lauren Wong, Jaclyn Avallone, Hayley McCrae

Number of students: 15

Grade: 1

Question: How does the digestive system work?

Materials: Iodine, crackers, egg, vinegar, cups, lemonade, baking soda, stethoscope

Total Cost: $16.42

Agenda:

- Introduction to activity: Open envelope with mystery
- The relationship between taste and smell: talk in groups about how things taste when you have a stuffy nose
- Iodine, crackers, and saliva: experiment in groups
    - Add iodine to saltine crackers. The crackers should turn purple or black.
    - Test another cracker after chewing. The iodine will not react and will turn brown.
    - Chewing starts digestion of crackers; the parts that turn the cracker black are taken away by chewing
- Boiled egg digestion: demonstration
    - A boiled egg with the shell on is placed in vinegar. Over a period of several days, the shell on the egg is taken off by the vinegar.
    - Observe an egg that has not been in the vinegar. Observe afterward. What are the differences?
- Making carbonated lemonade: experiment in groups
    - Add baking soda to lemonade: shows how carbonated soda is made
- Listening to the stomach
    - Listen to stomach sounds with a stethoscope

Good Teaching Strategies: There were lots of activites and the students were very engaged and excited to do all of the activities. Breaking up into groups in combination with whole class discussions also worked well.

Things to note: I think they had a hard time understanding the concepts. There needs to be more review of the connections between experiments and the body.

Science Detectives

Date: 2/24/2012

Location: Rover

Leader: Melinda Jenner

Assistants: Lauren Wong, Jaclyn Avallone, Melanie Lehnhardt, Hayley McCrae

Number of Students: 10

Grade: 1

Question: How do germs spread?

Materials:

- 4 potatoes
- Ziplock bags
- Paper towels
- Flour
- Water/soap
- Cups
- Food dye

Total Cost: $18

Agenda:

Talk about what kids already know about germs and how they spread from person to person.

How do germs spread?—activity with everyone (probably outside, might get messy)

One person puts flour on their hands, pretending to sneeze so that the flour is like the germs. The person then shakes everyone's hand. The kids then wipe their hands with paper towels to try to get the flour off (which shouldn't work very well). Run water over your hands without rubbing (there should still be flour on their hands). Now use soap and water, singing Happy Birthday while they rub their hands together. This shows the best way to wash your hands

Potato Experiment—in groups

Make a hypothesis about what part of the classroom is the dirtiest. Put one chunk of potato in a plastic bag without letting it touch anything and label it “control”. Rub the three other section of the potato on different places in the room, for example the doorknob, a desktop, and a pencil, etc.). Label each bag with the location the potato inside touched. Place the potatoes in a dark place and leave them there for one week and then observe. The potato with the most mold and fungus on it determines the place in the classroom with the most germs in it. (Don’t take the potatoes out of the bag, and pour bleach on the potatoes before throwing them out.)

Food dye experiment:

Give every student a cup filled with water. Put food dye in one of the cups. Then have them exchange water or ‘exchange germs” until everyone has the green water. Then discuss how the germs spread.

Glob Tag:

Discuss how germs cells attack normal body cells. Then go outside to play tag. This is normal tag except when you get tagged you hook arms, eventually everyone will be attached and the germ cell has attacked all the normal cells.

Good Teaching Strategies:

These were good experiments. They understood how the germs spread and could see how it got everywhere through drinks, touch and the air.

Areas to Improve:

The tag game wasn’t very successful because the ‘glob’ kept breaking. It started to work better if they held hands instead of hooking arms. However they still got the meaning of the game.

SCIENCE DETECTIVES

Date: 1/20/12

Location: Rover Elementary

Leader: Hayley McCrae

Assistants: Lauren Wong, Jaklyn, Melanie Lehnhardt, Melinda

Number of students: 12

Grade: 1

Question: What changes pulse?

Materials: Timer

Total Cost: $0, use phone/ clock

Agenda:

1. Introduce Lesson
    a. What is pulse?
        i. Heart pumping blood
    b. Where can you feel pulse?
        i. Neck
        ii. Wrist
    c. How do you measure pulse?
        i. Count beats in six seconds and add a zero
2. Measure Resting pulse three times
3. Dismiss tables by good behavior to go outside
4. Play Simon says with athletic activities
    a. Jumping jacks
    b. Running
    c. Hopping
5. Measure active pulse three times
6. Come inside and lie on floor. Ask kids to try and get their heart rate down by meditating.
7. Measure resting pulse three times.
8. Go over activity. What changes pulse?
    a. Exercise
    b. Heart pumps blood to body faster when needed
9. Do you think nutrition changes pulse? What are some healthy foods? What are unhealthy foods?
10. Draw arteries on board. Explain what happens when you eat a lot of unhealthy food.
11. Can the blood travel as fast through clogged arteries? Let's go find out!

12. Outside- Team members form and artery tunnel and kids run through. Then team members form a clogged artery and kids (can't) run through very fast.
13. Come inside and review

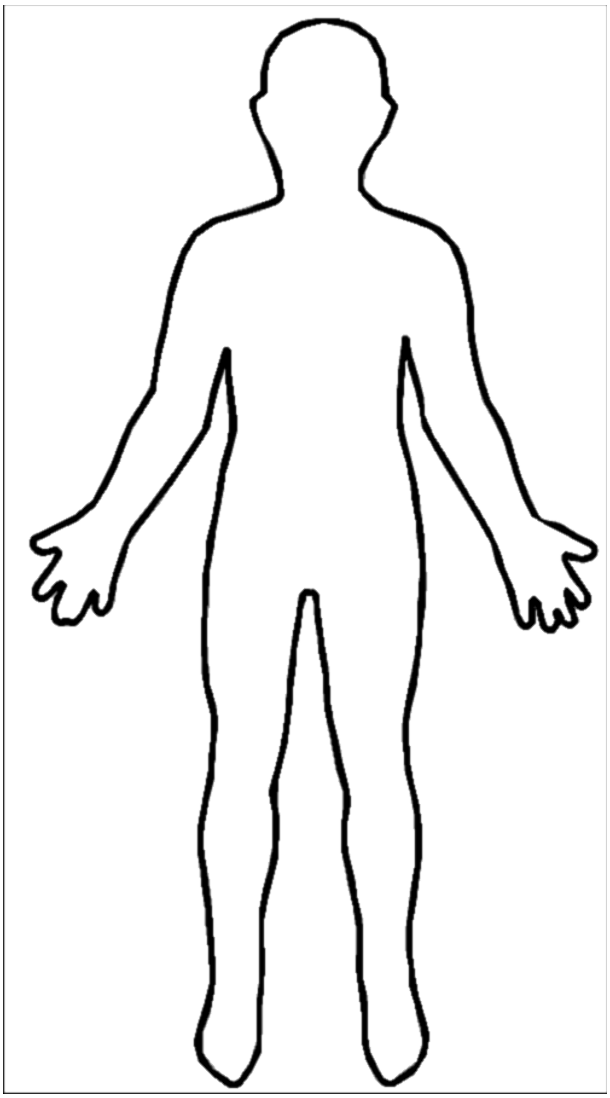
Good Teaching Strategies:

Kids loved running around. They easily understood that their pulse went up the more they ran. The game with the arteries also helped them understand how blood gets stuck with clots easily and also resulted in a lot of giggles which is always good.

Things to note/ possible problems:

Kids made up their pulse when they took it. They didn't fully understand how to take it but they still understood when/why it changes. Also there wasn't any "hands on" experiments which I think would be better.

Science Detectives



Pulse!!

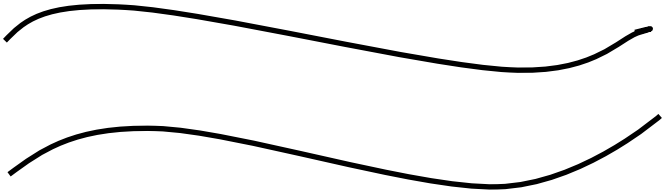
Resting Pulse: _____

Active Pulse: _____

Second Resting Pulse: _____

Normal Artery:

Clogged Artery:



SCIENCE DETECTIVES LESSON

Date: 2/10/12

Location: Rover

Leader: Lauren Wong

Assistants: Jaclyn Avallone, Melanie Lehnhardt, Melinda Jenner, Hayley McCrae

Number of students: 15

Grade: 1

Question:

Why is water important for our body?

Materials:

Water

Buckets

Cups

Brain Sponge Capsule

Total cost:$16

Intro: Did you know?

Why is it important to drink water?

What happens to your body when you do not get enough water? (dehydration)

Demonstrate how our brain needs water:

Put a sponge brain and has the chance to see how it grows when it is put into water! Your brain needs water in order to grow! Our brain is over 75% water.

Blood Team Relay:

1. Have two teams lined up and made up of kids holding large cups. Their goal is to get as much water through the blood stream (from one bucket through the line to the other bucket).
2. Whichever team can get the most water from one bucket to the other wins and has a healthier functioning body.
3. First team to finish must do 20 jumping jacks which shows the team that drinks more water has more energy.

Explanation: Our blood, the very substance of our existence, is more than 83% water and flows throughout our body, distributing nutrients, oxygen, and antibodies. In order for the blood to carry out its many critical tasks, the body must be sufficiently hydrated with "healthy water." An inadequate intake of water (or consumption of water laced with contaminants) causes the properties of our blood to change and negatively affects virtually every aspect of our health.

Question: What happens when we drink water?

Hypothesis:

Materials:

2 Half Liter Water bottles

Scissors

6 Coffee Filters

Clay

Piece of Cardboard

Funnel

Fish Tank Tubing

Tape

Food Dye

Demonstrate how our body processes water:

http://www.youtube.com/watch?v=nJVbFIIycKo

Explanation: When you drink water your digestive system absorbs the liquid into blood stream. Blood circulates through kidneys that go to work to filter the blood just like model filters red food dye. Blood is brought to your kidneys by arteries. Once inside the kidneys blood passes through tons of filters. The blood is under so much pressure that most the plasma leaks out of bloodstream leaving the blood cells. Kidney goes through reabsorption process that allows the plasma to be returned to the bloodstream without allowing chemicals that need to be removed to leave your body. Dangerous chemicals go to bladder. Bladder fills up enough that it fills up against other organs telling you that it needs to be released.

Relay Race Activity:

How your body processes liquid

Materials:

Two Large Sponges

Water

Two Buckets

Good Objects/Bad Objects

1. Have kids split into two teams set up at different stations

2. One kid starts by filling up his sponge with water from a bucket(digestive system absorbing water)

3. He then hands the water filled sponge to the next kid who will run it over to the bucket (the blood stream) where another kid will be waiting.

4. The kid waiting at the blood stream will squeeze as much water out of the sponge into the bucket.

5. The bucket will be filled with good objects and bad objects. Two kids at this station serve as the kidneys. They will work together to filter the blood by removing the bad objects and keeping in the good objects.

6. Next, they will hand the bucket to the next kids, “the bladder.” These kids will run to the finish line or “the bathroom” to empty the water with the bad stuff.

Good Teaching Strategies:

The transition from outside to inside to outside was beneficial. They had breaks playing the outdoor games and were more attentive once inside. The students loved playing with the water and worked as a team well

Areas to Improve:

This lesson needs a lot of team members, the outside games were a little chaotic and confusing. However it was manageable with the amount of people we had.

Lesson Plan: 19 January, 2012

Science Detectives: Rover 4th Grade

Lesson Leader: Eric Lehnhardt

Curriculum Theme: Olympics

Lesson Theme: Basketball

Causal Question: *Why do we have two eyes to see?*

Learning Objectives:

- Students will understand the essential steps in the Scientific Method.
- Students will understand and be able to describe stereoscopic vision.
- Students will practice recording data and taking observations.

Introductions – 10-15 min.

Who are you?
Who are we? (Eric, Laura, Abhivnav, Nicholas)
What is Science Detectives?
Who are you? (students – names and what activity they wish could be an Olympic sport)
Science Detectives Rules & Expectations (The Five Rules of Science Detectives)
*What are the Olympics?
Semester theme (science of the Olympics) and today's focus sport: Basketball

Guided Discussion – 10 min.

Who's played basketball?
What abilities do you need to play basketball in the Olympics?
Take answers until you get 'hand-eye coordination' or similar
Why do you use two eyes when you play basketball?
Why do you have two eyes?

Discuss: it's a mystery! How do we solve? Scientific Method
What is a hypothesis?
Accept hypotheses about why we have two eyes / why we use two eyes to play basketball
Thought experiment to eliminate the more far-flung ideas
Discuss the kinds of tests you could do to check your hypothesis
Cover one eye, try to shoot a basket, don't cover eyes and try to Shoot
Establish a procedure
Make predictions

Divide into equal groups.

Experiment: 10-15min.

*Notebook setup: each student writes name, experiment title, date, and hypothesis on half sheet of paper
On one half, student writes predictions: how many shots will go in with one eye, how many with both
On the other half, blank space for recording observations

*Each student gets 5 shots with one eye covered, and 5 shots with both eyes.
Shoot underhand with whiffleballs into a "hoop" made by team member's arms.
Make this fun! Encourage students to pretend they are at the Olympics. Use an announcer voice, but stay positive ("And the crowd goes wild!" Or "Better luck next time, Billy!")
Take turns shooting: form a line, each kid shoots once and passes the ball to the student behind him or her. May be best to do this outside.
Students should record their results on a half-sheet of paper (as they go).
*At end of 10 total shots per student, the team member then compiles all of the data. Ask student-by-student. Then, pick two students from your group: one to present your results to the class, and a second who is a "critic". This student may agree with, disagree with, or add to what the reporting student says.
*If your team finishes early, have students draw their experimental set-up and label it (draw arm "hoop" and label; draw student throwing and the ball in action and label, can also label distances, etc.)

Data Analysis and Drawing Conclusions: 10-15 min.

*Student pairs from each team report to the class as a whole. Team leader records data on the whiteboard / smartboard.
What does our data tell us? Does it match our predictions? What does that mean for our hypothesis? Does the result make sense?
Review: Scientific Method

Discuss: stereoscopic vision. Why do we have it? What is it like? (3D movies)
So, if you want to be an Olympic basketball player, do you shoot with one eye, or two?

*If >15 minutes extra remain, discuss stereoscopic hearing and basketball dribbling. Do example testing with individual student in front of class.

*If 5<time<15min, have students play competitive knowledge game. Ask questions from the lesson and about the scientific method. Whichever group "wins" gets a small prize (first in line at the door).

*If time<5min, just take them outside.

Tips & Tricks

When working with the small groups, have students sit facing you (sitting in a circle is best) so that everyone can see everyone.
Use "If you can hear the sound of my voice, clap once…" when in the larger group.
If, during full group instruction, you are near or see students who are not paying attention, quietly shush them, first. Then, separate. Put yourself in their physical vicinity. If still a problem, give them a choice: timeout or participation.
It is never necessary for you to initiate any kind of touch with a child. If one hugs you, side-hug them. Move kids who try to sit on your lap.
Learn names as fast as possible. Don't be afraid to call out kids by name if they're causing problems.
Make everything as much of a game as possible (not necessarily competitive, just fun).

Lesson Report

Date: January 19, 2012

Location: Rover Elementary School

Lesson Leader: Eric Lehnhardt*

Assistants: Laura Godshalk, Abhinav Mishra, Stephanie Maxwell**

Absent: Nicholas Hohmann

*denotes team leader.

**denotes substitute teacher.

Number of students: 17

Question: How/why do basketball players use both eyes to make baskets?

Materials: 1 package wiffle balls

Total Cost: $5.18

Agenda: See lesson report in this folder

Good teaching strategies:

- Use of white board
- Engaging to students
- Use of competition

Things to note/possible problems:

- Behavior problems: need to separate kids who don't work well together
- Not enough time for all activiities

Lesson Plan: 26th January, 2012

Science Detectives: Rover 4th Grade

Lesson Leader: Abhinav Mishra

Curriculum Theme: Olympics

Lesson Theme: Safety Equipment

Causal Question: How can we keep Olympic athletes safe?

Learning Objectives/Brief Description:

There is a special process how people have to keep Olympic athletes safe. This is the perfect way to teach the children how the scientific discoveries work (it uses the scientific process in order to perfect material). By using an egg and dropping it, the children will start to see that process, as well as seeing how much pressure is on the scientists to protect the athletes.

Guided Discussion – 10 min.

Who's ever ridden a bike? Why do your parents make you wear a helmet? That's the same thing that happens in the Olympics: to keep us safe. (If I can, I want to show this video http://nbclearn.com/olympics/cuecard/47281).

Discuss: How you can protect an egg?

1. Scientific Questions
2. "Dispersing Energy"/"Dissipating Energy"
3. Science of Designing
4. Experimenting with Scientific ideas
5. Record Observations, Note mistakes and possible changes
6. Use data to draw conclusions

Divide into equal groups.

Experiment: 15-20 min.

*Notebook setup: see worksheet attached

1. Tell students that they will be working in groups to design a safety gear device that would protect a raw egg if dropped from a height of 6-8 feet. Remind students that they must not alter the egg itself in any way (to make the egg stronger). Tell students that they must complete the preparation and the creation of their safety gear, with their raw egg inside, by a given deadline.
2. Give each group a plastic bag filled with:
    1.
3. After examining all the materials, students should brainstorm ideas on how to create the most protective "gear" for their egg.
4. They may proceed to create their safety gear.
5. At the appointed time given in the deadline, all groups will be told to stop. (5 minutes)
6. They must write a hypothesis about what they think will happen when the egg is dropped.
7. The teacher will take all the groups, with their completed projects, to the site where they will drop the egg.
8. After all the eggs are dropped, the students should return to their classroom to review and discuss the results. Groups should now complete in the experiment worksheet as they discuss why their protective gear worked well or why it failed to protect the egg.
9. As they formulate a conclusion about what they would do the same or differently, the next time they try to do the experiment.

Data Analysis and Drawing Conclusions: 10-15 min.

One person from each group should be chosen from within the group to share with the class what they wrote in Part Five. Students should take turns sharing their group's conclusion, specifically how well their safety gear protected the egg and what they could do differently to improve their design. Tell students that they are now going to see how and why athletes in the Winter Olympics are protect

Lesson Report

Date: January 26, 2012

Location: Rover Elementary School

Lesson Leader: Abhinav Mishra

Assistants: Eric Lehnhardt, Laura Godshalk, Abhinav Mishra, Nicholas Hohmann, Loni Amundson**

Absent: Nicholas Hohmann

*denotes team leader.

**denotes substitute teacher.

Number of students: 15

Question: How/why do Olympians use helmets to protect their heads? How can we protect eggs that are dropped?

Materials:

2 boxes crispy cereal

2 qty 24 gallon ziploc bags

1 dozen eggs

1 package of pipe cleaners

4 rolls of masking tape

1 bag of flex straws

Total Cost: $24.01

Agenda: See lesson plan in folder

Good teaching strategies:

- Lots of energy
- Very engaging lesson, lots of fun

Things to note/possible problems:

- Did not use scientific method during teaching; was present in lesson plan
- Don't over-step the authority of the team leader (i.e. do not improvise the lesson in ways that the lesson leader did not intend).

Science Detectives Lesson
Lesson Leader: Laura Godshalk
Lesson Theme: Track & Field - Running (Bipedalism)

Causal Question: Why are two legs better than more? Is two the best number of legs to give us the ample amount of abilities?

Learning Objectives:

- Students will understand the essential steps in the Scientific Method.
- Students will understand and be able to describe bipedalism.
- Students will practice recording data and taking observations.

Introduction – 5 min.

Go over Science Detectives Rules & Expectations (The Five Rules of Science Detectives)
What did we learn last week? (Safety Equipment - Dissipating/Dispersing Energy)
Today's focus sport: Track Running

Guided Discussion – 10 min.

Think about recess. Running around is an awesome way to burn off energy but also revitalize and feel more energized. It feels good but it's tiring, isn't it? Who thinks they're fast among their friends? What about those of you who think you can out-run your friends in distance?

Let's change gears for a moment. Who has a pet at home? What kind?

Take answers, focus in on the four-legged animals. Now do you think you could outrun a dog, for example? They're pretty fast.

What abilities do you need to run in the Olympics?

Take answers - speed, strength, endurance, balance

Do you think if humans trained themselves to, they could run on all fours? Do you think that would make us faster to have that ability, more like dogs?

Hypothesize over why we use two legs to run. Do you think we can be as fast on all fours? Or with three legs? (Tell children to turn to their worksheets) First ask everyone if they know of the terms "**Controls**" and "**Variables**".

Brainstorm. Discuss the kinds of tests you could do to check your hypothesis

Two-, three-, and four- legged races in each group.

Compare times, and how challenging each of them were compared to each other.

Experiment - 15-20 min.

Establish a procedure: In your groups, we will execute the following Olympic race time trials. Each group leader should have a stop watch to time their students (or pair of students), and have them record their times directly after each race.

1. Simple two-legged sprint
2. Three-legged races, two people per "three-legged person". Allow a student to go again if group number is odd.
3. Races on all fours.

Be encouraging, but also intense! Try to make them feel like they're at a serious time trial. "On your mark, get set..."

Make sure students have their papers and pencils outside to record their times for all three races on the backs of their papers.

Data Analysis and Drawing Conclusions - 10-15 min.

When back inside, kids in the groups should compare their times and feelings about each race. (This is on the worksheet: Which race received the fastest time? Was one race harder than all the others? Were there any races harder and more tiring than you thought? Who received the highest/lowest score, and for which race?)

Once this is discussed, group leaders pick one or two students to be the reporters of the findings of each group.

On the board, I create 3 columns, each titled with the difference race, and 4 rows, for each group. Record characteristics of each run, and write down best group time and worst group time.

Why don't you think the three-legged race worked very well? (Balance, Speed)
Why don't you think the four-legged race was also less successful? (Flexibility, Speed)

Explanation to class: Your flexibility, strength, and balance are <u>compromised</u> when you run with three or four "legs." This is because <u>humans evolve and adapt</u> to their surroundings, which means that with all the ideas we naturally have that make us smarter than animals, we need hands.

- Now humans are complex creatures because <u>we move for a lot of reasons</u> other than to catch our prey and run from predators like animals of the wild do. Having two legs gives us an <u>adaptive advantage</u> so that we can use the **balance, flexibility, and speed** that comes with that, used for walking, hunting, and traveling long distances. The scientific term for this is **bipedalism**. In Latin, "Bi-" means **two**, and "ped-" means **foot**. Can you think of animals that are bipedal? (Ostrich, monkey) Nearly all mammals are **quadrupedal**.
- We're not the only mammals that are built the way we are because of the way we live. All creatures develop over time, it's called evolution! A horse's legs, for example, aren't like a person's legs.
- What do those legs look like? Are they different from the way ours function?
- There's even a difference in the makeup of a horse's front and back legs. This is all because animals, like humans, adapt to their needs and surroundings and evolve through time so they are suited the best they can be for their surroundings.

- Yes, we may not climb trees and swing in them for example, like other primates, but as constantly developing humans, those skills are not very necessary.
- The main difference is that we are <u>civilized</u> and need our hands for <u>more complex tasks</u>.

- Like what, can you think of <u>examples</u>? If we had four legs to move, we would be more like animals and less able to do complicated things like **write** and **create** and **develop technologies** we have today.

- If we had four feet and no hands, imagine trying to text! An invention like computers would have to be **nearly impossible to physically execute** like that!

Worksheet

1. Hypothesis: Why do we have two legs to run? Can we humans be as fast on all fours? Or with three legs? Write what you think will happen when we race. Remember a hypothesis is a sentence! (Ex: "The _____ race will be the easiest and fastest because...")

Controls/Constants: (Answer: Distance of race, runners)

Variables: (Answer: Single person with 2 legs vs. 2 people with 3 legs vs. 1 person with 4 legs)

2. Results: Which race received the fastest time? Was one race harder than all the others? Were there any races harder and more tiring than you thought? Who received the highest/lowest score, and for which race?

3. Was your hypothesis accepted or rejected? What made you right or wrong?

4. Conclusion: Why is it that the easiest race was what it was? What made certain races harder or easier than others? Did any variables in the races slow you down?

Lesson Report

Date: February 2nd, 2012

Location: Rover Elementary School

Lesson Leader: Laura Godshalk*

Assistants: Eric Lehnhardt*, Abhinav Mishra, Nicholas Hohmann

*denotes team leader.

**denotes substitute teacher.

Number of students: 17

Question: How/why do humans run on two feet? Are we faster on two, three, or four limbs?

Materials: Stopwatches (owned by the program)

Agenda: See lesson plan in folder

Good teaching strategies:

- Good to get the kids outdoors
- Good to involve physical activity

Things to note/possible problems:

- Did not leave enough time to include wrap-up
- Understanding of bipedalism had to be accomplished in successive class periods
- Could include more emphasis on scientific method

Science Detectives Lesson

Lesson Leader: Nicholas Hohman

Lesson Theme: Capillary Action and Transpiration

Causal Question: How do plants get water to their leaves, stems, etc. (how is this alike and unlike people getting blood to muscles)

Learning Objectives:

- Students will learn to ask questions of nature and think critically.
- Students will understand capillary action and transpiration in plants.
- Students will understand cohesion and adhesion in water.

Introduction – 5 min.

Go over Science Detectives Rules & Expectations (The Five Rules of Science Detectives)
What did we learn last week? (Running - Bipedalism)
Today's focus sport: Nourishing our bodies

Guided Discussion – 8 min.

How do we get blood to our muscles? Okay, what about plants, is water like their blood? And how do plants get water to their leaves and stems? What are your hypotheses?

Experiment – 13 min.

Okay, here you have two cups, one with water and one empty, you can label them roots and leaf if you want, then you have this rubber tubing that's like a plants stem, the goal is to get the water from one cup to the other using the tubing, like a plant would. Ask for predictions. Leaders can work with groups and the worksheet to guide and test their hypotheses. Some groups may not figure out how to siphon the water.

Data Analysis and Conclusions – 19 min.

Model siphoning water; explain how this models **transpiration** which is caused by the water evaporating from leaves (perhaps mention **stomata**). Then explain **capillary action**, I can have students dip paper into water and show how it flows up the paper and/or bring in straws and stirring sticks that they can stick in water and then look through the straw to see how more water flows up the thinner straw. Explain that this is because of **cohesion** and **adhesion**, talk about how water flows down your arm and how water molecules stick together, they can model this individually while I speak. Then put all this together with a plant diagram to explain all the forces that move water through stems, ideally we could bring in a stalk of celery for them to look at and semi-dissect to show the **xylem** and **phloem**, which we can also discuss.

Worksheet

5. Hypothesis: How do plants get water to their leaves, discuss and/or diagram this anyway you can?

6. Results: What are the various forces going on within a plant, can you list and explain them and perhaps briefly write ways of demonstrating these phenomena?

7. Conclusion: Can you draw a plant and label what is going on within it to transport water across its body?

Lesson report

Date: February 9nd, 2012

Location: Rover Elementary School

Lesson Leader: Nicholas Hohmann

Assistants: Eric Lehnhardt*, Abhinav Mishra, Laura Godshalk

*denotes team leader.

**denotes substitute teacher.

Number of students: 19

Question: How do plants get water from their roots to their leaves (without a heart)?

Materials:

Solo Squared Cups

Medium Celery

Tubing (clear plastic)

Celery Heart

Total lesson cost: $17.99

Agenda: See lesson plan in folder

Good teaching strategies:

- Kids loved the challenge
- Lots of energy
- Good use of inquisitiveness

Things to note/possible problems:

- Cursed in front of class – do not do
- Chaotic opening portion – may be fun, but not productive / reinforces negative behaviors

SCIENCE DETECTIVES

Date: February 16th, 2012

Location: Rover Elementary School

Lesson Leader: Eric Lehnhardt*

Assistants: Abhinav Mishra, Nicholas Hohmann

Absent: Laura Godshalk (excused, ill)

*denotes team leader.

**denotes substitute teacher.

Number of students: 16

Question: Why do Olympians drink sports drinks, not just water?

Materials:

Food Scale (4x)

Gold Bears (gummy bears)

Salt

Total lesson cost: $1.99 (scales and salt previously owned by organization)

Agenda: See lesson plan in folder

Good teaching strategies:

- Good involvement of students
- Good use of scientific method
- Good emphasis on reality of science: things don't always work

Things to note/possible problems:

- Experiment did not work; disappointing to kids
- Chaotic classroom behavior; short-staffed, need to make sure that kids are silent before giving directions and that teachers re-inforce what the other teachers are doing

Lesson Plan: Paper Airplanes

Grade Level: 4th Grade, Rover Elementary

Causal Question: How does flight work?

Material: Paper, Scissors, Rubber Bands, Paper Clips

Lesson:

Begin the lesson by asking the students about flight. How does flight occur? How do birds fly? Write these on the board. Get a good-sized list. Do some thought-experiments. Talk about ones that could be tested with airplanes (large vs. small; having an engine (rubber bands); heavy vs. light). Break into groups. Each group gets one hypothesis. What is their test? What is the design? What happened? Why? In the large group, tell everyone what happened (tell the findings). Then go back into groups, give them newspaper strips. Show how "lift" is created. Test by 3:10; done test by 3:20; kids presentations end by 3:30.

Lift: Talk about history. What let birds fly? How could we fly? The Wright Brothers discovered how to make flight occur in 1913. The pull from the top of the wing pulls the plane upward (fast moving fluids have more pressure than slow moving fluids- Bernoulli's principle). The shower curtain gets sucked into the shower because of the pressure from the water is moving quickly and pulls the air and it moves faster, so to make the system have the same pressure, the curtain gets pulled. Demonstrate with the newspaper.

WORKSHEET

1. What test are you doing? Write a hypothesis. Make prediction(s).

2. Draw your design(s).

3. What happened?

4. Was your hypothesis supported?

Lesson Report

Date: February 23rd, 2012

Location: Rover Elementary School

Lesson Leader: Abhinav Mishra

Assistants: Nicholas Hohmann, Eric Lehnhardt*

Absent: Laura Godshalk (excused, mono)

*denotes team leader.

**denotes substitute teacher.

Number of students: 16

Question: How do planes, birds, and arrows fly?

Materials:

Printer paper

Tacks

Paper clips

Scissors

Total lesson cost: $0.00 (all supplies previously owned)

Agenda: See lesson plan in folder

Good teaching strategies:

- Great use of scientific method
- Very interesting to have diff. groups explore diff. hypotheses
- Good classroom presence / improved classroom management.

Things to note/possible problems:

- Confusion between “levitation” and “lift” because of an answer one student gave
- Inconsistent explanations between groups (inclusion of Bernoulli’s Principle, etc.)

SCIENCE DETECTIVES

Date: March 1st, 2012

Location: Rover Elementary School

Lesson Leader: Nicholas Hohmann / Eric Lehnhardt*

Assistants: Abhinav Mishra

Absent: Laura Godshalk (excused, mono)

*denotes team leader.

**denotes substitute teacher.

Number of students: 18

Question: What makes Diet Coke and Mentos work?

Materials:

J/R Kisses

Club Soda

SFY Orange Slices

CocaCola Classic

3 Diet Coke Contour

Prite Soda Cntour

Total lesson cost: $14.35 (all supplies previously owned)

Agenda: 1. Roll Call 2. Review Rules 3. Review Lessons

4. Discuss Diet Coke and Mentos – how might it work? Accept hypotheses

5. Using loupes, examine the different kinds of candy – mentos, jolly ranchers, orange slices – and take observations. Note that the mentos are porous and that this can be seen. It may help to slice candies in half.

6. Ask students to consider what is in Diet Coke vs. Coke vs. Sprite vs. Sparkling water vs. water.

7. Demonstrate combinations of candies / sodas. Discuss the factors involved in each combo (which variable is changing, what the attributes of each candy and soda are).

8. Discuss porosity and carbonation as the sources of the Diet Coke and Mentos effect; mentos has greater surface area leading to more sites for the exit of the carbonation from the fluid.

Good teaching strategies:

- Good use of the scientific method
- Good use of materials: jeweler's loupes.
- Good opportunities for students to form predictions/hypotheses based on observations of candy

Things to note/possible problems:

- Did not have sufficient time to test all combinations.
- Some students did not understand the final concept; were simply writing down what they were told.

SCIENCE DETECTIVES

Date: 01/18/2012

Location: Hudson Elementary

Leader: Kevin Hildebrandt

Assistants: Riley M., Mario M., Ben M., Connor S.

Number of students: 18

Question: *What is light made of?/Can we take all the colors and make white?*

Materials:

- Prism
- Flash light
- Tupperware
- Water
- Mirror
- White paper
- Crayons
- Cardboard
- Scissors
- Glue
- String

Total Cost: $19 (this cost was mostly for prism, flashlight, and mirror so if this experiment was redone it would be much cheaper.)

Agenda:

Role Call

Review the Scientific Method

Review concepts from the previous lab

What is light made out of?

Observe/ Question: Go outside and perform demonstrations with prism, and water/mirror/Tupperware

Go back inside. We know that light is made of colors, but can we make white out of all the colors?

Make color wheels and spin them. Hypotheses: what colors to use and in what order?

Closing discussion: So now that we know what light is made of, why do you think that we see colors?

Case closed!

Good teaching strategies:

Kevin made a good attention getting phrase “science… WO, WO” kids seemed to really like it.

Making the distinction between mixing paint (makes grey/brown) and mixing light made the kids think a lot about what color really is.

The kids really like the groups. They build closer connections with specific group members.

The kids brought in picture of their questions!!! :D

Things to note/possible problems:

The seed lab from last week carried over to this week, and it was a little distracting for the kids at the beginning.

You have to make sure that the kids really color in the color wheel. If they leave white spots or color lightly then they will see white on their color wheel.

Once again, need to make the transitions between different activities more crisp.

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SCIENCE DETECTIVES

Date: 02/01/2012

Location: Hudson Elementary

Leader: Mario Moreno

Assistants: Riley M., Kevin H. Ben M., Connor S.

Number of students: 18

Question: *What are cells? How do we know that they are there?*

Materials:

- 8 compound microscopes (checked out from school)
- 1 dissecting microscope (borrowed from lab)
- Live Paramecium, Live amoeba, various cell slides (borrowed from lab)
- Slides
- Cover slips
- Paper towels
- Pipets
- Surge Protectors

Total Cost: $0.00

Agenda:

Microscope and Room Set up

Review the Scientific Method

Review concepts from the seed and the light labs

Mario's Presentation

What are cells?

Where are they?

Are they alive? How do you know?

Assign two kids per microscope, and give them paper and pencils (from classroom)

Demonstrate the parts and how to use the focus on the microscope (many will need help)

Rotate every five minutes so they can see all the tissue slides and get a look through the dissecting microscope.

Take a quick break and set up the live specimen slides

Give each group a live specimen slide to look at.

So are cells alive?

They can move! Give explanation of cell movement and discussion of whether or not plant cells can move. Brief explanation of life makes life.

Case closed!

Good teaching strategies:

The kids were amazed by the dissecting microscope and getting to draw the live cells.

The presentation was good because it provided pictures as well as spoken explanation.

Something truly new and exciting for the kids to experience, I am glad we got to give them a rare experience like this.

Things to note/possible problems:

This is a very tricky but very rewarding lesson plan.

The set up at the beginning is a bit time intensive

The teachers must know how to use and focus a microscope

Teachers must really impress upon the kids the importance of respecting the equipment. (The 4^{th} graders were well behaved but I wouldn't suggest teaching this to kids younger than that?

Teachers must be strict about making sure that the kids share microscope viewing time equally.

The school provided microscopes and the lab that Mario and I work at was kind enough to provide the slides and specimens. We were very lucky to get all of these resources.

SCIENCE DETECTIVES

Date: 02/08/2012

Location: Hudson Elementary

Leader: Riley Molloy

Assistants: Mario M., Ben M., Amrit K.

Number of students: 15

Question: *What is Charge?*

Materials:

- Balloons
- String
- Van Der Graaf Generator

Total Cost: $0.00 (Supplies attained for Science Detective stock)

Agenda:

Question: What is Charge?

Electricity, charging phone, batteries, etc…

Static electricity

Things can receive charge or give charge away

1. Rub a balloon on your head: Which is receiving charge, the balloon or your hair?
    a. Hypothesize and predict
    b. Test by rolling coke cans (positive charge, balloon should pull coke can)
    c. Briefly discuss results with entire class
2. What happens when two like charges come into contact?
    a. Hypothesize and think of a way to test this question
    b. Tie string to balloons and hang two "charged" balloons close to each other (they should repel one another)
    c. Discuss results
3. What surface do you think the balloons would stick to the best?
    a. Discuss hypotheses and test three materials
    b. Also, can test if the size of the balloon affects sticking ability (smaller balloon is better)
    c. Share results
4. Fun with the Van der Graaf Generator
    a. Why does Ben's hair stand up when he standing on a chair and not when he is on the ground?
    b. Nothing to do with material of chair, it is because he is not touching the ground (aka. He is not "grounded") and charge can flow through him freely.

Case closed!

Good teaching strategies:

This Lesson works amazingly well with the Scientific Method.

The kids loved getting their own balloons, and also watching Ben and Amrit shock themselves on the VDG generator.

The teacher told us that this material is very good for the kids because charge/magnets are an integral part of AIMS curriculum!

Things to note/possible problems:

The kids got a little distracted by their balloons, so it is important that the team members be quick to discourage any distraction that could arise from this.

It is important to not go into too much depth with this lesson, keep it simple.

The lesson was too awesome to fit into one hour of class time, and our kids were late for pick up.

SCIENCE DETECTIVES

Date: 02/08/2012

Location: Hudson Elementary

Leader: Amrit K.

Assistants: Mario M., Ben M., Riley M., Kevin H.

Number of students: 13

Question: *What candies make coke explode!?*

Materials:

- (10) 1 Liter diet coke bottles
- (6) 1 Liter sprite bottles
- (6) 1 Liter diet dr. pepper bottles
- 2 Liter diet coke
- Mentos, Jolly Ranchers, Gummy Bears, M&Ms
- Plastic Mentos&coke spray nozzle

Total Cost: $19.65

Agenda:

What candies make coke explode?

  - What is the different between and independent and dependent variable?
  - Why do we use these variables?
- Let's test which candy is makes the larger explosion!
  - Independent and Dependent Variables? (Candy and Height of Foam respectively)
  - Examine candies and make hypotheses
- Go outside and test the four candies in the 1 Liter coke bottles
  - Makes observation and discuss what we saw
  - Compare this to earlier hypothesis
- Let's test which soda makes the largest explosion!
  - Separate into 4 groups
  - Independent and Dependent Variables? (Soda type and Height of Foam)
  - Examine Sodas: nutritional fact/ colors/ amount of fizz/ etc…
  - Test each soda with Mentos
  - Return to big group and discuss results
  - Retest diet dr. pepper and diet coke in large group (because their height was almost equal)
- Demonstration with big bottle
  - Put Mentos in 2 Liter bottle of diet Coke for fun ending to lesson

Case closed!

Good teaching strategies:

Amrit provided sheet for the kids to write on, and this was a very good strategy for 4th graders because none of them had trouble writing at this age.

The team as a whole worked very well this lesson with all of the members contributing to the large group sections.

Using small bottles worked well, although this was more expensive, because the kids enjoyed the large quantity of explosions.

Good lesson for scientific method and for explaining variables

Things to note/possible problems:

The experiment is messy.

The kids will ask if they can have the candy or the soda.

SCIENCE DETECTIVES **Date:** 02/22/2012

Location: Hudson Elementary **Leader:** Ben Masserano & Mario Moreno

Assistants: Riley M., Kevin H., Amrit K. Number of students: 12

Question: How do fish float? & How do whales stay warm?

Materials:

Whales:

- Ice ($4.65)
- Buckets (stock)
- Crisco bags (stock)
- Plastic bags (stock)

Fish:

- Beakers (stock)
- Bubble wrap (stock)

Cost: $4.65

Procedure:

1. Discussion of Marine Life: What is different between fish and mammals the live under the water? (5-10min)

2. Separate into two groups—half of class does “how do whales stay warm?” and half does “How do fish float” (20min)

Whale group: Whales migrate from tropical warm waters to freezing Alaskan waters, how do they keep warm? What do whales have lots of? => Blubber!

Hypothesize/ Predict!

Perform test with bags of Crisco and with control bags. Which can you keep your hand in the longest?

The Blubber insulates them and keeps them warm!

Fish Group: How do fish rise and fall in the water without sinking to the bottom or floating to the top? With their swim bladders (a lot like human lungs)!

Hypothesize/ Predict!

Perform test with beakers and bubble wrap. Can you get it to stay in the middle of the beaker?

The fish inflate their swim bladder to sink and inflate it to rise!

3. Switch activities (20min)

4. Regroup and discuss what we saw! Discuss what we learned about marine life: Maybe quickly talk about how fish stay warm, and how whales float? Why do dead fish float to the top? (5-10min)

Case Closed!

Good Teaching Strategies:

The kids enjoyed the added competition aspect of the whale lesson made the kids enjoy it more.

The kids enjoyed discussing the other questions at the end of the lesson.

Things to keep in mind:

The kids have to be kept focused to get through the scientific method and the experiment in the 20 minute period before switching stations.

The kids will really want to pop the bubbles of the bubble wrap!

The water can be messy so make sure that you have lots of paper towels and an area that you don't mind getting wet

SCIENCE DETECTIVES **Date:** 02/29/2012

Location: Hudson Elementary **Leader:** Kevin Hildebrandt

Assistants: Riley M., Ben M., Mario M., Amrit K. Number of students: 14

Question: What is Pulse?

Materials:

Stop watch (aka. phone)

End of year certificates ($24.40)

Cost: $24.40

Procedure:

1. The circulatory system, including the function of the blood and the heart.

2. Separate into small groups and learn how to take our pulse on our chest, throat, wrist, arm, and ankle

3. Take our resting heart beat and discuss how fast we think the heart beat should. Help any kids who are having trouble finding their heart beat and then record pulse again.

4. Hypothesize how our heart rate will change with exercise and predict by how much it will change.

5. Go outside and run the obstacle course. Regroup quickly and take your active heart rate in your small groups. Have kids record their results.

5. Discuss how our heart rate changed and why it changed. Include a discussion of muscles and of lungs if the kids are the appropriate age. Does the amount of muscle you use correspond to how fast your heart beats? Form Hypotheses and predictions of how we could test this.

6. Do jumping jacks and compare this to the running. Record results

7. Return to the classroom and record your results in a graph and discuss the results

8. Present certificates to kids and take a group picture

Case Closed!

Good Teaching Strategies:

Kids enjoyed the chance to run around and race each other.

They had just gone over how to make tables in class so this concept was good for them to go over again.

The kids got some good practice at mathematics which was very appropriate for a 4^{th} grade level

Things to keep in mind:

It will be difficult for some kids to feel their pulse.

Make sure no one gets hurt during the fitness activities