Unit Overview

INQUIRY INTO TRADITIONAL FOODS PREPARATION encourages students to think like scientists as they develop meaningful understandings about science concepts related to the traditional methods of food preservation. The unit focuses on the preservation of fish, but could easily be expanded to other foods. Students gain insight through direct experience with the process of science and through interaction as members of a cultural community.

At the heart of the unit, based on the Alaska State Standards, are these understandings:

- Traditional food preparation methods can be examined and explained through scientific investigations
- Science is a process of solving real problems
- The importance of traditional foods is more than how food is prepared and eaten; it is also reflected in social protocol and interactions

The Table of Contents divides the unit into sections. Below is a brief explanation of each.

Phase 1

PHASE 1 COMPONENTS

1) **Survey** Students will take a survey to help determine their attitudes about math and science.
2) **Pre-Test** Students will take a pre-test to help determine their proficiency in the standards we are going to cover at camp.
3) **Meeting Each Other** Students meet each other and begin teambuilding and cooperative skills work as well as learn about unit expectations.
4) **Introduction to Unit** Students will be introduced to the camp essential question. They will also be led through a KWHL activity to see what they think they know, want to know, how they will go about learning, and what they learned.
5) **Introduction to the Scientific Method** Students are introduced to the concept of the scientific method and variables through Roto-Copters and plankton experiment.

Phase 2

PHASE 2 COMPONENTS

1) **Microbes** Students are introduced to what microbes are, what they need to live, and how they relate to the camp essential question.
2) **Microbe Inquiry** Students practice using the scientific method while doing a short microbe investigation.
3) **Smoking Fish** Students observe and participate in smoking fish with local elders. Students and elders will share different ways of cutting fish, preparing brines, and types of wood for smoking fish.
4) **Drying!** Students observe and participate in the process of drying seaweed and drying halibut with local elders. These treats will be shared at the celebration at the end of camp. Students then investigate drying further by looking at why surface area and evaporation are big players in traditional ways of drying foods.
5) **Cabbage and pH** Students will be introduced to the concept of pH by mixing different solutions with cabbage juice as a pH indicator.
6) **Pickling and Canning** Students will observe and participate in pickling and canning the fish for the celebration at the end of camp. Students will also look at how pH is involved in pickling and why pH affects microbes.
7) **Elder Classroom Visit** Students will gain insight and knowledge about traditional food preparation. They will also seek the Elders' advice about input as they begin to think about their own investigations.
8) **Math Applications** Students do simple linear equations through teacher guided practice, group activities, and the computer program Compass Learning. Students will then apply what is learned in the classroom to real life situations provided by Sheldon Jackson Fish Hatchery.

Phase 3

PHASE 3 COMPONENTS

1) **Asking a Good Question** Students go through the process of coming up with a good question for their independent investigation. The

question must help answer the camp essential question.

2) **Independent Investigation** Students learn and apply the skills of the scientific method by creating and conducting their own independent investigations that attempt to answer the essential question, Why do traditional methods of putting up fish work?

Phase 4

PHASE 4 COMPONENTS

1) **Choosing a Presentation Format** Students review the presentation rubric and choose a format for how they want to share and explain their results.
2) **Presentation Focus Class** Once they choose a format, they begin designing their presentation with the help of teacher experts in the format area of their choice.
3) **Practicing Presenting** Students "rehearse" sharing their presentations with peers and guests, and practice answering possible questions. Peers will assess student presentations during practice time to provide help during the revision process. Students will self-assess themselves using the rubric and reflection worksheet.
4) **Presentations** A public gallery walk will give students the opportunity to share presentations and interact with community members, Elders, and peers. Community members will use the presentation rubric to help them ask questions about the displays or presentations.
5) **Survey** Students will take the same survey they took at the beginning of camp to see if their attitudes about math and science have changed.
6) **Post-Test** Students will take a post-test to help determine their proficiency in the standards we covered at camp.
7) **Vocabulary Test** Students will take a vocabulary test over 12 important science words focused on at camp.
8) **Celebration!** Time to share the food, gifts and entertainment that students have prepared.

Essential Question

Why do traditional methods of putting up fish work?

Alaska Standards

Science B1

A student should possess and understand the skills of scientific inquiry: use the processes of science; these processes include observing, classifying, measuring, interpreting data, inferring, communicating, controlling variables, hypothesizing, predicting, and experimenting.

Culture C

Culturally knowledgeable students are able to actively participate in various cultural environments.

1. Perform subsistence activities in ways that are appropriate to local cultural traditions.

2. Enter into and function effectively in a variety of cultural settings.

Math Performance M.A.6

Students should understand and be able to form and use appropriate methods to define and explain mathematical relationships.

Technology D

A student should be able to use technology to express ideas and exchange information.

Reading

(Ages 11-14)

1) Students should be able to restate and summarize information or ideas from a text and connect new information or ideas to prior knowledge and experience…

2) Students should be able to read and follow multi-step directions to complete a task, and identify the sequence prescribed…

Schedule

Day 1	Core group	Technology	Field
10	**PASE 1** Orientation Attitude Survey Pre-Test		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 1** Meeting Each Other Intro to Unit Intro to Achieve 3000		
3			
4			
Evening:		Staff:	

Day 3	Core group	Technology	Field
10	**PASE 2** Vocab. Activity Smoking Fish Literacy Activity		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 2** Drying! (mass and surface area) Achieve 3000		
3			
4			
Evening:		Staff:	

Day 2	Core group	Technology	Field
10	**PHASE 1** Vocab. Activity Intro to Sci-method Roto-copters		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 1** Plankton Experiment Achieve 3000		
3			
4			
Evening:		Staff:	

Day 4	Core group	Technology	Field
10	**PHASE 2** Vocab. Activity Cabbage and pH Literacy Activity		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 2** Achieve 3000		
3			
4			
Evening:		Staff:	

Day 5	Core group	Technology	Field
10	**PHASE 2** Vocab. Activity Microbes Microbe Inquiry Elder Visit		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 2** Graphing: Intro to Excel Achieve 3000		
3			
4			
Evening:		Staff:	

Day 7	Core group	Technology	Field
10	**PASE 3** Vocab. Activity Independent Investigations Literacy Activity		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 4** Presentation Focus Class Achieve 300		
3			
4			
Evening:		Staff:	

Day 6	Core group	Technology	Field
10	**PHASE 3** Vocab. Activity Asking a Good Question Ind. Investigation proposal Literacy Activity		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 3** Teachers Pres. Students Choose Pres. Format Achieve 3000		
3			
4			
Evening:		Staff:	

Day 8	Core group	Technology	Field
10	**PHASE 4** Vocab. Activity Graph Ind. Invest. Results Write Ind. Invest. Conclusion Intro to Rubric		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 4** Presentation Focus Class Achieve 3000		
3			
4			
Evening:		Staff:	

Day 9	Core group	Technology	Field
10	**PHASE 4** Vocab. Activity Presentation Focus Class		
11			
12			
1	LUNCH / STORY TIME		
2	FIELD TRIP		
3			
4			
Evening:		Staff:	

Day 11	Core group	Technology	Field
10	**PHASE 4** Vocab. Activity Presentations to Core Group Finish Moieties		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 4** Presentation Focus Class (pres. revisions) Achieve 3000		
3			
4			
Evening:		Staff:	

Day 10	Core group	Technology	Field
10	**PHASE 4** Vocab. Activity Presentation Focus Class		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 4** What Makes a Good Pres. Make Moieties Achieve 3000		
3			
4			
Evening:		Staff:	

Day 12	Core group	Technology	Field
10	**PHASE 4** Vocab. Activity Practice Pres. Attitude Survey Post-Test		
11			
12			
1	LUNCH / STORY TIME		
2	**PHASE 4** Gallery Walk of Presentations Self-Assessment Celebration!		
3			
4			
Evening:		Staff:	

Phase 1

Survey

Background:

Students will be given a survey to help show their attitudes toward math and science before the unit begins. If students ask questions about the directions you may read again the portion of the directions that address the question. Do not paraphrase, or in any other way, clarify the meaning of the directions. If students are still confused, tell them that they should do the best they can with the information that they have.

Prepare in Advance:

- ☐ Sharpened pencils
- ☐ Prep room for test taking
- ☐ Copies of tests
- ☐ Put "TESTING – PLEASE DO NOT DISTURB" sign on the door

Materials:

- ☐ Surveys
- ☐ Pencils

Pre-Test

Background:

After the survey has been given, students will take a pre-test to help show what they know about the standards covered in the unit before the unit is taught. Students may need a quick water break between the survey and the pre-test.

Prepare in Advance:

- ☐ Sharpened pencils
- ☐ Prep room for test taking
- ☐ Copies of tests
- ☐ Put "TESTING – PLEASE DO NOT DISTURB" sign on the door

Materials:

- ☐ Surveys
- ☐ Pencils

Meeting Each Other

Background:

In order to work together at camp students need to begin trust building through fun, non-academic activities. Depending on how many students remembered to bring a fishy treat recipe or a traditional picture of a fish,

you may not have enough time to do all of these meeting each other activities at once. You may choose to spread them out over a couple of days. (Most of these activities are modifications of activities found in *Discovering Gifts in Middle School* by Jeanne Gibbs.)

Before you begin any teambuilding activities, discuss with students the necessity for interacting respectfully and inclusively. Have students decide on guidelines they can all agree to and then review these guidelines before each activity.

Milling to Music

Time: 15 minutes

Group Size: Whole class

Where: Classroom

Focus: To build community inclusion and to start to get to know each other.

Prepare for each student a slip on which there are four numbered questions.

Examples:

- Describe a hunting or fishing trip.
- Describe one of your teachers last year.
- Describe your village or town.
- What do you and your friends do for fun?

Give the students their slips with the four questions and have them stand up. Explain that when the music starts they are to begin milling around silently but greeting each other as they pass. Explain that when the music stops (or when you give the hand signal), the student is to stop and discuss question #1 with a student standing close by for 1 minute. When the music begins again, they are to repeat the process until they have discussed all four questions.

Reflection Questions:

- What kind of greetings did you use?
- What similar things did you share?
- What skills did you use as a community member to make this activity successful?
- How has the atmosphere changed in the room?

One Special Thing About Me

Time: 30 minutes

Group Size: Whole class

Where: Classroom

Focus: To build community inclusion and to start to get to know each other's names.

Materials

- ☐ Journals
- ☐ Pencil/Pen

Students begin by arranging their chairs in a circle. Students will think of one fact about themselves they think will help people remember who they are. They will first say their name and then the memorable thing. For example, "My name is Collauna, and one special thing about me is that my name means Raven in Cherokee." The other students listening will be writing the names of each student who presents down in their journal and any notes they need to help remember the students' name. Teachers should model the process first. After everyone has had a chance, give students an opportunity to go around the circle to see how many names they can remember without looking at their notes.

Sharing Fishy Treats

Time: 15-45 minutes

Group Size: Whole class

Where: Classroom

Focus: To start to get to know each other and practice sharing in front of a new audience.

Before camp started, students were sent a camp packet that included a request to find a traditional fish recipe to bring from their community and share at camp. Students were also asked to bring traditional fish drawings. Give them an opportunity to share what they brought.

First, find out how many students brought something to share. Since this is the first time they will be presenting informally in front of a group at camp, you may choose to have students stay seated in a circle while sharing to help with their initial comfort level. Ask each student that has something to share to first state their name and where they got their recipe or picture, before sharing the item. Be sure to take notes on sticky tabs as the students are presenting, collect each item, and store with the sticky notes. The camp

recipes and pictures will be displayed for everyone in camp to see.

Roles People Play

Time: 45 minutes

Group Size: CLGs

Where: Classroom

Focus: To promote an awareness of helpful group roles and to learn collaborative skills. This activity can also be done later on.

Materials:

- ☐ Copies of "Roles That People Play in Groups:
- ☐ Pens/pencils

Distribute the student handout on "Roles That People Play in Groups." Ask the students to study the cartoons and decide which role (or roles) they usually play when working with a group. Ask them to share their answers to the questions at the bottom of the page with a partner.

Assign each CLG two roles, one from the helpful roles list and one from the unhelpful roles list. Ask each group to fill in the "What People Say" column. What kinds of things would you hear these people say in your school?

Have each group role play the lines and the rest of the class guess which role they are demonstrating.

Reflection Questions:

- ☐ What happens in a group when even one person is acting in an unhelpful role?
- ☐ What helpful roles do you often use in groups?
- ☐ What role are you willing to try today during the next activity?

ROLES PEOPLE PLAY IN GROUPS

Encourager • Joker • Organizer • Boss • Peace Keeper • Talker • Idea Person • Sitter • Helper • Put-Downer

QUESTIONS

Why do you think that it's the easiest role for you to play?

What other role or roles would you like to play to help your group?

Which role do you usually play in a group?

How willing are you to try out a new helpful role today?

from "Tribes" by Jeanne Gibbs page 342

from "Tribes" by Jeanne Gibbs page 342

Ideas for working together

DESCRIPTIONS OF HELPFUL ROLES

Encourager: Tells groups positive things and keeps energy going well.

Organizer: Helps group stay on task and time; encourages management of materials and resources.

Peace Keeper: Helps members to solve problems, make decisions, express feelings, and understand each other.

Idea Person: Gives and seeks helpful ideas. Initiates action and clarifies.

Helper: Is supportive and friendly, willing to listen and help others.

UNHELPFUL ROLE DESCRIPTIONS

Joker: Claims attention by interrupting, goofing off, distracting and trying to be funny.

Boss: Takes charge. Knows it all. Tells people what and how to do things. Usually doesn't listen well.

Sitter: Doesn't participate. Sits on the side. Always claims the right to pass. Will not help others. Can seem judgmental.

Put-Downer: Ridicules others and their ideas.

What would they say?
What would these guys say?

Introduction to Unit

Background:

This time spent introducing the unit to students is brief but extremely important. Students, in order to own their learning, need to know what will be expected of them as learners and what they will know by the end of camp.

Where are we going?

Time: 1 hour

Group Size: Whole group, and cooperative learning groups (CLGs)

Where: Classroom

Focus: What are we going to learn at ANSWER Camp? Why do traditional methods of putting up fish work?

Materials:

- ☐ Large butcher paper chart
- ☐ Sticky note pads (large size)
- ☐ Pens/pencils
- ☐ Copies of culminating task scoring guide

The essential question (Why do traditional methods of putting up fish work?) should be displayed prominently in the classroom throughout the unit. Ask students to talk about the question. Do they have any answers at this time? Record each CLG's possible answers on a large KWHL chart that displays three columns:

- What we think we **K**now
- What we **W**ant to know
- **H**ow will I go about learning
- What we **L**earned

They, or you, should write their answers under the first column. Next, ask each group to brainstorm any questions that they would need answered in order to feel certain that their answers were scientifically correct, and any questions they have about the topic. Each group should write their questions on sticky paper. As they add their answers to the chart, check for repetitive questions. Lead a discussion about how this is the beginning of scientific inquiry. This chart should be displayed throughout all of camp. Things will be added as things are learned.

Share the rubric for the culminating task with the class. Ask them to read it in their groups. Next, ask each group to share what they think (based on their reading of the rubric), they will be doing for the next two weeks and how they will share what they have learned. Students will share their

responses and the teacher reinforces their ideas with description of the culminating task and the process for the next two weeks.

Introduction to the Scientific Method

Scientific Method

Time: 30 minutes

Group Size: Whole Class

Where: Classroom

Focus: Introduce the students to the steps of the scientific method.

Materials:

- ☐ Poster of the Scientific Method
- ☐ 16 packets of 3x5 cards with the steps of the Scientific Method

Make a poster and the packets of 3x5 cards prior to class with the following steps of the Scientific Method:

Observation

Question

Hypothesis

Experiment

Results

Conclusion

Share your Results

Ask a New Question

Cover up a poster of the steps of the Scientific Method, go through each step by asking/prompting the students with questions like: What do people do when they observe something new? – (They ask a question) After asking each question, reveal the next step to the students as they guess it. Now cover up the poster and pass out 3x5 card packets with the scientific method steps all mixed up. Have students put the steps back in order. It is more like a game if you only allow two minutes for students to reorder the cards. See if students can get faster and faster.

Roto-Copters

Time: 45 minutes

Group Size: 2

Where: Classroom

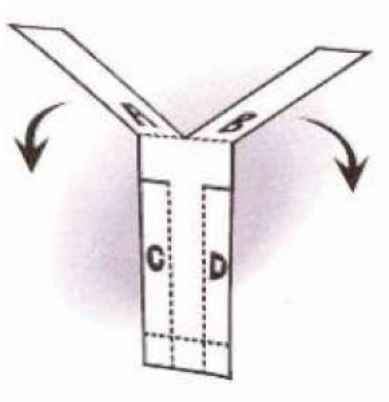
Focus: Variables are things that change. A manipulated variable can be changed by us, and a responding variable is what changes in response to the manipulated variable.

Here is a fun informal way to learn about variables! Handout copies of the Roto-Copter designs and make them available to each pair of students. A short explanation of variables as “anything that can change” is a good way to introduce this activity.

Roto-Copters

Roto-Copters are easily made by cutting and folding paper. To make your own Roto-Copter, follow these directions.

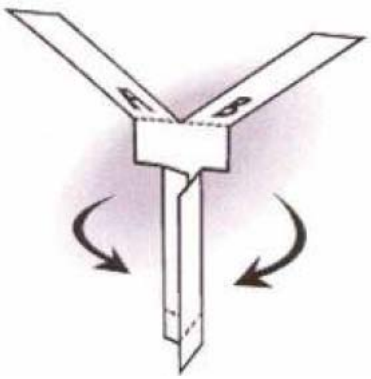
1) Cut out either the Mini-Roto or the Monster-Roto. Cut along the solid lines only. Fold the dotted lines.
2) Fold A toward you. Fold B away from you.



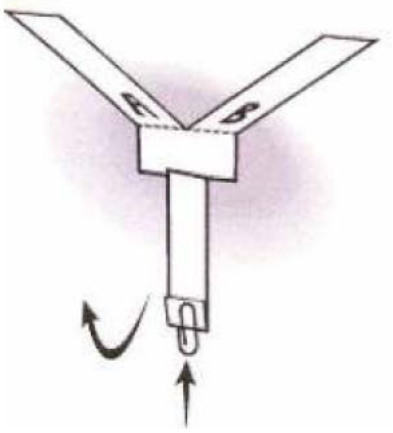
3) Fold C and D over each other so they overlap.

Materials:

- ☐ Copies of the Roto-Copters
- ☐ 8 pairs of scissors
- ☐ Pen or pencil
- ☐ 8 small paper clips
- ☐ 8 large paper clips



4) Fold the bottom up and put a paper clip on it.

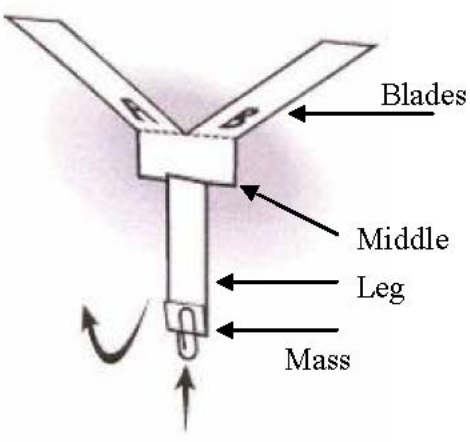


5) Hold the Roto-Copter by the paper clip. Throw it like a baseball as high and far as you can. It will spin to the floor.

Use your Roto-Copter. Play with it. Watch what it does. As you use your Roto-Copter, you are becoming an expert with it. You are developing a working understanding that will be very important for the next stage.

Playing with the VARIABLES

Remember a variable is anything that can change.



Make a new perfect Roto-Copter. This is your CONTROL. A control is what is considered normal. All others are compared to the control. Write CONTROL on the middle part of your Roto-Copter.

Make a list of variables about the Roto-Copter that can easily be changed.

Variables	How fast does it turn + S -

Testing the Variables

Choose one of the variables. Make a new Roto-Copter that is different from the control in one variable only. IMPORTANT NOTE: Be sure to change only one variable. If you change more than one variable at a time, it is hard to understand why changes in the flight of the Roto-Copter are happening.

When you have an EXPERIMENTAL Roto-Copter ready, you are ready to test.

Stand on a chair holding the Control Roto-Copter in one hand, and the Experimental Roto-Copter in the other. Drop them at the same time and from the

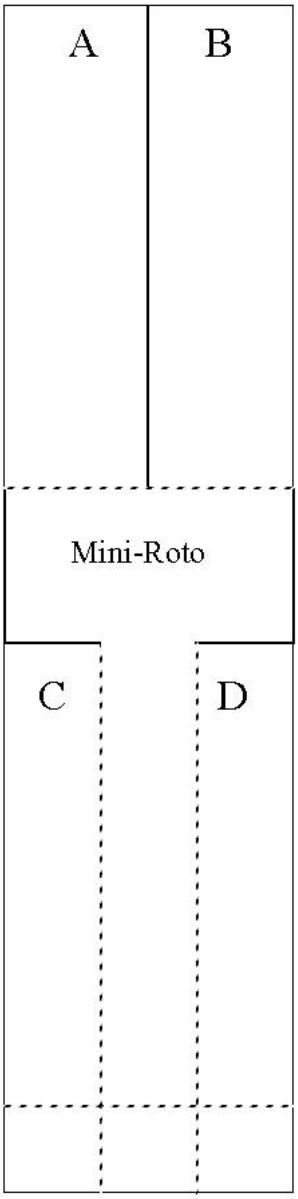
same height. Compare how fast they spin. If the Experimental Roto-Copter spins faster than the control, mark a + in the box to the right of the variable. If it spins slower, mark a – in the box. If they seem to spin at an equal rate, mark an s for “same” in the box. Test as many variables as you can.

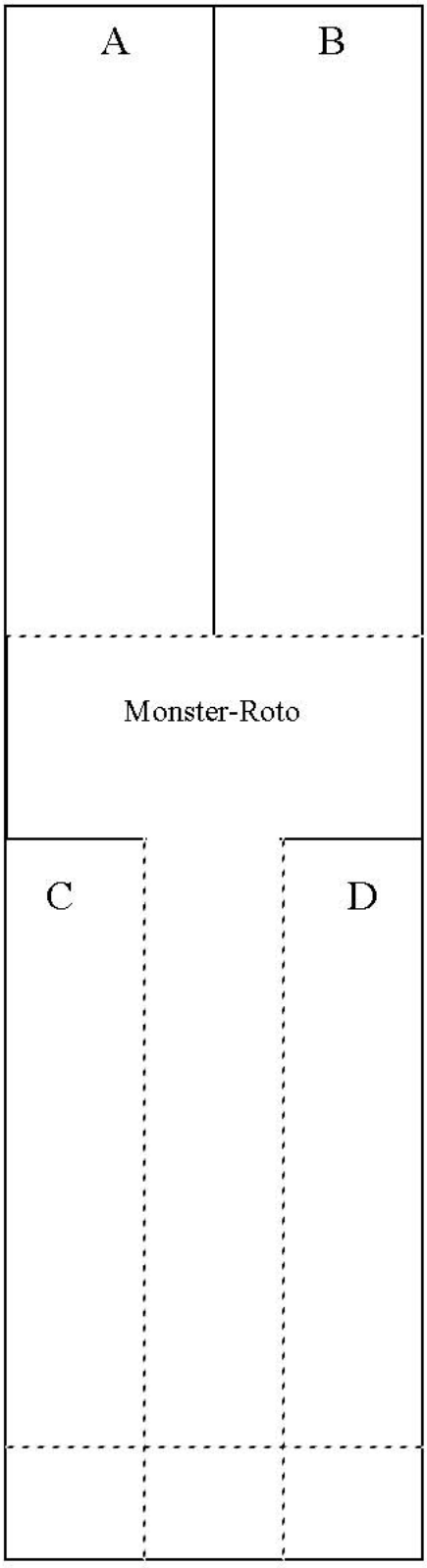
Which variables affected spin the most?

Which variables had little or no affect on the rate of spin?

Challenge: Design a Roto-Copter that will

A) Spin the fastest
B) Spin the slowest
C) Spin clockwise
D) Spin counter-clockwise


A
B
Mini-Roto
C
D


A
B
Monster-Roto
C
D

Plankton Experiment (application of the scientific method)

Time: 60 minutes (plus time to set the plankton traps the night before)

Group Size: Pairs

Where: Classroom

Focus: Different types of zooplankton (animal) and phytoplankton (plant) make up the diets of fish. Plankton can be caught easily using traps. This is an engaging way to introduce application of the scientific method while looking at what fish eat. The data collected can also be used to introduce graphing.

Background: Many students are aware that tropical rainforests provide oxygen to the atmosphere through the process of photosynthesis. However, the role that phytoplankton play in oxygen production, through the same process, is often overlooked even though they provide the majority of Earth's oxygen! Phytoplankton are not only major contributors to the Earth's oxygen concentration, but are also the base to almost all food webs in marine systems. More directly, phytoplankton are fed on by zooplankton which are in turn fed on by fish, our focus of camp. When studying these tiny critters students often experience a wonder of things small and are amazed at the diversity of life found in the water they often think of as being devoid of life!

Materials:

- ☐ 3 plankton traps
- ☐ 2 waterproof flashlights
- ☐ 2 glow sticks
- ☐ 3 sample collection bottles
- ☐ 1 turkey baster
- ☐ 1 rinse bottle
- ☐ 15 discovery scopes
- ☐ 1 microscope
- ☐ Plankton data sheet
- ☐ Pencil/pen
- ☐ Graph paper

Plankton Experiment

The Night Before Class:

Tie three plankton traps off the dock in three different locations at least ten feet apart. One will contain the two waterproof flashlights, the second will contain two glow sticks, and the third will contain no light source at all. When setting your traps, make sure the traps are one-two feet below the surface of the water with the flashlights turned on and the glow sticks activated. The plankton traps should be left overnight

and picked up the next morning. In the morning, use your rinse bottle to wash the plankton from the collection cup into your sample collection bottles. Label the collection bottles “flashlight,” “glow sticks,” and “no light source.” Refrigerate the samples until class begins.

The Day of Class:

Since this is the first time students will be applying the scientific method, they will need a lot of support and encouragement through this first experiment. It may be best to write out the experiment with them on the overhead. In addition, create a large class data table to display the class findings on the board.

Handout the plankton experiment worksheet and introduce the lab. It is important that all students do the lab sheet for this activity. Briefly go over what you had to do the night before to set the plankton traps. You may show some different examples of plankton that might be found. However, students will only be looking at abundance and will not be expected to identify the plankton they observe.

Question: Does the intensity of light affect the amount of plankton caught?

Hypothesis: **If** plankton are attracted to more intense light, **then** the trap with the flashlights will have the most plankton in it. (Feel free to modify this hypothesis. Students can come up with their own hypothesis as well.)

Manipulated Variable: The light source.

Responding Variable: Number of plankton found.

Control: The plankton trap with no light source.

Distribute the sample gathered from the “no light source” in the discovery scope containers suing the turkey baster. Make sure you decide on a set amount of liquid to gather from the sample so that the amount of liquid stays constant. All students to count the number of plankton they find and record the number on their data sheet. Repeat the procedure for the glow stick sample and flashlight sample. Be sure to

distribute the same amount of sample liquid as you did in the first sample.

Analyzing Results

Once students have counted the amount of plankton in each sample, have each group write their results on the class data table on the board and copy other group's data on to their data sheet. You may decide to average the class results for each sample. Then, have students graph their results on the graph paper provided. Did you prove or disprove your hypothesis? Discuss as a class your findings and have the student write their conclusion and new question in the space provided on the worksheet.

Names: _____

Plankton Experiment

Question:

_____

_____?

Hypothesis:

If _____

then_____

Manipulated Variable:

_____

Responding Variable:

_____

Control:

_____

Procedure:

1) Swirl the sample collection container labeled “no light source” to be sure all the plankton are dislodged from the bottom of the sample container.
2) Using a turkey baster, remove a set amount of liquid from the sample collection container and carefully place the sample in the plastic discovery scope box. Make sure you note the amount of liquid you are removing so to keep this variable constant when looking at the other samples.
3) Count the number of plankton using the discovery scope.
4) Record the number of plankton in the data table.
5) Repeat steps 1-4 for the “glow stick” sample and the “flashlight” sample.

6) Clean up.

Results:

Class Data Table

Group	# of Plankton (No Light Source)	# of Plankton (Glow Sticks)	# of Plankton (Flashlights)
Pair 1			
Pair 2			
Pair 3			
Pair 4			
Pair 5			
Pair 6			
Pair 7			
Pair 8			
Class Average			

Graph results on the back or on graph paper.

Conclusion:

_____

_____

New Question:

_____

_____?

Phase 2

Teacher Led Investigations

Students will learn to dry, smoke, pickle, and can fish. As they participate in the traditional preparation, they will begin to experience and understand the inquiry process. This is the beginning step in preparing them to undertake their own inquiry to find answers to the essential question.

As students move through the lessons, encourage inquisitive thinking about what they are doing and how it connects to the essential question. Keep a big piece of butcher paper in the front of the room to write down questions that students have. These questions will capture spontaneous inquiry and be tremendously valuable when it is time for independent investigations.

Microbes

Where: Classroom

Time: 20 -30 minutes

Group Size: Whole class

Where: Classroom

Focus: At camp we are interested in microbes because it causes food to spoil and becomes unsafe to eat. In order to answer the essential question, why do traditional ways of putting up fish work, we need to understand more about what microbes need to live. Each way of preserving food in some way deprives microbes of what they need to be able to spoil food. Start by facilitating a brief discussion about what microbes are and how they impact our lives. You can pose questions such as: “What are microbes? What are some microbes that you know cause our food to spoil? Are all microbes bad?

Next, introduce WAFT*”

Microbes have basic needs to live.

Moisture -	**W**ater
Atmosphere -	**A**ir
Nutrition -	**F**ood
Climate – warm	**T**emperature

*NOTE: You may choose to introduce WAFT after the teacher led investigations involving smoking, drying, and pickling fish. This would allow students to have a better understanding of each preservation method before filling out the WAFT chart.

Handout the copies of the WAFT chart to each student. See if they can figure out which microbe requirement is missing for each preservation method. For example, what microbe requirement(s) is missing from dry fish? Have students fill in the chart.

WAFT Chart Name _____

Directions: Fill in the chart below. Start by thinking about each food preservation method and what microbe requirement(s) is missing so that no microbes are found in pickled fish, canned fish, dry fish, or smoked fish.

	Water	**A**ir	**F**ood	**T**emperature
Pickling				
Canning				
Drying				
Smoking				

Moisture - **W**ater

Atmosphere - **A**ir

Nutrition - **F**ood

Climate – warm **T**emperature

Microbe Inquiry

Time: 1 hour

Group Size: CLG or Whole Class

Where: Classroom

Focus: Microbes can cause a lot of problems for people trying to preserve food. This investigation will give students practice in using the scientific method and skills of microbiology to help get ready to answer our camp question, Why do traditional methods of putting up fish work?

Materials:

- ☐ Copies of the Microbe Experiment Worksheet
- ☐ 8 Petrifilm plates
- ☐ Distilled water
- ☐ Sterile Q-tips
- ☐ Masking Tape
- ☐ Pen/pencil
- ☐ 8 droppers
- ☐ Graph paper

Demonstrate how to use a Petrifilm plate before starting the experiment. Good lab techniques are key to good results! While demonstrating, facilitate a discussion about some of the variables that have to be controlled in order to get good results.

These diagrams show how the Petrifilm is used:

Open the cover

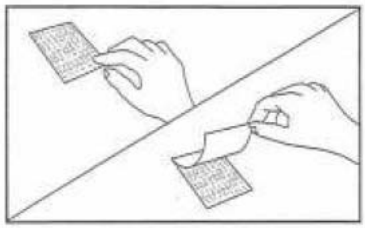


Figure 1

Spread or smear a liquid onto the second layer.

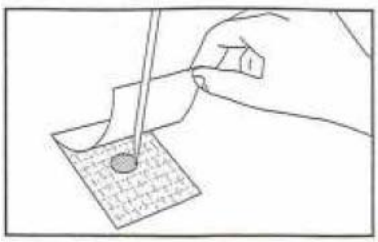


Figure 2

Allow the top layer to close down onto the bottom layer.

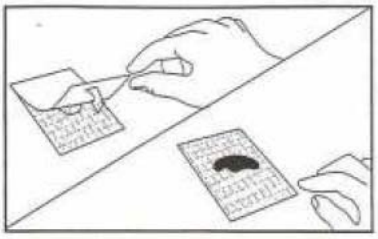


Figure 3

Doorknob Microbe Investigation

Since students may still be unfamiliar with the scientific method, it may be best to write out the experiment with them on the overhead. All students should fill out the microbe experiment worksheet. (Students can make up their own question if the supplies are available.)

Question: Do most microbes live on the inside or the outside doorknob of the bathroom door?

Hypothesis: **If** the inside doorknob of the bathroom door has more microbes, **then** the Petrifilm plate of the inside doorknob will grow the most microbes. (Feel free to modify this hypothesis.)

Manipulated Variable: The side of the door that the doorknob is found.

Responding Variable: Number of microbes.

Control: A freshly cleaned doorknob.

Procedure:

1) Tape two Petrifilms to a piece of paper and label one “Inside Doorknob” and the other “Outside Doorknob.”
2) Bring two sterile Q-tips to the bathroom and use one to swab the inside bathroom doorknob, and use the other to swab the outside bathroom doorknob. BE careful not to touch the tip of the Q-tip to anything else as you go back to the classroom.
3) Carefully lift the plastic covering of the Petrifilm plate labeled “Inside Doorknob” and place 3-4 drops of distilled water in the center of the plate. Be careful not to touch the inside portions of Petrifilm plate with your fingers.
4) Roll the inside doorknob Q-tip gently in distilled water on the Petrifilm plate.
5) Remove the Q-tip and allow the top layer of the Petrifilm plate to lie down on the bottom layer. Do not lift the top layer again.
6) Repeat steps 3-5 for the “Outside Doorknob.”
7) Place Petrifilm plates aside and wait 24-48 hours for results.

Name _____

Microbe Experiment

Question:

_____

_____?

Hypothesis:

If _____

then _____

Manipulated Variable:

_____

Responding Variable:

_____

Control:

_____

Procedure:

1) Tape two Petrifilms to a piece of paper and label on “Inside Doorknob” and the other “Outside Doorknob”.

2) Bring two sterile Q-tips to the bathroom and use one to swab the inside bathroom doorknob, and use the other to swab the outside bathroom doorknob. Be careful not to touch the tip of the Q-tip to anything else as you go back to the classroom.

3) Carefully lift the plastic covering of the Petrifilm plate labeled “Inside Doorknob” and place 3-4 drops of distilled water in the center of the plate. Be careful not to touch the inside portions of Petrifilm plate with your fingers.
4) Roll the inside doorknob Q-tip gently in distilled water on the Petrifilm plate.
5) Remove the Q-tip and allow the top layer of the Petrifilm plate to lie down on the bottom layer. Do not lift the top layer again.
6) Repeat steps 3-5 for the “Outside Doorknob.”
7) Place Petrifilm plates aside and wait 24-48 hours for results.

Class Data Table

	# of Microbes on Inside Doorknob	# of Microbes on Outside Doorknob
CLG1		
CLG2		
CLG3		
CLG4		

Graph results on the back or on graph paper.

Conclusion:

_____

_____.

New Question:

_____

_____?

Smoking Fish

Time: 3 hours

Group Size: Whole Class

Where: Classroom or Outside

Focus: Prepare fish for smoking using traditional methods. Activate curiosity about how the process makes food last longer.

Materials:

- ☐ 1 large bag of non-iodized salt
- ☐ 1 small potato
- ☐ 3 five gallon buckets
- ☐ 10 fresh sockeye salmon with heads and tails still attached
- ☐ 1 medium sized alder tree cut up into logs and debarked
- ☐ 1 plywood cutting table
- ☐ 1 smoke house
- ☐ Classroom set of fish cutting gloves
- ☐ 5 sharp knives
- ☐ 2 large wooden mixing spoons
- ☐ Access to a hose with fresh water
- ☐ 1 small kitchen timer
- ☐ 1 roll paper towel
- ☐ 1 kitchen sponge

Background:

Cook Inlet Region Incorporated (CIRI) has given ANSWER Camp permission to use its Guide to Smoking and Canning Salmon in the Cook Inlet Tradition.

The smoked salmon we produce will be canned. The length of processing time needed to guarantee safety can affect the quality of home-canned smoked fish. Canning tends to dry the flesh, darken the color, and intensify the smoked flavor. It is not safe to reduce the processing time to lessen these quality changes. Instead, the smoking procedure must be modified. Fully smoked fish that is dry enough to eat tends to be too dry and strong flavored after canning. For best quality, fish that will be canned should be smoked for a shorter time than fish that will not be canned. Additionally, canning smoked salmon decreases the time required for the fish strips to hang and glaze. Fish can be glazed, smoked and canned in a 24-hour period.

Activate Prior Knowledge

Ask students:

- What kinds of smoked foods have you eaten?

- Have you ever participated in cutting and brining fish to get it ready for the smoke house? Draw some pictures showing the ways you know how to cut fish.
- Does your family own a smoke house? If yes, draw a picture of your smoke house.
- Why do you think the traditional way of smoking fish works so well?

To get the students ready, pose the above questions. Have the students write their answers in their journals. After they have written their answers, have a couple student volunteers share what they came up with. Be sure to stress that there is no right or wrong answers, the activity is only to activate prior knowledge. Tell students that they will be having a guest Elder to show them some local traditional ways of cutting and brining fish for smoking. Have students write two or three questions in their journal they might have about how to prepare fish for smoking.

Elder Knowledge

After students have activated their prior knowledge and prepared questions, an Elder will come in to demonstrate traditional ways of cutting and brining fish. Students will listen and take notes in their journal while the Elder shows how to prepare each food. After the Elder demonstrates, students will have time to ask their questions they have prepared if they haven't been answered already. Then the students will help finish the process of preparing the fish for the smoke house. The fish that is smoked will be canned later so we can share it at the celebration at the end of camp!

NOW WHAT?

Facilitate the discussion on how this experience helps answer the essential question: Why do traditional ways of putting up fish work? Does the class know any questions that have to do with smoking that can be investigated in the future? List the questions on butcher paper.

Drying!

Time: 3 hours

Group Size: Whole Class and Groups of 2

Where: Classroom

Focus: Prepare fish and seaweed using traditional methods. Activate curiosity about how the process makes food last longer.

Introduce the concepts of mass, surface area, and evaporation.

Materials:

- ☐ 2 drying racks or dehydrator
- ☐ 2 sharp knives
- ☐ 1 meat grinder
- ☐ 1 can of clam juice
- ☐ 5-6 cups black seaweed
- ☐ 2 lbs. fresh or frozen halibut
- ☐ 2 cutting boards
- ☐ 1 roll paper towel
- ☐ 1 kitchen sponge
- ☐ Access to a sink with fresh water

Activate Prior Knowledge

Ask students:

- What dried foods have you eaten?
- Have you ever eaten dried meat or fish stored in seal oil?
- Why do you think the traditional way of drying food works so well?

To get the students ready, pose the above questions. Have the students write their answers in their journals. After they have written their answers, have a couple student volunteers share what they came up with. Be sure to stress that there are no right or wrong answers, the activity is only to activate prior knowledge. Tell students that they will be having a guest Elder to show them some local traditional ways of preparing dried seaweed and dried halibut. Have the students write two or three questions in their journal they might have about drying seaweed and halibut.

Elder Knowledge

After students have activated their prior knowledge and prepared questions, an Elder will come in to demonstrate traditional ways for preparing the seaweed and halibut. Students will listen and take notes in their journal while the Elder shows how to prepare each food. After the Elder demonstrates, students will have time to ask their questions they have prepared if they haven't been answered already. Then the students will help finish the process of preparing the seaweed and halibut for drying. These treats will be share at the celebration at the end of camp!

Investigation of Evaporation and Surface Area

Once the Elder has left, students will do an experiment looking at the mass lost from drying fish and how surface area affects the drying process. Start by having students think about what they just observed.

Facilitate the answers to the following question by writing their answers on the board: What did the Elder do to the seaweed and fish so that it would dry faster? Most students will remember that the halibut was cut in thin slices and the seaweed was ground up in order to dry faster. Tell students that cutting thin slices of fish or grinding up seaweed, is a way to increase surface area, and we are going to now do an experiment looking at surface area and evaporation.

What is Surface Area?

Ask students if they know what surface area means. Most kids will be able to articulate that it is the outside area of an object. Remind students how the area of a rectangle or square is calculated (Length x Width). Then ask them to guess how we can calculate the surface area of a cube?

What is Mass?

Most students use the words mass and weight interchangeably. Make sure students understand that weight can change, but mass never changes. Use the example of how an object's weight is different on the moon than on Earth. However, the object's mass never changes, regardless whether it is on the moon or Earth. Although we are almost always on Earth, as scientists, we try to use the word mass. We are going to measure mass in grams for this experiment. Show students how to use the electric balance.

Materials:

- ☐ 8 Drying Experiment worksheets
- ☐ 16 Pencils/pens
- ☐ 2 Electric balances
- ☐ 8 2-inchx2-inch chunks of frozen fish or potato
- ☐ 8 Pieces of wax paper
- ☐ 8 Cutting knives
- ☐ 8 Cutting boards
- ☐ 8 Rulers
- ☐ 8 Permanent markers
- ☐ 1 Roll masking tape

Starting the Experiment

Briefly go over the procedure, including safety precautions about handling knives. Using the Drying Experiment worksheet, walk students through writing a question, hypothesis, MV, RV, and control.

Question: How does surface area affect how fast something dries?

Hypothesis: **If** increased surface area increases evaporation, **then** the piece of fish/potato with the most surface area will have the largest difference in mass. (Feel free to modify this hypothesis. At this point, it may be better to allow students to come up with their own hypothesis.)

Manipulated Variable: The surface area of pieces of fish/potato.

Responding Variable: The mass of the pieces of fish/potato.

Procedure:

1) Gather materials
2) Cut the piece of fish in half
3) Get the mass of each piece and record
4) Using a ruler, measure the surface area of 1 piece of fish and record
5) Cut the second piece of fish into 4 slices
6) Measure the surface area of each of the 4 slices, add together, and record
7) Place fish on wax paper or drying rack and label with masking tape “Piece 1,” “Piece 2,” and the group member’s names.
8) Allow to dry for 3 days, measuring the mass each day. An extension can be to calculate the percent of water lost.
9) Graph results
10) Write conclusion and new questions
11) Share results with the rest of the class

NOTE: Students can find it difficult to cut perfectly square pieces. Completely accurate measurements are not essential in observing increased evaporation due to an increase in surface area. However, you can modify this activity by dipping the sides of the fish or potato in six different colors of paint and stamping them on graph paper in order to make more accurate surface area calculations. This modification may affect the drying time of the pieces.

What is Evaporation?

Once students have shared their results and new questions, facilitate a discussion about the mass lost from the pieces of fish. What was the mass that was lost? Where did the water go? What is that process called?

NOW WHAT?

Facilitate the discussion on how this experiment helps answer the essential question: Why do traditional ways of putting up fish work? What does this experiment have to do with microbes? Does the class know any more questions that have to do with drying that can be investigated in the future? List the questions on butcher paper.

Names_____

Drying Experiment

Question:

_____

_____?

Hypothesis:

If_____

then_____.

Manipulated Variable:

_____

Responding Variable:

_____

Control:

_____

Procedure:

1) Gather materials.
2) Cut the piece of fish in half.
3) Get the mass of each piece and record.
4) Using a ruler, measure the surface area of 1 piece of fish and record.
5) Cut the second piece of fish into 4 slices.
6) Measure the surface area of each of the 4 slices, add together, and record.
7) Place fish on wax paper or drying rack and label with masking tape "Piece 1," "Piece 2," and the group member's names.

8) Allow to dry for 3 days, measuring the mass each day. An extension can be to calculate the percent of water lost.

9) Graph results.

10) Write conclusion and new questions.

11) Share results with the rest of the class.

Results:

	Mass (g) of Piece 1	*Mass (g) of Piece 2*
DAY 1		
DAY 2		
DAY 3		

Surface Area (in^2) of Piece 1 = _____

Surface Area (in^2) of Piece 2

Surface Are of Section A = _____

Surface Are of Section B = _____

Surface Are of Section C = _____

Surface Are of Section D = _____

Total Surface Area = _____

Graph results on the back or on graph paper.

Conclusion:

_____

_____.

New Question:

_____

_____?

*Cabbage and pH

Time: 60 minutes
Group Size: CLG
Where: Classroom
Focus: Using cabbage juice as an acid/base indicator to introduce the concepts of acid, base, neutral, and indicator. Relate pH to effective food preparation.

Background: Cabbage juice is used in this lesson as a pH indicator. Neutrals cause cabbage juice to remain purple, bases cause it to turn green, and acids cause it to turn pink. This is a visual way to observe pH. This is related to food preparation because changing the pH of a microbe's environment can kill them. Part I and Part II of this activity do not need to be done on separate days. In fact, it works better for the students if you are able to do them both on the same day.

Materials:

For the class:

- ☐ Cabbage juice (see included preparation instructions)
- ☐ 3 household neutrals, 3 bases, and 3 acids (see included preparation instructions)
- ☐ 1 piece each of pink, green, and purple or blue chalk

Neutrals: (Neutrals cause cabbage juice to remain purple)

- ☐ 32 oz. (1 liter) rubbing alcohol (isopropyl)
- ☐ 3 teaspoons of table salt (25g)
- ☐ 32 oz. (1 liter) water

Base: (Bases cause cabbage juice to turn green)

- ☐ ½ tsp. (3g) dry drain cleaner
- ☐ 30 tsp. (160g) baking soda
- ☐ 40 antacid tablets

Acids: (Acids cause cabbage juice to become pink)

- ☐ 16 oz. (500ml) white vinegar
- ☐ 40 aspirin tablets
- ☐ 32 oz. (1 liter) lemon juice

For each CLG:

- ☐ 1 cafeteria tray
- ☐ 12 clear wide-mouthed cups
- ☐ 12 plastic teaspoons or straws
- ☐ Crayons or colored pencils (including at least pink, purple, blue, and green)

- ☐ 2-3 cups labeled “Cabbage Juice”
- ☐ 1 wide-mouth container to hold waste
- ☐ 1 white ice cube tray, with compartments labeled 1-9

For each student:

- ☐ 1 Cabbage and pH data sheet
- ☐ 1 Pencil
- ☐ 1 Pair of safety goggles

Part 1: Cabbage Juice Tests

Before the Day of Activity:

1) Assemble materials.
2) Prepare cabbage juice.
3) Prepare solutions of household chemicals.
4) Test solutions with cabbage juice.
5) Label containers.
6) Duplicate data sheets.

The Day of the Activity:

1) Pour solutions and cabbage juice into cups, put teaspoons or straws in cups, and set on trays.
2) Arrange the room.
3) Place all other equipment in a central location.
4) Write names of test solutions on board.

Introducing the Procedure:

1) Explain the challenge: to use cabbage juice to test various household chemicals. Explain how some chemicals were made into solutions and how cabbage juice was made.
2) Mention safety precautions.
3) Demonstrate test procedure:
    a. Put half a teaspoon or 2 inches of straw full of cabbage juice into an ice cube tray compartment.
    b. Add half a teaspoon full or 2 inches of straw full of test solution to the same compartment.
    c. Record the color that most closely matches on data sheet.
4) Explain that when finished they should “group” results by color and name each group.

Conducting the Cabbage Juice Tests:

1) Have students get out crayons and get equipment and data sheets.
2) Distribute trays of solutions.
3) Have students begin testing.
4) Circulate among students as they conduct tests.

5) Answer questions about grouping and naming groups of chemicals.
6) Have students set the ice cube trays aside for part II.
7) Collect data sheets.

NOTE: Part I and Part II can be done the same day if you wish.

Part II: Acid/Base Discovery

Before the Day of the Activity:

1) Check solutions and cabbage juice from Part I. Make more solutions as necessary.

The Day of the Activity:

1) Pour solutions and cabbage juice into cups. Put teaspoons or straws in cups, and set on trays.
2) Arrange the room.
3) Place ice cube trays with solutions and all other equipment in a central location.
4) Check to see that solutions in ice cube trays have not dried. Decide on a method of replenishing if they have.
5) Write names of test solutions on board.

Scientific Convention:

1) Distribute Cabbage and pH data sheets from Session 1. Review by asking what colors they observed and asking how many groups they made.
2) Explain that it is common for scientists to organize things in different ways.
3) Ask students to report their results as pink, purple, or green, whichever is closer. Collect group data on board.
4) Poll for agreement.
5) Ask why students get different results.
6) Record most commonly agreed upon results.

Introduce Acids, Bases, and Neutrals:

1) Classify results on board into three groups (pink, purple, and green).
2) Introduce terms: **acid, base, neutral.**
3) Reinforce terms.
4) Explain concept of indicator.

NOW WHAT?

Facilitate a discussion why our new knowledge about pH helps us answer the camp essential question. How does pH relate to pickling? Does the class know any more questions that have to do with pH that can be investigated in the future? List the questions on butcher paper.

Cabbage Juice Preparation Instructions

1) Cut a red cabbage into 8 parts.
2) Put the cabbage pieces in a non-aluminum pot.
3) Add enough water to cover the cabbage.
4) Boil for 10-15 minutes.
5) Pour the contents of the pot through a strainer into a container.
6) Discard the cabbage leaves.
7) Cool the cabbage juice and store it in a covered container in the refrigerator.

NOTE: If the water in your area is very alkaline, it will cause the cabbage juice to turn blue-green when you first make it. If this is the case, discard and make a new batch using bottled water. If you find that your tap water is very alkaline, use bottled water to make all acid and neutral solutions as well.

Preparation of Household Chemicals

The following instructions describe how to make 2 quarts (2 liters) of solution at the proper concentration:

Neutrals

1) Alcohol – Use full-strength rubbing alcohol.
2) Water – Use tap water unless your local water is very alkaline. If that is the case, use bottled water.
3) Salt Water – Dissolve several teaspoons of table salt in 2 quarts of tap water or bottled water.

Bases

1) Drain Cleaner – Dissolve ½ teaspoon of dry drain cleaner in 2 quarts of tap water.
   Caution: Avoid contact with skin
2) Baking Soda – Dissolve 30 teaspoons of baking soda in 2 quarts of tap water.
3) Antacid – Dissolve 40 antacid tablets in 2 quarts of tap water. (crush the tablets to hasten dissolving. The stabilizer in the antacid tablets will not dissolve, nor will it interfere with the tests.)

Acids

1) Vinegar – Combine 16 ounces (500ml) of household vinegar with 16 ounces (500ml) of tap or bottled water.
2) Aspirin – Dissolve 40 aspirin tablets in 2 quarts of tap or bottled water. (Crush the tablets to hasten dissolving.)
3) Lemon Juice – Use full strength.

NOTE: Test the solutions before testing them with the students. You may have to adjust the strength of the solutions for better results.

Adapted from Cabbage Chemistry, Lawrence Hall of Science (LHS) – Great Explorations in Math and Science (GEMS), University of California Berkley.

Names_____

Cabbage and PH

2 9 3 4 1 7 5 6 8

1) There are 9 test liquids numbered 1-9. Get an ice cube tray. Put a spoonful of each of the test liquids into the compartments in the tray. Match the numbers on the cup with the numbers on the compartments.
2) Add a spoonful (or 2 inches of a straw full) of cabbage juice to each of the 9 test liquids.
3) Record the color you see suing the chart on the right.
4) Sort the test liquids into the 3 color categories listed below:

Reaction Colors	**Write the numbers of the test liquids next to the correct color**
Pink – red	
Purple – light purple	
Blue - green	

Use colored pencils to show color below	**Record pH number below**	**Tape pH strip below**
1		
2		
3		
4		
5		
6		
7		
8		
9		

Pickling and Canning Fish

Time: 3 hours

Group Size: Whole Class

Where: Classroom

Focus: Pickling and canning fish so that it is preserved for the culminating activity. Activate curiosity about how the process makes food last longer.

Materials:

- ☐ 1 gallon of white vinegar
- ☐ 1 large container of non-iodized salt
- ☐ 3 containers of pickling spices
- ☐ 1 case of pint canning jars with lids
- ☐ 4 permanent markers
- ☐ 3 sets of measuring spoons
- ☐ 3 sets of measuring cups
- ☐ 2 large canners
- ☐ 1 roll paper towel
- ☐ 1 kitchen sponge
- ☐ Access to kitchen stove with large burners
- ☐ Access to kitchen sink with fresh water
- ☐ 1 bottle of dish soap

Activate Prior Knowledge

Ask students:

- What kinds of pickled or canned food have you eaten?
- Have you ever participated in pickling or canning fish? If so, with whom?
- Why do you think pickling and canning fish allows the fish to last longer?

To get the students ready, post the above questions. Have the students write their answers in their journals. After they have written their answers, have a couple student volunteers share what they came up with. Be sure to stress there are no right or wrong answers, the activity is only to activate prior knowledge. Tell students that they will be having a guest Elder to show how to pickle and can fish. Have students write two or three questions in their journal they might have about pickling and canning fish.

Elder Knowledge

After students have activated their prior knowledge and prepared questions, an Elder will come in to demonstrate how to pickle and can fish. Students will listen and take notes in their journal while the Elder shows how to prepare each food. After the Elder demonstrates, students will have time

to ask their questions they have prepared if they haven't been answered already. Then the students will help finish the process of pickling and canning the fish. The students will be pickling fresh fish and canning the smoked fish they smoked earlier. These treats will be shared at the celebration at the end of camp!

The elders may share a special canning or pickling recipe with the campers. Many different pickling recipes are found in Alaska cookbooks. Here is one from *Salmon Recipes* by Cecilia Nibeck:

PICKLING RECIPE

2 pounds salmon fillets
1 tablespoon salt
2 cups white vinegar
2 cups water
¼ cup salad oil
1 ½ tablespoons whole mixed pickling spice
1 teaspoon salt
5 small onions, thinly sliced

PICKLING PROCEDURE

1) Cut salmon into chunks and spread in a single layer in a shallow glass baking dish.
2) Sprinkle with one tablespoon salt and let stand, uncovered, about 30 minutes.
3) Rinse salmon well and pat dry.
4) Combine the vinegar, water, salad oil, pickling spices, and 1 tablespoon salt.
5) Bring the mixture to boil, reduce heat, partially cover, and simmer 30 minutes.
6) Layer Salmon chunks and onion slices in a bowl.
7) Pour the boiling hot pickling liquid over salmon, cover loosely, and let cool.
8) Cover tightly and refrigerate for at least 24 hours.
9) The next day, wash jars and lids with hot soapy water or wash in the dishwasher.
10) Rinse jars and allow to drain on a clean towel. Set rings and lids aside.
11) Fill clean jars with pickled salmon and screw on lids.
12) Refrigerate until eaten.

Elders should be leading the activity of canning fish. However, if an elder is not available, the following canning procedure can be used to jar the smoked fish prepared at camp:

CANNING PROCEDURE

1) Gather materials.
2) Wash jars and lids with hot soapy water or wash in the dishwasher.
3) Rinse jars and allow to drain on a clean towel. Set rings and lids aside.
4) Place one slice of jalapeno in each jar (optional).
5) Pack jars with pieces of fish, flesh side against the side of the jar and skin facing in. Leave a ¼ inch space from the top of the jar.

6) Add one tablespoon of olive oil over the top of the fish. Recommended when canning sockeye salmon.

7) Use damp paper towel or clean cloth to wipe the rim of each jar.

8) Repeat step 7 using vinegar around the rim of the jar.

9) Place lids in extremely hot water.

10) Remove a lid from the hot water using a fork or tongs (do not touch the rubber portion of the lid) and place on the clean packed jar.

11) Tighten ring on jar until finger tip tight, and set aside.

12) Place the rack on the bottom of the canner while already placed on a cool burner.

13) Load canner with jars.

14) Fill canner with 3-4 inches of warm water (usually covers the first layer of half-pint jars).

15) Place lid on canner and heat until team escapes from the cooker for 7 minutes.

16) After 7 minutes, place the round pressure regulator weights on the exhaust vent.

17) Cook at 10 lbs. for 110 minutes.

18) Turn off burner and do not remove the pressure regulator weight or open the canner until the pressure is allowed to come all the way down to zero.

19) Remove jars and wash.

20) Label jars and store in a cool dry place.

NOW WHAT?

Facilitate the discussion on how this experience helps answer the essential question: Why do traditional ways of putting up fish work? What do you think is the pH of the pickling solution? Does the class know any questions that have to do with smoking that can be investigated in the future? List the questions on butcher paper.

Elder Classroom Visit

Background

This more intimate Elder classroom visit is designed to foster sharing and discussion so the students may learn in a traditional, oral manner from their elders. As students gain insight and knowledge about traditional food preparation, they should also seek the Elders' advice and input as they begin to think about their own investigations.

Getting Ready to Learn With the Elders

Time: 1 hour

Group Size: CLG's and Whole Class

Where: Classroom

Focus: To gain insight and knowledge about traditional food preparation through listening to fish camp stories from local elders. To learn how we respectfully interact with elders.

CLG's begin by brainstorming in their journal possible responses to the following questions:

1) How do we interact respectfully with our Elders?
2) What questions do we have for the Elders about why traditional ways of putting up fish work.
3) What questions do we have for the Elders about their experiences at a traditional fish camp?

Ask students to talk briefly in their groups about how elders are shown respect in their home communities, while writing down their ideas in their journal. At the end of five minutes, ask each group to share their list. As the lists are read, students should add to their lists ideas they gather from other groups. If the following types of behaviors do not appear on the list, work with the whole group to add them:

- Politeness really counts. Be on your best behavior.
- Offer the Elders a glass of water.
- Stay silent and sit while guests speak.
- Listen.
- Watch the speaker.
- As questions when it is your turn.
- Introduce yourself before you ask your question.
- Thank the experts for sharing their knowledge.

Next, in their groups, ask students to think about any questions they might have for the Elders. They might just like

to know about how things were done a long time ago, compared to today, or why certain things are done the way they are. Practice designing at least one or two questions with the whole class before having them brainstorm in smaller groups. Repeat the five-ten minute work time followed by the group share. Make sure each group decides which questions they will ask, and that the groups will not be repeating each other's questions. Students may also ask other questions that arise as they listen to elders and other knowledgeable locals share. Remind students to take notes.

Learning With the Elders

Time: 1 hour

Group Size: Whole Class

Where: Classroom

Our Question: Why do traditional ways of putting up fish work?

Ask two of the students ahead of time (one from each class), to serve as hosts to the Elders. Prep the students as to how to introduce the guests and to share with the guests the purpose of the visit. The students should also make sure to invite the guests to attend the celebration.

After guests are finished telling any stories, the questioning should proceed from CLG to CLG, making sure each group asks one question at a time.

Math Activities

Time: 2 days

Group Size: Whole Class

Where: Classroom, Gym, Sheldon Jackson Fish hatchery

Focus: Students learn how to do simple linear equations through guided practice, group activities, and the computer program, Compass Learning. Students will then apply what is learned in the classroom to real life situations provided by the Sheldon Jackson Hatchery.

Math Performance Standard M.A.6:
Students should understand and be able to form and use appropriate methods to define and explain mathematical relationships.

Materials:

- Copies of pretest and posttest
- Sharpened pencils
- 4-5 large sheets of butcher paper (1 per CLG)
- 12 colored markers
- 3 stop watches
- 3 yard sticks or long tape measure
- Masking tape
- Copies of seal hop data sheet
- Clipboards (enough for the whole class)
- Calculators (1 per CLG)
- Graph paper
- Colored pencils for graphing
- Copies of hatchery field trip worksheet
- 8 Calculators (for hatchery calculations)
- Copies of reflection

Pretest: Give students the pretest prior to any instruction. The students are to take the pretest independently.

Activate Prior Knowledge: Pass around a big sheet of butcher paper and markers to each CLG. Ask students to write the word "equation" in the center of their paper. Give students 2-4 minutes to write words or draw pictures that come to mind when they hear the word, equation. Allow time for each group to briefly stand up and share what they came up with. Ask the group to look back at their paper and circle any commonly used equations they may have written down. Make a list of the equations on the board. Allow students to shout out additional example equations that pop into their minds as you are making the list. Ask the class what the letters in equations stand for (numbers) and what the letters are called (variables). Help students arrive at the correct answers.

Give each group 2-3 minutes to come up with a definition for the word equation based on what they already know about equations. Share and discuss the following definition for equation with the class: *a mathematical statement that shows the equality of two expressions.* Create a class

definition using student definitions and the dictionary version. Post on the word wall.

Explain that algebraic equations have been used for thousands of years, even by Alaska Natives. Use traditional kayak building as an example. Blue prints were never used to build kayaks long ago. In order to custom build a kayak to fit its owner perfectly, the measurements were based on body parts. The width of the kayak was determined by the two fists on either side of the hips of the person building the kayak, or W = 2F + H, where W is the width of the kayak, F is the size of a fist, and H is the size of the hips. The length of the kayak is determined by taking the arm span of the individual and multiplying it by three, or L = 3A, where L is the length of the kayak and A stands for one arm span.

Introducing Linear Equations with the Seal Hop: Using the list of equations made in the above activity, circle all the equations that are linear equations. Give students 1-2 minutes to discuss what all the circled equations have in common. Allow time for each group to share the similarities with the rest of the class. Write "linear equation" on the board. Explain that linear equations are *equations that represent a straight line when graphed.* Tell the students that they are going to use the Native Youth Olympic (NYO) event, the Seal Hop, to show how linear equations are a mathematical expression for things observed in real life.

Handout copies of the seal hop data sheet to each student. Briefly explain what the students will be doing in this experiment. With the class create a question and a hypothesis for the experiment prior to going to the gym. Take the students to the gym along with clipboards, pencils, copies of the NYO data sheet, stop watches, and yard sticks. Once at the gym demonstrate the seal hop. Show how it is like hopping forward in a push-up position, but your hands are shaped into fists. With every hop you land on your knuckles. Girls however, land on open hands. The following websites have good descriptions and images of NYO events, including the seal hop: http://library.thinkquest.org/3883/ and http://www.anchorage.net/764.cfm. Ask for three volunteers to race while doing the seal hop. Three students should measure and mark 25 feet with masking tape on the gym floor. Three other students will time the race, and assign three recorders to take down the times on their data sheets. Have

the students race three times (3 trials). The times will be averaged back in the classroom.

Once back in the classroom draw a large table on the board and have the recorders post the race times in the table. Ask the rest of the class to copy down the data on their individual data sheets. Have the students average the three trials so that you end up with three final average times, one for each person racing. Write Distance = Rate x Time (D= RT) on the board. Explain that D=RT is an example of a linear equation because when the data is plotted, it should make a straight line. Ask the students which pieces of the equation do they have? They should say distance and time. They will need to solve the equation to find the rate at which the racer was hopping. Plug in one of the racer's values in to the equation and ask students to tell you how you would go about solving this equation for rate. Most classes will have at least one or two students that will know something about solving simple equations to help facilitate this process. Once you have walked the class through solving the equation once, ask the students to solve the equation for the other two racers. Walk around the room and help students one on one. The rate for each racer should be recorded on the data sheet. Now hand out graph paper to each student. Remind the students that in order for D=RT to be a linear equation, the data has to make a straight line. Have the students plot the points for distance and time on the graph while plotting the points with them on the board. Draw a line through the x-y intercept to the time-distance point. Students can use a different colored pencil for each line. Ask the students which line represents which racer and why? Discuss with the students how the slope of the lines is equal to the rates of each racer.

Conclude this activity by asking the students if anyone can give you the definition of a linear equation. Briefly review the seal hop experiment. Ask the students to tell you what the equation was for the experiment (D=RT). Then ask if it was a linear equation and why? They should be able to say that D=RT was in fact a linear equation because it produced a graph with a straight line. Once the students have created their definition for linear equation, post it on the word wall.

Compass Learning – Solve One-Step Linear Equations:

Note: This activity may be done prior to the seal hop activity.

Log on to Compass Learning and open the lesson, Solve One-Step Linear Equations. It is a good idea to do the sections in the lesson prior to doing them with the students. Project the lesson using the SMART Board. Do the third section, Reteach, together as a class. This section explains how to solve all the types of one-step linear equations. Pause the program as you see fit to elaborate on the explanations or to allow for students to ask questions. Do the second section, Let Me Try, together as a class. This section gives the students example equations to solve. Have the students solve each example equation with you using scratch paper and make them show all their work. In the computer lab allow students to do the fifth section, Let Me Practice, independently. This section gives students a chance to work on their own. Walk around the room and offer help to those who need it. Offer an incentive for students that get the 3 highest scores on this last section.

Hatchery Field Trip: The Sheldon Jackson Hatchery has been a fascinating place to visit for ANSWER Campers since Sitka has been a site for camp. They have a touch tank of intertidal invertebrates, a series of saltwater tanks full of sea life, and a hatchery that enhances the local economy by augmenting Sitka's salmon stock. The hatchery is a perfect example of where algebra is being used daily. For example, they use algebraic equations to monitor changes in size of the fish, determine feed rates, and to assist in treating water borne fungus. ANSWER Campers will be taking what they have learned about solving simple linear equations and observe firsthand how it applies to keeping salmon healthy at the hatchery.

In order to prepare the students for the trip to the hatchery they must be familiar with a few new vocabulary words and the equations that they will be working with. Briefly go over the following vocabulary words and then reinforce the words with one of the vocabulary activities listed in the fish curriculum:

Biomass: total mass of an unknown quantity of fish

Population: total number of fish

Size: average mass per fish (grams)

Concentration: the amount or proportion of a substance in a mixture or solution

During the visit to the hatchery students will be working with the following equations:

1) Biomass = Population x Size

Once a week, the hatchery gathers samples of fish in order to determine how much the fish have grown. They use the biomass equation in order to calculate the average size of each individual fish. A sample of fish is collected with a dip nets from the live tanks. Biomass is defined in this situation as the total mass of the unknown quantity of fish in the sample. Population is the total number of fish counted in the sample. Size is the average mass of an individual fish in the sample.

2) Amount to Feed Fish = Biomass x Feed Rate

The fish are fed at different feed rates in order to insure that all the fish in the tank are able to eat during a particular feeding. Feed rates are predetermined values based on the time of year and water temperature. Using the above equation determines how much feed to give the fish.

3) Treatment per Minute = Rate of Water Flow x Concentration

Formalin is a mixture of formaldehyde and water that is used to treat the eggs for fungus in the fall. The formalin is added to the water at a controlled rate for a given period of time in order for the correct concentration to be applied to the salmon eggs. The hatchery uses a bag similar to an IV bag that drips the formalin into the incoming water flowing through the incubators. The rate of the water flow and concentration are predetermined values. Using this equation determines the amount of formalin per minute to be applied to the eggs.

The students will bring clipboards, pencils, calculators and copies of the hatchery field trip worksheet. Dan Goodness the hatchery manager will do a short lecture explaining the above equations. He will then lead the students through the hatchery demonstrating how some of the variables in the equations are determined. The students will be able to gather a small example of live fish use the biomass equation in order to calculate their average individual masses.

Reflection and Post Test:

Allow students to reflect over the last couple of days and their investigations of linear equations. Hand out the reflections sheets and encourage students to write about any ah-has they may have had during the Seal Hop activity, Compass Learning, or at the Hatchery.

Give students the posttest after they are finished with the reflection. The students are to take the posttest independently.

Phase 3

Asking a Good Question!

Time: 30 minutes

Group Size: CLG's and Whole Class

Where: Classroom

Focus: Brainstorming a list of questions for possible independent investigations.

Picking a Good Question

The first step is for students to pick a good question to lead their group's independent investigation. Pull out the list of possible questions that the class has been collecting on the piece of butcher paper in the front of the room. Go over what makes a good question below:

What Makes a Good Question?

- ☐ A manipulate variable and a responding variable can be identified.
- ☐ The responding variable can be easily measured.
- ☐ The question can be answered in a reasonable time frame.
- ☐ The question can be answered with simple materials that are available to us at camp.

The question helps answer the overall camp question of: Why do traditional ways of putting up fish work?

Students will instruct you on which questions can be scratched off the butcher paper list, according to the above requirements. After narrowing the list, give students an opportunity to add some good questions to the list. Next give CLG time to choose a question from the lists that they are interested in investigating for their independent investigation. Handout the Independent Investigation proposal sheet for them to fill out and get the sign of approval by the teacher. Your job is to make sure not every CLG is choosing the same or similar questions to investigate.

CLG_____

Independent Investigation Proposal

1) The question we want to investigate is: _____

_____?

2) The Manipulated Variable is: _____

3) The Responding Variable is: _____

4) The Control is: _____

5) Our Hypothesis is: If_____

then_____

6) The materials we are going to need are:

7) This experiment will probably take _____ to complete.

TEACHER INITIALS_____

Independent Investigations

Time: 2 Days

Group Size: CLG's

Where: Classroom or Outside

Focus: Students will ask their own question and conduct their own independent investigation. The independent investigation will help answer the camp essential question, and show their understanding of the scientific method. The investigations will then be presented, in the format of their choice, at the end of camp.

Prep for Independent Investigations (day before investigations begin)

Once each cooperative learning group has turned in an independent investigation proposal, and got the approval from the teacher, groups can begin preparing for their investigation. Start students by having them fill out the independent investigation design worksheet. They may choose to staple their proposal worksheet to the independent investigation design sheet so they don't need to write the first steps of the scientific method over again. Have students start creating a procedure, design their data tables, and sketch their graph outline a day before actually conducting the investigation. This makes it so the students have a strong picture of what their investigation is going to look like, and it allows the teachers enough time to make sure all the materials are gathered ahead of time. Be sure that students assign roles to each other, for example, Time Keeper, Mass Master, Recorder, etc.

Start Independent Investigations

The next day students will come knowing their roles, prepared to gather their materials, and excited about getting started! Each CLG will get out their Independent Investigation design worksheet. Before students are allowed to start gathering materials, remind them about any safety precautions. Help students gather materials and begin their investigations.

Keeping Busy!

Some CLGs will stay busy the whole time, but others may have long periods between trials in their investigation. Plan ahead of time for this! This is a great opportunity to incorporate some vocabulary practice, reading or other literacy activities, or Moiety making. It just depends on what your class chooses to do for each independent

investigation. Make sure you have a variety of activities to keep the CLGs busy that are waiting for their results to happen!

Finished!

Once students have finished their investigations, you will need to reserve some lab time so they can graph their data. Each CLG will have a hand drawn graph that will help them when making the graph on the computer. Before going to the computer lab, make sure the hand created graph is complete and all groups have written their conclusions and new questions.

CLG_____

Independent Investigation

Question:

_____

_____?

Hypothesis:

If_____

then_____.

Manipulated Variable:

_____

Responding Variable:

_____

Control:

_____

Procedure:

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

11)

12)

Results (draw your data table(s) here):

Graph results on the back or on graph paper.

Conclusion:

_____

_____

New Question(s):

_____

_____?

Phase 4

Choosing a Presentation Format

Time: 2-3 hours

Group Size: CLG's

Where: Classroom

Focus: Students are ready to begin designing their presentations for what they learned during their independent investigations. In preparation for this work, students will need to review the scoring guide, pick a format for their presentation, and write a project proposal.

Introducing the Presentation Rubric

It is best to introduce the rubric using an overhead projector. All students will follow along with their own copy of the rubric. The students will be assessed on three areas: content, communication, and participation/attitude. Go over how their presentation can "Meet" the standard for each assessment area. Obviously, if something is missing from the meets column then their presentation is "In Progress" of meeting the standards. Next go over how their presentation can "Exceed" the standards for each assessment area. You can even make a game out of it by choosing a specific bullets while having the students find which assessment area it belongs to. Once all students seem to understand how the rubric works, give them some time to add bullets to the rubric.

Teacher Presentations

This is a whole camp activity. Teachers will model 5 different presentation formats in order to give students practice using the rubric and to help CLGs pick a format for their presentation. Students will bring the rubrics with them and use it to assess each teacher presentation. The five different presentation format categories are: Art, Performance, Technology, Writing, and Science Fair.

Choosing a Format

After watching the teacher presentations, students will return to their classrooms to brainstorm presentation ideas. Write each presentation format category on the board. Brainstorm a list of ideas for each category. Make sure students are choosing ideas that can be completed in the time allowed and do note require materials out of our budget.

ART

- ☐ Picture book of steps of their independent investigation along with written captions.
- ☐ Painted mural of their independent investigation along with a scavenger hunt worksheet to lead an audience member to pertinent information.
- ☐ Board game that includes a microbe moving through a scientific investigation.

TECHNOLOGY

- ☐ PowerPoint presentation on independent investigation.
- ☐ Web page with simple links to the scientific method and how they apply to the independent investigation.

WRITING

- ☐ Brochure (informational or advertising) that focuses on effective ways of drying fish.
- ☐ Newsletter reporting on camp investigations; several stories, letters to the editor, advertisements, etc.

POSTER

- ☐ Science fair poster that has pictures and captions of the independent investigation.
- ☐ Mobile of the steps of the scientific method as they apply to the independent investigation.
- ☐ Poster along with a reenactment of the experiment where the audience can be involved in doing and seeing the results of the experiment.

After brainstorming a good list of ideas, have students choose one and fill out a project proposal sheet. Your job is to make sure no two CLGs choose the same idea.

Culminating Activity Rubric

	Exceeds	Meets
Content	• Students appropriately use half of the *12 Powerful Words* in their project display • Students identify where math was used in the development or completion of their experiment • Makes more than one specific reference to traditional knowledge or cultural values [from group members' village(s)] • Includes a relevant quote from camp elder	• Experiment tries to answer camp's essential question • Identifies manipulated and responding variable • Experimental design follows the scientific method (see back of page) • Includes a graph and a table • All sections are appropriately edited • Conclusions are supported by the data collected • Makes specific reference to traditional knowledge or cultural values [from group members' village(s)]
Display	• All written sections include borders • Layout is artistically displayed • Photos show the entire experimental process are included	• Experiment is neatly displayed/shared on the chosen medium: a Poster, a Power Point Presentation, a Newspaper, or an Artistic Display • Photos, graphs, charts and/or tables are included in some form • All sections are typed, (possible exception for artistic display) • Materials are arranged in a logical and pleasing manner that leads the audience through the scientific process
Presentation	• Students draw a connection between the traditional knowledge and the scientific findings from their experiment	• Student shows a thorough knowledge of the scientific method and his/her project • Student is able to describe the processes used to complete their project • Student communicates knowledge of the project with an enthusiastic and polite demeanor • Students discuss how they might use what they have learned in the future

Steps in the Scientific Method

Question: Identify the question that you want to answer.

Hypothesis: Based on what you already know, what do you think will happen?

Materials: Make a detailed list of the materials used to do your experiment. (Be sure to include amounts).

Procedure: How are you going to test your hypothesis? What design or methods will you use for your experiment? Does it really test what you think it is testing? (Identify your manipulated variable and responding variable)

Results: What happened when you did the experiment? Translate the results data. Data can be charted or graphed to help explain the results.

Conclusions: Was your hypothesis correct or incorrect? Did you learn something unexpected?

CLG _____

Presentation Format Proposal

1) Circle the format category that your idea falls under:

ART WRITING TECHNOLOGY POSTER

2) Briefly describe your group's idea for your culminating activity presentation.

_____

_____

_____

_____

_____

_____

_____

3) List the materials on the back that you think you might need for this project.

Teacher Initials _____

Presentation Focus Class

Now that CLGs have chosen a format for their presentation, CLGs will now participate in a presentation focus class. Each class focuses on one of the five format categories (art, performance, technology, writing, and poster). CLGs will go to their focus class to get extra support in creating their presentation of their independent investigation for the culminating activity. This support will be in the form of help with gathering materials needed, editing, technology support, and help with writing presentation notes. CLGs will also get a chance to practice presenting to the other focus class CLGs.

Practicing Presentations

What Makes a Good Presentation?

Time: 30 minutes

Group Size: Whole Class

Where: Classroom

Focus: Students think about what makes a good presentation and get to practice getting up in front of an audience.

Materials:

- ☐ At least 16 3x5 cards that have poor presentation characteristics written on each. For example: fidgets with notes, chewing gum, doesn't look up from notes, rocks back and forth, etc.

Brainstorm with the students a list of characteristics of what makes a good presentation on the board. After students have come up with a good list have a volunteer choose a 3x5 card. The student will act out the poor presentation characteristic that is on the back of the card, while talking about his/her best summer. The audience will try and guess what poor presentation characteristic he/she is acting out. Repeat until everyone has had a turn to be the poor presenter.

Practicing Presentations

Time: 2 hours

Group Size: Whole Class

Where: Classroom

Focus: Students will come back to their core group to present what they developed in their focus class.

Review the rubric with the class. Point out the bullets on the rubric that discuss good presentation characteristics. Ask each group to run through their presentation at least three times by themselves. One of the group members will time the presentation to get a good idea how long it takes.

Handout copies of the rubric to each student. Have each group present to the class while the rest of the class is assessing them with the rubric. Allow time for two compliments and two constructive feedback comments from the audience after each presentation. Students should use rubric language when giving feedback.

NOTE: This activity should happen at least two or three times over a couple of days. Students will have time to make revisions to their presentations after each presentation either in their presentation focus class or their core group.

Self-Assessment

Time: 20-30 minutes

Group Size: Individual work

Where: Classroom

Focus: How did we do?

Before students present to Elders and guests and begin the final Celebration, have them take a few minutes to think about all the work they have completed. Self-assessment will help you gain a more clear understanding of what each student learned individually as well as provide a chance for students to think metacognitively about their work and their learning.

Hand out copies of the self-assessment sheet and the rubric. Ask students why they think this might be an important task. Be sure to tell them that the information they provide will help teachers understand what students learned as well as help them prepare an even better ANSWER Camp next year.

Remind them that this is private work, to be completed individually.

Reflection and Self-Assessment

On the rubric, circle the lines that you think best describe your presentation. Next, please answer the questions below:

1. What is your answer to the essential question: Why do traditional ways of putting up fish work?

2. What do you like best about your presentation?

3. What do you think could use improving or could have been done differently?

4. Do you think the format you chose was the best way to show your learning? Why or why not?

5. Let's say your group was given $100. How would you split it up amongst you and your other group members? Why?

6. Share the most important thing you learned during ANSWER Camp.

Presentations

A gallery walk will give students the opportunity to share presentations and interact with community members, Elders, and peers. Community members will use the presentation rubric to help them ask questions about the displays or presentations. Student that are observing the displays/presentations will fill out a reflection guide to write comments about what they have learned and what impressed them about each project. Student projects will be displayed on tables, computers, the walls, and the stage. Not all groups may be formally presenting, however, all groups will be professionally interacting with the public.

Preparing Elders and Guests for Student Presentations

When you invite Elders and other local knowledgeable community members to view student presentations and attend the Celebration, make sure that you ask them to arrive 30 minutes early. Use this time to briefly discuss their role during the presentations.

Their role is to:

- Foster a supportive, caring environment for students.
- View presentations and listen to students share what they've learned.
- Engage in dialogue with the students to further understand what students learned and to clarify aspects of the presentations about which they would like to know more.
- Help students learn even more about traditional food preparation methods.

Be very clear that their role is NOT to:

- Assess student work, or
- Test students.

Name _____

Date _____

Culminating Activity Reflection Guide

Directions: You will be using what you learned about the scientific method and the different ways of preserving fish to observe and comment on other student experiment presentations. Use your words thoughtfully as you provide feedback to each group.

Write the names of the group members being observed: _____

_____

Check or circle the presentation format being observed:

- ❒ Art
- ❒ PowerPoint Presentation
- ❒ Writing
- ❒ Poster

Give a brief written answer for ach of the following questions:

1) What is the question and hypothesis for this experiment?

Question _____

_____?

Hypothesis_____

_____.

2) Did the group prove or disprove their hypothesis, why or why not?_____

_____.

3) How did this experiment answer the Camp's essential question of How do traditional ways of putting up fish work?

_____

_____.

4) What are a few things that this group did really well? _____

_____.

5) What did you learn from this experiment? _____

_____.

Celebration!

The Celebration provides an opportunity for students to serve the subsistence foods they have learned to prepare and to participate in a traditional activity, honoring elders and community members who have helped them learn.

Students will be preparing the food for the celebration during their smoking, drying, and pickling activities. Students will also be making decorations and elder gifts in the evening and during cultural activity time in the afternoons. In addition, students will share Alaska Native songs and dance with their guests. These songs and dances will be taught and practiced in the evening.

Literacy Infusion

This curriculum includes standards aimed at increasing the reading skills of students:

Reading (Ages 11-14)

1) restate and summarize information or ideas from a text and connect new information or ideas to prior knowledge and experience;
2) read and follow multi-step directions to complete a task, and identify the sequence prescribed.

Science Literacy

It is important to remember that there are two types of literacy, expository (factual) and fictional. At camp we will strengthen both types of literacy. When working with expository information, strategies such as graphic organizers and technical direction sequencing can help students synthesize the information more efficiently. When working with fictional information story maps and text connection strategies are more effective.

Literacy is treated as a tool here; the literacy activities and tasks are embedded within the context of scientific inquiry. All students need to have strong literacy skills and those skills focused in this unit are important to scientific inquiry. Literacy is such a holistic enterprise that reading is never taught in isolation. Reading, writing, listening, and speaking are intertwined in this unit to support the total literacy growth of the students. These specific activities and tasks will support the continuity of literacy development.

Journal Writing

Students will keep a journal as they investigate why traditional ways of putting up fish work. They will be used to:

1) Record what they learned and personal connections before and after listening to elders speak.
2) Summarize and draw conclusions during and after major class activities and investigations.
3) Draw pictures of diagrams of fish preparation methods.
4) Collect recipes to bring home.

It is of utmost importance that teachers incorporate journal activities consistently in all areas of instruction. Students need to become comfortable with the idea of recording ideas, thoughts and discoveries. The writing does not need to be lengthy, and in fact, drawings may often be used as a supplement or instead of written language. Ask students to write short summary statements of their learning often. This will also provide teachers with a way to check student understanding. Students will also be able to use their journals to help with the creation of their final presentation.

Text Processing

Students will participate in activities that guide students through the process of either viewing, reading or listening to text. This will be done with storybooks from the library about fish, traditional stories about fish, and Velma Wallis' book Two Old Women. They will be focusing on the following concepts:

1) Predicting
2) Inferring
3) Comparing and Contrasting
4) Text Connections

Predicting

Time: 1-1.5 hours for the first book

Group Size: Individual and Whole Class

Where: Classroom

Focus: To introduce the concept of predicting. The process of predicting is also an excellent strategy for keeping students interested in the text and activating prior knowledge in an are of instruction.

Introducing Predicting

People at bookstores and libraries are always picking up books, looking at the cover, reading the title, and then trying to guess what the book is about. This process that we all go through when picking out a

book, magazine, or movie is called predicting. Good readers predict before, during, and after reading something. Before you read a book, a prediction is a guess because you haven't read anything yet. During reading and after reading you adjust the predictions as you gather more information. We are going to use the process of predicting while we read Two Old Women by Velma Wallis to become better readers. But first we will use a short Haida story called "Salmon Boy" as an example of how we will be using predicting to become better readers as we read Two Old Women.

Predict and Support Guided Practice (before reading the story)

Show the main illustration included in Keepers of the Earth: Native American Stories and Wildlife Activities for Children by Michael J. Caduto and Joseph Bruchac and title of the short story, "Salmon Boy" to the class. Write the following question on the board: Can you predict what this story is about? Model with the overhead projector and ask students to write three columns with headings, Predictions Before Reading, Support, Based On, on a piece of paper or in their journal. Students will use the cover illustrations and the title to derive clues about what the story is about. Together as a class students will come up with three predictions about what the story is about, supporting evidence, and what the evidence is based on.

Predict and Support Guided Practice (during the story)

On a new piece of paper have students write the three columns again, except the first column should be titled Predictions While Reading. Begin to read the story to the class. Stop twice while you are reading and pose a question each time for students to add predictions, supporting evidence, and what the evidence is based on to the class chart. Model looking back into the text and rereading sections to find supporting evidence.

Confirm or Adjust Predictions

Now it is time to for students to return to their original predictions and confirm or adjust what they wrote. This analysis of their original predictions is valuable because many students often find that their predictions were based on personal experiences rather than actual facts. This should be done on a separate sheet of

paper, on different page in their journal. In addition, have students create a definition of the word prediction in their journal.

Prediction Application

Now students should be ready to repeat the process individually with the book Two Old Women. Obviously you may choose to have more than two stops for students to predict during the story.

Reflection

Pose the following reflection questions for students to respond to about how predicting makes good readers: What does predicting mean? How does predicting help you understand the book and become a better reader? Students can respond orally or independently in their journal.

This lesson is modified from those included in:
Reading Strategies that Work: teaching your students to become better readers by Laura Robb.

Inferring

Time: 1 hour

Group Size: Individual and CLGs

Where: Classroom

Focus: To introduce the concept of inferring. The process of inferring is also an excellent strategy for helping students realize how often they make conclusions based on what they observe and hear from their friends, family, community members, and the media.

Introducing Inferring

First have students write what they think to infer means in their journal. Have a few students share what they think to infer means. They will be going back to that definition at the end of the lesson. Introducing the concept of inferring is best done through what Laura Robb in *Reading Strategies that Work* calls “Mini-dramas.” Mini-dramas are short role- plays of real life situations that cause someone to infer and draw conclusions. Each situation can be written on a 3x5 card, and individuals or CLGs can pick one to act out for the class. The class will then identify inferences and draw conclusions about what they saw in the mini-drama. You can pick your own

situations, or take from the list that Laura Robb provides in her book:

- ☐ A student yawns several times in class.
- ☐ Two students pass notes to one another in class.
- ☐ A student falls asleep in class.
- ☐ One student takes a pen from a classmate's desk.
- ☐ Two students argue over who gets the soccer ball.
- ☐ A group of students has not completed homework.
- ☐ A group of students copies homework from another student.
- ☐ Three students leave the room without permission.
- ☐ A student returns from recess crying.
- ☐ Two students left all their books at home.

Inferring and Drawing Conclusions from Text

First have students read "Lady and the Halibut" so they can begin inferring and drawing conclusions about what is happening in the text. Have students first create a list in their journal of inferences with their CLGs about the short story. Then have students from each CLG share a couple inferences with the class.

Confirm or Adjust Predictions

Now have students go back to their original definition of what they thought to infer meant and make any adjustments necessary. Have students share their new definitions with the class.

Reflection

Pose the following reflection question for students to respond to about how inferring and drawing conclusions makes good readers: How does inferring help you understand the book and become a better reader? Students can respond orally or independently in their journal.

This lesson is modified from those included in:
Reading Strategies that Work: teaching your students to become better readers by Laura Robb.

Compare and Contrast

Time: 30 minutes

Group Size: Individual and CLGs

Where: Classroom

Focus: To introduce the concept of compare and contrast using a Venn Diagram.

Introducing Compare and Contrast

Students will be comparing and contrasting the two old women that are the main characters in the book Two Old Women by Velma Wallis using a Venn Diagram. However, first show the example Venn Diagram that was featured in the publication by the Alaska Native Knowledge Network newsletter. Before explaining the example Venn Diagram, have the students first comment in their journal about what they think the purpose is of using a Venn Diagram. After students have examined the example diagram and predicted what they are used for, introduce the concepts of compare and contrast. Have students write the definitions of each word in their journal.

Compare and Contrast Using Text

Ask students to compare and contrast the two old women in the story by creating their own Venn diagram in their journal. Ask students to share when finished.

Reflection

Pose the following reflection question for students to respond to about how comparing and contrasting makes good readers: How does comparing and contrasting help you understand the book and become a better reader? Students can respond orally or independently in their journal.

Text Connections

Time: 40 minutes

Group Size: Individual or Whole Class

Where: Classroom

Focus: To allow students to connect new information or ideas to prior knowledge and experience.

Introducing Text Connections

As you are reading Two Old Women out loud, have the students write connections to the story in their journal. Read the chapter where the two old women are left behind. The students will first listen to the portion of the story while jotting down any notes they may need in order to remember details. Students will write their connections in more detail after the teacher is done reading the chapter or section of the book. They can make a connection to something they have read somewhere else (text to text), they can make a connection to something that is going on in the world (text to world), or they can make a connection to something that is related to their own experiences (text to self). The students can choose which

connections they want to write about in their journal, but they should make at least two or three connections after reading for about twenty minutes. Have a few students share one of their connections with the class.

Making Connections

After you feel the students are comfortable with this activity, they can continue to add connections to their journal as the story progresses. This can happen on a daily basis or whenever you find time to read a section of the book.

A modification to this activity is to use sticky tabs to allow students to make their text connections while independently reading a story or article of your choosing.

Reflection

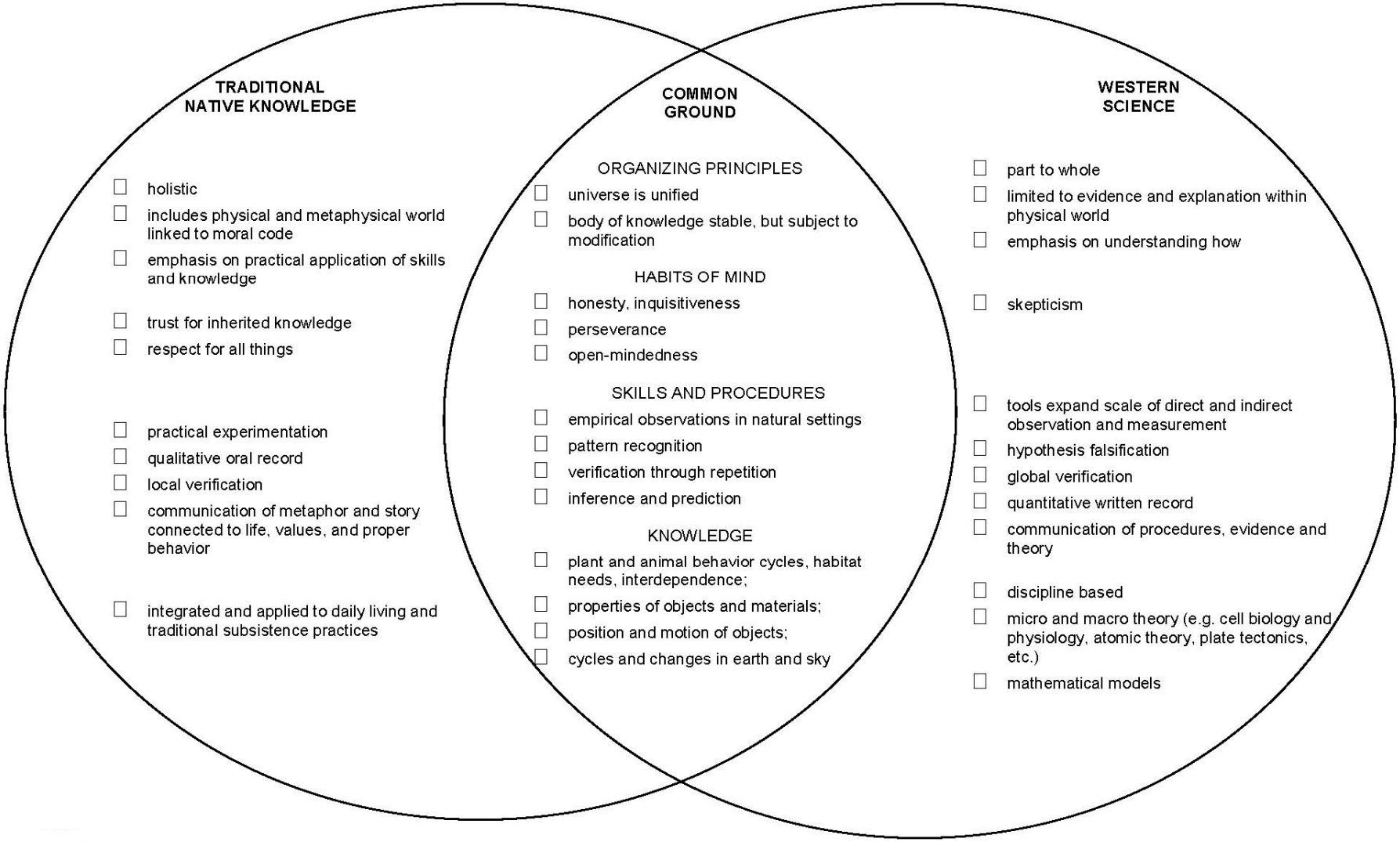
Pose the following reflection question for students to respond to about how making text connections makes good readers: How does making text connections hop you understand the book and become a better reader? Students can respond orally or independently in their journal.

Graphic Organizers

Graphic organizers are a visual way to help students categorize concepts, steps, or ideas. In our investigations with fish and literacy, we are using graphic organizers such as KWL charts, semantic maps, and Venn Diagrams. However, here are a couple Web sites that include blank templates of a wide variety of additional graphic organizers:

www.eduplace.com/graphicorganizer
www.region15.org/curriculum/graphicorg.html

Venn Diagram from the Handbook for Culturally Responsive Science Curriculum by Sidney Stephens, 2000
Modified from the Alaska Native Knowledge Network



Science Vocabulary

As you teach this unit, constantly focus on student acquisition of necessary vocabulary. Until students can sue these words on their own, they probably do not have a complete understanding of the concepts associated with the words. Here is a list of some of the important science vocabulary words we will be using at ANSWER Camp. The words in bold are the vocabulary words used most often in directions for high stakes tests. As new vocabulary words are being introduced, pick one or more vocabulary activities from the provided list to do everyday! By the end of camp. all students should know these words.

Conclusion – A statement in the scientific method that comments on how the data supports or doesn't support the hypothesis statement.

Trace – To follow or show a course or series of developments, or be able to be followed back in time or to a source.

Analyze – To examine something methodically by separating it into parts and studying how the parts relate to each other.

Infer – To conclude something on the basis of evidence or reasoning.

Control – A standard of comparison for checking or verifying the results of an experiment.

Evaluate – To examine and judge carefully; appraise.

Evaporation – The process where a liquid changes to vapor form.

Experiment – A test under controlled conditions that is designed to show a known truth, prove or disprove a hypothesis, or determine the effectiveness of something previously untried.

Summarize – To pick out and include the main ideas of a larger document or discussion.

Contrast – To compare in order to show differences.

Hypothesis – An educated guess that can be tested.

Variable – The part of an experiment that can change. Variables that can be measured (temperature, mass, length) are best for scientific investigations.

Manipulated Variable (MV) – Change that you control, or adjust, or measure very carefully.

Responding Variable (RV) – Something that changes as a result of changes to the manipulated variable.

Mass – The physical volume or bulk of a solid, liquid, or gas.

Microbes – A microorganism.

Compare – To examine in order to note the similarities.

Procedure – A set of instructions that perform a specific task.

Formulate – To devise, invent, or communicate something carefully or in specific words.

Describe – To explain the facts, details, or particulars of something verbally or in writing.

Questions – In science, the "I wonder…" or "how does…" statement that starts the scientific process and lead to experimentation.

Results – In science, results are the information collected while doing an experiment. Measured outcomes.

Support – Evidence or facts that back up a statement or idea.

Scientific Method – A system for answering questions.

Surface Area – The exposed outside space on an object.

Explain – To express ideas or thoughts in a way that is easily understood.

Saturate – To soak, fill, or load to capacity.

Predict – To say what is going to happen in the future, often on the basis of present indications or past experience.

Volume – The amount of space taken up by a three-dimensional object or region of space.

Acid – A substance that has a pH less than 7 and is usually characterized by having a bitter taste or slippery feel.

Neutral – A substance that is neither acidic nor basic.

pH – A measure of how acidic or basic a solution is. The pH scale commonly in use ranges from 0 to 14.

Definitions are modified from those included in:

Vocabulary Activities

1. **Word Walls**: Post a giant sheet of butcher paper on the wall. As you learn new words and concepts, have students record them on the wall with drawings when possible. Refer to the wall often.

2. **Semantic maps**: See the attached example.

3. **Modeling**: The more you use the words you teach, the more familiar students will become with the vocabulary.

4. **Vocabulary journal**: Students organize words into four columns: Words I don't know at all; Words I have seen or heard; Words I think I know; Words I know. This journal can be utilized during each lesson. Words should move, over time, from list to list.

5. **Peer-Response Huddle**: (This activity is from *Discovering Gifts in Middle School*, by Gibbs) Assign each CLG a number from one to four. Tell the students that you will call out a vocabulary word and that each group has 30 seconds to huddle and decide upon the definition. Say that you will then call out a number and each group member with that number will quickly stand up. You will then ask one of the standing students to give the answer. Keep the activity moving quickly so that the energy takes on a "popcorn" effect. Don't call on the first person that pops up unless you want to promote competition. After an answer is given, lead the applause.

6. **Peer-Response Tic-Tac-Toe**: (This activity is from *Discovering Gifts in Middle School*, by Gibbs) This is similar to bingo, but with a tic-tac-toe format. Write a list of 10 vocabulary words on the board, numbered 1-10. Have students meet in their groups. Have each student draw his/her own tic-tac-toe board and randomly write down one number in each square, using nine out of ten numbers from 1-10. Say the definition or clue related to a word on the list. Example: This is what you think will be the right answer to the question

you re investigating. Have the students in their groups discuss which numbered answer is correct and have them mark an "X" on their boards. When a winner is declared in each group, simply start a new game. After 5-10 minutes you can choose to ask various students to come up with the definitions or clues for each word.

7. **Matching Game**: (adapted from *Preparing ESOL Students for Success in Secondary Science*) Write sentences with two parts for matching or questions and answers for students to match in the topic you want to review. Copy the sentences or questions and answers on two different colors of paper. Cut the questions and answers apart. Put cut apart questions strips of one color and answer strips of a different color in the same Ziploc bag for easy identification and matching of question and answer strips. You could have students do this. Have pairs of students match questions and answers while teacher circulates to observe and encourage. When a pair of students believes they have all the parts matched, they raise their hands and the teacher checks for correctness. Any incorrect matches are pulled out so the students can continue working until they get all matches correctly. Sample pairs of questions and answers:

Microbes need me to survive.	I am water.
This shows the results of my investigation.	I am a graph.
This is the variable that doesn't change.	I am a controlled variable.
This causes food to rot.	I am a microbe.
How does drying preserve food?	It removes the moisture.

A variation of this would be to have students create questions and answers for other groups. This could also easily be made into a game of Jeopardy.

8. **Find the Word**: (From *Discovering Gifts in Middle School*) Give each student a card with one of the vocabulary words printed on it. Have each student pin his or her card on the back of another student without the student seeing it. Tell the students to move around the room and ask each other questions that can be answered "yes" or "no" until each student determines what is written on the card on his or her back. They may ask each student only one question and then must move along to another student.

Semantic Map

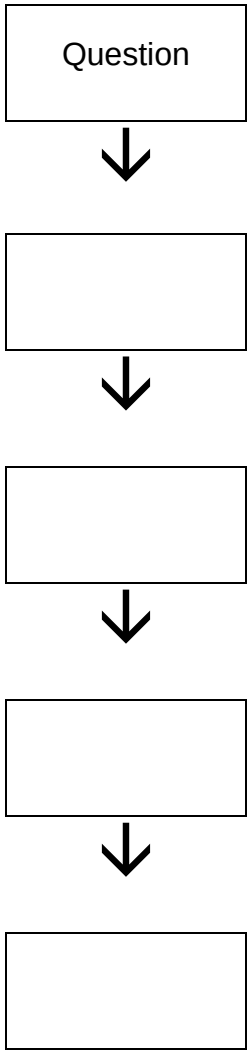
Fill the words in the correct boxes. What is the right order for the Scientific Method?

Conclusions

Results

Hypothesis

Procedure



Pre-test

Based on Math Performance Standard M.A.6

Students should understand and be able to form and use appropriate methods to define and explain mathematical relationships.

Background: A family decides it is time to change their set net location. They begin to wonder where would be the best spot on their beach. The children are told to set nets at two different spots for a period of two months. This summer the children will set out one net at each site; however, each site can handle more. The nets were set at site A near the big rock, and site B next to the waterfall. Each week the children recorded the number of fish caught at each site. Look at the data table. Using the information in the table, help the children graph the number of fish caught at each site, and answer the questions below.

Fish Count at Sites A (near rock) and Site B (near waterfall)

Week #	Site A (Rock)	Site B (Waterfall)
Week # 1	210	280
Week # 2	420	280
Week # 3	560	350
Week # 4	420	420
Week # 5	350	700
Week # 6	280	840
Week # 7	140	770
Week # 8	70	630

1) Which of the following are the manipulated variables?

a) Type of fish caught

b) Number of fish caught

c) Cloudiness of the water

d) Time in weeks

2) Which of the following is the responding variable?

a) Type of fish caught

b) Number of fish caught

c) Cloudiness of the water

d) Time in weeks

Title of Graph: _____

Y

X

X – Axis: _____

1) Graph both sets of data on the graph and do the following:

- ☐ Give the graph a title.
- ☐ Label the X and Y axes.
- ☐ Use a different color pencil for site A and site B.

2) White net is more productive after two weeks?

3) How many times do the nets catch the exact same number of fish in the same week?

4) Which net caught more fish in week 5?

5) During what week was the combined total of fish caught 700 for both nets?

6) Which set net site is best? Explain your answer.

Post-test

Based on Math Performance Standard M.A.6

Students should understand and be able to form and use appropriate methods to define and explain mathematical relationships.

Background: Grandpa says that there used to be way more Sockeye salmon in the Ugashik River and King Salmon River when he was a kid, than what his grandchildren are finding now. Is the Sockeye salmon population getting less and less as time goes on? The grandkids decide to see if the Sockeye are in danger by looking at the population estimates made by the Alaska Department of Fish and Game (ADF&G). The children decide to only look at the estimates for the Ugashik and King Salmon Rivers. The data was given for every five years, 1955 to 2005. Look at the data table. Using the information in the table, help the children graph the population of Sockeye salmon estimated by ADF&G. Then answer the questions on the following pages.

Sockeye Salmon Population Estimates by ADF&G

YEAR	Number of Sockeye Salmon In the Ugashik River	Number of Sockeye salmon In the King Salmon River
1955	1300	300
1960	1100	450
1965	800	410
1970	980	670
1975	950	720
1980	1000	690
1985	1100	790
1990	920	830
1995	890	800
2000	840	860
2005	850	850

1) Which of the following is the manipulated variable?

a) Saltiness of the water
b) Length of the fish
c) Number of Sockeye salmon
d) Time every five years

2) Which of the following is the responding variable?

a) Saltiness of the water
b) Length of the fish
c) Number of Sockeye salmon
d) Time every five years

Title of Graph: _____

Y

X

X – Axis: _____

3) Graph both sets of data on the graph and do the following:

- ☐ Give the graph a title.
- ☐ Label the X and Y axes.
- ☐ Use a different color pencil to graph each river.

4) Which year did the Ugashik River has the most Sockeye Salmon?

5) What year does both rivers have the same amount of Sockeye salmon return?

6) Which river had more fish in 1995?

7) During what year was the total salmon catch on both rivers 1210 fish?

8) Which river is Grandpa right about there being more Sockeye salmon in 1955 than there are now? Explain your answer.

Vocabulary Test

Directions: First write what each of the following word means. Next, create a sentence where each word is used. Refer to the example below.

EXAMPLE:

Saturate: Saturate means to soak or load something until it is full.

Sentence: When I was making the salt brine for smoking fish I added salt to water until it was **saturated** with salt, and that is what made the potato float.

1) Trace _____

Sentence: _____

2) Analyze _____

Sentence: _____

3) Infer _____

Sentence: _____

4) Evaluate _____

Sentence: _____

5) Summarize _____

Sentence: _____

6) Contrast _____

Sentence: _____

7) Compare _____

Sentence: _____

8) Formulate _____

Sentence: _____

9) Describe _____

Sentence: _____

10) Support _____

Sentence: _____

11) Explain _____

Sentence: _____

12) Predict _____

Sentence: _____

End of Unit Reflection – Teachers

Please take a few minutes to answer these questions to help us fine tune this unit.

1. What were the most positive aspects of this unit from the campers' perspective?

2. What were the most positive aspects of this unit from your teaching perspective?

3. What needs to be changed and why? We know you have completed notes about needed changes as you taught, but now we would like you to give us an overall perspective on needed change.

Student Name _____

Core Group Name _____

Date _____

Answer Camp Math Pretest

Directions: Solve the following linear equations. Show all your work by neatly writing down each step you took to solve the equation. This test is to be taken independently.

1. $X + 3 = 11$

2. $X - 21 = 3$

3. $5X = 25$

4. $X/20 = 1$

5. What is a linear equation?

Student Name _____

Core Group Name _____

Date _____

Answer Camp Math Posttest

Directions: Solve the following linear equations. Show all your work by neatly writing down each step you took to solve the equation. This test is to be taken independently.

1. $X + 3 = 11$

2. $X - 21 = 3$

3. $5X = 25$

4. $X/20 = 1$

5. What is a linear equation?

Student Name _____

Date _____

Hatchery Field Trip Reflection

Directions: Reflect on your experiences during the field trip to the hatchery. Answer the following questions using complete sentences. Include details to make your explanations easier to understand.

1. Briefly describe what you did during the hatchery field trip.

2. What was your favorite activity at the hatchery?

3. What was your least favorite activity at the hatchery?

4. Why is Algebra important at the hatchery?

5. Dan Goodness was the hatchery manager. How would you rate Dan on a scale of 1-10, 1 being horrible and 10 being great, on how he explained how they use Algebra at the hatchery? Explain your reasoning.

6. Would you be interested in working in a hatchery someday? Why or why not?

7. Even though you may not work in a hatchery someday, why is learning Algebra important to you?

Student Name _____

Date _____

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7. Even though you may not work in a hatchery someday, why is learning Algebra important to you?