Habitat Holiday

Grades 3,4 & 5 Life Science
And Data Management and Probability (Mathematics)

http://www.seatrasformatori.it/sites/default/files/styles/cover/public/images/article/465/ecop.jpg?itok=o4IfQvoL

"Look deep into nature, and then you will understand everything better." – Albert Einstein

. Name: _____

. Habitat Holiday Learning Log

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Toronto, Ontario, Canada M4N3R8

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PURPOSE of LEARNING LOG RESOURCE:

1. To support the Ontario Science and Mathematics Curriculum
2. To support independent and paired study during station work or during home study (holiday or at-home interest/ extended homework activities)
3. To add support as an enrichment or remedial resource (students can work at their own pace)
4. To provide a learning log (evidence of learning) built in to student resources

Table of Contents

Surface Check

What is life science?

What is an inquiry?

What is data?

What is an expert?

Bonus ☺
What is a source?

1. Life Science Safety

- Sign the STEM Safety Contract:

STEM Safety Contract

1. Follow your teacher's instructions carefully. Ask questions if you do not understand what to do.

2. Do not taste, eat, drink, or inhale anything used in science activities unless the teacher tells you to do so.

3. Keep your hands away from your face, eyes, and mouth during science activities. Wash your hands after science activities.

4. Always wear goggles when chemicals, glass, or heat are being used and when there is a risk of eye injury.

5. Tell the teacher if you see something/someone being unsafe.

6. Notify the teacher immediately if you have an accident or an injury.

I have reviewed these safety rules with my teacher.

_____ _____

Student's Signature Date

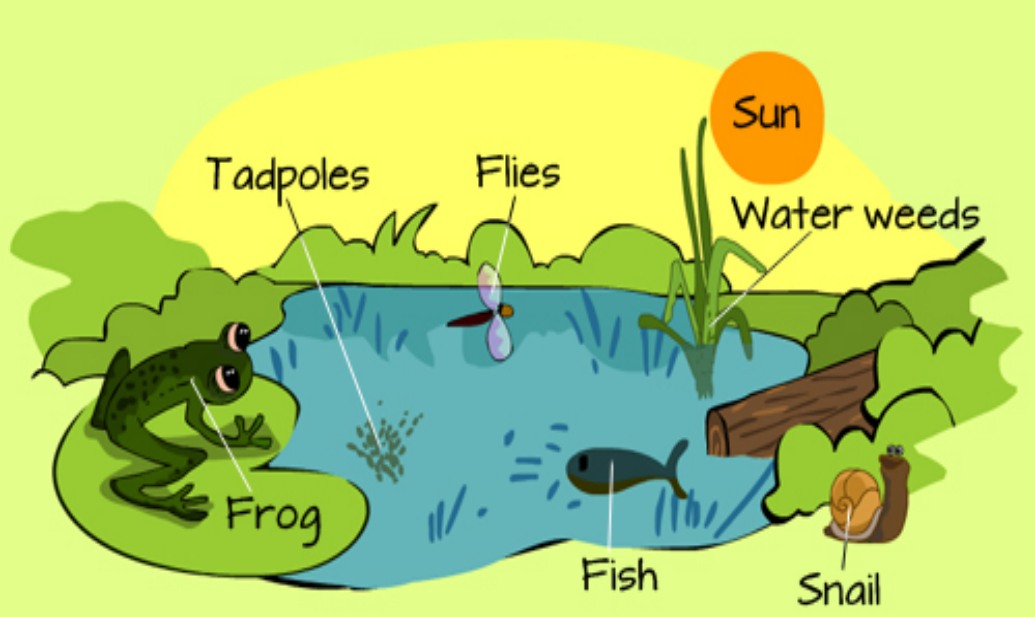
_____ _____

Teacher's Signature Date

2. Eco-Exhibition Inquiry

CREATE A MODEL ECOSYTEM

****During most Life Science classes, you will work at making and revising a 3D model of an ecosystem.



Task and Materials:

- You and your partner will be given space at an Eco Exhibition to feature your 3D model of an ecosystem.
- Explore and select an ecosystem problem and recommend solutions to help make the ecosystem better for living community members.
- You and your partner will explore as much as you can about an ecosystem around the world and make recommendations for **how to solve a real ecological problem.**
- Your model should include at least ten species of plants and animals.
- Create a 3D model/artifact that you will share with a PowerPoint presentation to teach others at an 'Eco Exhibition' (at the end of the semester).

- Your PowerPoint will explain how your ecosystem:

    - ✓ links things to each other
    - ✓ solves a problem
    - ✓ works better than other ecosystems
    - ✓ helps living things in the system
    - ✓ make recommendations for what humans can do to help
    - ✓ is affected by humans

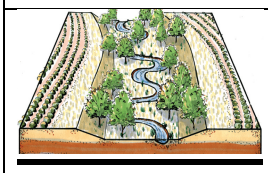
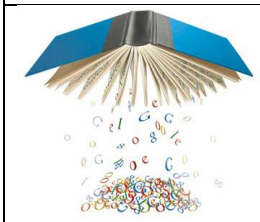
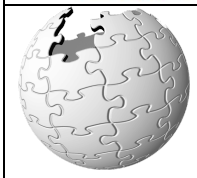
- At first you can go back and forth between designing blueprints of your ideas – and building samples.
- Starter Materials: *journal*, pencil, duct tape, boxes (large and small), scissors, magnet strips, material, buttons, safety pins, crayons, newspapers, magazines.
- Use your Learning *Journal* to make and label diagrams.
- List more things you might need to help you make your ecosystem.
- At the end your report, you should include labeled diagrams with arrows showing how living things are linked to one another.

You will use 6 ENGAGE inquiry actions in thia investigation:

1. E - **E**xplore
2. N – **N**arrow
3. G = **G**ather
4. A = **A**nalyze
5. G = **G**enerate
6. E = **E**ducate

Biologists, botanists, historians and many others conduct inquiries to find out more about life in the present and in the past.

- Read through the ENGAGE action description and circle key words.
- Then tell your partner (without looking) what ENGAGE stands for!

Icon	ENGAGE Inquiry Steps
	**EXPLORE** 1. Browse images/artifacts 2. Search through books/newspapers/magazines 3. Browse web pages...
	**NARROW** focus of interest Brainstorm on own/with others Think about value of project Choose initial direction
	**GATHER** data Immerse in books and web articles Summarize notes from Informational texts (books, Web) Design interview questions and conduct interview(s) Design items for survey/ questionnaire
	**ANALYZE** by comparing: informational text expert quotes and perceptions
	**GENERATE** Findings Conclusions/Connections/Theories/Symbols Recommendations Admit bias/limitations Future research possibilities
	**EDUCATE** Others • Create visual art, musical score, dramatic or dance as a teaching aid to help others understand inquiry and findings • Generate an inquiry report to be published for others to reference in the future - using technology • Generate a visual display using technology to teach others • Develop a quiz to check for understanding that peers were actively listening to and learning about project from presentation

3. Guests Near our School Community

- Step outside for a Scavenger Hunt to see how many special places and living things you can find.
- List them below:

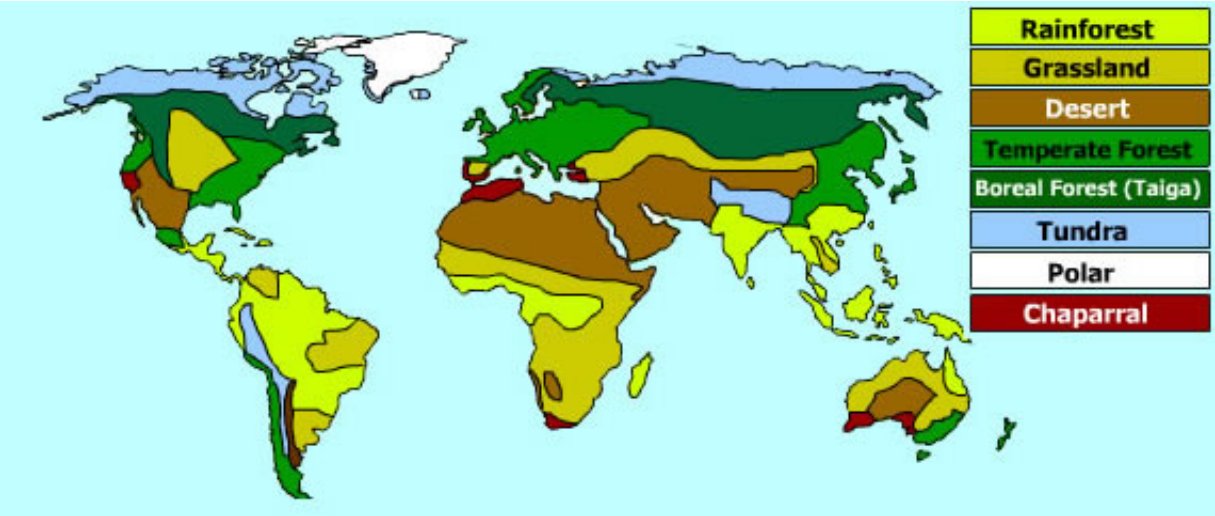
Living Thing	Location

- Take a picture or draw a picture of one living thing you discovered.

How well did I do this task?	Like a Trailblazer ☺ (Expert	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

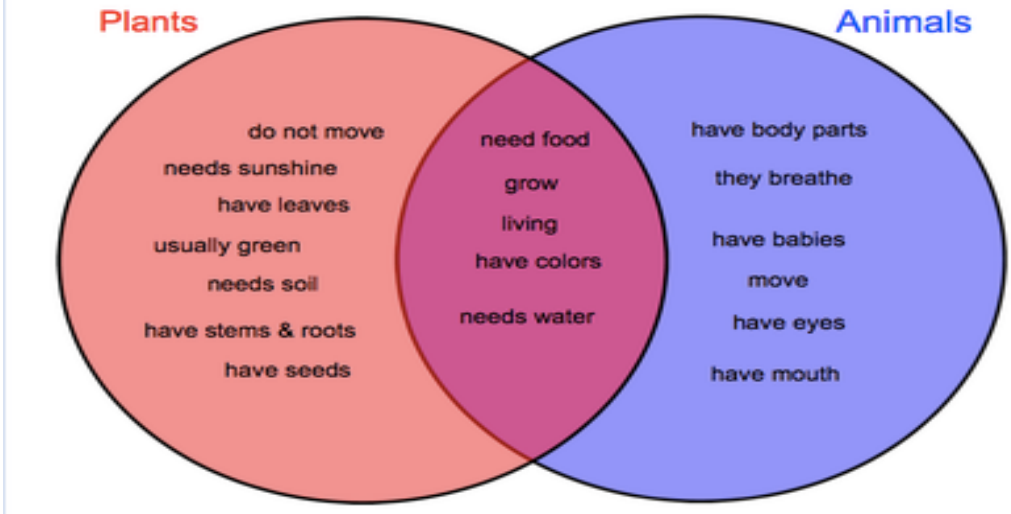
4. Biome Watch

- Take a look at a map of the world biomes and think about where it might be easiest for living things to survive!



http://mrnussbaum.com/wlandform/biome.jpg

- Take a look at the sample Venn diagram showing how plants and animals are the same and different:

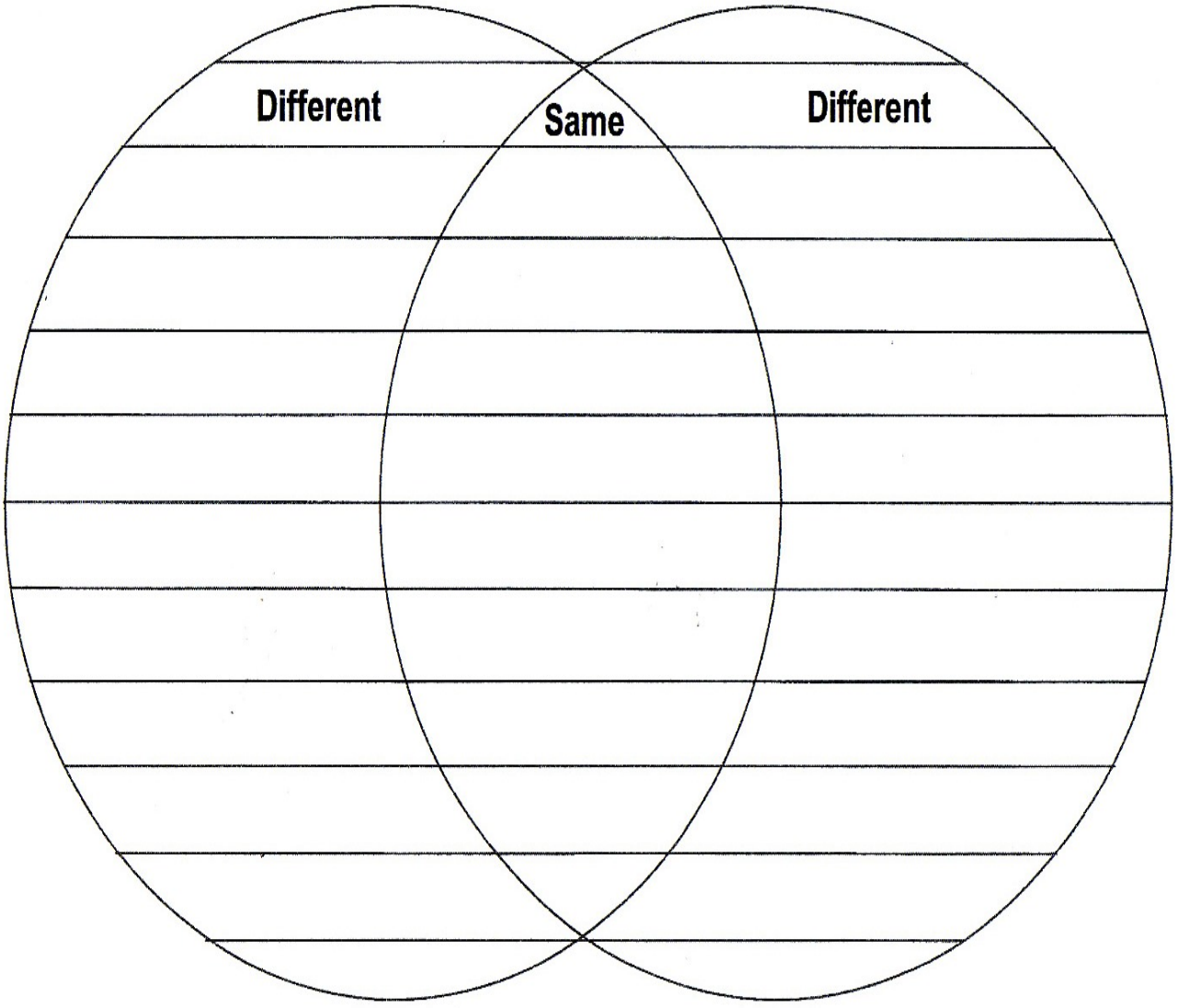


http://cowen.ahsd25.wikispaces.net/file/view/Screen_shot_2011-04-26_at_9.49.38_PM.png/223266360/400x277/Screen_shot_2011-04-26_at_9.49.38_PM.png

Experts know that ecosystems are made up of living and non-living biomes.

A biome is…

- Create a Venn diagram illustrating how living and non-living biomes are the same and different.



https://adventureclubinteractive.files.wordpress.com/2013/02/venn-diagram.jpg

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

- View the following video about cycles, habitats, niches https://www.youtube.com/watch?v=JPHqUxxyLsY (cycles, habitats, niche)
- Draw an image of each biome:

World Biome	Image

5. EXPLORE

- To start off view the following videos to find out more about ecosystems:
  - ✓ https://www.youtube.com/watch?v=Ac1UV30jt_U (1 minute)
  - ✓ https://www.youtube.com/watch?v=EdKhQVHc3Ao (4 minutes)
  - ✓ https://www.youtube.com/watch?v=GlnFylwdYH4&ebc=ANyPxKq3gzW2v0C5a870uQm5-pd9VhTzFDZ_Yr2L1p_J8pQCeBl-bvu99sRLiWWRioQQSXaSZWIHL48JpJu_2GB4a3zO_e_lBw (5 minutes)
  - ✓ https://www.youtube.com/watch?v=WuejxJttBqo (4 minutes)

What are three things you learned about ecosystems?

_____

_____

_____

"Science is just an image of the truth" **~ Francis Bacon**

- In order to create a model ecosystem, you will need to start browsing by finding some interesting images.

http://www.abernethy.org.uk/files/4813/8296/7788/explore_logo.jpg

- List the web addresses browsed and rank them 1 through 5.

Websites Addresses Searched	☺ Really sparked my interest	☹ ho hum (did not spark my interest)
http://eschooltoday.com/ecosystems/what-is-an-ecosystem.html		
https://www.thinglink.com/scene/373893887053266944		

- Copy and paste or print and paste one interesting picture below.
- Label the image with at least 5 words.

Reflect - When I first viewed the image I thought…

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

ET – Solid understandings of biomes

6. NARROW

FIELD TRIP:

- Check out a freshwater ecosystem.
- How many living things can you see in the river?
- Record them below:

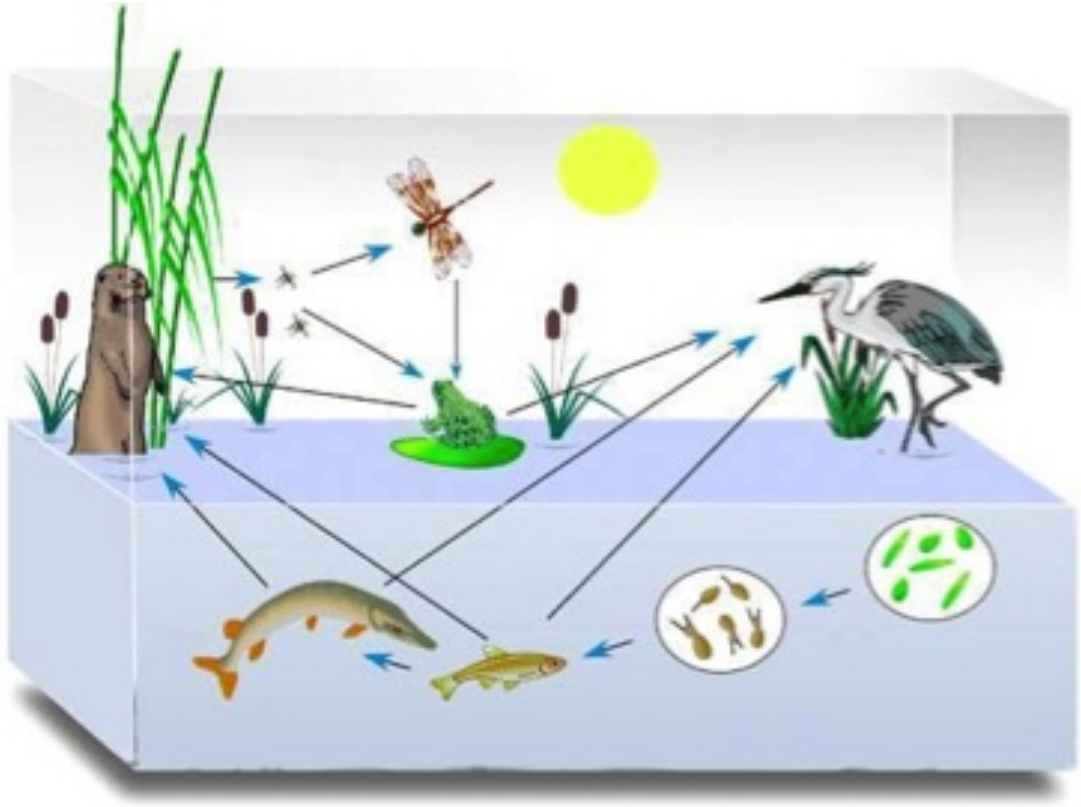
Living things in a Freshwater Ecosystem

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

- Then review the following websites about global ecosystems:

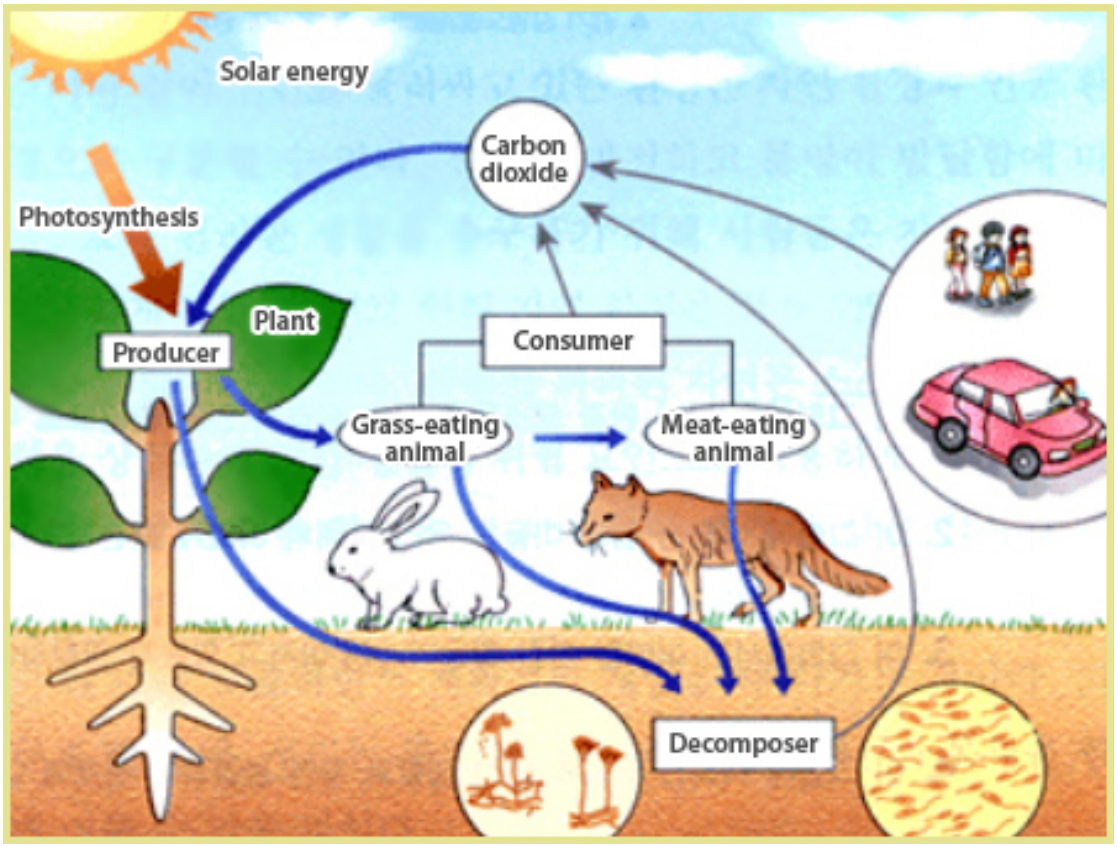
http://chsweb.lr.k12.nj.us/mstanley/outlines/ecology/ecotypes/ecotypes.htm
http://www.ecosystem.org/types-of-ecosystems (types of ecosystems)

- Work with a partner to complete six KWL Charts about each kind of ecosystem on the next three pages.



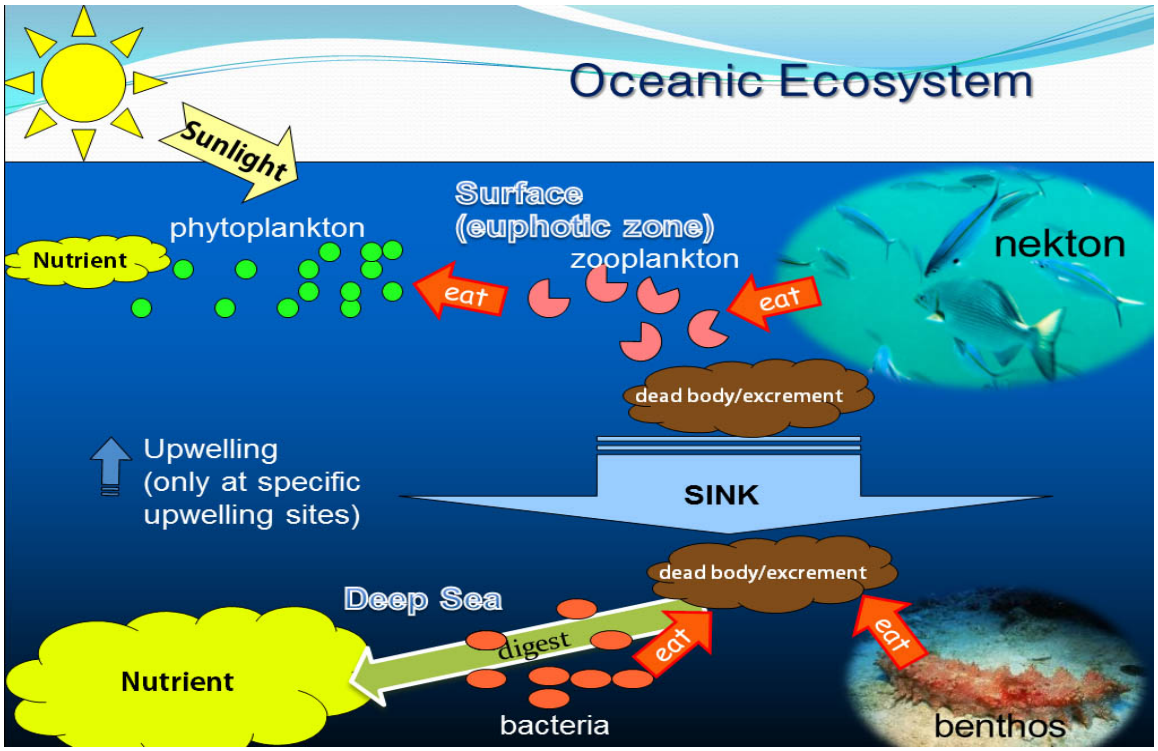
http://www.ecologyedu.com/education_resources/photosynthetic_bacteria_and_protista_represent_plankton_in_freshwater_ecosystems_files/aquatic-food-web.jpg

Freshwater Ecosystem		
I KNOW	I WONDER	(Want to) LEARN more about



http://4.bp.blogspot.com/-rKVL4csMI7Q/Ty2MPPxF5VI/AAAAAAAAAOI/V83uvLk2gCY/s1600/terrestrial+ecosystem.jpg

Terrestrial Ecosystem		
I KNOW	I WONDER	(Want to) LEARN more about



http://mrskievit.weebly.com/uploads/3/7/9/0/37901697/9539346_orig.jpg

Ocean Ecosystem

I KNOW	I WONDER	(Want to) LEARN more about

How well did you demonstrate your knowledge of biomes?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

7. Cycle Shop

Different cycles play key roles in ecosystems.

- You will need to gather data about cycles to decide how you will use them in your own ecosystem.
- Search for information about each cycle, draw a picture and label it with words and arrows below:

(a) Food Chain and Food Web (Energy Cycle)
(b) Carbon Cycle
(c) Oxygen Cycle
(d) Water Cycle
(e) Nitrogen Cycle

(a) Food Chain and Food Web Energy Cycle Image:

(b) Carbon Cycle Image:

(c) Oxygen Cycle Image:

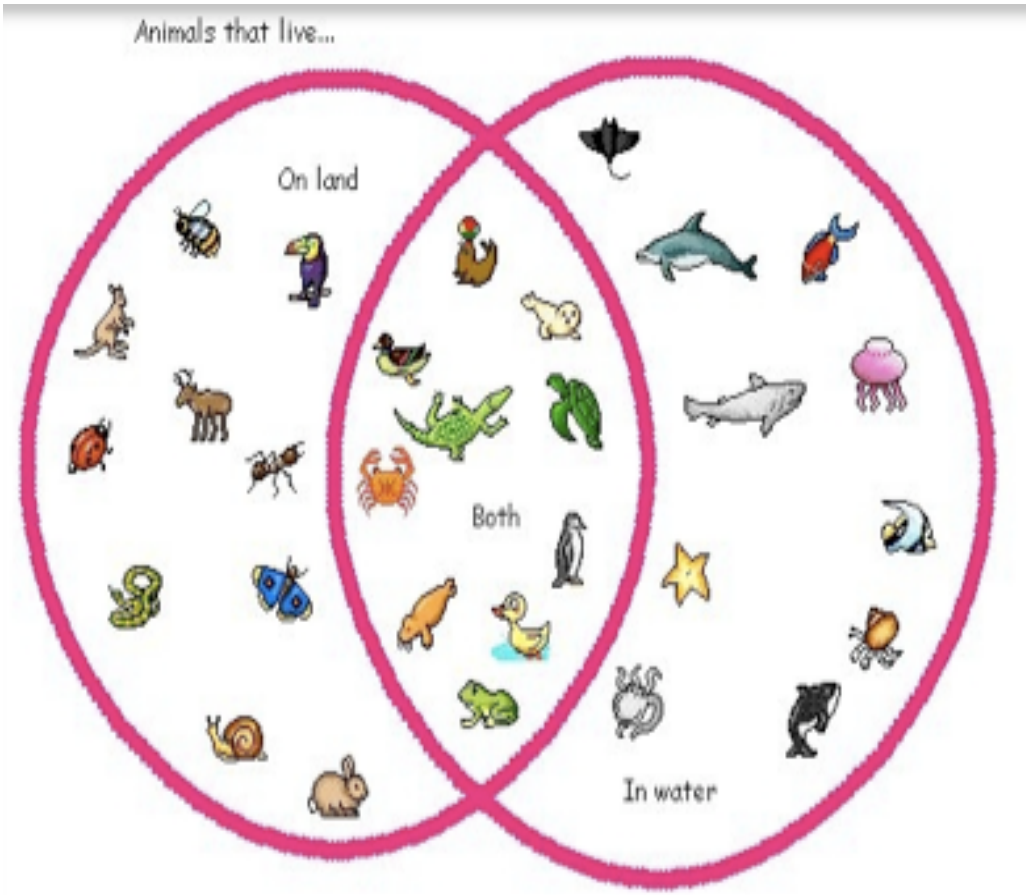
(d) Water Cycle Image:

(e) Nitrogen Cycle Image:

How well did you demonstrate your knowledge of life cycles?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

8. The Circle of Life

- Look at the Venn diagram below comparing some living things that live on land and water.

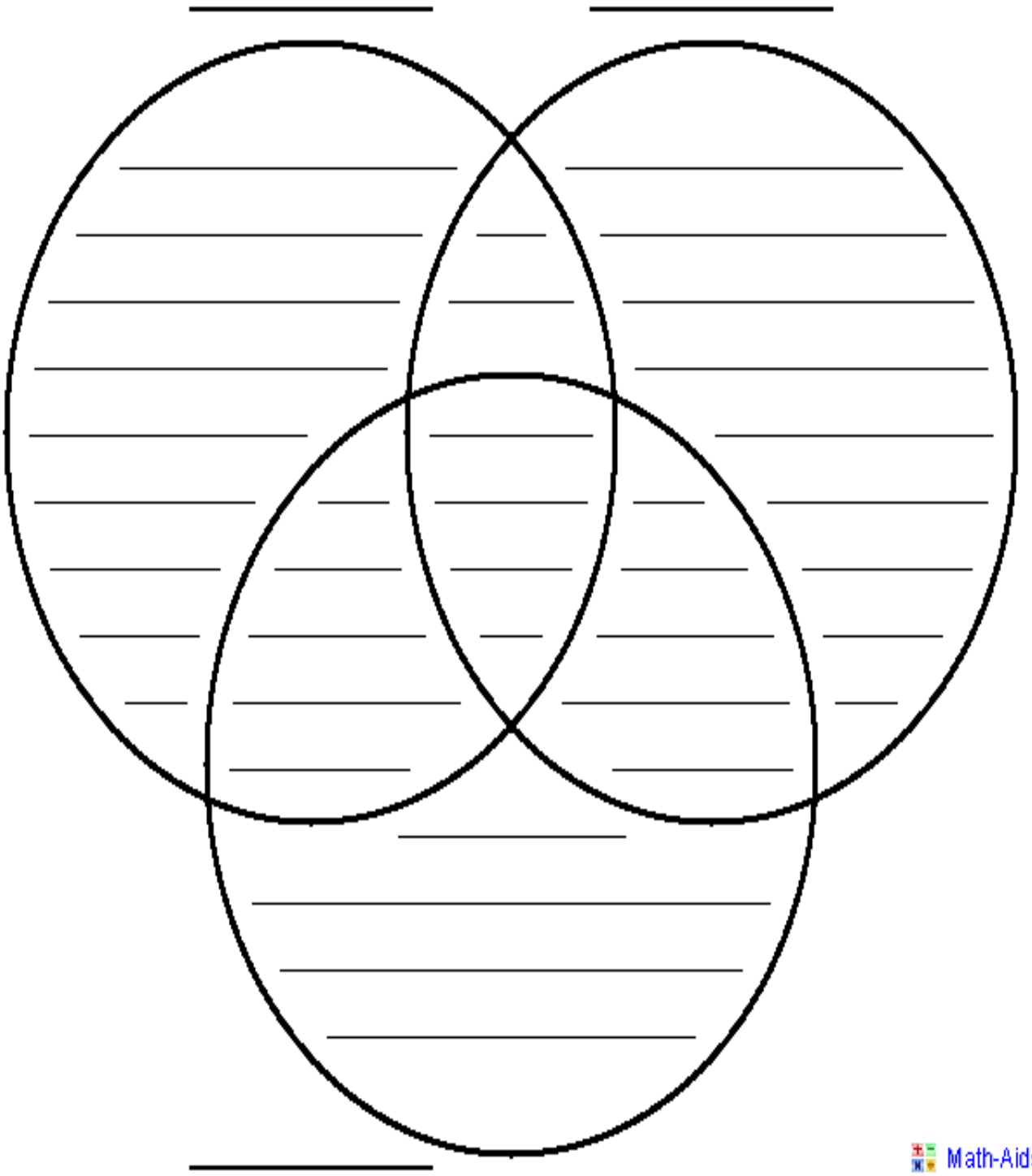


http://www.proprofs.com/quiz-school/upload/yuiupload/228571270.jpg

TECH CHECK:

- Before creating your ecosystem project, take a deep dive into more these print and digital texts:
  - http://www.canadianecology.ca/http://vastudies.pwnet.org/vs2/vs2_a.htm
  - http://education.nationalgeographic.org/media/wolves-yellowstone/ (6 minutes)
  - http://www.discovery.com/tv-shows/frozen-planet/videos/filming-the-wolves-of-winter/ (Canada) (6 minutes)
  - http://videos.howstuffworks.com/discovery/40313-animals-vernal-pools-spring-to-life-video.htm (4 minutes)
  - https://www.sciencedaily.com/videos/587610.htm (bee population - 11 minutes)

- **Extension:** Compare the life cycle of a frog, a butterfly and a bee using a triple Venn diagram.



9. GATHER

You will gather data from three different kinds of sources:

A. print and digital
B. interview (primary)
C. survey/questionnaire

The print, digital and interview sources ideally should be as 'bias' free as possible.

- What do you think **bias** means? (Put your ideas or classmates ideas here during a discussion of possible definitions).

- Look it up in the dictionary and circle the words that come closest to the dictionary definition.

http://s3.amazonaws.com/libapps/customers/17/images/gsdwordle.png

- You will be gathering data from Eco-experts.
- The quality of print, digital and interview sources can be screened using the following *Bias Check*.

Bias Criteria	**What sources fit Quality Check**	**What sources may not fit Quality Check… (caution)**
Peer-reviewed writing	• Research papers (usually linked to universities/recognized research labs) • Quotes from peer-reviewed researchers in newspapers • Peer-reviewed books • Author/credentials listed • Current research/ 'classic' research	• Interest groups (lobbyists) • Politicians • Commentary articles in news • Journalists/television commentators quotes in newspaper • Self-published books • Author name/credentials • Dates of source not listed
Multiple perspectives	• At least three experts confirm each point of view	• Questionable experts confirm single perspective
Benefactors of claims	• Have nothing to gain from promoting ideas • Admission of potential benefit to writer/expert	• Source does not admit possible personal/financial gains • Some lobbyists (make a living from convincing politicians to support action)
Interpretation of data/claims	• Can follow the research method • Clarity in communicating variables • Reluctance to make cause and effect claims without reference to at least 2 other quality peer-reviewed research studies	• Too much data can cloud ability to check for validity of sources • Simplifies causes and effect (without admitting other possible variables)
Language use can be trusted	• Uses caution words not assuming that findings will replicate (many, some, few, perhaps, believe)	• Uses absolutes (all, none, never, always)
Conditions are clear	• Admitting limits of ideas (a pilot, in a few situations, detailing of background/conditions)	• Information left out • Limited description of conditions/background

- Read through the checklist again and circle 5 key words that you will use to create a 'Wordle' about quality sources.
- Insert WORDLE HERE:

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie (Novice)

10. Gathering Print and Digital Information

- Look up the following websites and cut and paste or write in the box how the description is completed (first example is completed for you):

Water pollution http://www.nrdc.org/water/	Clean and plentiful water provides the foundation for prosperous communities. We rely on clean water to survive, yet right now we are heading towards a water crisis…Dirty water is the world's biggest health risk, and continues to threaten both quality of life and public health in the United States. When water from rain and melting snow…	*…runs off roofs and roads into our rivers, it picks up toxic chemicals, dirt, trash and disease-carrying organisms along the way.*
Air Pollution http://triblive.com/news/allegheny/3970696-74/pollution-pittsburgh-allegheny#ixzz2ZQTuj7fq	Albert Presto, a research professor at Carnegie Mellon University's department of mechanical engineering, leads a team of researchers who drive around the city and county in a van doing mobile air monitoring to… .	*…to*
Land Pollution http://eschooltoday.com/pollution/land-pollution/what-is-land-pollution.html	Land pollution is the deterioration (destruction) of the earth's land surfaces, often directly or indirectly as a result of man's activities and their misuse of land resources… Exploitation of minerals…	*…(Mining activities)*

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

- To gather data, you will need to do some reading.
- Find at least two books that relate to your ecosystem.
- Record details found in each by filling in the 'Book Data Bank' charts:

BOOK DATA BANK	
Title of Book:	Name of Publisher:
Author of Book/Chapter:	Date:
3 Quotes	***Jot Notes from Book***

BOOK DATA BANK	
Title of Book:	Name of Publisher:
Author of Book/Chapter:	Date:
3 Quotes	***Jot Notes from Book***

- Find at least two web articles that relate to your ecosystem.
- Record details found in each by filling in the 'Website Data Bank' charts.
- Jot notes in the margins of the printed off articles.
- Place quotes from the web by 'copying and pasting' directly into the chart.
- If you can print off copies of written text and circle key quotes, this would be good to include in a research folder.

WEB SOURCE DATA BANK WEB ADDRESS (copy and paste here):	
Title of Article:	
Author of Article:	Date:
3 Quotes	***Jot Notes from Article***

WEB SOURCE DATA BANK WEB ADDRESS (copy and paste here):	
Title of Article:	
Author of Article:	Date:
3 Quotes	***Jot Notes from Article***

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

11. Gathering Information from Experts

(Interviewing Primary Sources)

Finding an Expert - You can find agencies or websites on the Internet that claim to have experts. Some stand the test of time, others do not. Not only will it help to learn about these agencies, you will also discover that they may exist for limited or extended periods of time.

Places to Find Eco-Experts on-line	
☑ United Nation's Environmental Program (http://web.unep.org/)	☑ National Association of Environmental Professionals (http://www.naep.org/)
☑ Worldchanging (http://www.worldchangingcentre.org/)	☑ Biosphere Expeditions (http://www.biosphere-expeditions.org/) - travel
☑ Earth Charter Initiative (http://earthcharter.org/)	☑ BirdLife International (http://www.birdlife.org/)
☑ Mountain Wilderness (http://www.mountainwilderness.org/)	☑ Fauna and Flora International (http://www.fauna-flora.org/)
☑ Friends of Nature (http://www.friends-of-nature.ca/)	☑ Friends of the Earth (https://foecanada.org/en/campaigns/the-bee-cause/;
☑ Green Cross International (http://www.gcint.org/)	☑ Conservation International (Amazon) ☑ http://www.conservation.org/stories/vr/Pages/amazon-under-the-canopy-virtual-reality.aspx
☑ Plant A Tree Today Foundation (PATT) http://www.pattfoundation.org/	☑ PRBO Conservation Science (http://www.pointblue.org/)
☑ Project AWARE (http://www.projectaware.org/?q=/homepage/project-aware-homepage)	☑ Rainforest Alliance (http://www.rainforest-alliance.org/)
☑ Sandwatch (http://www.sandwatch.ca/)	☑ Wetlands International (https://www.wetlands.org/)
☑ The Mountain Institute (http://mountain.org/)	☑ The Nature Conservancy (http://www.natureconservancy.ca/en/)
☑ World Land Trust (WLT) (http://www.worldlandtrust.org/)	☑ World Resources Institute (WRI) (http://www.wri.org/)
☑ World Wide Fund for Nature (WWF) (http://www.worldwildlife.org/)	☑ Environmental Studies professors, scientists

- You can look at careers for hints about who might be a good primary source. Here are some ideas:

Environmental officials	Researchers	Public Policy officials
Foresters	Biologists	Officers in environmental organizations
Research Fellows	Artists	Business
Scientists	Ecologists	Professors

University Researchers – Some university professors have established 'outreach' type programs. They can provide the names and links to experts who conduct their own research for a living. Web pages can provide key biographical information that can let you zero in on people who specifically could support your research project.

- Search the Internet to find experts that might have something important to add to your investigation:

  _____ from _____ because

  _____

  AND

  _____from_____ because

  _____

- Generate questions for an email interview with one or more experts.

- Create questions to find out more about:
  - the expert's background
  - the expert's perspective
  - interesting ideas to improve understanding of the topic
- In ELA class, write a draft letter and share this with your teacher.
- When the letter is ready for mailing, your teacher will mail it for you.

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

Extension:
*Read about different Environmental Science university programs and find out what kinds of jobs seek the expertise of environmental scientists.

12. Gathering Perceptions from Surveys

- Create an electronic survey to gather input from your classmates/ parents/teachers about their perceptions about ecosystems.

  Step 1 - Sign up for an account.
  https://www.surveymonkey.com/user/sign-up/
  Step 2 - Draft questions on cue cards about ecosystems gathered from books, web sites and expert information.
  - One question will be a 'yes/no' question.
  - One question will be a multiple-choice question.
  - One question will be open-ended.
  - Edit each one after getting feedback from at least two people (one will be your teacher).

  Step 3 - Type the revised questions on your survey.
  Step 4 - Make sure 10 people complete your survey.
  Step 5 - Fill in the data gathered from the yes/no questions and the multiple choice questions in the two frequency tables that follow.

- Take a look at these examples:

Do you agree that progress can lead to invading habitats?	**Perceptions**
AGREE	10
DISAGREE	0
Not sure	3

Where do you think we have the most green spaces?	**Perceptions**
(a) cities (with little excess)	3
(b) parks	1
(c) rural areas	8
(d) other	1

- Complete the following frequency tables for your yes/no ecosystem question and your multiple-choice ecosystem question:

Yes/No Frequency Table 1:

Yes/No Question: (Place question here):	**Number of Perceptions**
AGREE/YES	
DISAGREE/NO	
Not sure/OTHER	

Multiple Choice Frequency Table 2:

Multiple Choice Question (Place question here - and choices below):	**Number of Perceptions**
(a)	
(b)	
(c)	
(d)	

An open-ended question gives respondents the freedom to respond.

- See sample below:

Open-Ended Question Sample: How do people impact an ecosystem?

- Place your open-ended question here:

Open-Ended Question:

- Place responses to your open-ended question here:

Respondent	Responses
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

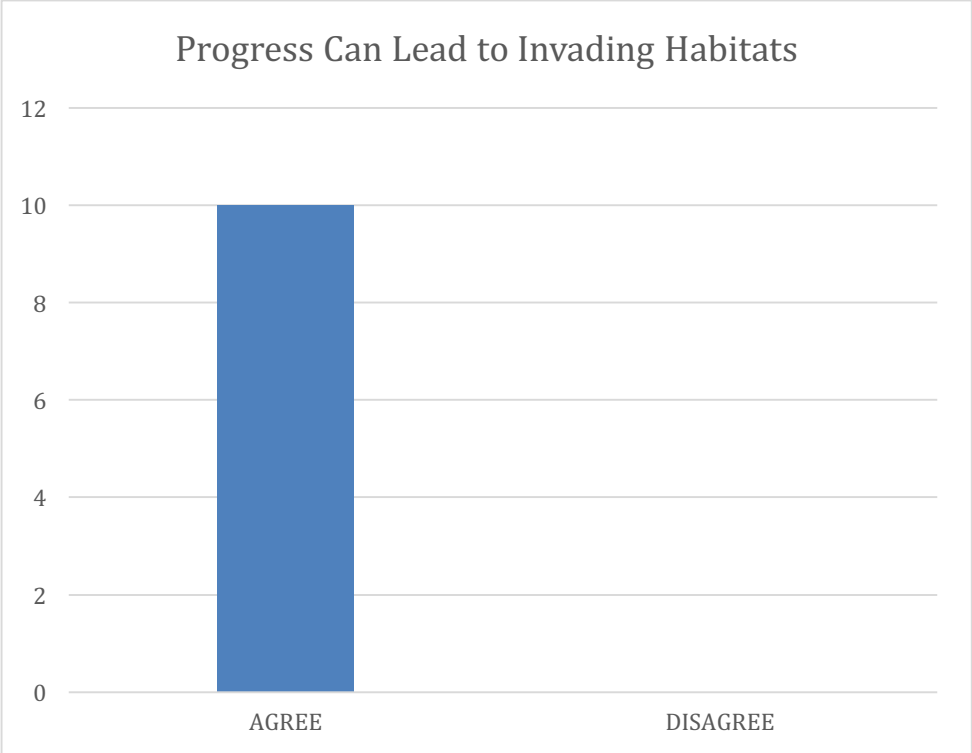
How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

13. ANALYZE

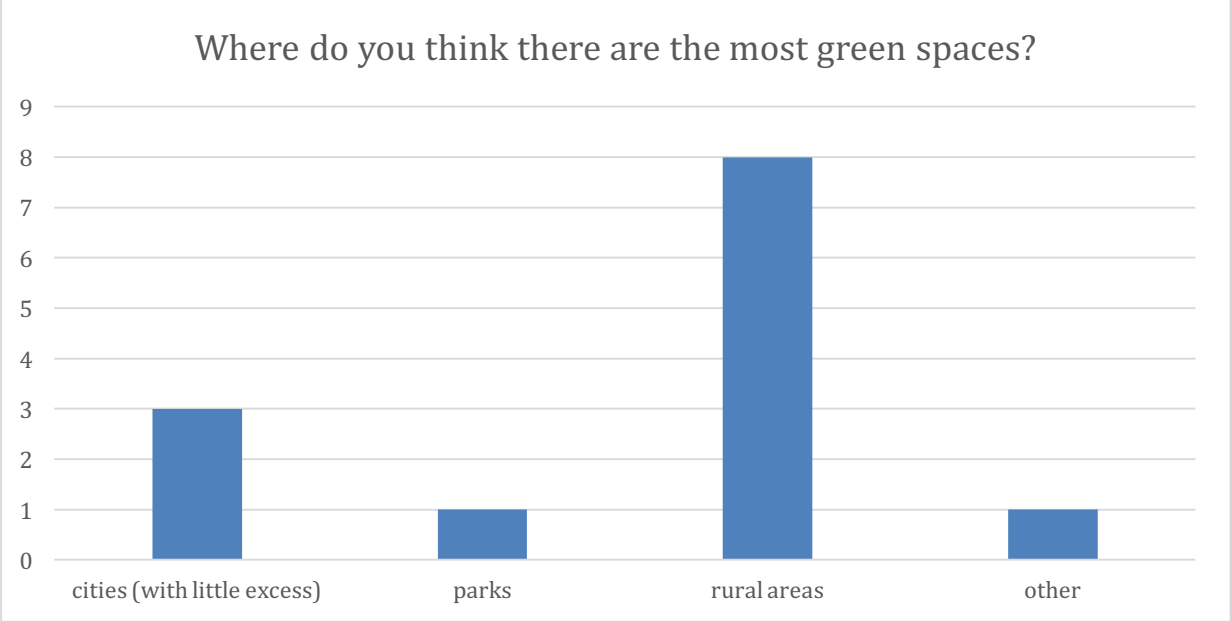
There are a number of important steps to take when analyzing data.

- Copy and place data from your survey on an Excel spreadsheet, and then turn data into a graph so you can analyze patterns.
- The following example illustrates how the data can be compiled in a Frequency Table.

Do you agree that progress can lead to invading habitats?	**Perceptions**
AGREE	10
DISAGREE	0
Not sure	3



Where do you think we have the most green spaces?	**Perceptions**
(a) cities (with little excess)	3
(b) parks	1
(c) rural areas	8
(d) other	1



You can use Excel to present the perceptions you gathered from your classmates in graph form.

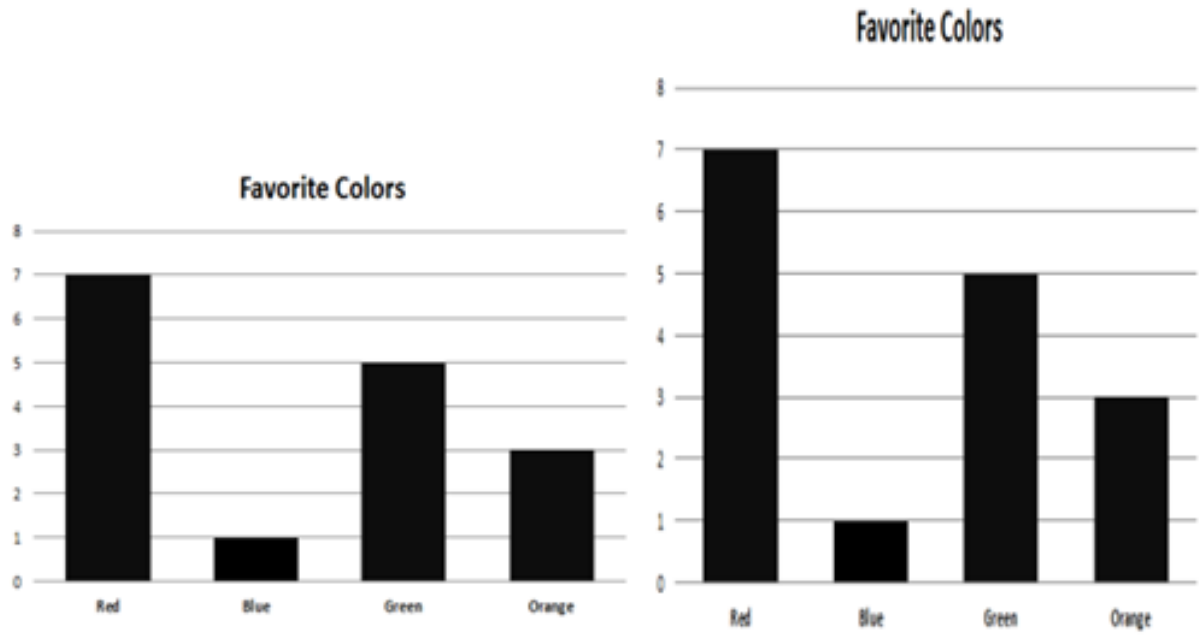
- Copy and paste the frequency table into an open Excel spreadsheet.
- Click on 'Chart' tool.
- Choose a bar graph.
- Place a title on your chart.
- Copy and paste the graphs here for your yes/no question and your multiple choice question:

[PASTE EXCEL GRAPHS BELOW WITH YOUR DATA]

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

Next Graphs

- Create 2 more graphs by changing the Y axis on your bar graph – to make the distance between each space larger and smaller.
- What does that do to the viewers' perception of the data?
- Discuss your ideas with your teacher.



https://wiki.ncscpartners.org/images/d/d3/Curriculum_Resource_Guides_Data_Analysis12.PNG

Extension

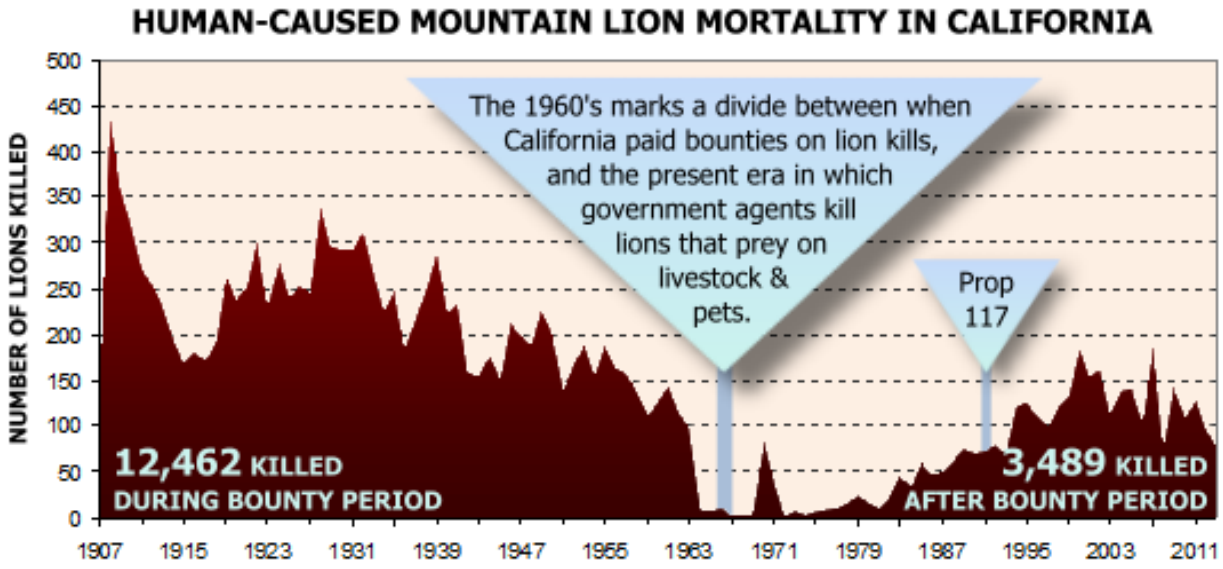
- Create at least 3 different kinds of graphs and determine which kind is best to show your data, and why?

ET - Construct, compare & synthesis frequency tables & line plots with a focus on median

ET - Constructs line plot to illustrate 'mean', 'medium', & 'mode

14. Statistical Patterns

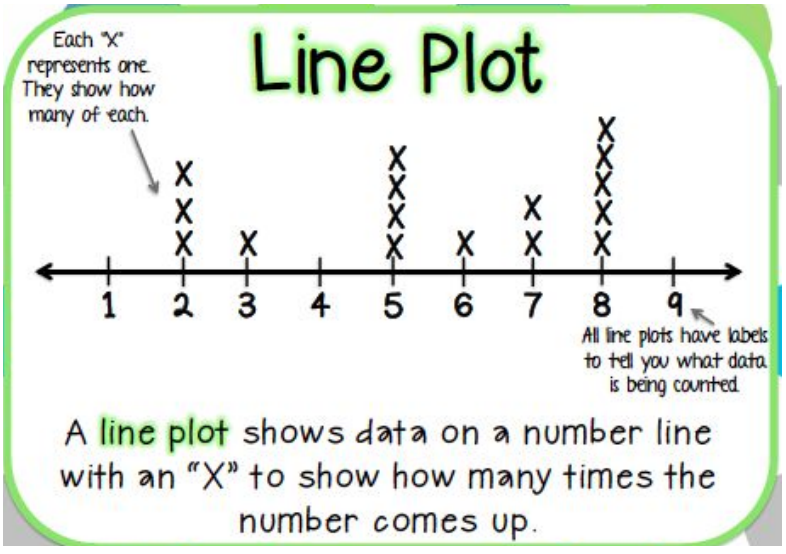
- Explain what you think this graph means?



http://wildlifewaystation.org/images/content/mountain-lions/education-coexisting-predator-Mortality-Graph.png

Line plots are easy ways to track data.

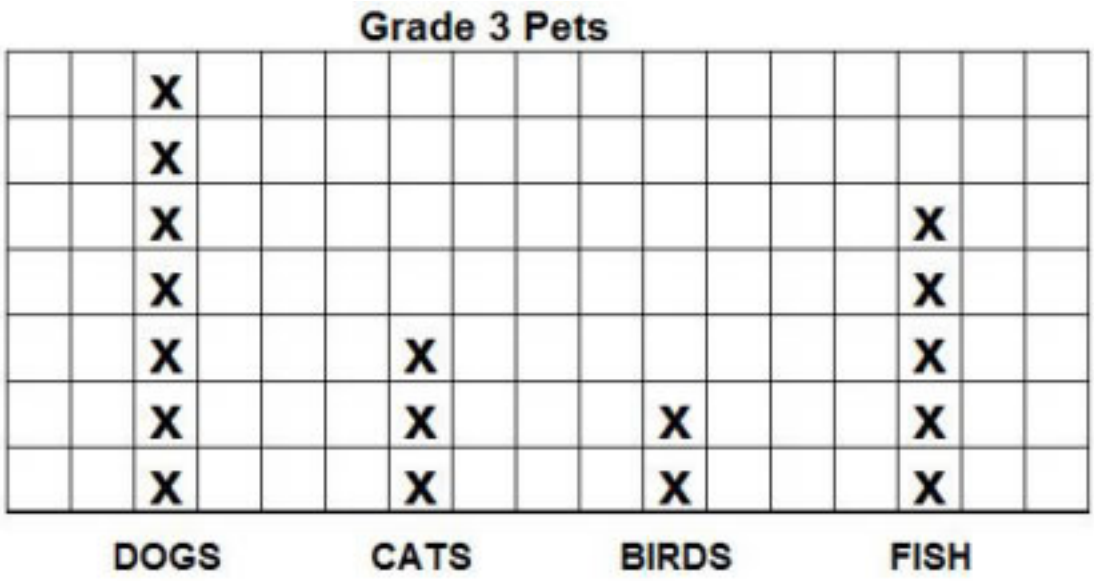
- Look at the line plot below talk about the patterns in the data.
- Which numbers are more common?
- Which numbers are less common?



to

https://s-media-cache-ak0.pinimg.com/736x/7f/74/50/7f74505e52adb40d475b6c0a311b66b8--nd-grade-math-bar-graphs-second-grade.jpg

- Look at this line plot.
- Complete the frequency table listing the data from least to most:



Frequency Table of Pets Listed on Graph:

Midpoint or Median of the Data

To find the median of the data, you need to order from least to most:

birds, birds, cats, cats, cats, fish, fish, fish, **fish,** fish, dogs, dogs, dogs, dogs, dogs, dogs, dogs

.

There are 17 pieces of data.

The median or midpoint is at "fish" – as it is the 9th on the list.

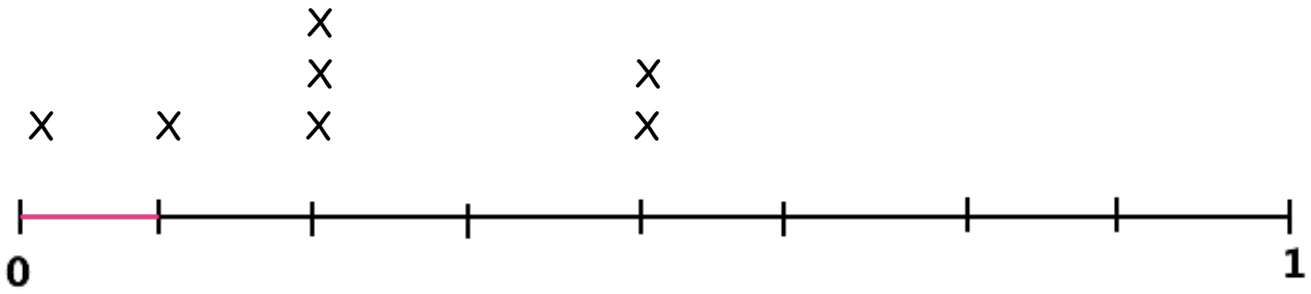
- Now survey your classmates to find out who has pets and who doesn't.
- Record this information in a frequency table and then make a line plot graph, and then determine the 'median' from this data.
- Then talk about and compare the two line plots about pets.

FREQUENCY TABLE GOES HERE:

- Let's look at the following frequency table that list the amount of sunlight that shone on an oak tree in part of a day, over a week:

Frequency Table: Sunlight on an Oak Tree
Day 1: $\frac{1}{2}$ day of sunlight (12 hours)
Day 2: $\frac{1}{4}$ day of sunlight (6 hours)
Day 3: $\frac{1}{4}$ day of sunlight (6 hours)
Day 4: 0 sunlight (0 hours)
Day 5: $1/8^{th}$ day of sunlight (3 hours)
Day 6: $\frac{1}{2}$ day of sunlight (12 hours)
Day 7: $1/8^{th}$ day of sunlight (3 hours)

Fractal Plot Graph: Parts of Days of Sunlight on Oak Tree

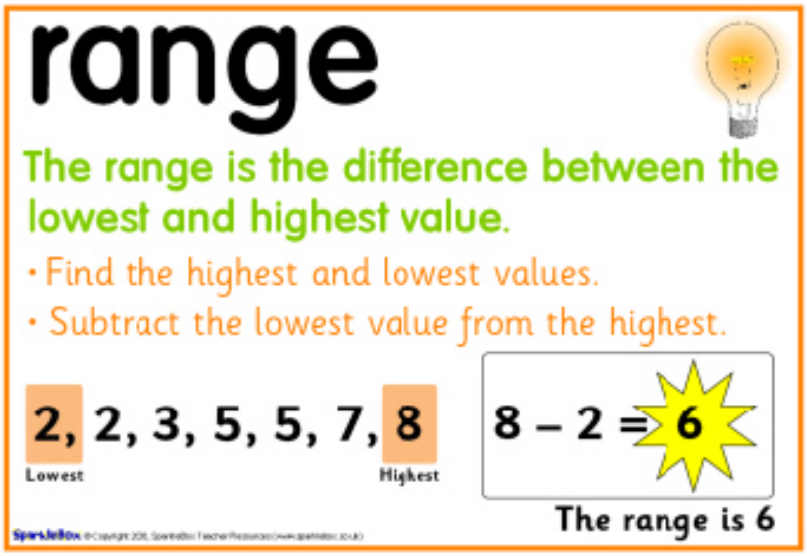


- Mark on the "x" access fractions: 1/8, 3/8, 5/8, 7/8.
- Where would you put $\frac{3}{4}$?
- Talk about how connection between 2/8 and $\frac{1}{4}$; 4/8 and $\frac{1}{2}$; 6/8 and $\frac{3}{4}$.
- Why is "1/4" the mid-point or median of the data?

How well did you construct, compare & synthesis frequency tables & line plots with a focus on median?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

Mean, Median, Mode and Range

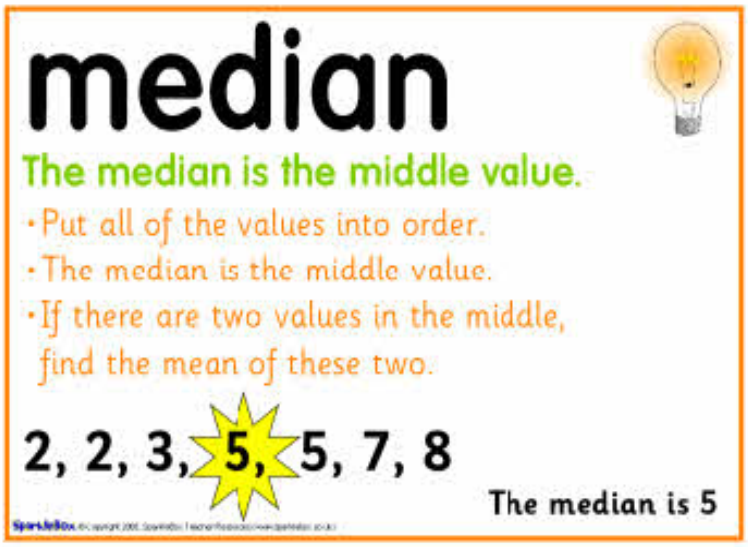
- To determine the range, median, mode and mean of the data, it's important to know exactly how to find them.
- View the poster below to learn more about the range of a group of numbers:



- With a partner, go to the STEM Library and find a book about habitats.
- Tell the class the 'range of pages' in the book that focus on the habitat you are studying.
- Look at the temperature data in your journal and share the temperature range for the month of January.
- List the temperatures for each day here in order from warmest to coldest.

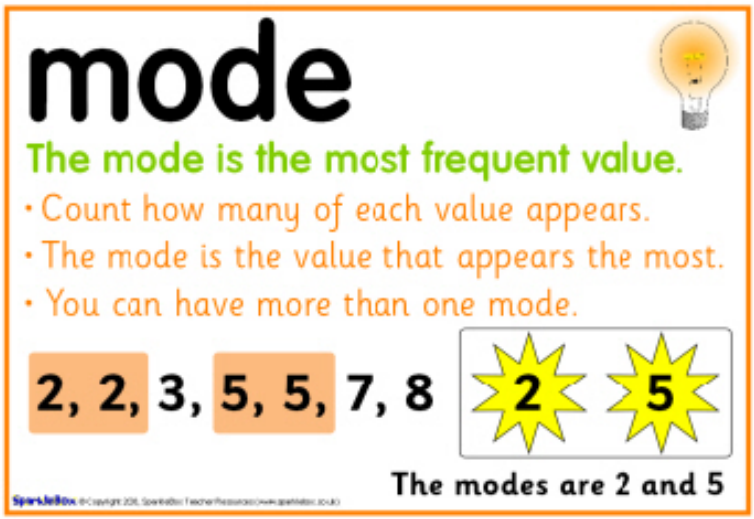
When we have a string of numbers we can also figure out the median or middle value.

- Read the poster below to see the example.



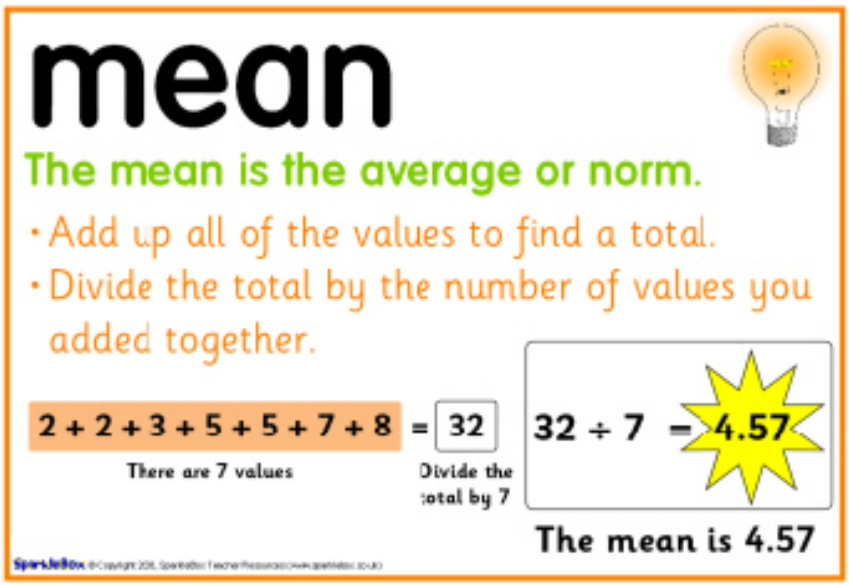
- Look at the temperatures listed to figure out the median temperature in January.

Mode is all about finding the most common number. (See sample below)



- What was the most common temperature(s) in January this year?

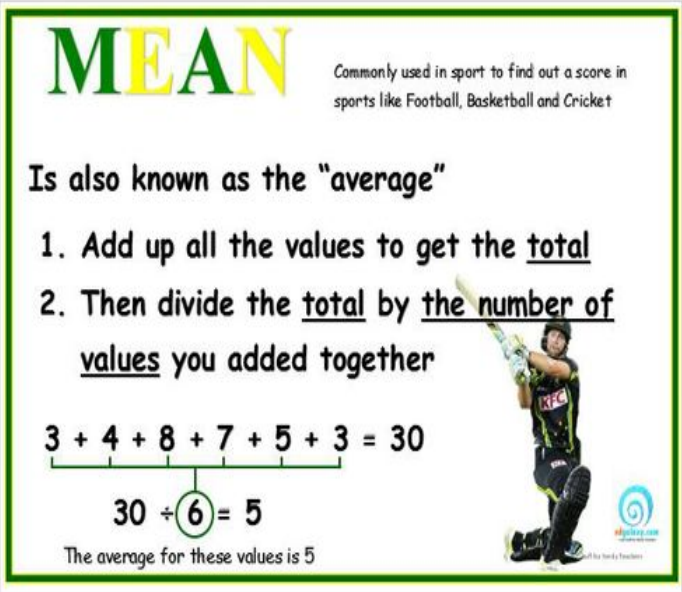
To figure out the actual average temperature, you will need to know how to add – AND DIVIDE!

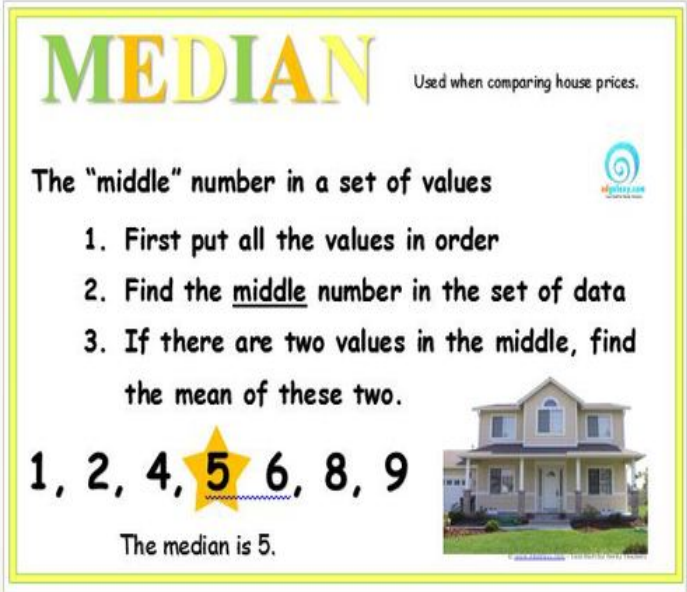


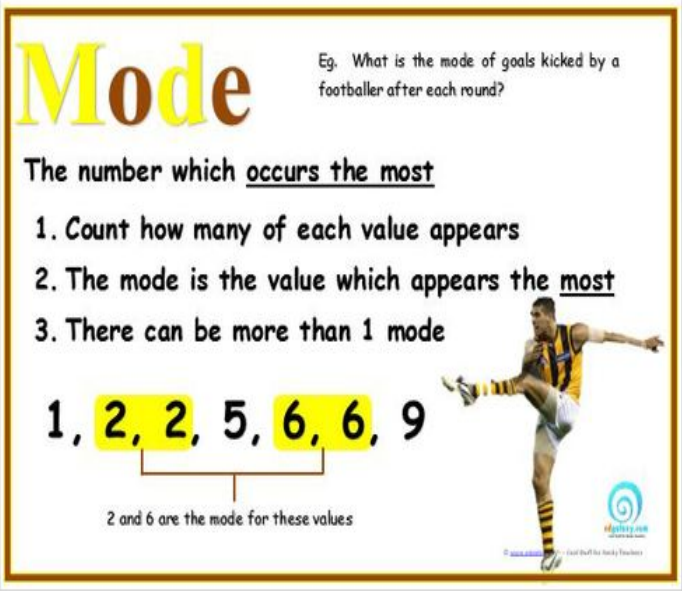
- What were the mean temperatures in September and January?
- Show the math below ☺.

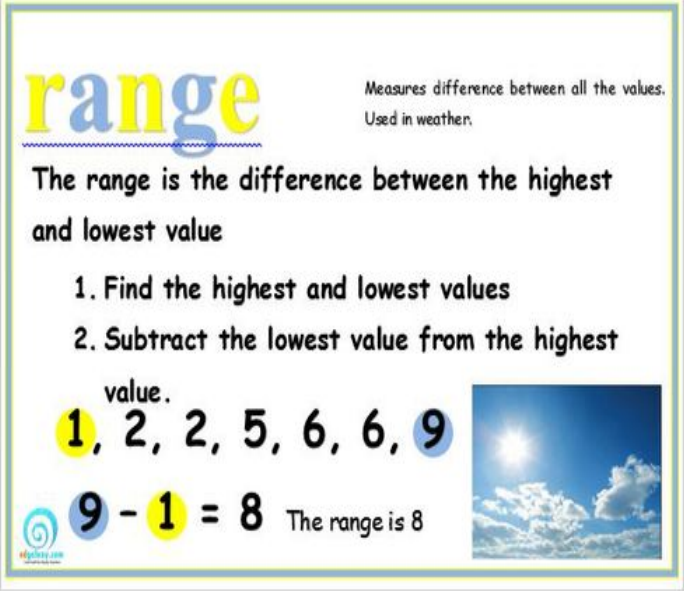
- Read the posters below and explain at first with scrap paper the difference between mean, median, mode and range.

  (a) First to a classmate
  (b) Then to your teacher









- Practice finding each of the following, using the following data:

6, 7, 7, 9, 13, 13, 14, 14, 14, 17, 18

Enter the mean: ☐ Enter the mode: ☐

Enter the median: ☐ Enter the range: ☐

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

- Find out more about analyzing the range, median, mode and mean:
  - https://www.youtube.com/watch?v=5C9LBF3b65s
  - http://www.henryanker.com/Math/Number_Sense/Describing_Numbers/Finding_the_Median_Set_1.swf
  - http://www.bbc.co.uk/schools/teachers/ks2_activities/maths/activities/modemedianmean.swf
  - http://www.mathplayground.com/howto_mode.html

- Using your survey data from your Habitat Study, list your data from your multiple-choice question in order from lowest responses to highest responses:

_____ _____ _____ _____

Multiple Choice Data Statistics			
Range	Mode	Median	Mean

- Create a line plot using your multiple-choice habitat survey data and illustrate the ‘range’, ‘mode’, ‘median’ and ‘mean’ on it.

- Gather data from your local ecosystem over ten days.
- Consider temperature data, rainfall data, amount of sunlight…
- Record the data below:

____ ____ ____ ____ ____ ____ ____ ____ ____ ____

- Figure out the range, mode, median and mean of the data and place in the chart below:

Ten Data Day Statistics			
Range	Mode	Median	Mean

How well did you construct a line plot to illustrate 'mean', 'median' and 'mode'?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

Extension

*Construct a line plot to illustrate 'mean', 'medium', & 'mode.

*Use box plots & design graphs & tables to illustrate 'mean', 'medium', 'mode' & 'range'

15. GENERATE

Generate Findings

- Generate a summary of your findings from each inquiry source (books, web, expert(s) and non-experts).

After a thorough investigation of ecosystems, we discovered…
(list at least three findings)

Generate New Questions

- Use the following question starter to generate at least 3 new questions to start a new ecosystem inquiry or start a new phase of your current inquiry:

Who would…? Who could…? Who might?
What would…? What could…? What might…? What if…?
When would…? When could…? When might…?
Where would…? Where could…? Where might…?
Why would…? Why might…? Why does…?
How would…? How could…? How might…? How did…? How can…?
Which would…? Which could…? Which might…? Which is…

List new questions here:

- Taking into consideration the information gathered from books, web sites, experts and the perceptions/opinions of non-experts, create and label an image of your ideal ecosystem below.

- Gather materials together to make your 3D ecosystem model to use for your presentation and display in a *Class Eco Exhibition*.

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

Generate Limitations

All researchers have limitations (what you could have improved on; admitting bias; quality of sources…)

- List at least 3 possible limitations (and why you think they limited your inquiry:

1. _____

because _____

2. _____

because _____

3. _____

because _____

Generate Recommendations

- Write a draft of a 3-paragraph business letter to someone who shares responsibility for local, national or global environmental health of the planet.
- Paragraph 1 – introduce yourself and summarize some of your findings – to let the individual know you have done some good research.
- Paragraph 2 – describe your concerns about the environment, and further questions about their work.
- Paragraph 3 – describe at least three recommendations for helping an ecosystem thrive.

School address

_____ (date)

_____ (Expert name)

_____ (Expert address)

Dear Mr./Mrs./Dr. _____:

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

ET - Construct stem & leaf plots, with a focus on the difference between mean & median

16. In Our Own Backyard

- View information about the Great Backyard Bird Count.

  The Great Backyard Bird Count
  https://www.audubon.org/news/how-begin-birding (made possible, in part, by generous support from Wild Birds Unlimited)

- Let's create our own Great Backyard Bird Count
- Make a proposal for organizing one in our own backyard:

Question Prompt	Proposal
Who	
What	
When	
Where	
Why	
How	

- View (if you can find it on BBC) David Attenborough's "*Life of Birds*".
- What did you think?

☹_____ ☺

- You can look out a window, walk, or bike to a place to see birds.
- Let's look out the window now to check out birds that naturally visit our school area.

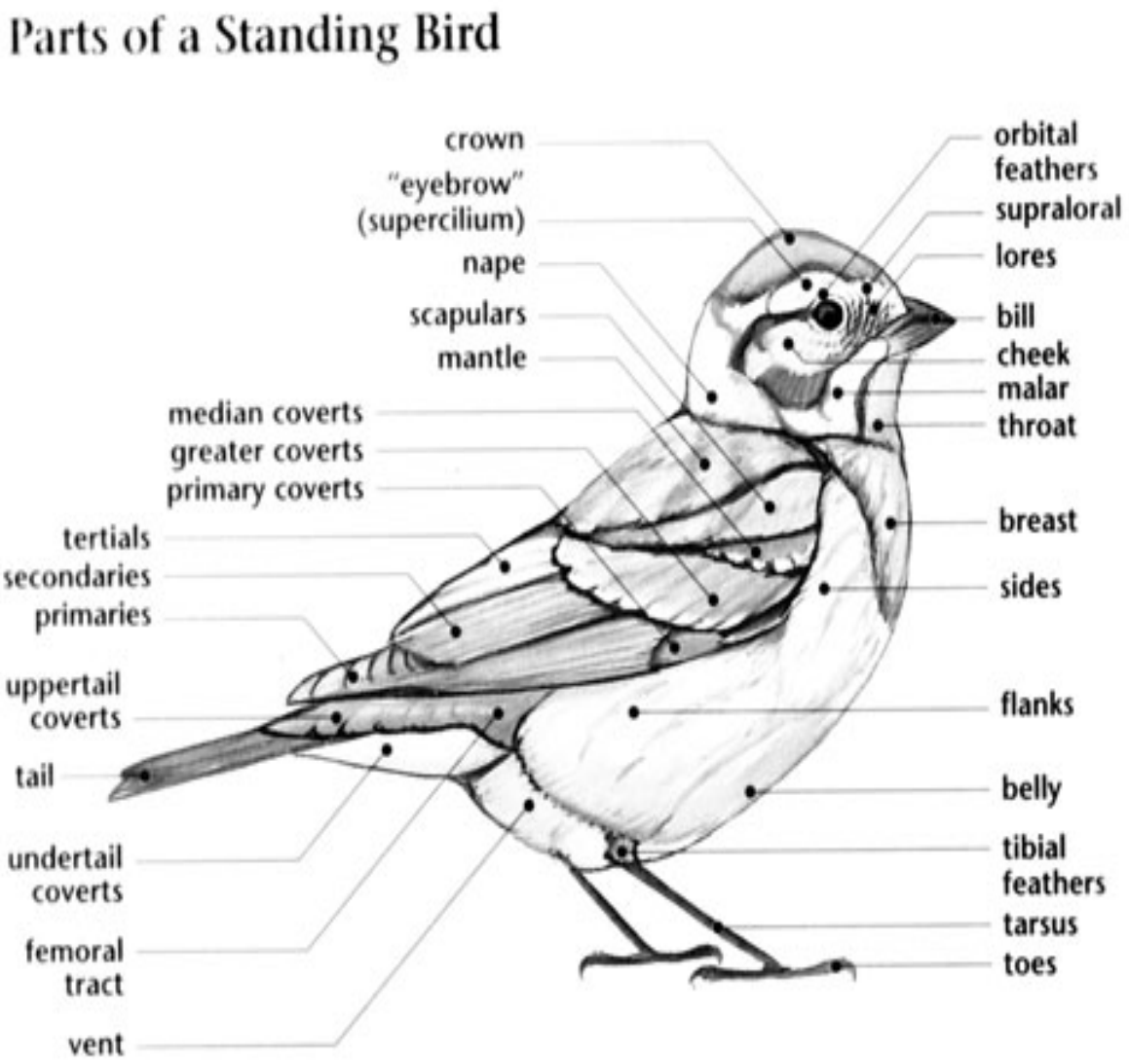
- *When I looked out the window I saw:* _____

STEP OUTSIDE: Going on a Bird Hunt

- Let's go outside for 30 minutes to see if we can find more birds!
- Try and take binoculars, a camera, sketch pad and pencil
- Read through the field guide to find an interesting local bird.
- Draw your bird and describe it in the table below:

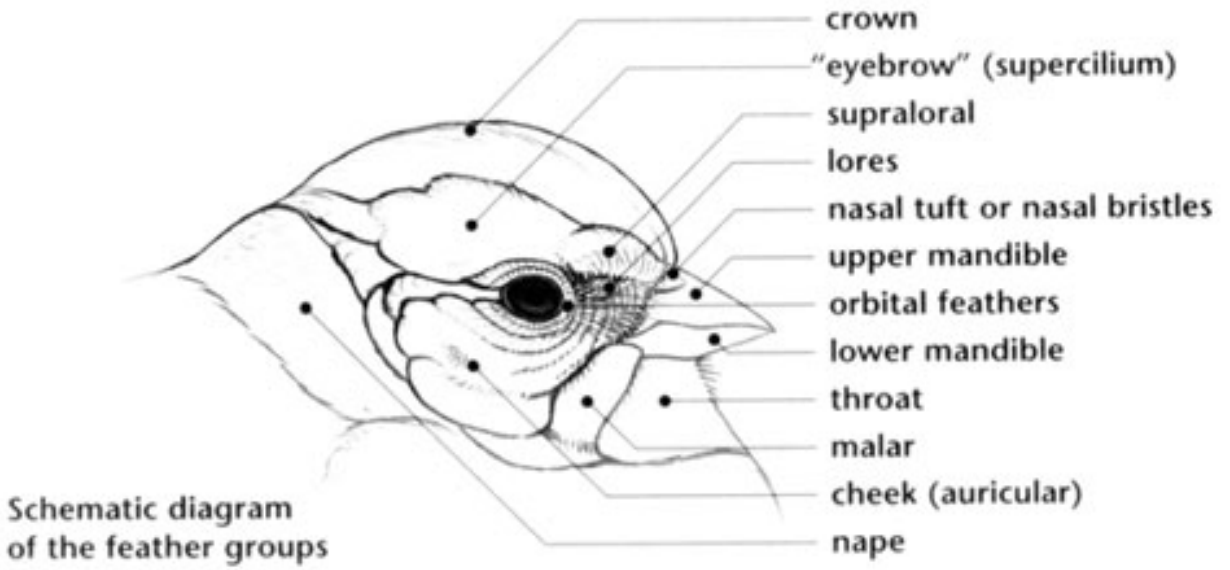
Local Bird -	Description
Image	

- Did you know that owls, vultures, eagles, falcons and hawks are raptors?
- Look at local data about raptors over two years and analyze what trends you see between 2014 and 2015, and your own observations from going on your own bird hunt!
- Look at the following diagrams to find out more about the kind of details that bird experts know about:

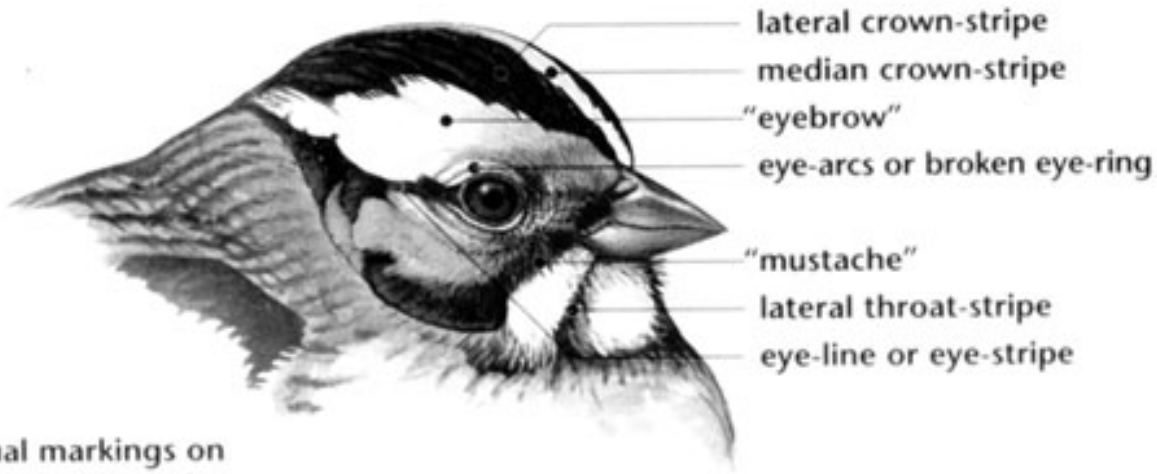


http://www.whatbird.com/images/Parts%20of%20a%20Standing%20Bird.jpg

Head Feathers and Markings

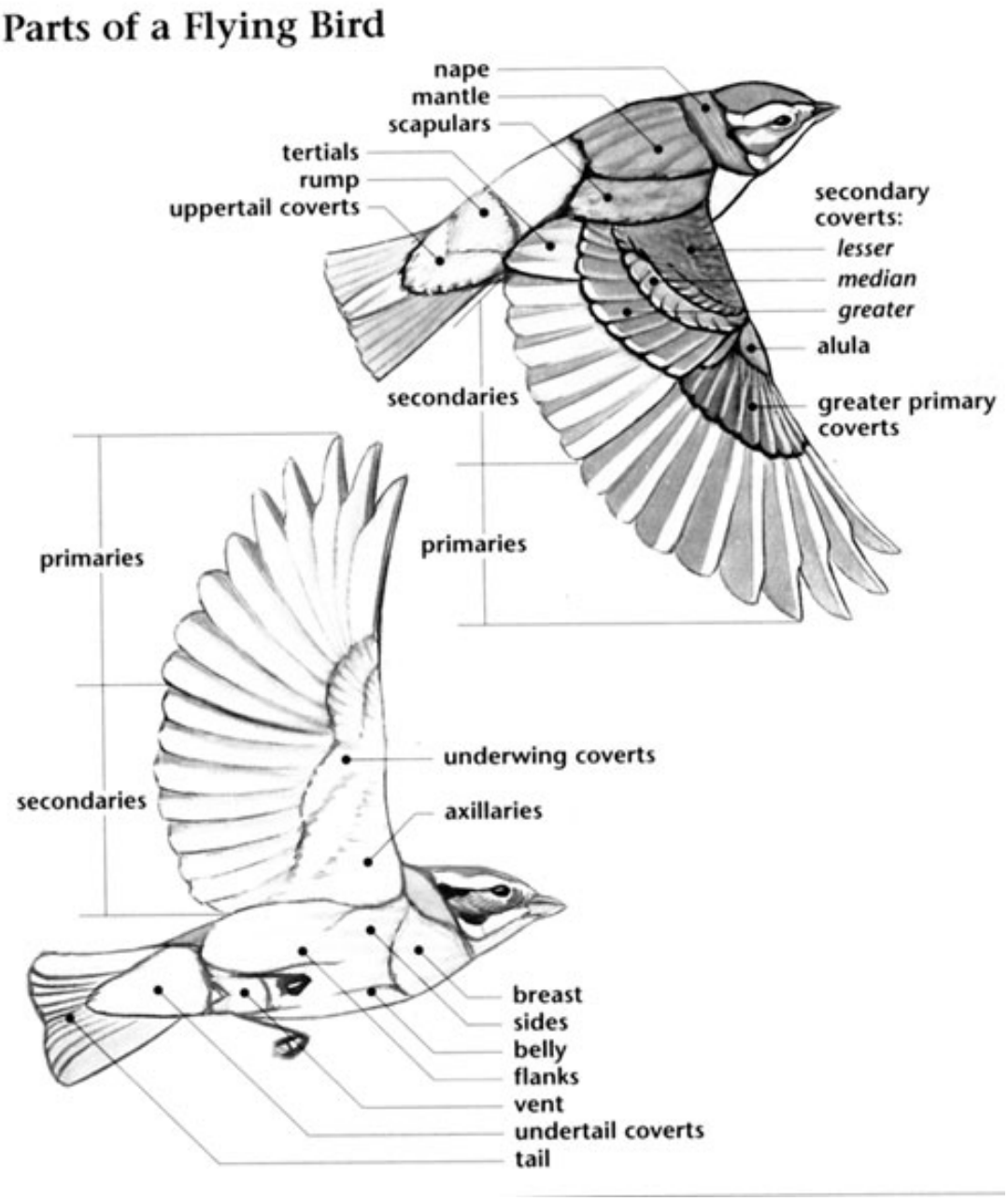


Schematic diagram
of the feather groups



Actual markings on
a White-throated Sparrow

http://www.whatbird.com/images/Head%20Feathers%20and%20Markings.jpg



http://www.whatbird.com/images/Parts%20of%20a%20Flying%20Bird.jpg

- Look at data gathered about the Niagara Peninsula Hawkwatch Monthly Counts:

2015 Species Sightings	March	April	May	Totals
Black Vulture	0	0	0	0
Turkey Vulture	3003	4507	220	7730
Osprey	0	39	3	42
Bald Eagle	49	26	5	80
Sharp-shinned Hawk	36	1061	156	1253
Cooper's Hawk	57	77	19	153
Red-shouldered Hawk	586	112	0	698
Broad-winged Hawk	0	2830	68	2898
Swainson's Hawk	0	1	0	1
Red-tailed Hawk	912	825	41	1778
Rough-legged Hawk	15	30	1	46
Golden Eagle	8	6	0	14
Peregrine Falcon	0	5	1	6
Unid. Falcon	0	1	0	1
Unid. Eagle	1	1	0	2
Unid. Raptor	2	4	0	6
Total Raptors	**4687**	**9654**	**528**	**14869**
Hours Counted	**220**	**219.5**	**99.1**	**538.6**

2014 Species Sightings	March	April	May	Total
Black Vulture	2	0	0	2
Turkey Vulture	1,809	5176	345	7330
Osprey	1	55	1	57
Bald Eagle	14	25	4	43
Sharp-shinned Hawk	41	734	60	835
Cooper's Hawk	29	74	19	122
Red-shouldered Hawk	224	168	0	392
Broad-winged Hawk	0	1391	117	1508
Swainson's Hawk	0	1	0	1
Red-tailed Hawk	434	668	29	1131
Rough-legged Hawk	14	14	0	28
Golden Eagle	4	1	0	5
Peregrine Falcon	4	4	0	8
Unid. Falcon	3	5	2	10
Unid. Eagle	59	16	0	75
Unid. Raptor	0	0	0	0
Total Raptors	**2658**	**8427**	**586**	**11671**
Hours Counted	***214.25***	**211.9**	**94.0**	**520.16**

http://www.niagarapeninsulahawkwatch.org/2014summary.php

- How can the above data be organized using a stem and leaf plot?

What is a stem and leaf plot?
Rather than making a list from smallest to largest numbers, a stem and leaf organizes numbers according to groupings. Look at the sample stem and leaf plot for the March 2014 raptor data:

2,1809,1,14,41,29,224,0,0,434,14,4,4,3,59,0

- First, put numbers in order:

  0,0,0,1,2,3,4,4, 14,14,29,41,59,224,434,1809

  What is the median: _____ and _____.

Stems	Leaves
0	0,0,0,1,2,3,4,4
1	4,4,809
2	9,24
3	
4	1,34
5	9

- Now look at the data from March 2015

0,3003,0,49,36,57,586,0,0,912,15,8,0,0,1,2

In order: 0,0,0,0,0,0,1,2,8,15,36,49,57,586,912,3003

And the median is: _____ and _____.

Stems	Leaves
0	0,0,0,0,0,0,0,1,2,8
1	5
2	
3	6,003
4	9
5	7,86
6	
7	
8	
9	12

- What can we analyze when we make stem and leaf plots?

In the above example, you can see that:
There were fewer different kinds of raptors in the 2015 March season. From a quick glance of the data there were 13 different raptors cited in 2014 and only 10 in 2015.

You can also combine stem and leaf plots.

April 2014: 0,5176,55,25,734,74,168,1391,1,668,14,1,4, 5,16,0
April 2015: 0,4507,39,26,1061,77,112,2830,1,825,30,6,5,1,1,4

April 2014: 0,0,1,1,4,5,14,16,25,55,74, 168,668,734,1391,5176
April 2015: 0,1,1,1,4,5,6,26,30,39,77,112,825,1061,2830,4507

Leaf for 2014	**Stem**	**Leaf for 2015**
0,0,1,1,4,5	0	0,1,1,1,4,5,6
4,6,68,391	1	12,061
5	2	6,830
	3	0,9
	4	507
5,176	5	
668	6	
4,34	7	7
	8	25

In April 2014 and 2015, there were 14 raptor sightings each year.

- Create a stem and leaf plot for May 2014 and 2015 raptor sightings, to see if there is a change in the pattern of data.

Means (Average) of Raptor Data

- If there was an even distribution of different raptors what would the mean be in 2014 and 2015.
- Look at the sample for 2014 and then figure out the mean for 2015.

$$11671/16 = 729.44$$

Therefore, the mean or average of the 16 raptors would be 729 or 730 of each raptor (as there is no such thing as a part raptor).

In 2015, there were 14,869, sightings of different raptors. The mean or average would be:

How well did you construct a stem & leaf plot with a focus on the difference between mean & median?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

- As a class, talk about what kinds of conclusions can you generate about the raptor's local ecosystem based on the data
- Create a bird house or feeder to monitor birds in the school yard.

TECH CHECK:

- Take a look at these ideas and share your plans with your teacher.

http://boysalmanac.com/2009/03/09/free-bird-house-plans/
http://www.freebirdhouseplans.net/woodpeckerbirdhouseplan.html
http://www.birdhousevillages.com/freestuff5
http://www.diyncrafts.com/3515/home/23-diy-birdfeeders-will-fill-garden-birds

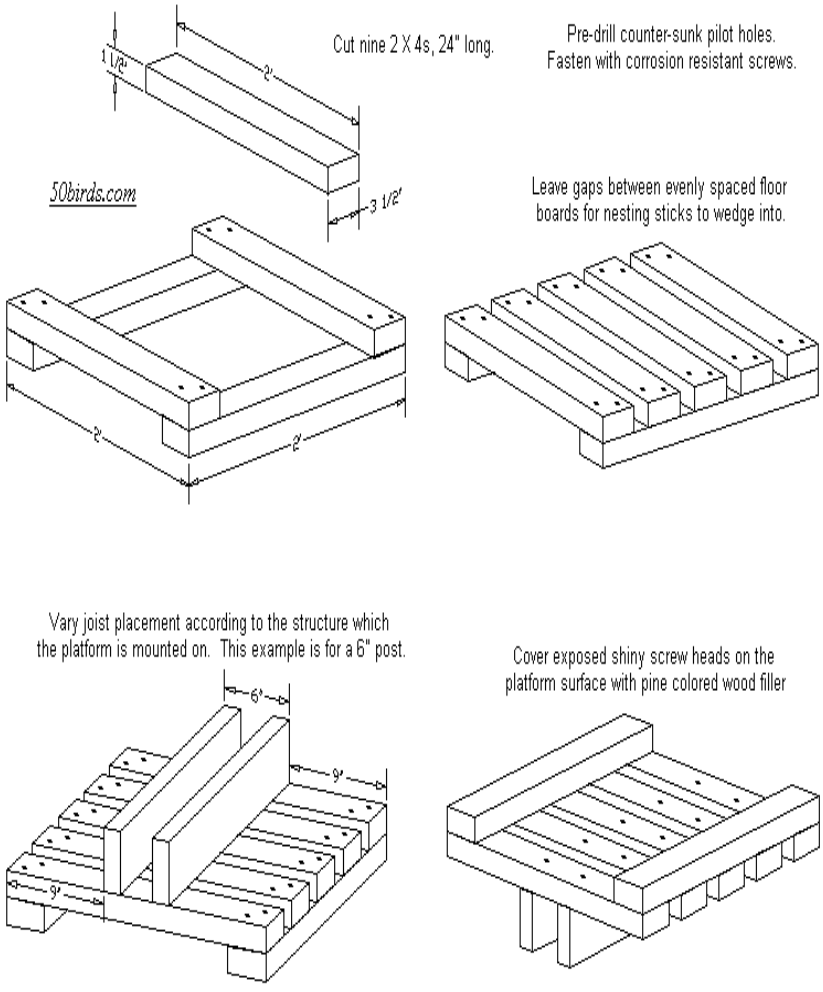
Extension:

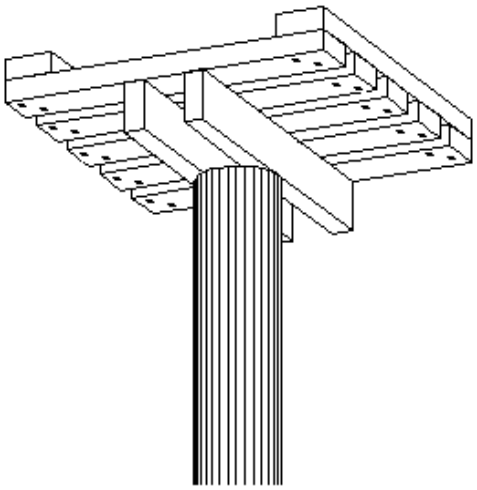
- Create nest boxes for local raptors.

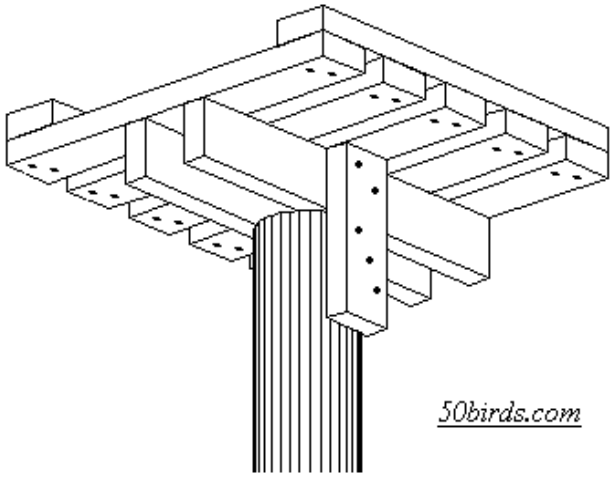
Why? It can be difficult for raptors to find suitable homes. Dead trees are often taken down for burning wood, leaving fewer spaces for hawks and other raptors to breed. When properly built these raptor 'bird houses' may be used year after year. Raptors can help control rodents.

- Use weathered 2 x 4s and corrosion resistant screws.
- Pre-drill countersunk pilot holes
- Mount platform 14' or higher on a sturdy post on the forest edge
- Working at these heights is dangerous.
- Platforms at this dangerous height should be installed by professionals

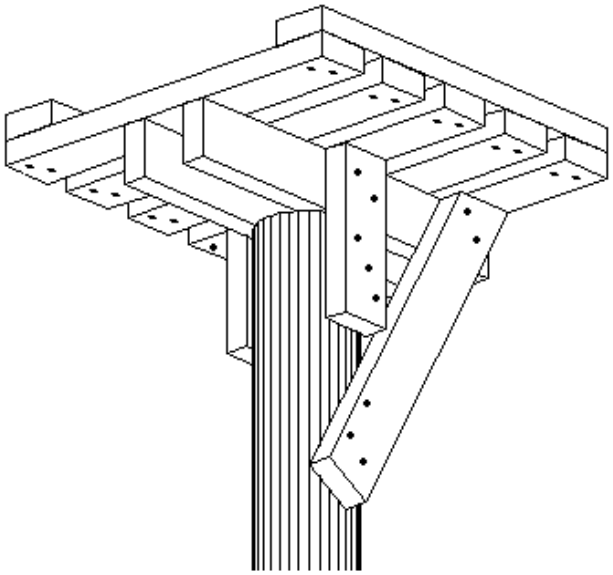
- Assemble on a work bench at a height between waist and chest.
- Wear eye protection.

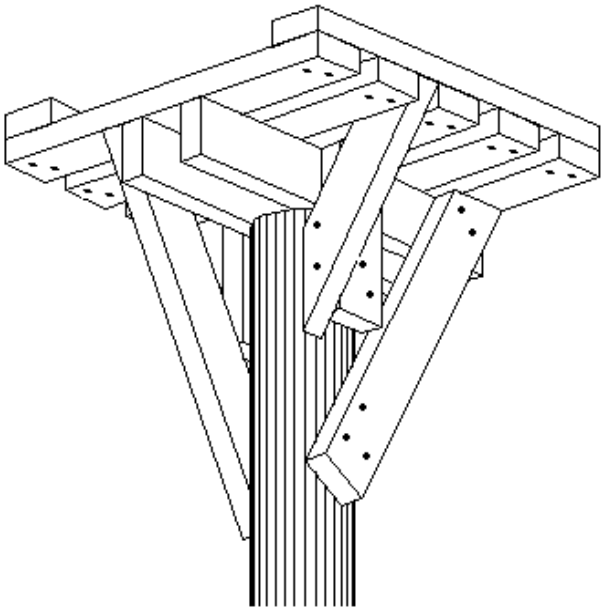






Cut cleat and brace lengths and angles to fit.





http://www.50birds.com/birdhouse-plans/red-tailed-hawk-great-horned-owl-nesting-platform.htm

17. Ecosystems Interrupted

To find out about how factors affect living things in an ecosystem, biologists observe living things in their habitat. Sometimes they reach out to the public to share their observations.

- Think about what can interrupt birds that:

(a) live in the area of our school

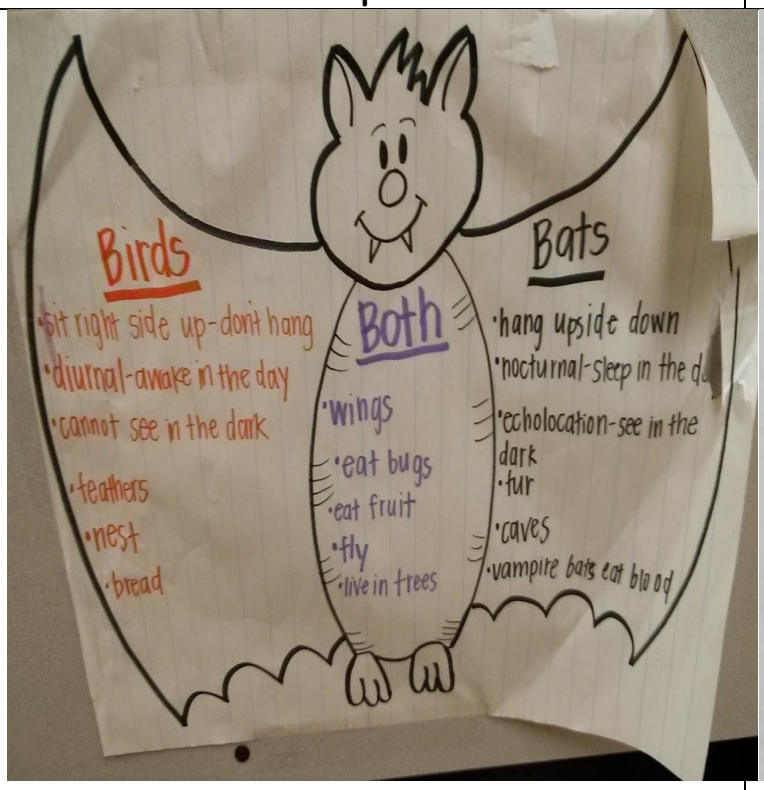
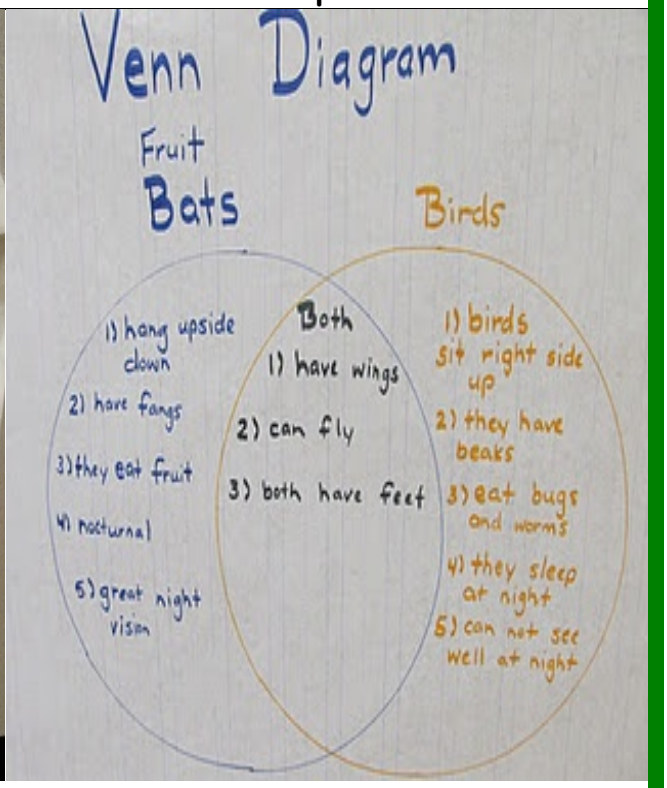
(b) live in the ecosystem you are creating

- Use some of the following conflicts to describe how the bird population might be effected.

Conflict	**Local Birds**	**Birds in Your Ecosystem**
Living Things (Birds) vs. Living Things		
Living Things (Birds) vs. Non-Living Things		
Humans vs Other Living Things (Birds)		
Humans vs. Non-Living Things		

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

- Look at the following Venn diagrams comparing bats and birds and put a check beside the one you like best.

Sample A	Sample B
	

How well did you share your values about preserving habitats?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

Extension:

*Discuss ways of reducing our 'Global Footprints'

18. EDUCATE

When experts can educate others, they can keep a legacy of learning alive!

- View the following video on *You Tube:*
https://www.youtube.com/watch?v=-jrQtywa5zk (less than 3 minutes)

Why do you think Chantal wants to be an ecologist?

Ecologists teach others.

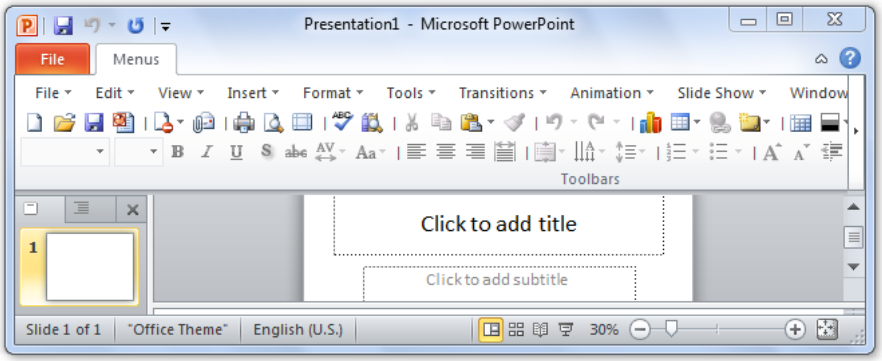
PowerPoint Presentation Preparation

- Create a PowerPoint presentation to share with your 3D model for the Eco Exhibition
- Your goal will be to convince your classmates and your teacher that you and your partner are ecosystem experts by:
    - using the language of ecology accurately and with ease
    - communicating current information about healthy ecosystems
    - explaining how your ecosystem works
    - creatively solving a problem in an existing ecosystem
    - designing a model of an advanced ecosystem, perhaps worthy of consideration for future space colonization.

Slide 1 – Title of Ecosystem, name of ecologists, date (include picture of 3D model)
Slide 2 - Who (Whose ideas influenced your work?)
Slide 3 – What did you include in your ecosystem?
Slide 4 – Where would your ecosystem thrive and survive best on Earth?
Slide 5 – How does your ecosystem work? (…and how is it like other ecosystems?)
Slide 6 - When? (What season or time of day influences your ecosystem?)
Slide 7 – Why did you think this was an important ecosystem to design?

Evaluation of Ecosystem PowerPoint Presentation:

Self		**Teacher**
/2	used language of ecology with ease	/2
/2	communicated current information about healthy ecosystems	/2
/2	explained how ecosystem works	/2
/2	solved a problem of an existing ecosystem	/2
/2	3D Model of ecosystem	/2
/2	spoke clearly and with a good volume for all to hear	/2
/2	influenced others (helped others learn)	/2
Followed instructions for each slide (slide 1 – 7)		/2
TOTAL (Self + teacher)		**/30**

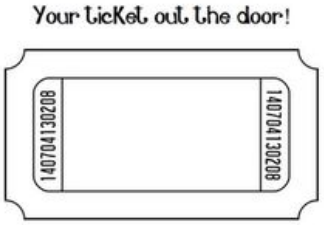


What I learned from PowerPoint Presentations

- At the end of all the PowerPoint Presentations, students will be asked to write about their classmate's ecosystem, by responding to the following Exit Ticket question:

EXIT TICKET (you will receive a hard copy of this ticket)

1. *What ecosystems (other than your own) do you think hold promise for helping us live on other planets in the future? (include 'why' you think so)*



- The teacher will review the responses and circle below the Degree of Influence your presentation had on your classmates:

High (75-100%+) Medium (50-75%+) Low (below 50%+)

How well did you present your inquiry using PowerPoint and Visual Arts?	Trailblazer (Expert)	Pathfinder (Apprentice)	Rookie (Not Yet)

Extension:

*Plan a Longitudinal Inquiry proposal about habitats.

Reflection

This inquiry report will be published for others to read and learn from in the future. When I reflected on this inquiry project and the "How Well Did I do each Task?" (bottom of each page), I think I learned…

_____

_____

I also think that I contributed to the movie having a _____ degree of influence because….

_____

_____

Teacher Response:

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

Ecology Quiz (Your quiz will total 20 points)
*At least 5 points will come from the questions below:

- Identify the biome you think best describes this data:

Month	Precipitation (cm)	Temperature (C)
January	10	35
February	3	37
March	2	39
April	5	40
May	13	42
June	9	44
July	2	45
August	2	44
September	2	42
October	8	40
November	18	37
December	7	35

http://ftwreggiemythirstisreal.weebly.com/uploads/2/3/4/2/23426360/1382143703.jpg

I think this data describes the _____ biome because…

_____

_____(3 points)

- Create a quote that begins with:

"If someone was interested in becoming an ecologist, they should…"

_____(2 points)

ENGAGE Project *this booklet (completion of each project stage)

Ecosystem Life Science Project	Points	Teacher Score
Explore • Image – label and pasted	2	
Narrow • Know, Wonder, Learn Charts	2	
Gather • Print and digital sources (8) • Interview source(s) (4) • Survey sources (2)	14	
Analyze • Data Management (2) • Quality of Sources (2)	4	
Generate • Theory (2) • Further Questions (2) • Recommendations (2)	6	
Educate • Detailed Model (2)	2	
Total	/30	

Other Activities in Reference Notebook:	Total: /10
completed all tasks with thought and care	/2
completed tasks like an expert	/2
labeling detailed	/2
neat and professional look	/2
evidence of creativity	/2

Final Check

What is life science?

What is an inquiry?

What is data?

What is an expert?

Bonus ☺
What is a source?

How well did I do this task?	Like a Trailblazer ☺ (Expert)	Like a Pathfinder ☺ (Apprentice)	Like a Rookie ☺ (Novice)

Appendix A
Ontario Ministry of Education and Training Science Standards

GRADE 4A. UNDERSTANDING LIFE SYSTEMS HABITATS AND COMMUNITIES

4A.1.1 analyse the positive and negative impacts of human interactions with natural habitats and communities taking different perspectives into account

4A.1.2 identify reasons for the depletion or extinction of a plant or animal species, evaluate the impacts on the rest of the natural community, and propose possible actions for preventing such depletions or extinctions from happening

4A.2.1 follow established safety procedures for working with soils and natural materials (e.g., wear gloves when handling soils to set up a working terrarium)

4A.2.2 build food chains consisting of different plants and animals, including humans

4A.2.3 use scientific inquiry/research skills to investigate ways in which plants and animals in a community depend on features of their habitat to meet important needs food and protection [

4A.2.4 use scientific inquiry/research skills to create a living habitat containing a community, and describe and record changes in the community over time

4A.2.5 use appropriate science and technology vocabulary, including habitat, population, community, adaptation, and food chain, in oral and written communication

4A.2.6 use a variety of forms to communicate with different audiences and for a variety of purposes

4A.3.1 demonstrate an understanding of habitats as areas that provide plants and animals with the necessities of life

4A.3.2 demonstrate an understanding of food chains as systems in which energy from the sun is transferred to producers (plants) and then to consumers (animals)

4A.3.3 identify factors that affect the ability of plants and animals to survive in a specific habitat

4A.3.4 demonstrate an understanding of a community as a group of interacting species sharing a common habitat

4A.3.5 classify organisms, including humans, according to their role in a food chain (e.g., producer, consumer, decomposer)

4A.3.6 identify animals that are carnivores, herbivores, or omnivores

4A.3.7 describe structural adaptations that allow plants and animals to survive in specific habitats

4A.3.8 explain why changes in the environment have a greater impact on specialized species than on generalized species

4A.3.9 demonstrate an understanding of why all habitats have limits to the number of plants and animals they can support

4A.3.10 describe ways in which humans are dependent on natural habitats and communities (e.g., for water, medicine, flood control in wetlands, leisure activities)

Ontario Mathematics Expectations (Grades 3-8)

3E. DATA MANAGEMENT AND PROBABILITY

3E.1.2 collect data by conducting a simple survey about themselves, their environment, issues in their school or community, or content from another subject

3E.1.3 collect and organize categorical or discrete primary data and display the data in charts, tables, and graphs (including vertical and horizontal bar graphs), with appropriate titles and labels and with labels ordered appropriately along horizontal axes, as needed, using many-to-one correspondence

3E.2.1 read primary data presented in charts, tables, and graphs (including vertical and horizontal bar graphs), then describe the data using comparative language, and describe the shape of the data

3E.2.2 interpret and draw conclusions from data presented in charts, tables, and graphs

3E.2.3 demonstrate an understanding of mode, and identify the mode in a set of data.

4E. DATA MANAGEMENT AND PROBABILITY

4E.1.1 collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or the community, or content from another subject, and record observations or measurements.

4E.1.2 collect and organize discrete primary data and display the data in charts, tables, and graphs (including stem-and-leaf plots and double bar graphs) that have appropriate titles, labels, and scales that suit the range and distribution of the data, using a variety of tools

4E.2.1 read, interpret, and draw conclusions from primary data (e.g., survey results, measurements, observations) and from secondary data (e.g., temperature data in the newspaper, data from the Internet about endangered species), presented in charts, tables, and graphs (including stem-and-leaf plots and double bar graphs)

4E.2.2 demonstrate, through investigation, an understanding of median, and determine the median of a set of data

4E.2.3 describe the shape of a set of data across its range of values, using charts, tables, and graphs

4E.2.4 compare similarities and differences between two related sets of data, using a variety of strategies

5E. DATA MANAGEMENT AND PROBABILITY

5E.1.1 distinguish between discrete data and continuous data

5E.1.2 collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject, and record observations or measurements

5E.1.3 collect and organize discrete or continuous primary data and secondary data and display the data in charts, tables, and graphs (including broken-line graphs) that have appropriate titles, labels

5E.1.4 demonstrate an understanding that sets of data can be samples of larger populations

5E.1.5 describe, through investigation, how a set of data is collected (e.g., by survey, measurement, observation) and explain whether the collection method is appropriate.

5E.2.1 read, interpret, and draw conclusions from primary data (e.g., survey results, measurements, observations) and from secondary data

5E.2.2 calculate the mean for a small set of data and use it to describe the shape of the data set across its range of values, using charts, tables, and graphs

5E.2.3 compare similarities and differences between two related sets of data, using a variety of strategies

5E.3.1 determine and represent all the possible outcomes in a simple probability experiment

6E. DATA MANAGEMENT AND PROBABILITY

6E.1.1 collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject, and record observations or measurements.

6E.1.3 select an appropriate type of graph to represent a set of data, graph the data using technology, and justify the choice of graph

6E.1.4 determine, through investigation, how well a set of data represents a population, on the basis of the method that was used to collect the data

6E.2.1 read, interpret, and draw conclusions from primary data (e.g., survey results, measurements, observations) and from secondary data

6E.2.2 compare, through investigation, different graphical representations of the same data

6E.2.3 explain how different scales used on graphs can influence conclusions drawn from the data.

6E.2.4 demonstrate an understanding of mean

6E.2.6 demonstrate, through investigation, an understanding of how data from charts, tables, and graphs can be used to make inferences and convincing arguments

Possible Connections (dependent on information gathered):
6E.1.2 collect and organize discrete or continuous primary data and secondary data and display the data in charts, tables, and graphs that have appropriate titles, labels, and scales

Alberta Mathematics Standards – Grades 3 through 6
STATISTICS AND PROBABILITY (Data Analysis)

3D.1. Collect first-hand data and organize it using:
• tally marks
• line plots
• charts
• lists
to answer questions.

3D.2. Construct, label and interpret bar graphs to solve problems.

4D.2. Construct and interpret pictographs and bar graphs involving many-to-one correspondence to draw conclusions.

5D.1. Differentiate between first-hand and second-hand data.

5D.2. Construct and interpret double bar graphs to draw conclusions.

6D.1. Create, label and interpret line graphs to draw conclusions.

6D.2. Select, justify and use appropriate methods of collecting data, including:
• _questionnaires
• _experiments
• _databases
• _electronic media.

6D.3. Graph collected data, and analyze the graph to solve problems.

Overall Life Science Grade:	***Life Science Overall Report Card Grade:***
30 points – Ecosystem Project	90-99 points = A 80-89 points = B Below 80 points = NY (not yet)
30 points – Eco-Exhibition PowerPoint Presentation	
30 points - Ecology Quiz	
10 points – Other Activities in Reference Notebook	