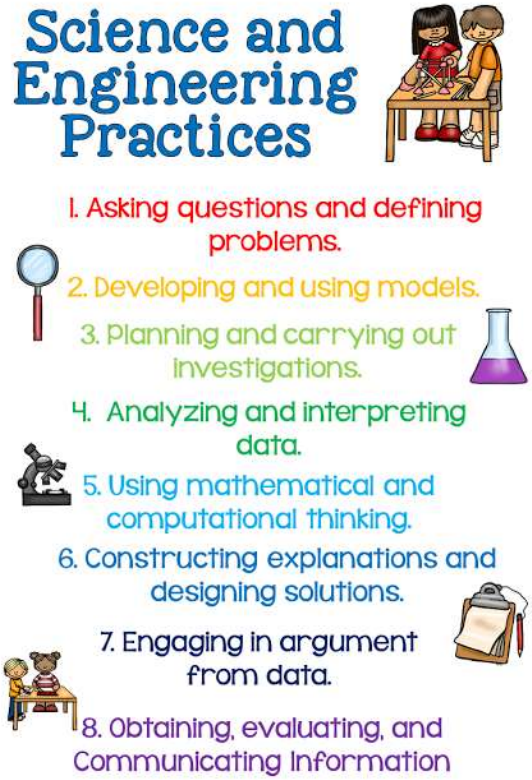
Science Summer Packet

2021

Ms. Cruz



In order for us to get ready for the next school year, all of the following assignments deal with the first four steps of the science and engineering process (we will review them in September and will learn the other four together in school), which is a requirement for 6th-8th grade as per the Next Generation Science Standards. You may print a copy of each assignment and write in the answers or you may complete each assignment by typing on a separate google doc and print.

(Please complete each assignment and turn in by the first day of school in September)

Assignment 1

Asking Questions and Defining Problems

Phenomenon – An observable event that can be explained using scientific facts.
Observation – Recording what you see, hear, smell, taste, or feel.
Evidence – Body of facts that help prove a belief or suggestion.
Hypothesis – Explaining what you think will happen based on evidence you have seen.

Read the following phenomenon and answer the questions that follow.

On a cold winter day, Bradley notices ice on the road. As he waits for his bus, he sees a truck driving over the ice, spreading small salt pellets onto the road. The pellets appear to bounce as they hit the ground. "How do the salt pellets affect the ice?" Bradley asked. As the school bus arrives at his stop, Bradley gets on and goes to school.

At the end of the school day, it is still very cold outside. He can still see his breath just like he could in the morning. Bradley gets back on the bus and notices that even though the temperature outside has not changed, the ice on the roads have melted! All that can be seen on the road now is wet puddles; no more salt pellets, and no more ice. "I think the salt dissolves into the ice, causing it to melt, because the pellets are no longer visible, and the ice has turned into liquid water," Bradley stated proudly.

What is the phenomenon Bradley noticed?

What observations did Bradley make?

What hypothesis did Bradley make?

What evidence did Bradley use to form his hypothesis?

Read the following phenomenon and answer the questions that follow.

As Beth was digging a hole in her garden for her plants, she uncovered a large, baseball-sized rock. She pulled it out of the ground and set it aside. By the time she was done gardening, she forgot about the rock. Day after day, she forgot about the rock, and never really paid much attention to it.

Then a few weeks later, she noticed the rock. "I remember that day. I worked really hard! What will happen if I just leave the rock there?" she asked herself, and she decided to leave the rock in that spot as a reminder of her hard work.

The following year, Beth noticed the rock was slightly covered by grass. The year after that, the rock was partially covered with soil. The year after that, the rock was half covered with soil. Beth looked around. "I think the rock will eventually be in the ground again, because the rock has already sunk halfway into the ground in the last couple years. Also, the leaves, grass, bugs, and other things just keep falling onto the ground, becoming more dirt."

What is the phenomenon Beth noticed?

What observations did Beth make?

What hypothesis did Beth make?

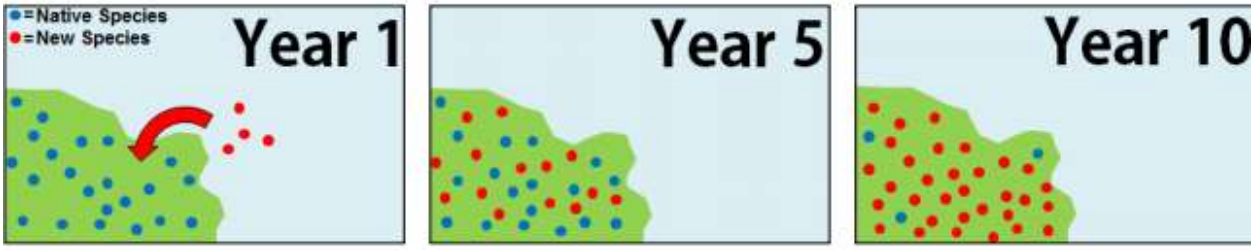
What evidence did Beth use to form her hypothesis?

Assignment 2

Asking Questions and Defining Problems

Observe the following phenomenon and answer the questions that follow.

A native species inhabited the land seen on the map below for a long period of time. Suddenly, a new species was introduced, and over the course of the next ten years, you can observe the population changes below.



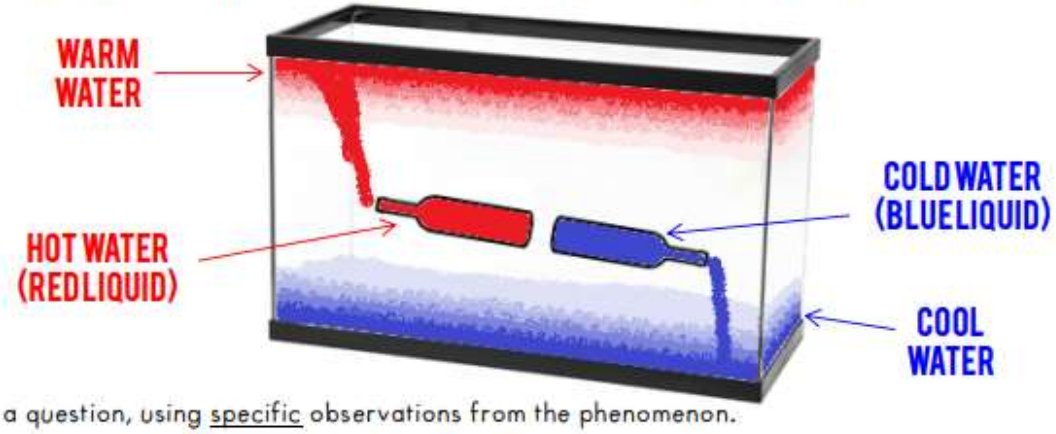
Ask a question, using specific observations from the phenomenon.

Do you think there is a problem happening in this phenomenon? Why or why not?

Form a hypothesis about what you think is going to happen to the new species. Use evidence from the images.

Observe the following phenomenon and answer the questions that follow.

Your crazy science teacher fills a tank with room temperature water. They fill one bottle up with red food coloring and hot water. Another bottle is filled up with blue food coloring and cold water. As a demonstration, your teacher holds both of the bottles in the middle of the tank and opens them. Here is what happened:



Ask a question, using specific observations from the phenomenon.

Compare this phenomenon to a real world situation. Have you ever seen something like this happen before? How are they similar?

Form a hypothesis about what you think is going to happen if you pour in more cold water from the top of the tank. Support your hypothesis with evidence from the demonstration.

Assignment 3

Asking Questions and Defining Problems

Phenomenon or not?

Put a checkmark next to each example that you think is a phenomenon.

___ Fossils forming	___ Needs and wants	___ Predator attacking prey
___ Speed	___ Volcanic eruption	___ Earth orbiting the sun
___ Weight measurement	___ Two chemicals reacting	___ An ice cap reducing size
___ Seeing your shadow	___ Expecting results	___ Brainstorming ideas
___ A car accelerating	___ Sugar dissolving in water	___ Flipping on a light switch

Testable or not testable?

Read the examples. Circle ones that are testable questions (you could TEST it by doing an experiment)

How do plants grow?

What effect does the type of liquid have on dissolving rate?

How does changing a car's weight affect its acceleration?

Where does the water go after it rains?

What is the closest star besides the sun?

What's the most populated city in the world?

What is the average number of red pieces in a Skittles bag?

How does changing a dog's diet affect its weight?

Which type of plant is the one that eats insects?

What effect does the amount of light have on plant growth?

How does water affect the shape of land?

How does hair color of parents determine the hair color of their child?

Hypotheses: Good or bad?

Read the examples. Put a smiley face next to each one that is a good hypothesis (it predicts what will happen based on EVIDENCE you have seen)

If I pour water on the sand castle then it will collapse because I have seen water wash sand away on the beach.

If I drop the ball from a certain height then it will bounce back up slightly less each time because it's losing energy.

I think the hammer will hit the ground before the feather.

I think that a quarter will hold more drops of water than a penny because its surface area is larger in size.

If I release my goldfish into the pond then they will die.

It is going to rain today according to the meteorologist on the news.

I think that the mineral oil and the water will not mix together because they have a

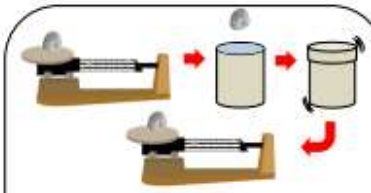
Assignment 4

Match each science investigation with a question it helps answer by writing its letter in the blank. Explain why you chose the letter.

A

A beaker of water is left under a lamp for 24 hrs. Look what happened to the amount of water!

B

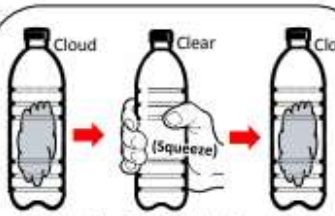


Weigh a rock. Then put it in a can of water and shake it up for 20 min. Take it out, dry it, and weigh it again…it is lighter!

C

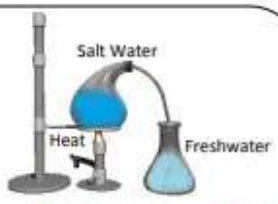
Place a jar over a burning candle. The flame goes out. Repeat, but this time, place a live plant in the jar. The flame still burns!

D



This bottle is 1/3 full of water and smoke from a match. See the cloud inside the bottle? When you squeeze it, the cloud disappears!

E



Fill up a flask with salt water and boil it. Capture the steam in another flask. The steam gathers to form liquid freshwater!

_____ **How does water wash away our land?**

Explain:

_____

_____

_____

_____ **How do plants affect oxygen levels in our atmosphere?**

Explain:

_____

_____

_____

_____ **How can we make ocean water safe to drink?**

Explain:

_____

_____

_____

_____ **How does air pressure impact the cloud cover in the sky?**

Explain:

_____

_____

_____

_____ **How does light energy affect the evaporation rate of water?**

Explain:

_____

_____

_____

Assignment 5

View each image and the student-made observation with it. Then, come up with a testable question you could use to start an investigation with this phenomenon. The first two have been done for you.

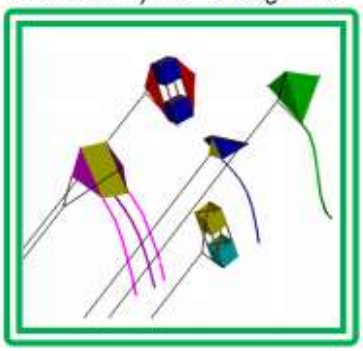
Observation: My bananas turn brown faster depending on where I store them.

Question: How can we prevent a banana from turning brown?

Observation: I spilled juice, but there are many brands of paper towels to choose from.

Question: Which paper towel cleans up spills most efficiently?

Observation: I see many kite designs, and only some of them can fly for a long time.



Question:

Observation: Oil spills can happen near coastlines, and soap is needed to clean it up.

Question:

Observation: When I exercise, my heart rate increases. There are many exercises to choose.

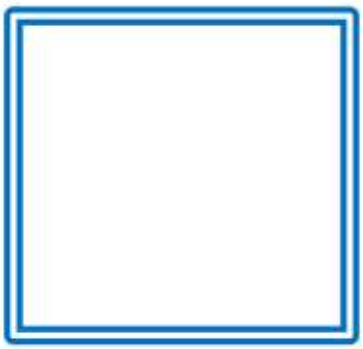
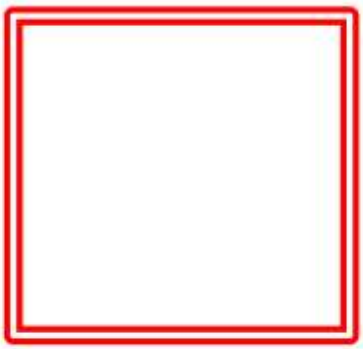
Question:

Observation: The sun seems to set at different times throughout the year.

Question:

Assignment 6

This time, come up with your own scientific observation that you've seen in your everyday life and draw a picture of it. Then, form a testable question you could use to start an investigation with this phenomenon.

Observation:  **Question:**	Observation:  **Question:**
Observation:  **Question:**	Observation:  **Question:**
Observation:  **Question:**	Observation:  **Question:**

Assignment 7

Developing & Using Models

Model – Constructions that explain patterns, predict outcomes, and activate more questioning.
Evaluate – To judge or determine the quality of a model and how well it works.
System– A set of interacting parts that form a whole structure.
Simulation – An imitation, or "mock" version of a real world process or system over time.

Read the following story and evaluate the model by answering questions.

Karen watched a documentary on volcanoes. She was so fascinated by it that she decided she would build her own volcano for a science project. After researching online, she found an exciting volcano design that actually erupts! "I have to buy the right materials to make this model," she thought to herself.

Karen formed a dome shaped volcano cone out of clay. Then, she put tiny toy houses around it to represent a human civilization. Inside the volcano, she poured in some baking soda.

In order to make the volcano erupt, Karen had to pour vinegar inside of it. The vinegar would react with the baking soda and create fizzing bubbles that expand and move quickly out of the volcano. "I think I'll add some red food coloring to the vinegar to make it look like real lava," Karen thought. When she finally conducted her experiment, she was very excited at the results!

"It comes out of the volcano just like real lava!" She exclaimed.

What is the phenomenon Karen is modeling?

In what ways is Karen's model just like the real thing?

In what ways is Karen's model not like the real thing?

Read the following story and evaluate the model by answering questions.

Peter was playing a city simulation on his computer. As different events happened to his city, he could instantly see how it affected his population number. For example, as he planted trees and added parks in his city, he noticed that the population slowly increased. On the other hand, when he added large factories and landfills to his city, the population would suddenly decrease.

When the population increased, there seemed to be much more pollution and a need for water pipelines. When the population decreased, there seemed to be much less traffic problems and cleaner air.

What is the phenomenon Peter is modeling?

In what ways is Peter's model just like the real thing?

In what ways is Peter's model not like the real thing?

Assignment 8

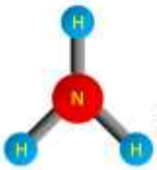
Developing & Using Models

Observe the following model and answer the questions that follow.

The following examples are conceptual models of molecules. Observe each one and answer the questions that follow.

H_2O
(Water)

CH_4
(Methane)



NH_3
(Ammonia)

Each model is made up of several parts. What do you think these parts are? How are they labeled? What do you think they mean?

Do these models help you understand what a molecule is? Why or why not?

After observing these models, use the space on the right to draw a model of a carbon dioxide (CO_2) molecule. How did the models help you know what to draw?

Sketch of CO_2 Molecule

This is a physical replica of our solar system. This model includes the sun and the 9 planets in their correct order. When plugged in, the planets start spinning around the sun similarly to their real orbit.

In what ways does this model help you understand how the solar system works?

How could this model help you make predictions about our solar system?

What limitations does this model have (how is it not as good as the real thing)?

Assignment 9

Models vs "The Real Thing"

There is a rationale, or reason, why it is easier to observe a model than to observe the real thing. Look at each model. Why would you use it? Select rationales that explain why you would use it.

Reasons to Use a Model

- The real thing is too dangerous!
- The real thing is too expensive!
- The real thing is too complicated!
- The real thing takes way too long!
- The real thing is much too big!
- I can't test the real thing or else I might ruin it.

Water Cycle Diagram

Rationale

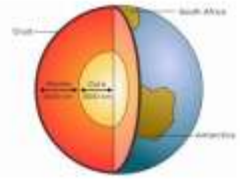
Rationale

Bridge Builder Simulation

Lego Tower Earthquake Test

Rationale

Rationale



Layers of the Earth Diagram

Handmade Wind Fan

Rationale

Rationale

Simulation that shows animal survival over time

Mechanisms
Observable
Developed
Evaluate
Limitations

No bones about it!
These are things to remember when developing or using model!

Assignment 10

Developing & Using Models

Model or not?

Put a checkmark next to each example that you think is a model.

___ Skeleton poster	___ Written explanation	___ Ant farm
___ Safety goggles	___ Online simulation	___ Defining a problem
___ Mathematical formula	___ Paper DNA strand	___ Drawing a conclusion
___ Group discussion	___ Map	___ Timeline
___ Notable observation	___ Popsicle stick tower	___ Time-lapse photos

Models as a System of Parts

Models are made up of interacting parts that affect each other. Match each model with its parts.

___ **Math formula for Volume**
(to calculate the space an object takes up)

___ **Water erosion model**
(to show how water washes away land)

___ **Pendulum**
(to show how gravity can make an object speed up)

___ **Model airplane**
(to show how a design affects aerodynamics)

___ **Electric circuit**
(to show how a current flows in a circuit)

___ **Human body diagram**
(to show the system of vital organs in the human body)

A. Heart, lungs, brain

D. Length, width, height

B. Battery, wire, light bulb

E. Wings (airfoil), body (fuselage), Tail (stabilizer)

C. Ball, string, hook

F. Water, sand, terrain

Draw a model of a tree changing during all four seasons.

Sounds easy, right? But remember, all models have many parts and factors that interact with each other; you must label every important part of this model.

Think about it... what are the important parts of the tree? Surrounding the tree? What is causing change in this model?

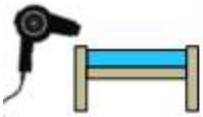
Assignment 11

Developing & Using Models

Model Accuracy

Models have limitations (flaws or shortcomings). Depending on how many limitations it has, a model can be accurate at portraying a real world phenomenon, or it might be ineffective. Observe each model below and read the quote with it. List the advantages and disadvantages of using each model.

"To show the effect of wind on water, we will use a hair dryer."



Accuracy (How is like the real thing?)	Limitations (How is not like the real thing?)
• The hair dryer moves air just like wind. • The water forms waves.	• Much smaller than ocean. • Wind varies in speed, hair dryer is constant.

"We need a part to represent the sun. How about a heat lamp?"

Accuracy (How is like the real thing?)	Limitations (How is not like the real thing?)

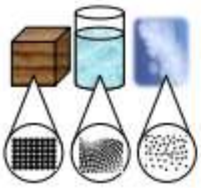
"I've drawn contour lines of this mountain to model elevation changes."

Accuracy	Limitations

"These arrows indicate nutrients put into our soil by decomposers."

Accuracy	Limitations

"The dots in this model are the particles that make up solids, liquids, and gases."



Accuracy	Limitations

"This ball and rings show the structure of an atom."

Accuracy	Limitations

"I will use a small plant to show how trees create oxygen."

Accuracy	Limitations

"Ocean currents make circles, just like rice in boiling water."

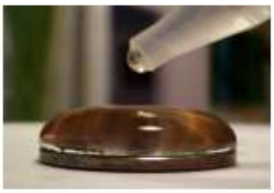
Accuracy	Limitations

Assignment 12

Planning & Carrying Out Investigations

Variables – During an investigation, things that are deliberately changed or kept the same
Trials – Conducting multiple tests during an investigation in order to get accurate results
Planning – Make an observation → form a question → gather materials → identify variables
Carrying Out – Conduct trials → gather data → draw a conclusion → repeat investigation

Read the following story and evaluate the investigation by answering questions.



On a hot summer day, Kyle decided that he wanted to go swimming. Before jumping into the water, he emptied the change in his pockets. After he was done swimming, he went inside as it started to rain.

Hours later, Kyle returned outside and observed the coins he placed on the ground earlier in the day. There were blobs of water on them that kind of looked like big, fat bubbles. Kyle wondered, "How much water can a penny actually hold?" He decided to start an investigation.

With an eyedropper, Kyle would count how many drops of water a penny could hold until the water spilled over. He conducted this test once and wrote down the number of drops. Then, he dried off his penny and repeated this test 4 more times. His final data looked like this: 18, 24, 22, 19, 21.

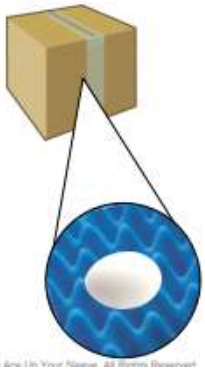
After he was done with this investigation, he decided he would try it again, but this time he would use a quarter instead of a penny.

What observation started this investigation? What question did Kyle form?

What materials did Kyle need for this investigation?

How many trials did Kyle conduct? What did he find out?

How will Kyle repeat this investigation? What is he going to change?



Read the following story and evaluate the investigation by answering questions.

Amy wanted eggs for breakfast. She reached into the refrigerator and grabbed the carton of eggs, but her arm hit the refrigerator door. She dropped the eggs on the floor! When she picked them up, she noticed something. Not all the eggs were broken!

Amy thought that if some of the eggs did not break, then a "break-proof" carton was possible. She wondered, "How can I stop an egg from breaking when dropped from a considerable distance?"

She made a uniquely designed container out of cardboard with soft foam on the inside. She put an egg inside, taped it shut, and dropped it five times, at five different heights. The egg withstood the impact in all of the trials; it remained unbroken. Amy decided she would try this investigation again, but this time she would use two eggs instead of one.

What observation started this investigation? What question did Amy form?

What materials did Amy need for this investigation?

How many trials did Amy conduct? What did she find out?

How will Amy repeat this investigation? What is she going to change?

Assignment 13

Planning & Carrying Out Investigations

Planning for Materials

Read each investigation question. Then plan the investigation by listing materials you could use to conduct it.

"How can I make ice melt faster?"

Materials Needed: Small Ice cube, Large Ice cube, Timer, Salt, _____

"How does changing the length of a rubber band on a slingshot affect how far it will shoot?"

Materials Needed: _____ _____ _____ _____ _____

"Does artificial sugar attract ants as much as natural sugar?"

Materials Needed: _____ _____ _____ _____ _____

"How does the type of surface effect how fast a pull-back car moves?"

Materials Needed: _____ _____ _____ _____ _____

"How does the type of light affect the rate of a plant's growth?"

Materials Needed: _____ _____ _____ _____ _____

"Do thunderstorms in my area happen the most during the day or at night?"

Materials Needed: _____ _____ _____ _____ _____

Measurement Tools

When planning an investigation, you will need to think about HOW you will measure your data. Match each measurement instrument with its investigation description.

A. Ruler

B. Balance

C. Graduated Cylinder

D. Stopwatch

E. Thermometer

F. Microscope

G. Compass

☐ How will the angle of a slope affect the distance a ball will travel?

☐ What is the boiling point of rubbing alcohol?

☐ How does the brand of chocolate chip cookie affect its weight?

☐ What is the prevailing wind direction in our area of the world?

☐ What effect does salt have on cells?

☐ Does the size of an orange affect how much juice we can squeeze out of it?

☐ Does stirring tea have an affect on how long it takes the sugar to dissolve?

Assignment 14

Identifying Variables

Read each investigation. Observe the variables that have changed or stayed the same. Then, answer the questions.

What effect does air exposure have on the rate of molding fruit?

Investigation: Tony placed one banana in an open area and another inside a Ziploc bag.

Results:

Test #1  Ziploc Bag

Test #2  Air Exposure

How many tests were conducted in this investigation? _____

Control: Which variables did Tony keep the same in the tests?

_____

Experimental: Which variable did Tony purposely change in the tests?

_____

How did this affect his results?

_____

_____

What effect does the type of water have on plant growth?

Investigation: Kari planted 3 flowers and evenly watered them regularly with 3 different types of water.

Results:

Bottled Tap Distilled

How many tests were conducted in this investigation? _____

Control: Which variables did Kari keep the same in the tests?

_____

Experimental: Which variable did Kari purposely change in the tests?

_____

How did this affect her results?

_____

_____

Will the food I eat affect my heart rate?

Investigation: For one week, Gary ate a balanced diet. The following week, he ate only fast food.

Results:

Start – 65 bpm
Week 1 End – 63 bpm
Week 2 End – 84 bpm

How many tests were conducted in this investigation? _____

Control: Which variables did Gary keep the same in the tests?

_____

Experimental: Which variable did Gary purposely change in the tests?

_____

How did this affect his results?

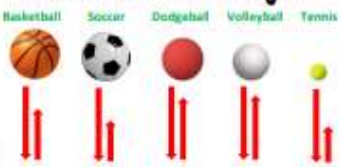
_____

_____

Does the type of sports ball affect how high it will bounce?

Investigation: Mia dropped 5 different balls and observed their return bounce height.

Results:



How many tests were conducted in this investigation? _____

Control: Which variables did Mia keep the same in the tests?

_____

Experimental: Which variable did Mia purposely change in the tests?

_____

How did this affect her results?

_____

_____

Assignment 15

Planning & Carrying Out Investigations

Carrying Out a Procedure

An easy-to-follow procedure must be detailed and in order. Read the procedure steps below. Unscramble the steps by using numbers to show what order they belong in.

Melting a Crayon to Create Liquid Wax

_____ Put your broken crayon pieces inside the beaker.
_____ Place a 250 mL beaker on the center of a hot plate.
_____ Using the corner of a desk, break the crayon into 3-4 smaller pieces.
_____ As the crayon melts, stir the liquid wax so the beaker does not overheat.
_____ Using a blade from scissors, carefully cut and peel off the label of a crayon.

Measuring the Temperature of Boiling Water

_____ Place the pot full of water on a hot plate.
_____ Turn on a faucet and fill a small pot with tap water.
_____ When the water is boiling, record the final temperature.
_____ Record the temperature for several minutes until the water starts to boil.
_____ To see a temperature change, place a thermometer in the water in the pot.

Making an Egg Float in Water

_____ Fill a large glass with water.
_____ Repeat step 4 until you see the egg start to float!
_____ After placing the egg in the glass, start pouring salt into the glass.
_____ Carefully place an egg in the glass of water; notice it sinks to the bottom.
_____ Stir the salt in the glass of water so it can dissolve more easily.

Investigation Tips!

Some of these investigation tips are given by top scientists, and some are given by lazy loafers!

Circle only the helpful investigation tips below.

"Try this investigation again, but this time you should change the wind speed."

"Just mix these two materials together to see if something cool happens!"

"Study the amount of materials we need so we don't accidentally waste anything."

"Make an investigation better by adding more types of tests."

"What variable should you change in this investigation?"

"We don't have a stopwatch, so just count in your head."

"If you don't have a lot of time, just do 2 trials."

"Keep track of the data from each trial your head."

"Discuss your results with a partner to help make sense of it."

"Do 5 trials of this test so you can get more data."

"Notice if there are any hazardous materials needed for the investigation."

"What variables should you keep the same in this investigation?"

"Read the procedure steps slowly and carefully."

"Don't spend too much time reading a procedure."

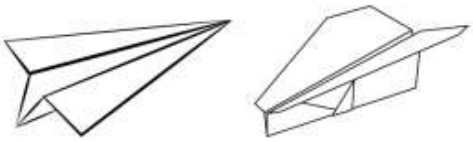
Assignment 16

Planning & Carrying Out Investigations

Be Prepared for Errors

When carrying out an investigation, things might not go the way you planned. Unexpected things can happen, and this will affect the results of your tests. Read each situation below and answer the questions that follow.

Jack designed two different paper airplanes because he wanted to see which one would fly farther. He decided to do 5 trials for each and to test his airplanes in his backyard.



During this investigation, what unexpected things could happen that might affect Jack's results?

_____

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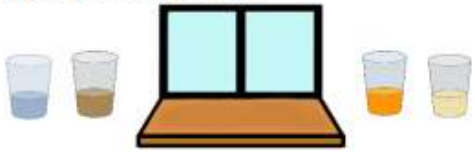
Nina wanted to see which liquid melts ice the fastest - water, soda, orange juice, or vinegar. She decided to do 3 trials for each liquid and to test them on a window sill.



During this investigation, what unexpected things could happen that might affect Nina's results?

_____

_____

_____

_____

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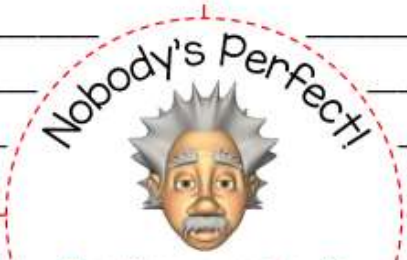


Shania chose 3 paper towel brands to see which one soaked up spills best. For each test, she would pour some water onto her lab counter, put a paper towel on it, and pick it up to see how much water was left. She would repeat this test for each brand, 4 trials each.

During this investigation, what unexpected things could happen that might affect Shania's results?

_____

_____

_____

_____

Mitchell was trying to determine his lizard's favorite food. He decided to feed it crickets in the morning, fruit at noon, and pellets at night. He would record how much his lizard ate at each meal, 5 straight days.

During this investigation, what unexpected things could happen that might affect Mitchell's results?

_____

_____

_____

_____

Assignment 17

Analyzing & Interpreting Data

Data – Facts, statistics, or measured numbers that you gather during an investigation.
Graphing – A visual display using lines, bars, or points that helps you make sense out of data.
Correlation – Sets of data that seem to increase or decrease together.
Causation – Sets of data that cause each other to increase or decrease.

Read the following story. Then analyze and interpret the data by answering questions.

After showing interest in being a police officer, Chelsea volunteered to go on a ride-along trip with Officer Hudson. Officer Hudson decided he would show Chelsea how to use a radar speed gun when monitoring vehicles on the highway.

"It's not as easy as it looks," Officer Hudson told Chelsea. "Even though drivers know the speed limit, they tend to be in a hurry and drive much faster." Chelsea was interested to see the average speed of cars when the speed limit is 55 miles per hour.

They used the radar speed gun to detect the speed of each moving vehicle on the highway over the course of 2 minutes. "Here's what we found," announced Chelsea. "Over the last 2 minutes, 18 cars drove by. 2 cars were going 54 mph, 6 cars were going 55 mph, 3 cars were going 56 mph, 3 cars were going 58 mph, and 4 cars were going 60 mph." Chelsea was surprised at the results.

"I suppose we should get the siren ready," grinned Officer Hudson, who knew that this data would be useful to help them predict the speeds of the cars to come.

How many numbers were collected in this data set? How are they related?

What measurement tool was used to gather this data? What unit of measurement was used?

Analyze the data that was collected. What would you say was the average speed of a car? Explain your answer.

How can Officer Hudson use this data to predict what will happen next? What should they expect?

Read the following story. Then analyze and interpret the data by answering questions.

At the end of the semester, Felix decided to gather all of his assignments and record his scores. These assignments included homework, quizzes, projects, and tests. Overall, there were 6 homework assignments, 3 quizzes, and 2 tests. A semester is 7 weeks long.

On his homework assignments, Felix had the following scores: Week 1 – 86%; Week 2 – 92%; Week 3 – 94%; Week 4 – 95%; Week 5 – 98%; Week 6 – 100%. On his quizzes, Felix had the following scores: Week 2 – 79%; Week 4 – 86%; Week 6 – 93%. On his tests, Felix had the following scores: Week 3 – 84%; Week 7 – 91%.

"After gathering all of my scores, I can definitely see how my performance changed over the semester," Felix said. He then began to calculate his overall grade by using the data he gathered.

How many data sets are there? How many numbers were collected in each data set?

Which type of assignment seems to be Felix's best achievement? Explain your reasoning.

Do you see a pattern in Felix's scores as the weeks go by? Explain the pattern you see and give possible reasons why this could be happening.

Assignment 18

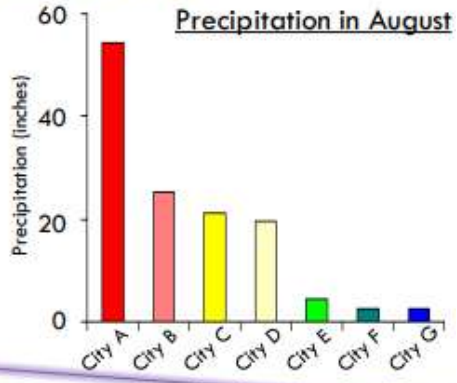
ANALYZING & INTERPRETING DATA

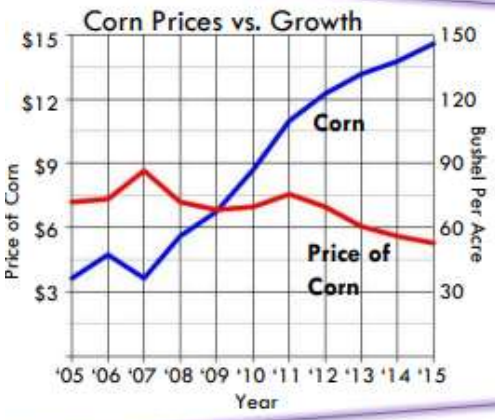
View each graph and answer the analysis questions.

Which city receives the most rain in the month of August? The least?

Consider these climates: Tropical, temperate, and desert. Which cities could represent each of these climates? Explain your reasoning.

Think about a city you live nearby. Which city in the bar graph could represent your city? Why?





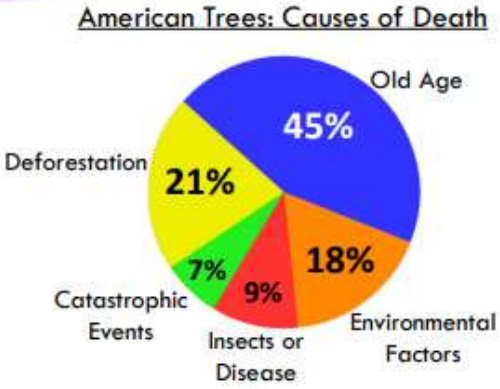
Explain the relationship between corn growth and the price of corn.

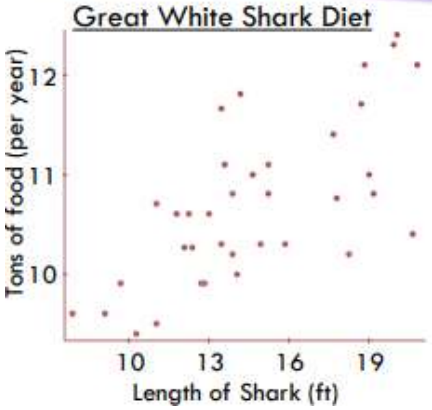
About much does a bushel of corn cost? How can you tell by viewing this line graph?

According to this pie chart, what is the most likely cause of death for a tree in the US? What is the least likely?

Which percentage(s) would you like to see decrease? Explain.

Observe "environmental factors." What environmental factors do you think causes trees to die? Where do you think this happens?





Explain the relationship between the length of a Great White Shark and how much food it eats per year.

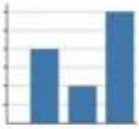
Look back at the definitions of "correlation" and "causation." Which of these do you think is displayed in this scatter plot graph? Explain your reasoning.

Assignment 19

Analyzing & Interpreting Data

Selecting the Appropriate Graph

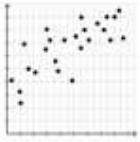
I need your help! I have A LOT of data. The only problem is I don't know how to display it. Read each data example and match the type of graph you would use to help other people understand it. Then explain your reasoning why you chose that graph.



A

B

C



D

Tracking temperature of water heated over 20 minutes.

Graph: _____

Reasoning:

Showing the amount of students in each 6th grade class.

Graph: _____

Reasoning:

Comparing the heights of giraffes to their age.

Graph: _____

Reasoning:

Displaying percentages of different gases in our air.

Graph: _____

Reasoning:

Presenting the findings of several bird-watching participants.

Graph: _____

Reasoning:

Outliers

When analyzing data, you may see a number that is out of the ordinary; it may not "fit" with the rest of your data because it is so abnormal. This is called an outlier. Outliers happen for many reasons, such as mistakes, errors, or unusual circumstances. Identify the outlier in each data set and give an explanation why this outlier could have happened.

Run	My 5K Time
1	21:35
2	22:26
3	31:18
4	21:56
5	22:09

Outlier:

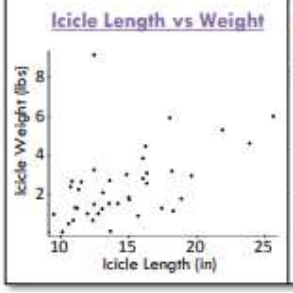
Explanation: _____

Outlier:
(circle it in the graph)
Explanation: _____

Bag	Number of Yellow M&Ms
Ted	13
Sue	11
Bert	12
Kim	12
Ann	5

Outlier:

Explanation: _____



Outlier:
(circle it in the graph)
Explanation: _____

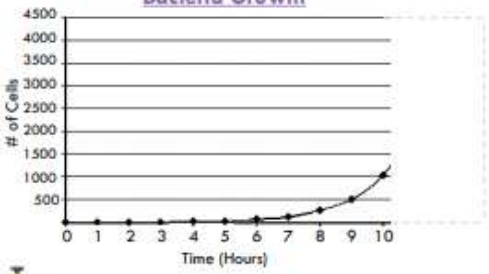
Assignment 20

ANALYZING & INTERPRETING DATA

Predict What Will Happen Next

When you are interpreting data, you can make predictions about what will happen next. **Analyze each data set below and complete the interpretation boxes.**

A scientist put a small amount of me and my bacteria friends into a petri dish of warm milk. I know, gross, right? They tracked how quickly we grew more cells and recorded it in this graph.



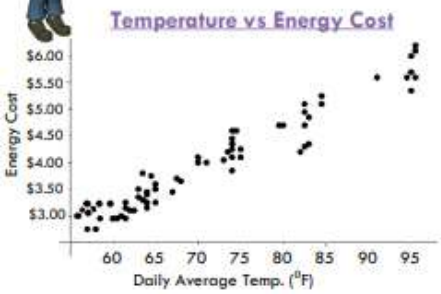
ANALYZE What does the data show you?

INTERPRET What does the data mean?

PREDICT What will happen next? Why?

Continue the graph by drawing your prediction next to it!

During the hot summer, I am spending a lot of money on electricity! Just how much, you ask? This graph shows my energy costs compared to the outdoor temperature on any given day.



ANALYZE What does the data show you?

INTERPRET What does the data mean?

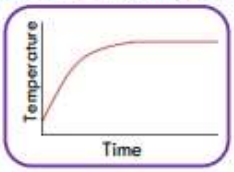
PREDICT What would the energy cost be on a 100° Day? On a 50° Day?

Draw a straight line that shows the trend of the data in the graph!

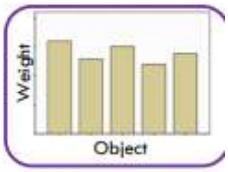
What is the Data Telling You?

Below, there are several descriptions of data results, and there are several graphs. Some graphs are detailed while others are not. **Draw a line from each description to the matching graph that goes with it.**

A car accelerates faster as it travels farther.

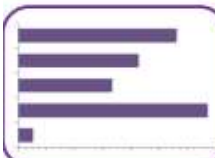


Most groups found over 10 types of rocks, but one group only found 2.



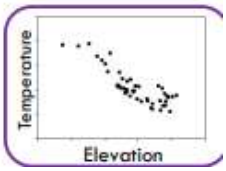
As we hiked higher up the mountain, the air became colder.

There are several types of weeds in my yard, but 60% of it is crabgrass.



John weighed 5 metals and they were all around 100-120 grams.

Water is heated on a stove until it reaches its boiling point.



Assignment 21

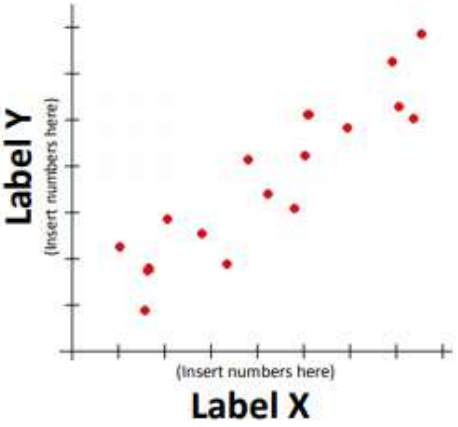
ANALYZING & INTERPRETING DATA

Correlation vs Causation

When you read a graph that shows a relationship between two things, you may be able to determine if the relationship is an example of correlation or causation.

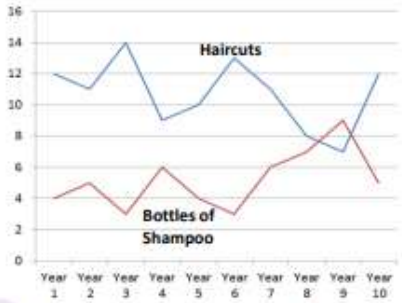
For example, look a the graph to the right. Imagine a construction company is pouring sidewalks for houses. Label Y is "square feet of sidewalk" and label X is "lbs. of concrete." Is one causing the other one to increase? The answer is yes – if more sidewalk needs to be poured, more lbs. of concrete will be needed by the company. This is an example of **causation**.

On the other hand, imagine label Y is "Height of Person" and label X is "size of shoe." Is one causing the other one to increase? No. Just because someone is taller doesn't mean their foot will definitely be bigger. However, it is an interesting **correlation**! Can you think of any other correlative relationships?



Correlation or Causation?

For each example, decide whether it is showing a correlation or a causation between the data sets. Then support your answer with reasoning.



Circle One:
Correlation or **Causation**

Why do you think so? Give Reasoning.

Workout	Minutes	Calories Burned
Day 1	40:35	331
Day 2	24:58	195
Day 3	35:13	284
Day 4	30:42	245
Day 5	44:55	366
Day 6	18:27	143
Day 7	27:23	227

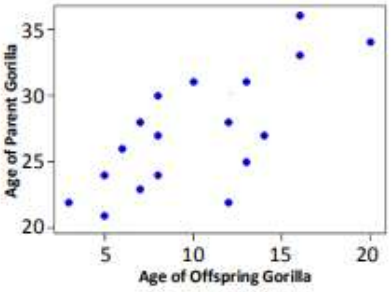
Circle One:
Correlation or **Causation**

Why do you think so? Give Reasoning.

Year	Avg. Servings of Fruit/Vegetables Per Day	Illnesses
'08	3.5	4
'09	3.5	5
'10	4.5	4
'11	5	3
'12	4	3
'13	6.5	2
'14	5.5	2
'15	7	1
'16	9	0

Circle One:
Correlation or **Causation**

Why do you think so? Give Reasoning.



Circle One:
Correlation or **Causation**

Why do you think so? Give Reasoning.