Enhancing Instruction through Content Integration

SUMMARY

What science skills do your students possess? Can they create a graph? Can they interpret data? Can they recognize and describe a trend in the data? As students advance in science it is important not to assume that because they know many facts that they can interpret what those facts mean. Math and science skills become more integral as students advance in these subjects. The author shares three simple integrated math and science skill lessons for you to use in your class. Each one can be used as a formative assessment and can be completed within a 40-minute class period. Try them and see what your students can do.

There are more than 30 pages of standards, performance indicators and process skills in the NYS Intermediate Science curriculum that students in grades 5–8 are to master (University of the State of New York, 1996). When the ELA, math, and social studies syllabi are added (with health, art and other subjects), middle school becomes a time of congested information. Too often science instruction is lost because the focus is on teaching children science facts without connecting the facts to something meaningful (Griffin, 2014). The students become informational bulimics where they can give information back on tests but miss the essence of science. Science and math complement each other and can be taught together. As a veteran teacher, I have heard adults, as well as, students say, "I don't do math" or "I don't do fractions, but science is fun." Science is doing; it is studying our world using fundamental skills, and like math, if students are going to become successful in science, we have to move past accepting the idea of not doing math. In many instances, science is applying math concepts.

I am a middle school science teacher. When I am introduced as one, there is often an eye roll and a comment like, "Well, someone has to do it." Some teachers shy away from the inherent variety of middle school, but middle school offers significant educational opportunities where great gains in a student's confidence and abilities can be achieved (Balfanz, 2009). When students are presented with a curriculum that builds a strong foundation in basic science skills, it is easier for them to progress through the higher levels of science that follow (Maral, Oguz-Unver, & Yurumezoglu, 2012).

Teachers face heterogeneous populations, diverse learners and limited time

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Teachers working together with integrated lessons reinforce each other's curriculum and help bridge the gap between material being *taught* by an educator and *mastered* by the students.

to orchestrate a classroom where higher-functioning students aren't bored, and challenged students can find success. Integrating math skills in science class can enhance instruction and improve the students' attitudes toward math skills because students view them in a different context. We all have our own way of avoiding something we don't want to do. Some students try to avoid math class. Middle school students can become inventive if they want to avoid a class. Ask any teacher, traveling to the water fountain, bathroom or their locker can become commonplace.

School can become more efficient, if teachers work in concert reinforcing the skills students are to master. When classes are taught independent of each other then they are limited. Teachers working together with integrated lessons reinforce each other's curriculum and help bridge the gap between material being *taught* by an educator and *mastered* by the students. With integrating skill work between subjects, students do the tasks, hear the vocabulary used in different classes and it becomes more recognizable to the students (Willingham, 2015).

In order to differentiate lessons the design needs to address the different skill levels and learning styles. Keeping continuity within the lessons along with scaffolding the lessons aids in addressing heterogeneous groups. Ideally, the lessons created for a heterogeneously grouped classroom would have the higher-achieving students challenged (but could complete the work independently) and the students who need support would not be overwhelmed at the task. Working with the NYS grades 5–8 Science curriculum and NYS Math Learning Standards (National Governors Assoc. Center for Best Practices and the Council of Chief State School Offices, 2016), I have developed a series of lessons focused on specific skills called simply "Science Math Activities." The purpose of these lessons is not primary instruction but to review what was already taught in both math and science classes. If one uses

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The activities presented here are in essence simple formative assessments that can generate information to assist the teacher in determining the future lessons of the class.

these lessons in class, the discrepancies in what the student understands and what they can do becomes apparent. Teachers are familiar with students saying, “I know how to do this” and then when the teachers ask the students to show what they know there is a bombardment of rudimentary questions. I regard these lessons as simple checks on what students think they know and what they can actually do.

The activities presented here are in essence simple formative assessments that can generate information to assist the teacher in determining the future lessons of the class. Each activity can be completed in about 40 minutes and reviews specific vocabulary introduced in a previous class. By observing students doing their work the teacher can address the student’s misconceptions and difficulties immediately within the class period.

The goals of these activities are:

(1) to have students participate in an activity in my class where I can interact with them and glean information on their abilities;

(2) to have the activity take place in one class period so that there is no disruption in the progression of the lesson;

(3) to have the activity require different levels of abilities so I can assess where the difficulties lie.

As their teacher, I want a snapshot to see what the students can do so I can plan and possibly change the next lesson. I will also conference with the math teacher after the lesson and compare our outcomes and evaluations of students’ abilities. This will help me decide the course of action, whether I reteach or move on.

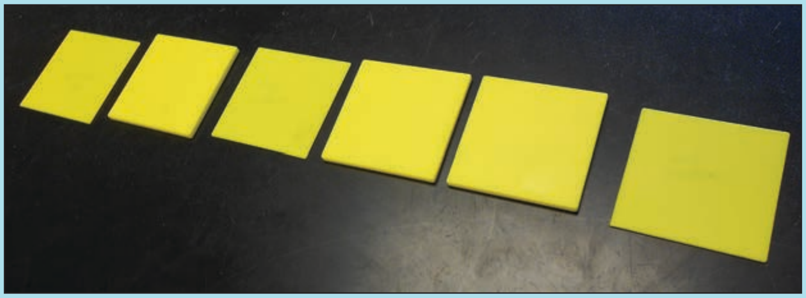
A requisite skill for middle school science students is for the students to calculate density. In order to calculate density, the students measure the mass of an object on a triple beam balance and divide that mass by the volume. If one wanted to calculate the density of a regular rectangular object, the mass would be found on the triple beam balance and the volume would be calculated using the formula Volume = Length x Width x Height. I find that measuring the sides of a regular rectangular object and calculating the volume can be challenging for some students. I often have students ask questions like, “Which side is the height?” or “If I turn it, does the length change?” Instead of pushing forward with the formula, L x W x H, I take a step back and review why we use the formula, but not with volume (three dimensions), I simplify it with area (two dimensions).

Picture 1 shows attribute blocks set up, six blocks in one row. I ask the students to tell me how many blocks there are. Of course, each student responds

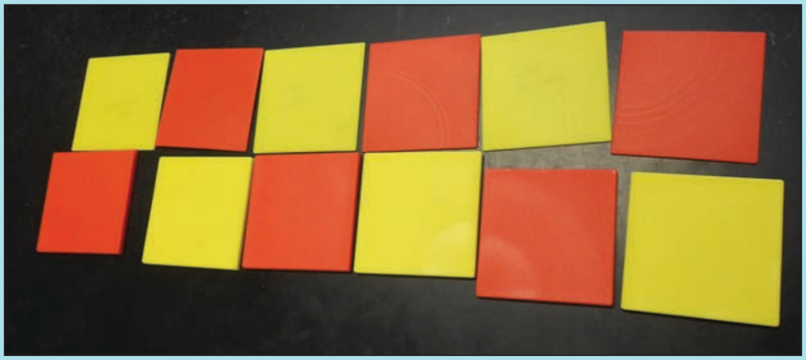
with the correct answer. I then ask them, how did they arrive at that answer? Did they count one block six times (1+1+1+1 +1+1) or did they recognize that there is one row with six blocks in it (1 x 6)?

I then expand the blocks to two rows [Picture 2]. This is where students typically get an "Aha" moment. I ask the same question, how many blocks are there? Students do respond with the correct answer, 12. Again, I ask, how do you know? Did you count each one individually or did you recognize that there were two rows of six each. My goal for the lesson is not for them to just calculate area but to understand why we use the formula *Length x Width* to figure out how many blocks are *covering* an area. For finding area we are essentially just counting the blocks or whatever units (like centimeters) we measure in. This is the basis for explaining why we use *Length x Width x Height* to measure volume because it is the same concept of counting but with an added dimension. Middle school students have had previous experiences with measurement, calculating area and volume. I find that when I force the students to reexamine the way we calculate area and volume, their understanding and retention increases. The integration of these simple concepts improves student comprehension.

Picture 1



Picture 2



Overview of Lessons

Each one of the following lessons requires similar math and science process skills. Measuring, calculating, graphing and interpreting data are required skills in both math and science.

Lesson A: Students are to draw regular rectangles that are a specific square area.

Lesson B: Students are to estimate their location down the hallway to get to their next class on time. After creating the data students are asked to graph the data and answer simple questions about the graph.

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Lesson C: Students are to identify variables, describe correlations and recognize outliers. Students complete this activity with graphing data and creating a best fit line.

In my eighth-grade science class we work mostly on general physical science (*New York State Intermediate Level Science Standard 4: The Physical Setting*). Lesson A is a quick exercise I use after we have reviewed the concept of area. (See Graphic 1) An intermediate science skill is calculating the density of objects, which requires measuring the volume in cubic centimeters. I have found that a common mistake is that students do not fully understand the concept of an exponent when calculating volume (*NYS Math Learning Standards: Geometry and Expressions & Equations*).

Often times, if the side of a cube is 2 centimeters, students will calculate the volume at 6 cm instead of 8 cm because they see 2^3 as 2 x 3 rather than 2 x 2 x 2. Instead of pushing forward with volume, I step back and focus first on length (distance), then area and finally volume. I challenge the students with reversing the calculation. In the preceding lesson, students measured the area of specific regular rectangles. In this lesson I ask the students to draw specific areas. Notice the numbers increase in what I call complication, they go from 25 (perfect square) to 7.5 cm^2. The majority of students have difficulty with this exercise. They confuse perimeter with area and fail to understand that if they are given the area, they need to find two numbers multiplied together that form area. Again this is unsettling to many students because there are different correct answers.

Graphic 1: Lesson A

Length or **distance** is a one dimensional measurement. Let us say that the length of a line is 3.0 cm. The unit or label is centimeters. Because the measurement is just one dimension, and we use a linear device (a ruler) to arrive at the length of the line, there is just one unit. There are no calculations, just measurement. **Area** is a calculated two dimensional measurement. Area of a rectangle or square is the product (multiplication) of the two sides.

On the back of this paper **DRAW** five shapes A, B, C, D and E.

Shape A: Draw and label Shape A with an area of 25.0 cm^2

Shape B: Draw and label Shape B with an area of 20.0cm^2

Shape C: Draw and label Shape C with an area of 30.0cm^2

Shape D: Draw and label Shape D with an area of 18.0cm^2

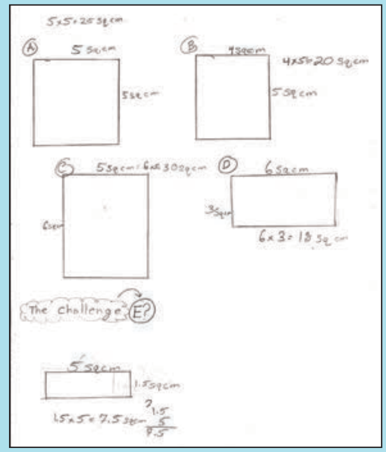
Shape E: Draw and label Shape E with an area of 7.5cm^2

Pictures 3 and 4 (at right) are representative of two students in the same class. Picture 3 is Lesson A from a student who has grasped the idea of drawing a regular rectangle with a specific area, while Picture 4 is a sample from a student who has difficulty. For the student who did Picture 4, the student used the concept of attribute blocks (discussed previously) but when asked to calculate the area (7.5 cm^2) the student had difficulty. The student understands what area is but lacks number sense or familiarity. These are simple concepts that are taught, reviewed and learned in math classes all through middle school. But if the students are to use these skills in science for the foundation of more complex skills they need to be constantly reinforced.

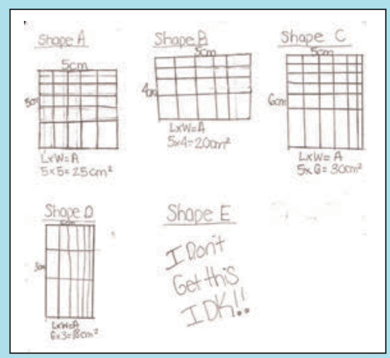
Revisiting that *area* really means a "region" or a "covering," and that multiplying *length* times *width* shows us the size of the region helps portray the concept that area is not just a formula. The shapes of the areas can be different (squares or rectangles) but quantity is the same. Addressing students' misconceptions in exponents, and reinforcing the concepts of area and perimeter make the next step of calculating volume easier. By working through these lessons I hope to improve the students' familiarity with numbers, units, rulers and calculations.

In previous lessons to Lesson B (see Appendix 1) students have been introduced to speed and acceleration. Students have completed an activity where they have measured the rate of movement *(NYS IL Process Skills based on Standard 4)*. My purpose for this activity is to have students move past the concrete measurement of an object moving a specific distance in a period of time. In this lesson, I give the students an *approximate* speed, with a distance and having them use a familiar setting (the school hallway) I ask them to create their own data that includes stopping at a locker *for about 40 seconds*. I then ask the students to graph their data following specific bulleted instructions. (See Graphic 2).

Picture 3



Picture 4



Graphic 2: Lesson B

Time and ***distance*** (changing distance during a specific amount of time) are often graphed using a **line graph**. An example of this would be how **you** travel through the hallways of the middle school. Follow the directions below to gather data and create a specific graph.
There are 3 minutes between classes. If there are 60 seconds in a minute, how many seconds are there between classes?

3 minutes x 60 seconds / 1 minute =??? seconds

Room 220 (your science room) is located at the end of the hallway. It is approximately 60 meters to your English class (room 210) and math class (room 209) with the Spanish room being approximately 75 meters away.

Your task is going to graph (line graph) your movement from science class to Spanish. You are going to stop at a locker on the way for *about 40* seconds. A slow walk is 0.3 meters/second and a fast walk is 1.4 meters/second, let us **estimate** your walk is 1.0 meter/second.

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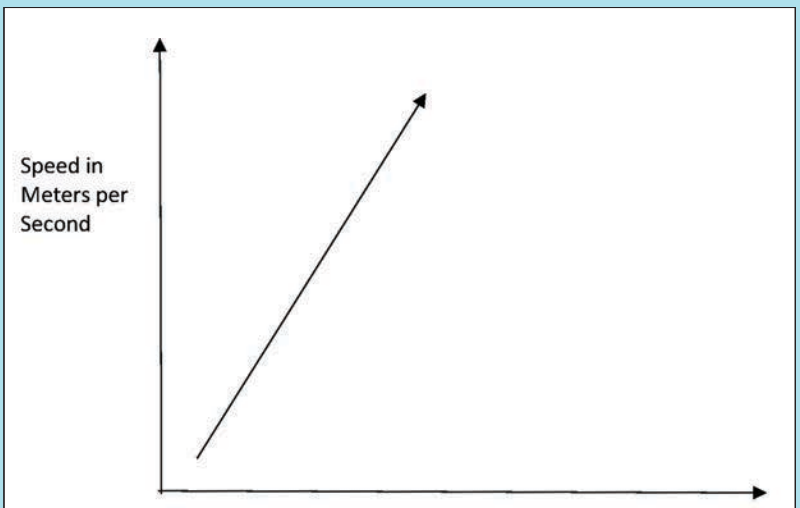
Today's middle school students have gone through earlier grades in school with the emphasis on high-stakes testing where they have been conditioned to identify the one correct answer.

Asking students to interpret data where variability is acceptable deviates from what they are used to. This activity challenges the high-achieving students because in middle school, these students become uneasy with the realization that there is more than one correct answer. The students are asked to estimate data about their own speed. Their data comes from a common experience because all of the students have moved to another class and stopped at a locker. This activity asks them to analyze that rate of movement. Once these students understand that they can create their own data, they find comfort in the concrete directions of creating the graph and answering questions.

Students who are not high achieving have difficulty with the data, and at different parts of this activity. I address this by actually having the students walk down the hall so they can relate to what the question is asking. If they cannot imagine themselves doing this familiar task, they can repeat it during class and report their data. These students also often find difficulty in having their data fit the graph using an appropriate scale and the students are using graph paper of different sizes. Many times students ask, "What should the interval be?" Reviewing the vocabulary of range and dividing the range into even parts emphasizes basic math skills. I often refer to the axes as yardage marking on a football field. Remember, it is ten yards from 10 to 20, as well as, 40 to 50.

The questions at the end of Lesson B review the word **variable**, another concept students often find difficult. One common answer from students for "What is the variable on the horizontal axis" is "X." Typically students lump together **"X," horizontal** and **variable** without distinction. Understanding that a variable is anything that is liable to change, is often not retained. Students can write equations in math using variables but they often just see the variable as a quantitative solution not as a descriptive term.

Graphic 3



Speed is increasing (positive slope) as time is increasing which means there is acceleration.

I know students can measure an object moving through a distance and calculate rate but I want to evaluate if they understand what speed means, the rate of movement, and whether they can represent it on a graph. (*NYS Math Learning Standards: Expressions & Equations and Statistics & Probability*). The goals for future lessons are to have students read a graph of "Time vs. Distance" and relate it to speed and then read a graph of "Time vs. Speed" and understand it is as acceleration as seen in Graphic 3. Creating graphs, reading the data off graphs and then drawing conclusions from the data shows students understand how things move in our world.

Lesson C (see Appendix 2) is a more challenging lesson that is completed toward the end of the school year. Students are asked to read and interpret graphs based partly on bacterial growth. This lesson is part of my genetics unit when we have finished learning about mitosis. Previously we did a lesson on counting how bacteria multiply through binary fission (2, 4, 8, 16, 32…) so the students are familiar with the idea of microbes multiplying. Having the students interpret graphs reinforces the idea of mitosis and binary fission. Understanding what a graph shows and being able to draw conclusions based on this data is a key skill (*NYS IL Process Skills based on Standard 4*). Questions in the activity include references to variables and correlations (linear and non-linear). Students also interpret clusters and outliers. The end part of the activity has students create a graph and draw a best fit line (*NYS Math Learning Standards: Statistics and Probability*).

The subject matter is science; the skills cover both general science and middle school math. I again ask the students to identify variables on a graph (math and science concept), then to recognize a positive and negative slope (*NYS Math Learning Standards: Statistics and Probability*). The lesson refers to correlations and outliers, which are eighth-grade math concepts typically found mid-year. These concepts are somewhat sophisticated and the questions in the activity are purposefully designed to elicit discussion and the answers could vary based on different reasoning. A by-product of teaching has always been the unexpected answer. In science, students can be directed to a specific conclusion, but by leaving questions open for interpretation and allowing students to arrive at different conclusions educators promote good discussions and independent thinking. The end of Lesson C reviews a past activity of creating a line of best fit. The data is about weather. I changed the topic from bacteria to weather to reinforce the idea that graphs show the data and possibly a trend or correlation (*NYS Math Learning Standards: Statistics and Probability*).

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The higher-achieving students characteristically finish this entire lesson in one class period; however, they have difficulty with some of the more open-ended questions. High-achieving middle school students become unsettled when experimental data is not clean and uniform. They often ask, "Is this what is supposed to happen?" I always emphasize that whatever the data is, is true. The explanation comes after one has collected the data. Discussing outliers gives the students a way to accept strange occurrences in their data. The concept of outliers has also been discussed in previous lessons throughout the year when we were collecting data during other activities. Other students will usually need more examples and further clarification of correlation and outliers where I can refer back to previous experiments. These students usually need to finish the best fit line graph outside class.

This lesson is consistent with the unifying concept of constancy, change and measurement (Science Content Standards, 1996). I want my students to practice looking at patterns, rates of change and scales. The skill of identifying trends and being able to describe relationships in data is important. Math can measure the changes while characterizing and identifying the trends.

With scaffolding the lessons and monitoring a student's progress I can determine their rate of success. If students are going to master science skills, it is important to keep them engaged in class work. All too often, borderline students become overwhelmed while the high achievers can get bored. If the lessons are designed to start on a basic level and then become more sophisticated, outcomes can be monitored. Low-achieving students do become familiar with the vocabulary and develop a comfort in their recognition. High-achieving students can move through parts of the lessons quickly. I find that the high-achieving middle school students often lack the patience for quality detail work. Slowing down these students and emphasizing details synchronizes what they do and what I expect. The challenge with any classroom is recognizing what type of students you have and designing or differentiating accordingly. By middle school, students already have an opinion on what they can accomplish. In my classes I have the high-achieving students mixed in the same class with very low-achieving students so my lessons have a structure that can be utilized in different ways.

In Lesson A, the first page is a chart with the number 75 at the bottom where I ask students to create the data for the chart. When I introduced this lesson, some students immediately pull ed out a calculator because they assumed if a chart and numbers were present, they would be required to add

something. The high-achieving students listened for the explanation and could imagine the data. Most of the other students struggled with this concept. I believe many were waiting for me to give them the answers to fill in. They often repeated, "I don't get this." For this lesson the concrete thinkers need to go and move to the hallway to help them imagine their movement.

Leana: "What am I supposed to write down?"

Me: "Let's go in the hall, on the floor, imagine a ruler that extends from my room to the Spanish room. At each of these time intervals, write down where you are."

Leana: "Yeah, but how do I know?"

Me: "Pretend. Pretend you are walking, I walk 10 meters, and how far did I travel from the room?"

Leana: "10 meters"

Me: "If you walk another 5 meters, how far are you?"

Leana: "15 meters"

Me: "If you, stop, how far are you from my room?"

Leana: "Zero"

Me: "Zero is the starting point at my room, you were at 15, how did I get back to zero?"

Leana: "I don't know, I don't know what you are asking."

Meanwhile, I have students who have completed the data chart and want to know if they can proceed with the graph. I assure them that they can proceed but I want to check their scale on the graph before they plot their points. Back to Leana, who now has been joined with her friend, Raquel. They are both discussing movement in the hall. Raquel reassures Leana and they both seem to be able to understand what I am asking. They return to their seats, pull out their calculators, and divide 75 evenly so that one would travel evenly through each time period. The discussion then leads to the question, "Do we always walk at the same rate?" At this point, class ends.

My class would have gone easier if I gave Leana the numbers to graph. The actual discussion with her took about 15 minutes. During my discussion with her, other students were tuned in and offered different explanations. Afterward, I am not confident that she knew what I was asking her to do, but I am confident that she did think about measuring rates of movement and how that relates to distance and time. The next time we met, Leana was much more confident and did know what I was asking her to do and she did accomplish the task. I believe she just required more time to digest the concept.

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> Sharing what we are teaching, offering suggestions and ideas while trying to find common threads in the instruction is vital and improves education.

Reflections on the three Lessons

When assessing these activities, I want the students to be able to master certain skills. The first skill is for them to be able to follow bulleted instructions. Breaking down the requirements into a list gives the students a device to learn how to complete a task. I work on this skill throughout the year. I find that structuring tasks in this way gives students an unambiguous way to review their own work, which is another skill I want them to develop. When graphing I want the students to decide on their own scale for each axis. This offers a chance for students to reinforce their own number sense.

Observing middle school students for a number of years I believe the readily available calculator has depleted common number sense from the population. The more students work with numbers in graphing the more confident they become recognizing and determining scale. I always like to place questions at the end of these activities for a general review. I want all my students to be familiar and recognize the variables that are graphed. Comparing the variables (what is changing in the activity) in a graph is a way to understand the relationship between those variables, which is, in essence, describing the world around us.

All three of these activities are based in general science but utilize math skills. If teachers embrace an integration of math skill work then we can work to avoid the math phobia in middle school (Strategies for Reducing Math Anxiety, 2011). I have found that students do become familiar with the math vocabulary and can relate to it in science class. Often times they do recognize, "We just did this in math class!"

Having the students complete these activities independently in class allows me to evaluate the progress of students. Reflecting on where the strengths and weaknesses are with students and comparing these notes with my colleagues takes time. I am fortunate to work on a core team (math, science, ELA, social studies and Spanish) and we have team time during the school day where we are able to do some common planning. Sharing what we are teaching, offering suggestions and ideas while trying to find common threads in the instruction is vital and improves education (Hackmann & Valentine, 1998).

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Glossary

Variable: something that is liable to change. Most middle schoolers will say: The variable on the horizontal axis is "x" and on the vertical is "y". Ask the question, what is changing on the horizontal axis, the reply is, "the numbers". Ask what do those changing numbers represent? That is the variable.

Slope (positive and negative): A slope is how steep and in what direction the line moves. Low numbers are "bunny hills" and big numbers are steeper. Positive slopes go up or increase; negative slopes go down or decrease.

Outlier: something that is on the outside of a group. When looking at data points, this would be a point that does not follow the trend. The odd one out.

Cluster: A close-knit group. A group of data points that are close together.

Correlation (linear, non-linear, strong and weak): This is the relationship between two things (usually called variables). Linear correlations are straight lines while non-linear correlations tend to be curvy type lines. Strong correlations are nice neat lines and weak correlations are kind of scattered.

Best fit line or **Line of best fit:** An advanced topic in middle school but one that always elicits good discussion. This is the "trend" line, the path the data is taking when presented with a scatter plot (lots of data points all over the place). An excellent tool when discussing what "probably" will happen. I always associate with animal tracks in the snow. Where is the animal headed? The animal may change direction, but chances are, it is headed in one direction.

Appendix 1: Lesson B

Time Interval (seconds)	Distance from the science room (meters)
Science class is over! 0-19	
20-39	
40-59	
60-79	
80-99	
100-119	
120-139	
140-159	
160-179	
180 (Need to be in class!)	75

PLOT THIS DATA ON A LINE GRAPH

Directions for graph:

- Use graph paper
- Draw a horizontal and vertical axis with about a 2.0 cm margin
- Label the horizontal axis (x-axis) "Time Interval (seconds)"
- Label the vertical axis (y-axis) "Distance from Science Room (meters)"
- Choose an appropriate scale that uses most of the graph paper
- Remember **all of the data** must fit on the graph
- The **origin** (0,0) will be in the bottom left corner
- Make sure to put your **name**, a **title** and the **date** your graph
- Always use a straightedge to draw a line

ANSWER THESE QUESTIONS:

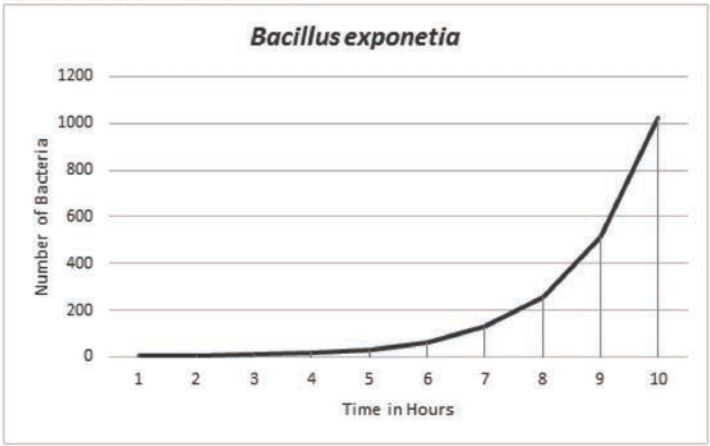
1. What is the variable on the horizontal axis?
2. What is the variable on the vertical axis?
3. How many meters in one kilometer?
4. How many meters in five kilometers?
5. How many centimeters in one meter?

****STAPLE TO YOUR GRAPH AND HAND IN****

Appendix 2: Lesson C

Bacteria reproduce by mitosis. Bacteria are named for their shape. ***Bacillus*** is a rod-shaped bacteria. Bacteria can grow at different rates based on the environment they are introduced into. When antibiotics or other solutions are present the growth rate can diminished or stopped.

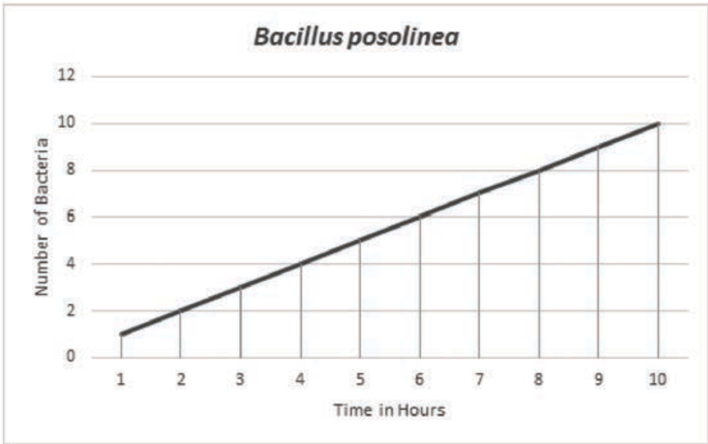
Study the following 5 graphs and answer the questions **and** complete **all** the tasks [read and understand the directions].



1. In the above graph, what are the variables?

2. What happens to the number of bacteria as the time increases?

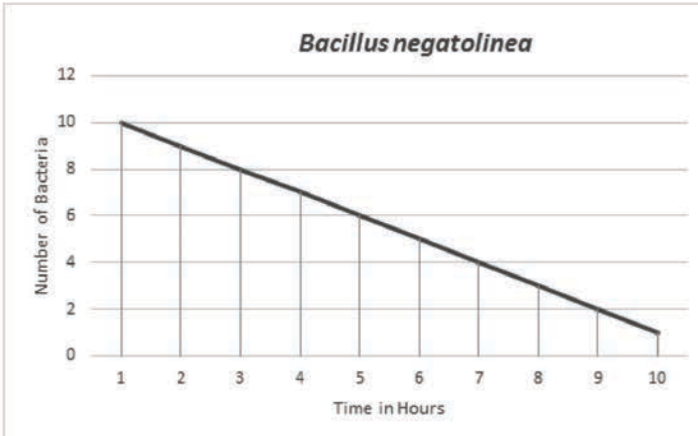
3. How does the growth of ***Bacillus exponetia*** differ from the growth of ***Bacillus posolinea***? [write a sentence that refers to BOTH number of bacteria and time]



4. In the graph above, what is the label of the x-axis?

5. In the graph above, what is the label of the y-axis?

Appendix 2: Lesson C (continued)



6. How does the growth of ***Bacillus posolinea*** differ from the growth of ***Bacillus negatolinea***? [write a sentence that refers to BOTH number of bacteria and time]

A **correlation** is the mutual relationship or connection between two variables. It is also the relationship of a **function**. A **linear correlation** is a straight line. **A non-linear correlation** is a curvy line. The correlation is said to be "strong" with a tight line and "weak" when points are scattered. A linear correlation is said to be **positive**, when both increase [positive slope] and **negative**, when one goes up and the other down [negative slope].

7. **Circle** the correct words that describe each graph's correlation.

Bacillus exponetia

linear non-linear positive negative strong weak

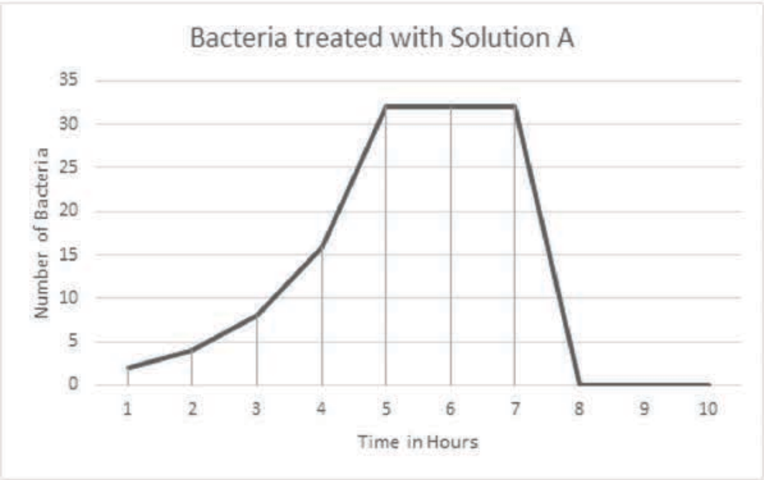
Bacillus posolinea

linear non-linear positive negative strong weak

Bacillus negatolinea

linear non-linear positive negative strong weak

Appendix 2: Lesson C (continued)



8. **Solution A** is found to kill bacteria.

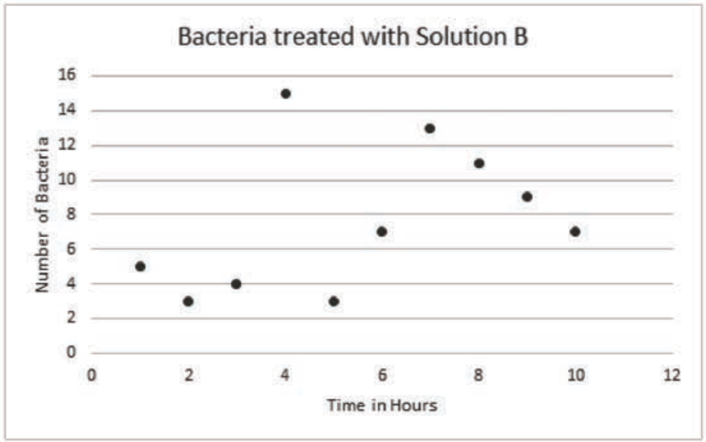
a. At what time did the bacteria stop growing?

b. For how long was the population not changing?

c. At what time was the population zero?

d. What is the name of this bacteria?

Appendix 2: Lesson C (continued)



There are situations when there is no correlation with the defined variables. In the graph above Solution B was introduced into the population of bacteria and the solution had varying effects of it. In a **scatter plot** (where there is no correlation-like the above graph) there are certain data points that are close to each other (called **clusters**) and those that are far removed from the group (called **outliers**).

9. For the graph above:

- **Circle** the cluster
- **Star (*)** the outlier(s)

Appendix 2: Lesson C (continued)

The previous graphs were about the growth of bacteria, the following data are the average high temperatures (ºF) in cities around New York.

Graph the data below, follow the directions and answer the questions:

Month	Gloversville	Saratoga	Albany	Plattsburgh
January	28	31	31	26
February	31	35	35	29
March	41	45	44	39
April	55	60	58	53
May	68	72	69	66
June	76	80	78	75
July	80	83	82	80

- Label the x-axis “Month”
- Label the y-axis “Average High Temperature ºF”
- Use a different color to represent each cities data points
- Draw **a best fit line**
- Attach your graph to this packet and hand in
- Answer the questions below

Questions

1. What are the two variables for the above graph?

2. Is there a correlation between the variables? If yes, describe it. (linear, non-linear, positive, negative, strong, weak)