
ADP MaST Academy Presents:
Detective Academy
Summer 2024
Riverside High School

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ADP MaST Academy
The University of Texas at El Paso
500 W. University Ave.
Carl Hertzog Room 101
(915) 747 – 8469
mastacademy@utep.edu

Lesson Plan

TITLE: Brantingham Crime Pattern Theory

LENGTH OF LESSON: 45 min

TEKS:

Algebra (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

> (A) apply mathematics to problems arising in everyday life, society, and the workplace;
>
> (E) create and use representations to organize, record, and communicate mathematical ideas;
>
> (F) analyze mathematical relationships to connect and communicate mathematical ideas; and
>
> (G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

LESSON OBJECTIVES:

What do you want the students to know and be able to do?

We will: Learn what a pattern is, and how the geometrical shapes are related to the crime pattern theory.

I will: Be able on how to connect geometrical patterns to the crime pattern theory.

ACTIVATE PRIOR KNOWLEDGE/ HOOK:

Building Background

Instructor will ask what a pattern is and how a pattern can relate to a crime.

ACTIVITIES

Direct teach/modeling activities/collaborative activities/independent practice

The instructor will provide individual canvases and paints to every student. After that, the instructor will ask them to paint something that has geometrical patterns. Instructor needs to clarify that students need to use geometrical shapes and make patterns with the paint.

Example

After every student is done painting, the instructor will ask how they think this activity could be related to solving a crime. Later, the instructor can explain how crime is not random, and it is either planned or opportunistic. Pattern is defined as the regular and

repeated way in which something happens or is done; a similar thing occurs in a crime. Crime happens when the activity space of a victim or target intersects with the activity space of an offender. After that, the instructor will explain what the Brantingham Crime Pattern Theory is and will ask every student to draw the triangle that is part of this theory.

Information can be find in the following website: More information

In a few words, crime is committed in those intersections because the offender knows the activity space, the target's availability, there is "reduced risk" because the offender knows the surroundings, knows escape routes, and there is reduced surveillance.

This is the triangle that students will have to make (by connecting the green dots): Triangle

RESOURCES/MATERIALS

- Canva Presentation
- PDF Presentation
- Paint
- Small canvases
- Paper
- Rulers
- Pencil
- Small ball

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

After everyone is done drawing the triangle, we will play tagging with the ball, whoever gets tag, the student will respond to the question related to the Brantingham Crime Pattern Theory.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Having a relaxing activity such as painting before an explanation could make them feel intrigued about how that can be related to a crime.

Lesson Plan

TITLE: Scavenger Hunt

LENGTH OF LESSON: 45 min

TEKS: Algebra (A)(1)(B) Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will… participate in a scavenger hunt and find mystery clues and evidence around our campus to find the abdicated ranger.

I will… make predictions, observe data, collect evidence, and collaborate with other junior detectives to analyze and interpret the information gathered to formulate a hypothesis about what happened to the abdicated ranger.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

Hook:

- A local High School student has been reported missing and it is up to the Ranger Forensics Scientist team to crack the case.

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice

Introduction:

- Students will be given the prompt of the case of the missing ranger and will be given their objective. To search the school grounds for any evidence or clues as to what has happened. - Share with students to be on the look-out for anything out of the ordinary, and if they need assistance to ask the head detectives.
- Students will be given the missing students schedule; they may start their investigation anywhere on the students' schedule.

Evidence:

- Artifact
- DNA
- Substance spatter
- Ripped paper
- Mystery powder
- Students schedule

TIME	PD	SUBJECT INFO
8:30-9:15	01	PE Find Coordinates
9:20-10:05	02	History Kept looking out the window, was very distracted and not his usual self
10:10-10:55	03	Art Drawing weird pictures? Charcoal sketches of the planet, artifact, figures?
11:00-11:45	04	Math Fidgeting and asking to use the bathroom. Student left for 30 minutes
11:50-12:15	05	Advisory Left gym bag in the classroom, asked teacher if he could be let out early
12:15-12:50		LUNCH Last seen during lunch
12:55-1:40	06	Dance Have not seen him
1:45-2:30	07	Science Have not seen him
2:35-3:20	08	Optional extracurricular Have not seen him activities (sports or drama practice, games, club meetings, etc.)
3:25-4:10	09	Yearbook Have not seen him

Activity:

- Students will engage in a scavenger hunt uncovering mystery clues, piecing together evidence, and collaborating to unravel the mystery behind the abducted ranger.
- Students will come together as a class and discuss evidence found during scavenger hunt. This will lead them to other summer activities.

RESOURCES/MATERIALS

- Evidence bags
- Gloves
- Evidence LOG, to keep track of verbal information
- Key evidence:
    - Artifact
    - DNA
    - Substance spatter (90 degrees, abducted up)
    - Ripped mystery power paper
    - Mystery powder
- Additional found items:
    - Weird drawings
    - Coordinates
    - Folder of random papers
    - Map of school
    - Gym shoes with mystery powder
    - Gym bag

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

- Observe students' participation and engagement during the hands-on activities and discussions. - Evaluate students' understanding through their ability to record and analyze collective information.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

- Visual Aids
- Hands-on activities
- Group work and collaboration
- Scaffolded learning

Lesson Plan

TITLE: Detective's Guide to Cellular Mysteries: Probing Prokaryotic and Eukaryotic Cells

LENGTH OF LESSON: 60 min

TEKS:

Biology (4)(a): compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity.

Biology (4) (b): investigate and explain cellular processes, including homeostasis and transport of molecules.

LESSON OBJECTIVES:

What do you want the students to know and be able to do?

We will: Students will investigate cellular processes, including homeostasis and molecule transport, while comparing and contrasting prokaryotic and eukaryotic cells. They will apply their knowledge to analyze cells left at an alien abduction scene and determine the type of organism involved.

ACTIVATE PRIOR KNOWLEDGE/ HOOK:

Building Background

8th grade TEKS: 6.12(D) identify the basic characteristics of organisms, including prokaryotic or eukaryotic, unicellular or multicellular, autotrophic or heterotrophic, and mode of reproduction, that further classify them in the currently recognized kingdoms.

Begin by asking, “What do we know about prokaryotic and eukaryotic organisms? What are some examples of organisms that are prokaryotic? How about eukaryotic?”

ACTIVITIES

Direct teach/modeling activities/collaborative activities/independent practice

- Introduce cellular processes, homeostasis, molecule transport, and review characteristics of prokaryotic and eukaryotic cells (15-20 min)
- Students will be divided into groups and be provided with microscopes, prepared slides, and worksheets. Students will observe cells, compare structures, and record observations (20min) (4 total stations)
- Students will then come back and be given the “mystery handout” which will include pictures of unknown cells/eukaryotic cells as well as other “evidence” handouts from the scene. They will collaborate, analyze samples, and discuss findings. (20 min)

RESOURCES/MATERIALS

- Detective notepad

- Microscopes
- Prepared slides of prokaryotic and eukaryotic cells
- Printed worksheets for each student
- Mystery scenario handout including pictures of “unknown” cell
- Presentation: Link Click HERE
- Guided Notes: Link Click HERE

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

After comparing prokaryotic and eukaryotic structures and recording observations as a group, students will come back and collaborate, analyze samples, and discuss findings as a class.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Utilize graphic organizers, concept maps, or visual aids to help organize information and support understanding. Scaffold by breaking down tasks/content

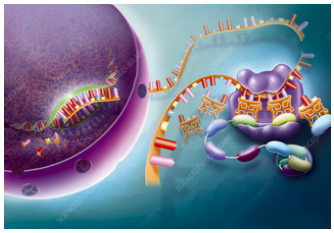
A Detective's Guide to Cellular Mysteries: Probing Prokaryotic and Eukaryotic Cells

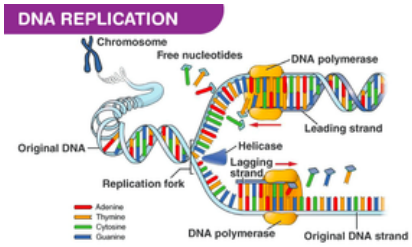
Cellular Processes

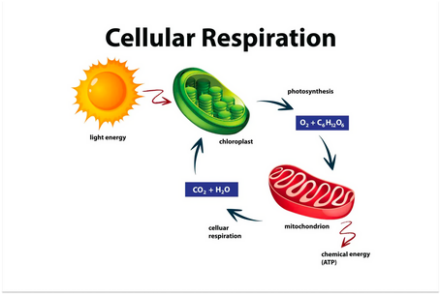
Cellular processes refer to the various activities that occur within cells to maintain life.

These processes encompass a wide range of functions, including metabolism, _____, _____, and response to stimuli.

Examples of Cellular Process:







1._____ Synthesis

_____

_____

2.DNA _____

_____

_____

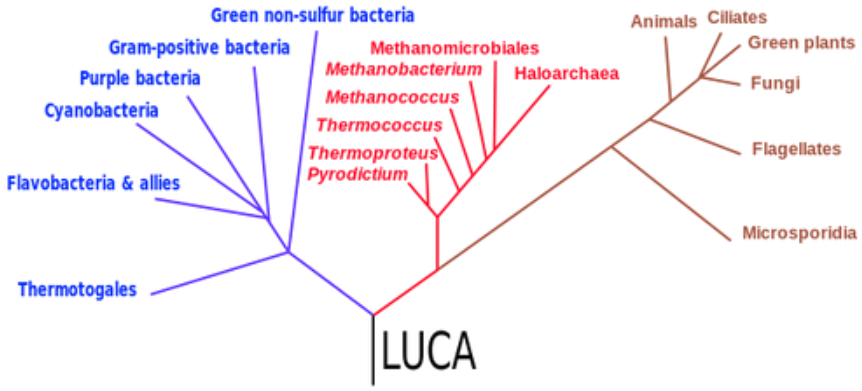
3._____Respiration

_____

_____

3 Domains of Life:

1. _____ **2** _____ **3.** _____

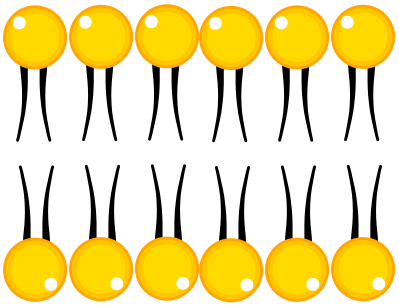


Eukaryotic Cells

Eukaryotic cells are found in plants and animals. Eukaryotic cells are _____in the sense that they contain membrane-bound_____. These organelles perform specialized functions within the cell. The presence of membrane-bound organelles enhances the structure contributing to their ability to perform tasks for _____ function and _____.

Membrane Bound-Organelles to Remember:

1.



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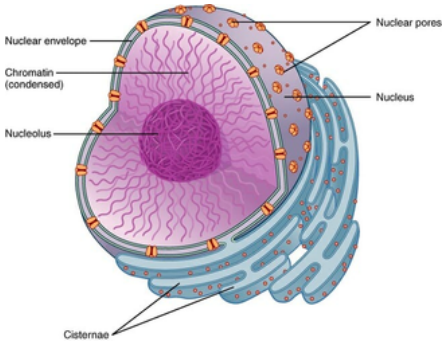
2.



_____

_____

_____

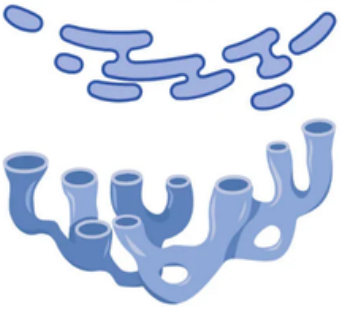
3.

_____

_____

_____

4.



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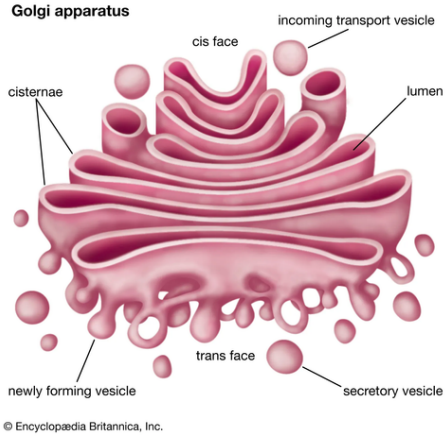
5.



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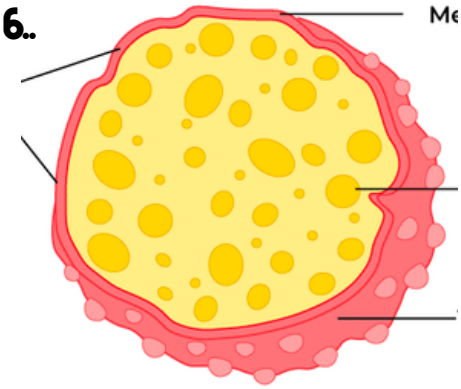
6.



_____

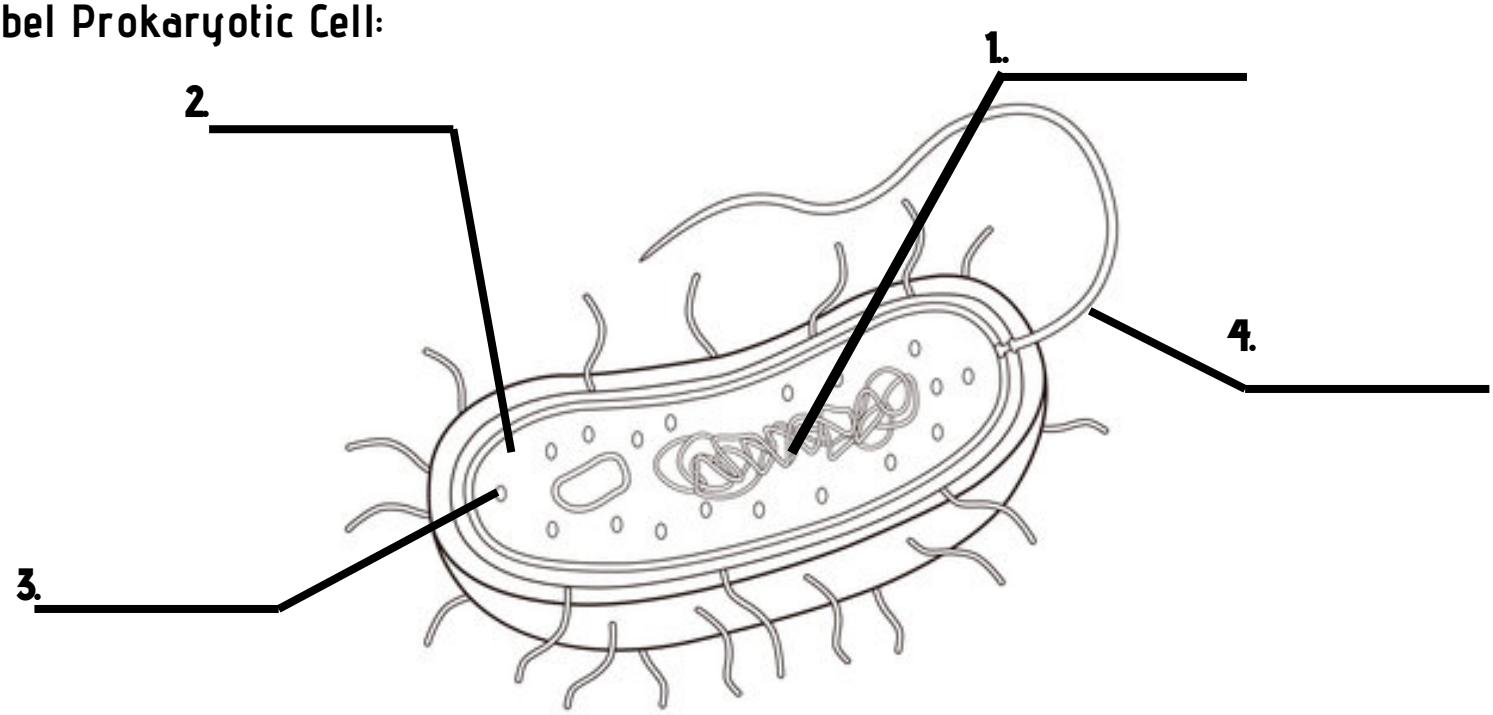
_____

_____

Prokaryotic Cells

Prokaryotic cells are found in _____and archaea. They are less complex. One major distinction is that prokaryotic cells lack a distinct _____ and _____organelles. They are typically smaller and have a simpler structure.

Label Prokaryotic Cell:



What are the differences between Prokaryotic and Eukaryotic cells? List two examples:

_____

_____

_____

_____

Homeostasis in Cells

Homeostasis refers to the ability of cells (and organisms) to maintain a _____ internal environment despite changes in the external environment.

Examples:

_____

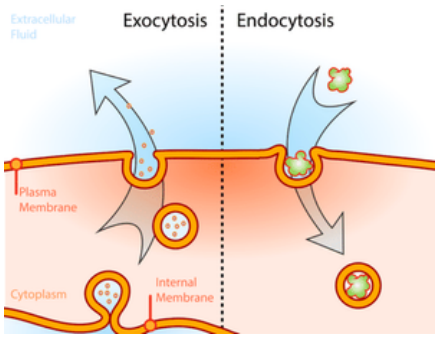
_____

_____

Molecule Transport in Cells

Molecule transport refers to the movement of molecules across cell membranes, allowing cells to _____nutrients, _____ waste products, and _____ with their environment.

Types of Transport:

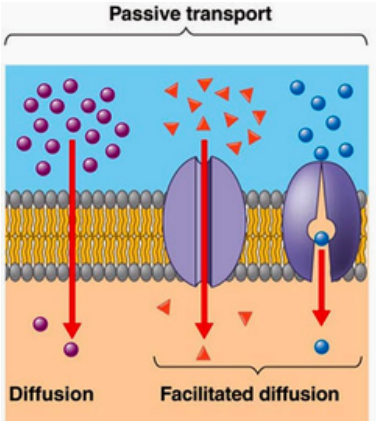


1Endosytosis and Exocytosis

_____

_____

_____

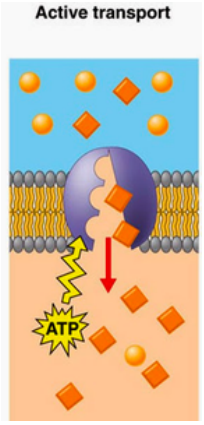


2.Passive transport

_____

_____

_____



3. Active transport

_____

_____

_____

Lesson Plan

TITLE: Unraveling the DNA of the Case

LENGTH OF LESSON: 70 min

TEKS: HS Biology (7) Science concepts--mechanisms of genetics. The student knows the role of nucleic acids in gene expression. The student is expected to:
(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA.
(B) describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA).

LESSON OBJECTIVES
What do you want students to know and be able to do?
We will... Students will be able to identify components of DNA, explain the process of gene expression, and understand how genetic concepts relate to solving mysteries.

I will... demonstrate an understanding of the mechanisms of genetics by identifying components of DNA, explaining the process of gene expression, and applying genetic concepts to solve a detective sci-fi mystery.

ACTIVATE PRIOR KNOWLEDGE/HOOK
Building background

Hook:
- Several DNA have been found at the crime scene; it is the responsibility of the Ranger Forensics Scientist team to determine what organisms were at the crime scene.
- Are they human, animals, or ... out of this world creatures?

ACTIVITIES
Direct teach/Modeling activities/Collaborative activities/Independent practice

Reviewing DNA Structure:
- Start by reminding students of the fundamental structure of DNA: a double helix composed of nucleotides.
- Break down the components of a nucleotide, emphasizing the sugar-phosphate backbone and the nitrogenous bases (adenine, thymine, cytosine, and guanine).
- Discuss how the sequence of nucleotides in DNA holds the instructions for building (traits such as eye color, blood type, or susceptibility to certain diseases) and maintaining an organism.

Gene Expression and Protein Synthesis:

- Emphasize the significance of gene expression in translating genetic information into functional traits.
- Discuss the central dogma of molecular biology, which outlines the flow of genetic information from DNA to RNA to protein.
- Use analogies or visual aids to illustrate the concept of gene expression as a "recipe" for building proteins.

Transcription: Turning DNA into RNA:

- Explain the process of transcription, wherein the information stored in DNA is copied into a complementary RNA molecule.
- Describe the role of RNA polymerase in catalyzing the synthesis of RNA from a DNA template.
- Highlight key elements of transcription, such as initiation, elongation, and termination.

Types of RNA:

- Introduce different types of RNA molecules involved in gene expression, including messenger RNA (mRNA), transfer RNA (tRNA), and ribosomal RNA (rRNA).
- Explain the functions of each type of RNA, such as mRNA carrying the genetic code from DNA to the ribosome, tRNA delivering amino acids to the ribosome, and rRNA forming the structural and catalytic core of the ribosome.

Translation: Building Proteins from RNA:

- Transition into the process of translation, where the information encoded in mRNA is used to assemble amino acids into polypeptide chains.
- Describe the structure and function of ribosomes, the molecular machines responsible for protein synthesis.
- Walk students through the steps of translation, including initiation, elongation, and termination, and the role of tRNA and ribosomes in mediating these processes.

Activity:

- Engage students in a hands-on activity where they can simulate transcription and translation using model DNA, RNA, and amino acids.
- Divide students into groups or pairs where they will each be given the DNA of the creatures where they must determine the mRNA, then amino acids.
    - Must build the DNA of the sample with color corresponded beads
    - Then make the complementary mRNA strand
    - Then finally determine the amino acids using an amino acid chart.
    - *Three different bracelets
- After students have correctly built the DNA, mRNA, and amino acids they will be given the key to all animals to determine what species are found in the area.
- *Can tie into ecology etc.
- Once all have completed, we will as a class write what species are found in the area and have a set location of the crime scene.

RESOURCES/MATERIALS

- Bracelet beads
- Bracelet string
- DNA sequences
- Presentation: Link Click HERE
- DNA Sequences Handout: Link Click HERE

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

- Observe students' participation and engagement during the hands-on activities and discussions.
- Evaluate students' understanding through their ability to apply genetic concepts to solve the mystery.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

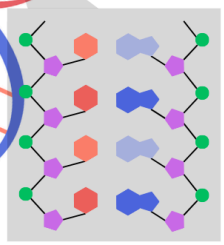
Which strategies will you use to deliver content?

- Visual Aids
- Hands-on activities
- Group work and collaboration
- Scaffolded learning

Unraveling the DNA of the Case

DNA (_____)

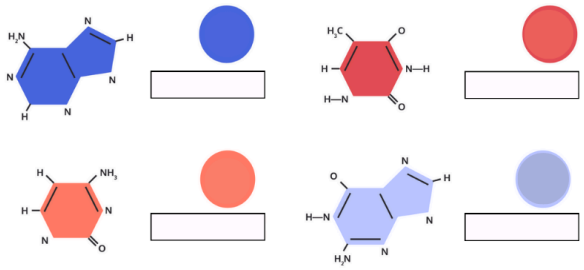
- DNA is often called the blueprint of life.
- In simple terms,
  - DNA contains the _____ for making _____ within the cell.

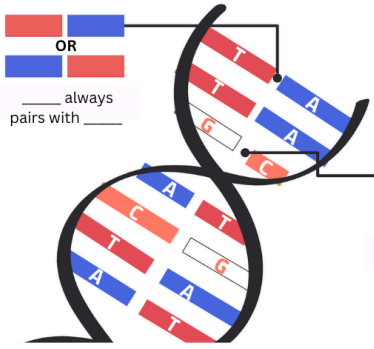


Structure of DNA

- DNA is a _____ composed of repeating subunits called _____.
  - 2 long strands
  - Each a chain of nucleotides

4 Types of Nitrogenous Bases





Base Pair Rule

- The two strands are _____.

*helpful hint

_____ in the _____

_____ in the _____

Let's Practice!!

C	T	A	G	G	T

T	G	C	A	G	T

	C	T		G			A	C
T			C		A	G		

lost? use your helpful hint

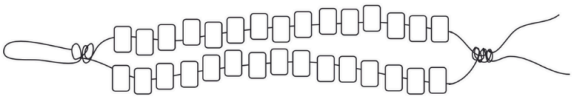
***A**pples* in the ***T**ree*

***C**ars* in the ***G**arage*

Protocol!!

- Fill in the blanks of your DNA sequence.

- Begin to plan how you'd like to design your bracelet.
  - Choose any colors for your bracelet, but they must correspond to the correct base.



☐A ☐T ☐C ☐G

- After everyone in your group has completed their bracelets, you must all work together to investigate who or what this DNA belongs to :O
  - Which DNA sequence is a match to your groups?

STUDENT SLIPS

	C	A	C			C								G
T				T	C		A	G	C	A	C	G	T	

G	A	T			A		A	C	A	C	G			
			C	A		C						G	A	G

								A	G	T	A	G	C	T
C	T	T	G	A	T	C	A							

		A	C			T	G				T	A	G	
G	T			T	C			T	A	A				C

	T		C		C		A		C		T		A	
A		T		T		G		T		C		C		A

			A	T				A	C	A			T	
G	G	T			T	C	A				G	C		T

A		T				A		G		T		C		T
	A		A	T	G		T		T		T		T	

				C	A	C	T			C			T	C
A	C	A	C					T	C		C	T		

KEY

A	C	A	C	A	G	C	T	C	G	T	G	C	A	G
T	G	T	G	T	C	G	A	G	C	A	C	G	T	C

G	A	T	G	T	A	G	A	C	A	C	G	C	T	C
C	T	A	C	A	T	C	T	G	T	G	C	G	A	G

G	A	A	C	T	A	G	T	A	G	T	A	G	C	T
C	T	T	G	A	T	C	A	T	C	A	T	C	G	A

C	A	A	C	A	G	T	G	A	T	T	T	A	G	G
G	T	T	G	T	C	A	C	T	A	A	A	T	C	C

T	T	A	C	A	C	C	A	A	C	G	T	G	A	T
A	A	T	G	T	G	G	T	T	G	C	A	C	T	A

C	C	A	A	T	A	G	T	A	C	A	C	G	T	A
G	G	T	T	A	T	C	A	T	G	T	G	C	A	T

A	T	T	T	A	C	A	A	G	A	T	A	C	A	T
T	A	A	A	T	G	T	T	C	T	A	T	G	T	A

T	G	T	G	C	A	C	T	A	G	C	G	A	T	C
A	C	A	C	G	T	G	A	T	C	G	C	T	A	G

	C	O	T	T	O	N	T	A	I	L	S			

	Q	U	A	I	L									
						D	O	V	E	S				

	R	A	C	C	O	O	N	S						

	S	K	U	N	K	S								

	S	Q	U	I	R	R	E	L	S					

	M	O	U	N	T	A	I	N						
									L	I	O	N	S	

	C	O	Y	O	T	E	S							

	U	N	K	N	O	W	N	?	?	?				

Lesson Plan

TITLE: Mystery Substance at the Crime Scene!

LENGTH OF LESSON: 60 min

TEKS: HS Chemistry (2) Scientific processes. The student uses scientific practices to solve investigative questions. The student is expected to:
(H) organize, analyze, evaluate, make inferences, and predict trends from data; and
(I) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports, and technology-based reports.

LESSON OBJECTIVES
What do you want students to know and be able to do?
We will… explore the properties of different solids and liquids, as well as understand how to collect and compare data with results

I will… facilitate learning by offering support and feedback as they work through the problems independently to reinforce their understanding.

ACTIVATE PRIOR KNOWLEDGE/HOOK
Building background
- Students have a basic understanding of the properties of solids and liquids.
- Students have a basic understanding of physical and chemical changes.
- Students understand how to compare observational data with written data.

Hook
- New evidence was found at the crime scene, a mysterious white substance.
- Students must solve what the mystery substance is and come up with the next lead!
- Possibly set up a fake crime scene with substance on the floor.

ACTIVITIES
Direct teach/Modeling activities/Collaborative activities/Independent practice
- Show students the mystery powder which was found at the crime scene. Inform them that we, the Ranger Forensics Scientist, need to determine what the substance is and where we can find it to open more leads in the case.
- Pass the mystery substance around so that students can take a closer look at the powder.
- Ask students to suggest ways to determine what kind of powder it is. Students may make suggestions such as feel it, taste it, smell it, or look at it up closely.
- Introduce the other substances we must compare with the mystery substance. Powders A-E which are Alka seltzer, baking soda, flour, sugar, and salt.
- Begin with students making observations of the powders and record them on a sheet of paper. Observing how they react with the three indicators (water, vinegar, pH

indicator)
- After they have made all observations of materials, they will be given the mystery substance where they must run the same tests and write down their observations and findings of the identity.

*Remind students to never put anything in their mouths, to smell, or to touch, unless told it is safe to do so by a trusted adult. In science we do not use our senses of taste, touch or smell to make observations unless we know it is safe to do so.
*Remind students are only given a limited amount of substance, they must test in small amounts.
*Scientists do not work alone. They work in teams where different members bring different skills and abilities to the task they are working on.
*Have the students delegate the tasks in their group (e.g., one person is the note taker, another person can measure out the indicator liquid, another can add the liquid to the powder, etc.). Students can take turns doing these tasks.

- Once they have their findings, they will be given more information of the powder substance and discover that the mystery substance is not found on this planet!!

RESOURCES/MATERIALS
Presentation: Link Click HERE
Student handout: Link Click HERE
Mystery powders answer key: Link Click HERE

Materials:
- Petri dishes
- Scoops
- Droppers
- Viles (for powders/mystery substance)
- Powders A-E (Alka seltzer, baking soda, flour, sugar, and salt)
- Indicator Liquids (water, vinegar, pH indicator)
- *pH indicator will be red cabbage water

CLOSING TASK/ASSESSMENT
How will you know if students have mastered essential learning?
- Using evidence gathered through activity students will compare findings to determine the mystery substance.
- Identification of substances will be given to students upon completion of their substances.
- A mysterious substance will be one that is not found naturally on this planet!!

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES
Which strategies will you use to deliver content?
Student collaboration, inquiry-based learning.

Mystery Substance at the Crime Scene!

Substances	Observations	Water	Vinegar	pH indicator
Powder A				
Powder B				
Powder C				
Powder D				
Powder E				
Mystery Substance				

Due to our investigations, the Ranger Forensics Scientist team have concluded that the mystery substance found at the crime scene is …
Our findings are scientifically backed up due to the following:

Powder A
A combination of sodium bicarbonate, aspirin, and anhydrous citric acid. Can be found typically in all households and is used to relieve pain and discomfort caused by acid indigestion, heartburn, upset stomach, and headache.

Powder B
Sodium bicarbonate has a wide range of uses such as in cooking, cleaning, personal care, or even in fire extinguishing. It is a cost effective powder with a wide range of uses and is a known household staple.

Powder C
A fine powder made from the grinding of seeds of edible specific grasses. It serves as a fundamental component in baking, providing structure, texture, and volume to various baked goods like bread, cakes, and pastries. It plays a vital role in food, and can be found in households, restaurants, or bakeries.

Powder D
$C_{12}H_{22}O_{11}$ is widely used to sweeten foods and beverages, enhance flavors, and provide texture in baking. It is commonly found in desserts, baked goods, candies, soft drinks, and processed foods. Additionally, it serves as a preservative in jams, jellies, and fruit preserves, extending their shelf life. Can be found in households, restaurants, or bakeries.

Powder E
Sodium chloride (NaCl) serves various purposes in cooking, food preservation, and beyond. It is widely used as a seasoning agent to enhance the flavor of dishes. Additionally, it acts as a preservative in curing meats and pickling vegetables, extending their shelf life. Can be found in households, restaurants, or bakeries.
However, although found abundantly in seawater and mined from underground salt deposits, salt has also been recently discovered on planets other than earth.

Lesson Plan

TITLE: Spatter Analysis
LENGTH OF LESSON: 85 min
TEKS: Algebra (9) Similarity, proof, and trigonometry the student uses the process skills to understand and apply relationships in right triangles. The student is expected to: (A) Determine the lengths of sides and measures of angles in a right triangle by applying the trigonometric ratios sine, cosine, and tangent to solve problems

LESSON OBJECTIVES
What do you want students to know and be able to do?
We will... Discover what the SOH trig function is and how to apply it on right triangles.
I will... Work with my group to apply the SOH trig function and measure the angle on various splatters.

ACTIVATE PRIOR KNOWLEDGE/HOOK
Building background
- How to form an equation
- How to replace the variables in the equation
- Students have a basic understanding of what a right triangle looks like
- Students have a basic understanding in how to measure length and height.

Hook
- There was new evidence found at the crime scene, different spatters everywhere!
- We need the students' help in figuring out what the shape of the spatters are and what direction they came from.
- We need the students to develop and build their skills on how different angle spatters are made.

ACTIVITIES
Direct teach/Modeling activities/Collaborative activities/Independent practice :
- Explain to students that mysterious splatters have been found at the scene. (Various spatters of various substances)
- Provide student handout.
- Students complete station activity, 3 minutes at each station.
- Students complete spatter creation pattern activity.
- SOH review presentation.
- Spatter calculations, students complete handout.

RESOURCES/MATERIALS
- Presentation: Link Click HERE
- Student Handout: Link Click HERE
- Giant post it notes
- Food gloves alt gloves if student is allergic to latex
- Detective number cards

- Glue, pb&j, colored glue using food coloring, juice, glitter glue
- Copies of worksheet I will create/ something to write with
- Measuring sticks/ ruler
- Calculator
- Caution tape
- Index cards/cardstock
- Water paint
- Straw
- Plastic cups

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

- Closing, students will share information about spatter observations and SOH calculations.
- Students write hypotheses on the direction ranger was abducted.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Inquiry based learning, student collaboration, report writing

Spatter Analysis

OBSERVATIONS:

What you need to know as a Ranger Detective:

What Is the SOH Trig Function?

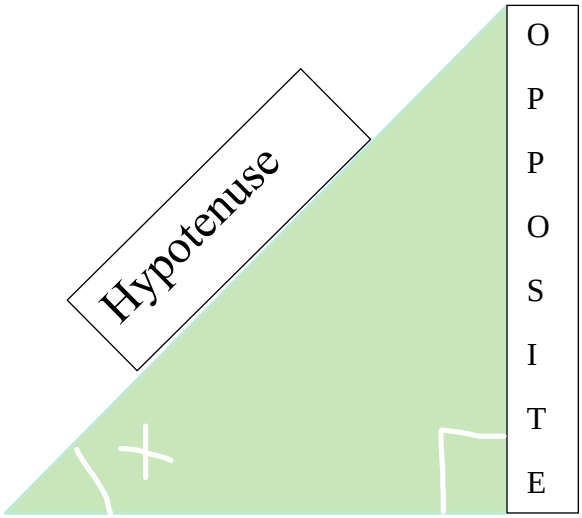
S: Sin

O: Opposite

H: Hypotenuse

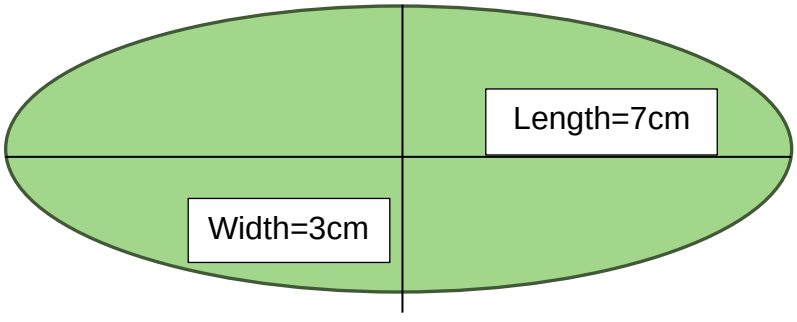
Formula to find angle X:

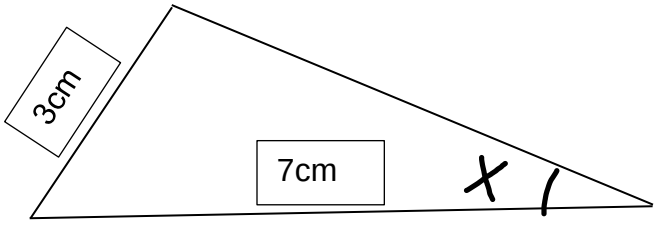
$$Sin^{-1}\frac{Opposite}{Hypotenuse} = X$$



How Will We Use the SOH Function?

-We will use the SOH function to calculate the angle of the spatter.





Spatter Analysis

Spatter	Length (Hypotenuse)	Width (Opposite)	Sin^{-1} Formula	Angle Measure	Spatter shape
1					
2					
3					
4					
5					

What Is the Shape of the Spatter??

- If the angle is $90°$ or close to $90°$ then the spatter is **Circular**
- If the angle is $75°$ or below, then the spatter is **Elliptical.**

Lesson Plan

TITLE: A Detective's Handbook for Investigating Ancient Remains

LENGTH OF LESSON: 50 min

TEKS:

B.7(a) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental.
B.7(b) examine scientific explanations of abrupt appearance and stasis in the fossil record.
B.7(c) analyze and evaluate how natural selection produces change in populations, not individuals.

LESSON OBJECTIVES:

What do you want the students to know and be able to do?

Students will analyze evidence of common ancestry among groups provided by the fossil records and evaluate how natural selection produces change in populations and examine scientific explanations of abrupt appearance and stasis in the fossil record. They will do this by providing an "artifact" found at the scene of the "crime" and use it as a clue to piece together the "abduction" mystery.

ACTIVATE PRIOR KNOWLEDGE/ HOOK:

Building Background

8th grade TEKS: 7.11(C) identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch (Geospiza fortis) or domestic animals and hybrid plants 8.11(B) explore how short-and long-term environmental changes affect organisms and traits in subsequent populations. Begin by asking, "What do we know about fossils?"

ACTIVITIES

Direct teach/modeling activities/collaborative activities/independent practice

- Introduce common ancestry, natural selection, punctuated equilibrium (abrupt appearance), etc.(20-25 min)
- Students will be presented with the "artifact" (students will be shown step-by-step process of analyzing the fossil artifact (5 min)
- Students will be given a "mystery artifact" handout/ resources and will break out into groups. They will write down their observations and predictions. They will collaborate, analyze artifact, and discuss findings. (20 min)

RESOURCES/MATERIALS

- Detective notepad

- Mystery Artifact
- “Top-secret” documents
- Mystery artifact
- Presentation: Link Click HERE
- Guided Notes: Link Click HERE
- Evidence Sheets (articles): Link Click HERE

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

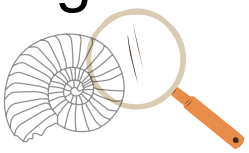
After discussing their predictions and analyzing the artifact, students will come back as a class and collaborate, analyze the artifact and all other “documentation” and will discuss findings as a class.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Utilize graphic organizers, concept maps, or visual aids to help organize information and support understanding. Scaffold by breaking down tasks/content.

A Detective's Handbook for Investigating Ancient Remains (Guided Notes)



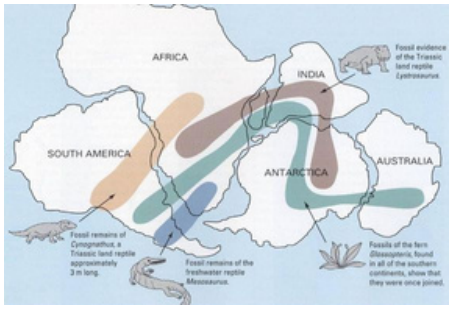
Fossil Record

The fossil record consists of all the preserved remains or traces of ancient organisms, such as _____ ,_____,_____, and _____. Fossils provide a window into the past, allowing scientists to study past life forms and ecosystems.

Fossils help scientists reconstruct evolutionary relationships, track changes in species over time, and study patterns of_____and _____.

Biogeography

The distribution of fossils across different _____ can provide insights into past environments and the movement of organisms over time. Similar fossils found in different regions or the presence of related species in nearby locations suggest shared _____.



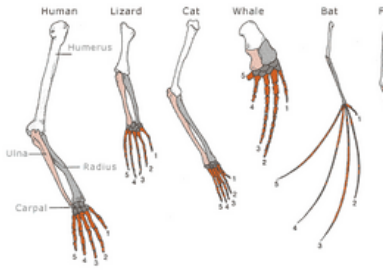
Then

Now

Common Ancestry

Common ancestry refers to the concept that all living organisms on Earth share a _____ _____ or _____. This means that despite the vast diversity of life forms we see today, there is a fundamental unity in their evolutionary history.

Evidence for common ancestry:

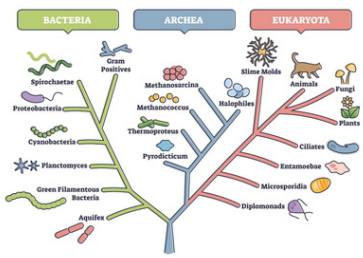


1.Comparative anatomy

_____

_____

_____

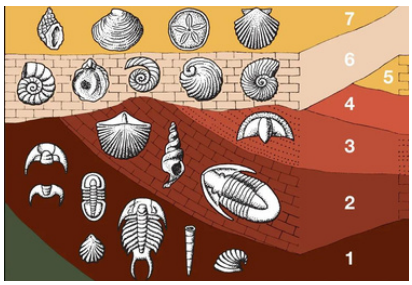


2.Molecular Biology

_____

_____

_____



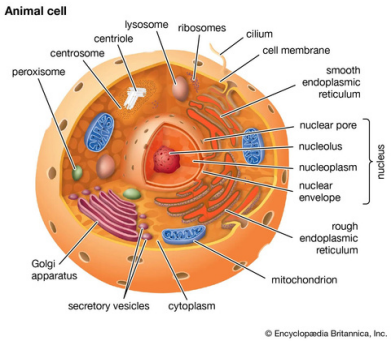
3.Fossil Record

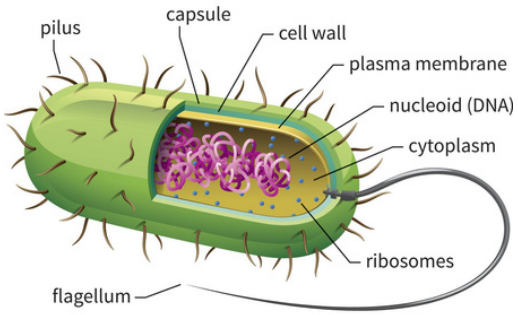
_____

_____

_____

Recap



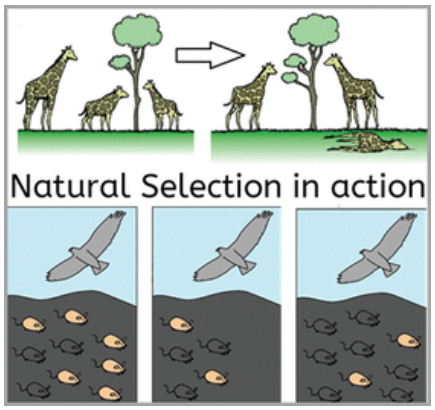


Natural Selection

Natural selection is the process by which organisms with traits that are better suited to their environment are more likely to _____ and _____, passing on those advantageous traits to their offspring.

Natural selection occurs because individuals within a population vary in their _____, and some of these traits confer advantages in terms of _____and _____.
Examples: _____,_____, or_____.

This variation is influenced by _____ differences, _____ factors, and random chance.



What are other examples of Natural Selection?
Provide two examples below:

"All the News That's Fit to Print"

Ten Cents

The Rosewell Times

FINAL Edition
Forty-Four Pages

Vol. 129 No. 176

Roswell, New Mexico, Wednesday, July 28, 1971

Mysterious Object Unearthed in Roswell Desert Sparks Madness in Discoverer

In an eerie twist of fate that seems to draw from the very essence of our imaginations, a bizarre object was unearthed in the sands of the Roswell desert, near the infamous Area 51. The discovery, made on July 23, 1971, by a local prospector named Elmer Johnson, has already led to a disturbing sequence of events that are as confounding as they are chilling.

Known for his routine treasure hunts, Johnson stumbled upon a smooth, deep red object shaped like a staff. Shortly after bringing it home, Johnson began exhibiting erratic behavior, muttering about messages from the stars and unseen watchers. His condition deteriorated rapidly, prompting his wife to call the sheriff. Authorities soon involved military officials, who confiscated the object and placed Johnson under observation.

During their investigation, they found Johnson's house filled with strange sketches and random letters and scribbles, adding another layer of mystery to the incident.

This alarming incident comes at a time when the American public is still reeling from the monumental achievement of the Apollo 11 moon landing just two years prior, on July 20, 1969. As humanity reaches for the stars, questions about what—or who—might be out there have grown increasingly prevalent.

The discovery of an enigmatic artifact in Roswell, a town already steeped in UFO lore following the infamous 1947 incident, has only added fuel to the fire of speculation. Dr. Harold Stein, a leading astrophysicist at the Massachusetts Institute of Technology, expressed cautious interest in the object. "The possibility that this artifact is of extraterrestrial origin cannot be dismissed outright," said Dr. Stein in a telephone interview. "The markings appear to have biological origins, resembling fossils or something similarly enigmatic. The material composition, as described, suggests it could indeed be something not of this Earth."

While Johnson's fate remains uncertain, Roswell is abuzz with speculation and fear. The object's secrets, tightly guarded by the government, continue to fuel conspiracy theories, leaving the town in a state of anxious curiosity.

Local Farmer Wins Blue Ribbon at County Fair for Giant Pumpkin

The farmer, known for his green thumb, credits his success to diligent care and a secret fertilizer recipe

31

SATURDAY
October 12, 2023
By: Maxine Turner

Sun City Times

Suncitytimes.com

73°/ 37°
Windy Later

Unexplained Activity Grips El Paso Amid Speculation of Government Relic

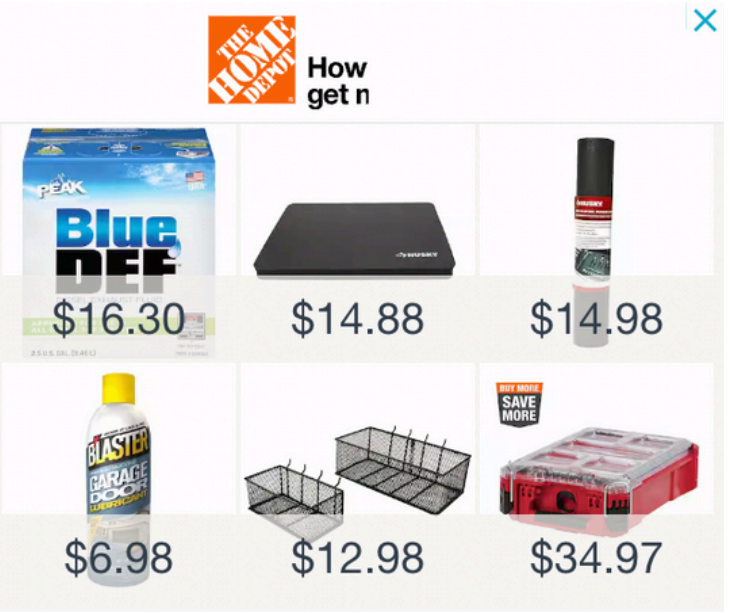
El Paso, Texas, finds itself at the center of a whirlwind of speculation and intrigue as reports of mysterious activity grip the city. Residents and amateur investigators alike have been abuzz with rumors of strange occurrences, sparking fervent discussion and debate across social media platforms.

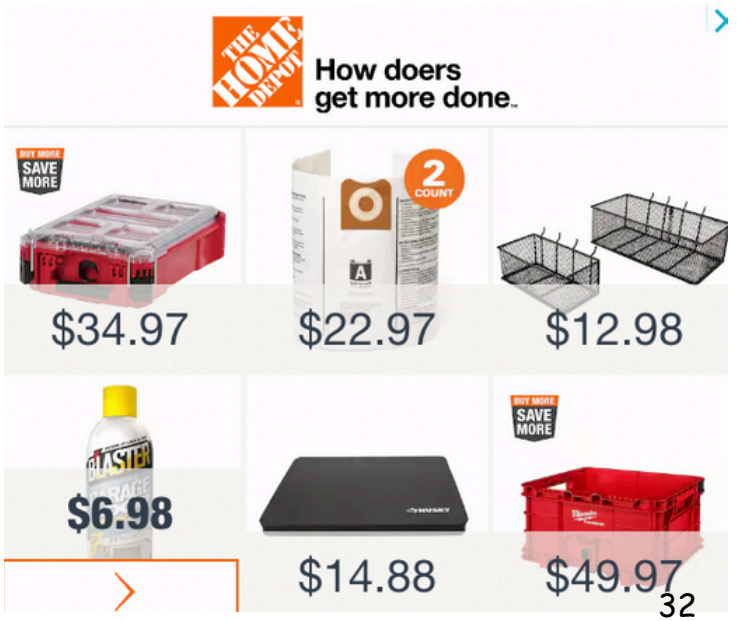
The source of the commotion can be traced back to a viral video circulating online, purportedly featuring a local resident claiming to have stumbled upon a decades-old government relic hidden within the city limits. According to the video, the relic—an item allegedly connected to the infamous events of the 1970s—holds the key to unlocking long-held secrets and untold mysteries.

Speculation runs rampant as residents scour the city, fueled by curiosity and a sense of adventure, in search of clues that might shed light on the enigmatic artifact's whereabouts. Conspiracy theories abound, with some suggesting clandestine government involvement and others entertaining the possibility of extraterrestrial origins.

The timing of these events, occurring against the backdrop of renewed interest in historical government projects and covert operations, only adds to the intrigue surrounding El Paso's latest mystery. As amateur sleuths pore over old records and comb through archives in search of answers, the city finds itself at the crossroads of history and speculation, with the promise of discovery looming on the horizon.

As authorities work to quell rumors and maintain order amidst the frenzy of activity, one thing remains certain: the allure of the unknown continues to captivate the imagination of El Pasoans, driving them ever closer to unlocking the secrets hidden within their midst.





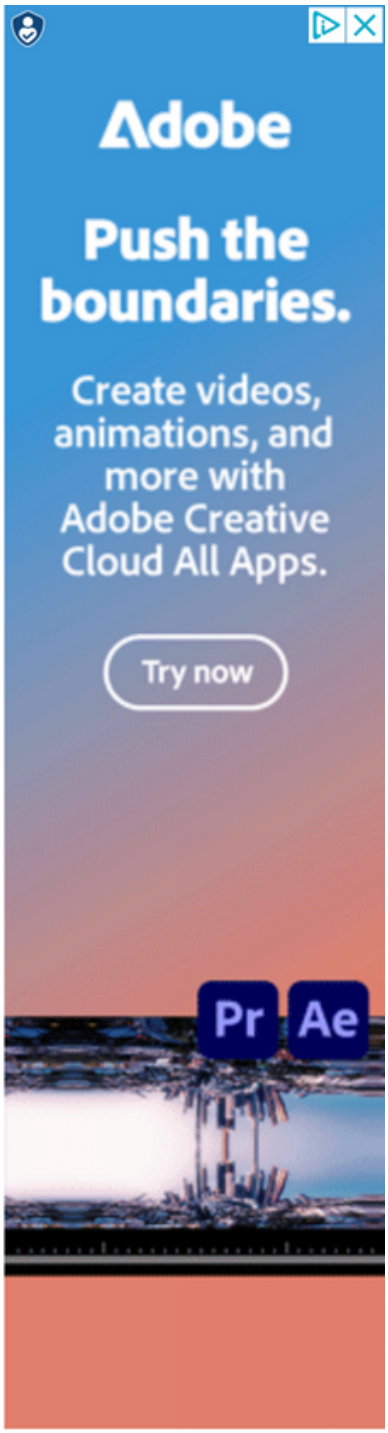
Beyond Borders: How Travel Expands Our Perspectives

www.dnadigestwashington.dc.com

DNA DIGEST

Washington, D.C.

May 15, 2005
By: Max Fuentes



Advancements in genetic sequencing technology are revolutionizing our understanding of human origins. Scientists, utilizing cutting-edge techniques, have deciphered genetic codes revealing common ancestry among diverse populations.

Through meticulous analysis, researchers have traced genetic lineages, uncovering shared ancestry that transcends geographical and cultural boundaries. These revelations provide compelling evidence of our interconnectedness and offer profound insights into the journey of humanity across continents and millennia.

In a groundbreaking study published in a leading scientific journal, geneticists have identified a genetic marker prevalent among individuals of diverse backgrounds, suggesting a common origin in ancient times. This discovery not only sheds light on our shared evolutionary history but also underscores the importance of genetic diversity in shaping the tapestry of human heritage.

Moreover, recent discoveries of peculiar rocks, not found in the fossil record, have sparked intrigue within the scientific community. These anomalous formations, rich in iron and other minerals, challenge conventional understanding and raise questions about the potential role of genetic sequencing in unraveling their mysteries.

As we delve deeper into the complexities of genetic code and geological formations, the boundaries of human knowledge are continuously expanding. The convergence of these scientific disciplines offers a glimpse into the interconnectedness of life on Earth and the vast mysteries that lie beyond.

www.dnadigestwashington.dc.com/asduwe12301asdasudfansdf2DNCSA.SDIASdsosdpEXOPlanet.osd2389

Accessed June 2, 2024

Lesson Plan

TITLE: Who's the Next Sherlock Holmes?

LENGTH OF LESSON: 45 min

TEKS: Algebra (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to: (A) apply mathematics to problems arising in everyday life, society, and the workplace; (B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

LESSON OBJECTIVES:

What do you want the students to know and be able to do?

We will: Learn how to calculate the bullet trajectory, and play "Who's the next Sherlock Holmes?"

I will: Calculate the bullet trajectory and collaborate with teammates

ACTIVATE PRIOR KNOWLEDGE/ HOOK:

Building Background

The instructor will ask if anyone is familiar with the term "bullet trajectory" and how it can be determined in mathematics or physics.

ACTIVITIES

Direct teach/modeling activities/collaborative activities/independent practice

The instructor will randomly divide the group into four teams (https://www.randomlists.com/team-generator) and assign a handout on how to calculate the bullet trajectory. The instructor will go over that handout to introduce the concept of bullet trajectory and how to calculate it. Teams will keep this handout throughout the entire lesson. The instructor will provide instructions for the upcoming game, "Who's the next Sherlock Holmes?" The game is an electronic board game where four teams will select a token to move around the board. Three different categories exist:

"Solve the Case," where the team must solve a math problem focused on bullet trajectory within five minutes. The team can earn one point based on the correctness of their answer.

"True Crime Trivia," where questions will be directed to the team in this category, and correct answers earn one point.

A third category involves all teams competing to solve a math problem related to bullet trajectory.

The winning team in this round earns a point. The game concludes when one team reaches the last grey dot, and the winner is the team with the highest accumulated points.

RESOURCES/MATERIALS

- Presentation: Link Click HERE
- Electronic board game: Link Click HERE
- Four handouts with one problem about Bullet Trajectory: Link Click HERE
- 36 problems related to bullet trajectory: Link Click HERE
- Trivia Questions: Link Click HERE
- Calculators

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

Informal checking for understanding. Sticky note activity on randomly selected trivia question from game.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?
The lesson is more focused on a board game, which is fun, and students tend to remember and learn things that are outside of the box.

Calculating the bullet trajectory

Sample Problem:
Detective Alex is investigating a crime scene where a mysterious character shot a paintball at an angle to create a pattern. The paintball was shot with an initial speed of *4 meters per second at an angle of 30 degrees*. If we want to know how far the paintball will travel sideways before hitting a target, can you help Detective Alex calculate the horizontal distance?

Steps Explained:

Step 1. Identify the initial speed and the launch angle.

Step 2. Calculate the horizontal and vertical components of the initial velocity using the following formulas:

Horizontal Component= Initial Velocity × cos(θ)
Vertical Component= Initial Velocity × sin(θ)

Step 3. Calculate the time using the following formula:

Time= (2 × Vertical Component)/Gravity
Gravity=9.81 m/s

Step 4. Calculate the horizontal distance by using the formula

Distance=Horizontal Component·time

Observation Time

Solving Problem:

Step 1.

Initial speed (speed) = 4 meters per second
Launch angle (angle) = 30 degrees

Step 2.

Horizontal Component= 4 m/s × cos(30) = 3.46 m/s
Vertical Component= 4 m/s × sin(30) = 2m/s

Step 3.

Time= (2 ×2m/s)/9.81m/s = 0.408 s

Step 4.

Distance=3.46m/s×0.408s≈1.414m

Bullet Trajectory Problems

$v0x$=Speed·cos(θ)

$R=v0x \cdot t$

Problem 1. Detective Elena is investigating a crime scene where a mysterious character shot a paintball at an angle to create a pattern. The paintball was shot with an initial speed of 4 meters per second at an angle of 30 degrees. If we want to know how far the paintball will travel sideways before hitting a target, can you help Detective Alex calculate the horizontal distance? How far will the paintball travel sideways before hitting the target?

Problem 2. Detective Katelyn is investigating a crime where a mysterious character shot a toy dart at an angle to create a pattern. The toy dart was shot with a speed of 3 meters per second at an angle of 20 degrees. Can you help Detective Emma figure out how far the toy dart will travel sideways before reaching the target?

Problem 3. Captain Natalie is on a space mission investigating alien signals. Suddenly, she spots a group of friendly aliens who want to communicate by shooting laser beams in different patterns. The spaceship shoots a laser beam with a speed of 6 meters per second at an angle of 45 degrees. Can you help Captain Zara calculate how far the laser beam will travel sideways in space before reaching the target?

Problem 4. In the quirky city of Chuckleville, Detective Victoria is investigating a crime involving a sneaky cat burglar who escapes by launching whoopee cushions. The whoopee cushion travels at 7 m/s at an angle of 25 degrees. Can you help Detective Victoria calculate how far the whoopee cushion will comically fly sideways before landing at the scene of the crime?

Problem 5. Detective Sarah is investigating a burglary case where a suspect fired a smoke pellet to create confusion and escape. The smoke pellet was launched with a speed of 6 meters per second at an angle of 40 degrees. Can you assist Detective Sarah in calculating how far the smoke pellet will travel sideways before reaching its intended destination?

Problem 6. Detective Jessica is analyzing a bullet trajectory. If the bullet travels at 400 m/s and the angle is 20 degrees, what is the horizontal distance?

Problem 7. Officer Yasahira is investigating a crime scene. The bullet speed is 300 m/s. What is the horizontal distance if the launch angle is 30 degrees?

Problem 8. In a forensic analysis, Detective Katy finds a bullet with a speed of 200 m/s. If the angle is 15 degrees, what is the horizontal distance?

Problem 9. Investigator Elena is studying a bullet's path. If the bullet speed is 350 m/s and the launch angle is 25 degrees, what is the horizontal distance?

Problem 10. Agent Dafne is examining a bullet trajectory. At a speed of 250 m/s and a launch angle of 18 degrees, what is the horizontal distance?

Problem 11. Detective Katelyn needs to calculate a bullet's trajectory. If the speed is 280 m/s and the angle is 22 degrees, what is the horizontal distance?

Problem 12. Officer Natalie is reconstructing a crime scene. With a bullet speed of 320 m/s and a launch angle of 28 degrees, what is the horizontal distance?

Problem 13. Inspector Victoria is analyzing a bullet's flight path. If the bullet speed is 180 m/s and the launch angle is 12 degrees, what is the horizontal distance?

Problem 14. Detective Sarah is investigating a bullet trajectory. At a speed of 240 m/s and an angle of 24 degrees, what is the horizontal distance?

Problem 15. Investigator Jessica is studying a bullet's path. With a bullet speed of 270 m/s and a launch angle of 15 degrees, what is the horizontal distance?

Problem 16. Alien Zorg is practicing shooting star bullets. If the bullet speed is 500 m/s and the angle is 35 degrees, what is the horizontal distance?

Problem 17. Alien Nebula is testing its laser projectiles. At a speed of 450 m/s and a launch angle of 40 degrees, what is the horizontal distance?

Problem 18. Alien Quasar is calculating the trajectory of its energy beam. With a speed of 600 m/s and an angle of 25 degrees, what is the horizontal distance?

Problem 19. Galactic Explorer Xylon is measuring the path of its photon bullets. If the speed is 350 m/s and the angle is 30 degrees, what is the horizontal distance?

Problem 20. Alien Nova is analyzing the trajectory of its antimatter projectiles. At a speed of 420 m/s and a launch angle of 18 degrees, what is the horizontal distance?

Problem 21: Officer Hernandez is investigating a crime scene. The bullet speed is 280 m/s. What is the horizontal distance if the launch angle is 22 degrees?

Problem 22: In a forensic analysis, the detective finds a bullet with a speed of 420 m/s. If the angle is 30 degrees, what is the horizontal distance?

Problem 23: Investigator Turner is studying a bullet's path. If the bullet speed is 300 m/s and the launch angle is 20 degrees, what is the horizontal distance?

Problem 24: Agent Rodriguez is examining a bullet trajectory. At a speed of 400 m/s and a launch angle of 18 degrees, what is the horizontal distance?

Problem 25: Detective Patel needs to calculate a bullet's trajectory. If the speed is 320 m/s and the angle is 15 degrees, what is the horizontal distance?

Problem 26: Officer Hayes is reconstructing a crime scene. With a bullet speed of 250 m/s and a launch angle of 28 degrees, what is the horizontal distance?

Problem 27: Inspector Morgan is analyzing a bullet's flight path. If the bullet speed is 360 m/s and the launch angle is 24 degrees, what is the horizontal distance?

Problem 28: Detective Foster is investigating a bullet trajectory. At a speed of 310 m/s and an angle of 22 degrees, what is the horizontal distance?

Problem 29: Investigator Wong is studying a bullet's path. With a bullet speed of 290 m/s and a launch angle of 18 degrees, what is the horizontal distance?

Problem 30: Officer Ramirez is reconstructing another crime scene. The bullet speed is 330 m/s, and the launch angle is 25 degrees. What is the horizontal distance?

Bullet Trajectory Problems

Problem 1. Detective Elena is investigating a crime scene where a mysterious character shot a paintball at an angle to create a pattern. The paintball was shot with an initial speed of 4 meters per second at an angle of 30 degrees. If we want to know how far the paintball will travel sideways before hitting a target, can you help Detective Alex calculate the horizontal distance? How far will the paintball travel sideways before hitting the target?

Problem 2. Detective Katelyn is investigating a crime where a mysterious character shot a toy dart at an angle to create a pattern. The toy dart was shot with a speed of 3 meters per second at an angle of 20 degrees. Can you help Detective Emma figure out how far the toy dart will travel sideways before reaching the target?

Problem 3. Captain Natalie is on a space mission investigating alien signals. Suddenly, she spots a group of friendly aliens who want to communicate by shooting laser beams in different patterns. The spaceship shoots a laser beam with a speed of 6 meters per second at an angle of 45 degrees. Can you help Captain Zara calculate how far the laser beam will travel sideways in space before reaching the target?

Problem 4. In the quirky city of Chuckleville, Detective Victoria is investigating a crime involving a sneaky cat burglar who escapes by launching whoopee cushions. The whoopee cushion travels at 7 m/s at an angle of 25 degrees. Can you help Detective Victoria calculate how far the whoopee cushion will comically fly sideways before landing at the scene of the crime?

Problem 5. Detective Sarah is investigating a burglary case where a suspect fired a smoke pellet to create confusion and escape. The smoke pellet was launched with a speed of 6 meters per second at an angle of 40 degrees. Can you assist Detective Sarah in calculating how far the smoke pellet will travel sideways before reaching its intended destination?

Problem 6. Detective Jessica is analyzing a bullet trajectory. If the bullet travels at 400 m/s and the angle is 20 degrees, what is the horizontal distance?

Problem 7. Officer Yasahira is investigating a crime scene. The bullet speed is 300 m/s. What is the horizontal distance if the launch angle is 30 degrees?

Problem 8. In a forensic analysis, Detective Katy finds a bullet with a speed of 200 m/s. If the angle is 15 degrees, what is the horizontal distance?

Problem 9. Investigator Elena is studying a bullet's path. If the bullet speed is 350 m/s and the launch angle is 25 degrees, what is the horizontal distance?

Problem 10. Agent Dafne is examining a bullet trajectory. At a speed of 250 m/s and a launch angle of 18 degrees, what is the horizontal distance?

Problem 11. Detective Katelyn needs to calculate a bullet's trajectory. If the speed is 280 m/s and the angle is 22 degrees, what is the horizontal distance?

Problem 12. Officer Natalie is reconstructing a crime scene. With a bullet speed of 320 m/s and a launch angle of 28 degrees, what is the horizontal distance?

Problem 13. Inspector Victoria is analyzing a bullet's flight path. If the bullet speed is 180 m/s and the launch angle is 12 degrees, what is the horizontal distance?

Problem 14. Detective Sarah is investigating a bullet trajectory. At a speed of 240 m/s and an angle of 24 degrees, what is the horizontal distance?

Problem 15. Investigator Jessica is studying a bullet's path. With a bullet speed of 270 m/s and a launch angle of 15 degrees, what is the horizontal distance?

Problem 16. Alien Zorg is practicing shooting star bullets. If the bullet speed is 500 m/s and the angle is 35 degrees, what is the horizontal distance?

Problem 17. Alien Nebula is testing its laser projectiles. At a speed of 450 m/s and a launch angle of 40 degrees, what is the horizontal distance?

Problem 18. Alien Quasar is calculating the trajectory of its energy beam. With a speed of 600 m/s and an angle of 25 degrees, what is the horizontal distance?

Problem 19. Galactic Explorer Xylon is measuring the path of its photon bullets. If the speed is 350 m/s and the angle is 30 degrees, what is the horizontal distance?

Problem 20. Alien Nova is analyzing the trajectory of its antimatter projectiles. At a speed of 420 m/s and a launch angle of 18 degrees, what is the horizontal distance?

Problem 21: Officer Hernandez is investigating a crime scene. The bullet speed is 280 m/s. What is the horizontal distance if the launch angle is 22 degrees?

Problem 22: In a forensic analysis, the detective finds a bullet with a speed of 420 m/s. If the angle is 30 degrees, what is the horizontal distance?

Problem 23: Investigator Turner is studying a bullet's path. If the bullet speed is 300 m/s and the launch angle is 20 degrees, what is the horizontal distance?

Problem 24: Agent Rodriguez is examining a bullet trajectory. At a speed of 400 m/s and a launch angle of 18 degrees, what is the horizontal distance?

Problem 25: Detective Patel needs to calculate a bullet's trajectory. If the speed is 320 m/s and the angle is 15 degrees, what is the horizontal distance?

Problem 26: Officer Hayes is reconstructing a crime scene. With a bullet speed of 250 m/s and a launch angle of 28 degrees, what is the horizontal distance?

Problem 27: Inspector Morgan is analyzing a bullet's flight path. If the bullet speed is 360 m/s and the launch angle is 24 degrees, what is the horizontal distance?

Problem 28: Detective Foster is investigating a bullet trajectory. At a speed of 310 m/s and an angle of 22 degrees, what is the horizontal distance?

Problem 29: Investigator Wong is studying a bullet's path. With a bullet speed of 290 m/s and a launch angle of 18 degrees, what is the horizontal distance?

Problem 30: Officer Ramirez is reconstructing another crime scene. The bullet speed is 330 m/s, and the launch angle is 25 degrees. What is the horizontal distance?

Answer Key

- Problem 1. Horizontal distance ≈ 1.732 meters
- Problem 2. Horizontal distance ≈ 1.308 meters
- Problem 3. Horizontal distance ≈ 4.5 meters
- Problem 4. Horizontal distance ≈ 4.512 meters
- Problem 5. Horizontal distance ≈ 3.451 meters
- Problem 6. Horizontal distance ≈ 320.8 meters
- Problem 7. Horizontal distance ≈ 191.39 meters
- Problem 8. Horizontal distance ≈ 304.9 meters
- Problem 9. Horizontal distance ≈ 409.9 meters
- Problem 10 Horizontal distance ≈ 203.3 meters
- Problem 11. Horizontal distance ≈ 235.3 meters
- Problem 12. Horizontal distance ≈ 404.1 meters
- Problem 13. Horizontal distance ≈ 91.57 meters
- Problem 14. Horizontal distance ≈ 197.1 meters
- Problem 15. Horizontal distance ≈ 195.6 meters
- Problem 16. Horizontal distance ≈ 421.6 meters
- Problem 17. Horizontal distance ≈ 474.6 meters
- Problem 18. Horizontal distance ≈ 520.3 meters
- Problem 19. Horizontal distance ≈ 303.1 meters
- Problem 20. Horizontal distance ≈ 257.6 meters
- Problem 21. Horizontal distance ≈ 235.3 meters
- Problem 22. Horizontal distance ≈ 364.5 meters
- Problem 23. Horizontal distance ≈ 160.7 meters
- Problem 24. Horizontal distance ≈ 335.5 meters
- Problem 25. Horizontal distance ≈ 215.3 meters
- Problem 26. Horizontal distance ≈ 287.2 meters
- Problem 27. Horizontal distance ≈ 347.8 meters
- Problem 28. Horizontal distance ≈ 293.9 meters
- Problem 29. Horizontal distance ≈ 230.3 meters
- Problem 30. Horizontal distance ≈ 321.2 meters

Trivia Questions

(Aliens and True Crime Edition)

Question 1: In what year did the alleged Roswell UFO incident take place?

a) 1947
b) 1955
c) 1962
d) 1970
Answer: a) 1947
Fact: The Roswell UFO incident refers to the reported crash of an unidentified flying object near Roswell, New Mexico, in 1947, sparking UFO conspiracy theories.

Question 2: Who is considered one of the first people to claim to have been abducted by aliens?
a) Betty and Barney Hill
b) Travis Walton
c) Whitley Strieber
d) Antonio Villas Boas
Answer: a) Betty and Barney Hill
Fact: Betty and Barney Hill claimed to have been abducted by aliens in 1961, making their case one of the first widely publicized abduction stories.

Question 3: What is the name of the government facility often associated with UFO conspiracy theories and alleged extraterrestrial technology?
a) Area 51
b) Camp David
c) Fort Knox
d) Cheyenne Mountain Complex
Answer: a) Area 51
Fact: Area 51, located in Nevada, is a highly classified U.S. Air Force facility that has become synonymous with UFO-related conspiracy theories.

Question 4: Which celestial body is often linked to theories of harboring extraterrestrial life?
a) Mars
b) Jupiter
c) Saturn
d) Venus
Answer: a) Mars
Fact: Mars has been a focal point for extraterrestrial life speculation due to its potential habitability and the search for water.
Question 5: Who wrote the science fiction novel "Communion," detailing his alleged alien abduction experiences?

a) Whitley Strieber
b) Travis Walton
c) Betty Hill
d) Antonio Villas Boas
Answer: a) Whitley Strieber
Fact: Whitley Strieber's "Communion" (1987) recounts his encounters with extraterrestrial beings and became a bestseller.

Question 6: In the famous 1997 Phoenix Lights incident, what was witnessed by thousands of people in the night sky?
a) Flying saucers
b) Meteor shower
c) Satellite launch
d) Formation of lights
Answer: d) Formation of lights
Fact: The Phoenix Lights incident involved a formation of lights seen over Phoenix, Arizona, sparking UFO speculation and debate.

Question 7: Who is known for his research into alleged government cover-ups of UFO sightings and information?
a) Stanton Friedman
b) J. Allen Hynek
c) Jacques Vallée
d) Richard Dolan
Answer: a) Stanton Friedman
Fact: Stanton Friedman was a nuclear physicist and ufologist, advocating for the scientific study of UFOs and government transparency.

Question 8: Which NASA mission sent signals containing images, sounds, and information about Earth into space, intended for potential extraterrestrial civilizations?
a) Voyager 1
b) Apollo 11
c) Hubble Space Telescope
d) Pioneer 10
Answer: d) Pioneer 10
Fact: Pioneer 10, launched in 1972, carried a plaque and a golden record with messages for potential extraterrestrial contact.

Question 9: What is the name of the star system around which the alleged extraterrestrial beings, the Greys, are often associated?
a) Alpha Centauri
b) Zeta Reticuli
c) Proxima Centauri
d) Sirius

Answer: b) Zeta Reticuli
Fact: Zeta Reticuli is a binary star system frequently mentioned in UFO lore, particularly in relation to the Greys.

Question 10: Who is the scientist known for creating the Drake Equation, estimating the number of active, communicative extraterrestrial civilizations in the Milky Way galaxy?
a) Frank Drake
b) Carl Sagan
c) Stephen Hawking
d) SETI Institute
Answer: a) Frank Drake
Fact: Frank Drake formulated the Drake Equation in 1961, providing a framework for estimating the potential number of extraterrestrial civilizations.

Question 11: In what year was the infamous "Black Dahlia" murder case?
a) 1947
b) 1955
c) 1962
d) 1970
Answer: a) 1947
Fact: The "Black Dahlia" murder refers to the brutal killing of Elizabeth Short in Los Angeles. The case remains unsolved.

Question 12: Who is known as the "Unabomber"?
a) Ted Bundy
b) Timothy McVeigh
c) Ted Kaczynski
d) Charles Manson
Answer: c) Ted Kaczynski
Fact: The Unabomber, Theodore Kaczynski, engaged in a nationwide bombing campaign against people involved with modern technology.

Question 13: Which notorious gangster was finally captured in 1931 for tax evasion?
a) Al Capone
b) John Dillinger
c) Bonnie and Clyde
d) Machine Gun Kelly
Answer: a) Al Capone
Fact: Al Capone, the infamous gangster, was convicted of tax evasion in 1931 and sentenced to prison.

Question 14: What is the name of the infamous prison located on an island in San Francisco Bay?

a) Rikers Island
b) Alcatraz
c) Sing Sing
d) Attica
Answer: b) Alcatraz
Fact: Alcatraz, often called "The Rock," was a federal prison known for housing notorious criminals, including Al Capone.

Question 15: Which serial killer was known as the "Son of Sam" and terrorized New York City in the 1970s?
a) Jeffrey Dahmer
b) David Berkowitz
c) Richard Ramirez
d) John Wayne Gacy
Answer: b) David Berkowitz
Fact: David Berkowitz, known as the "Son of Sam," committed a series of shootings in New York City during the 1970s.

Question 16: Who was the first woman executed in the United States after the reinstatement of the death penalty in 1976?
a) Aileen Wuornos
b) Karla Faye Tucker
c) Velma Barfield
d) Susan Smith
Answer: b) Karla Faye Tucker
Fact: Karla Faye Tucker was the first woman executed in the U.S. after the reinstatement of the death penalty in 1976.

Question 17: Which criminal mastermind orchestrated the Great Train Robbery in 1963?
a) Al Capone
b) Jesse James
c) John Dillinger
d) Ronnie Biggs
Answer: d) Ronnie Biggs
Fact: Ronnie Biggs was involved in the Great Train Robbery in 1963, a notorious heist in the UK.

Question 18: What is the name of the notorious prison in Siberia, known for its harsh conditions during the Soviet era?
a) Alcatraz
b) Robben Island
c) Devil's Island
d) Gulag Archipelago
Answer: d) Gulag Archipelago

Fact: The Gulag Archipelago refers to the Soviet system of forced labor camps during Joseph Stalin's rule.

Question 19: In what city did the infamous "Brinks Job" take place in 1950?
a) Chicago
b) Boston
c) New York
d) Los Angeles
Answer: b) Boston
Fact: The "Brinks Job" in 1950 involved the robbery of an armored car company in Boston.

Question 20: Who was the mastermind behind the 1971 plane hijacking for ransom known as D.B. Cooper?
a) Ted Bundy
b) Richard Ramirez
c) John Dillinger
d) Unknown/Unsolved
Answer: d) Unknown/Unsolved
Fact: D.B. Cooper hijacked a plane in 1971, received a ransom, and parachuted away, but his identity and fate remain unknown.

Lesson Plan

TITLE: Crack The Code

LENGTH OF LESSON: 60 min

TEKS: Algebra (B)(2) Linear functions, equations, and inequalities. The student applies the mathematical process standards when using properties of linear functions to write and represent in multiple ways, with and without technology, linear equations, inequalities, and systems of equations.

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will…Use our skills and activate our prior knowledge in Algebra 1 to crack the code.
I will… Work with my group to apply linear functions and various algebra 1 skills to figure out which planet "the ranger" is at.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

- Plotting coordinate points
- Finding slope & using the slope Int. equation
- Students will use their basic understanding of operations
- Students will learn how to replace variables, from their coordinate point finding
- Students will use their basic understanding of distributive property factoring.

Hook

- The clues and evidence are now coming together, the students will now start to realize that the abductor is from a different planet!
- It is the students' job to crack the code in figuring out which planet the missing ranger is at.

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice :

- Rotation activity of 6 stations, 6 minutes each.
- Students complete all stations using their student handout, instructions posted and review videos.

RESOURCES/MATERIALS

- Presentation: Link Click HERE
- Stations: Link Click HERE
- Student handout: Link Click HERE
- Expo markers & dry erase boards
- 2 Linen Cloth the students can graph coordinates on
- Invisible ink pen w black light
- 3 buckest of slime

- A single magnetic letter
- Velcro circles

CLOSING TASK/ASSESSMENT

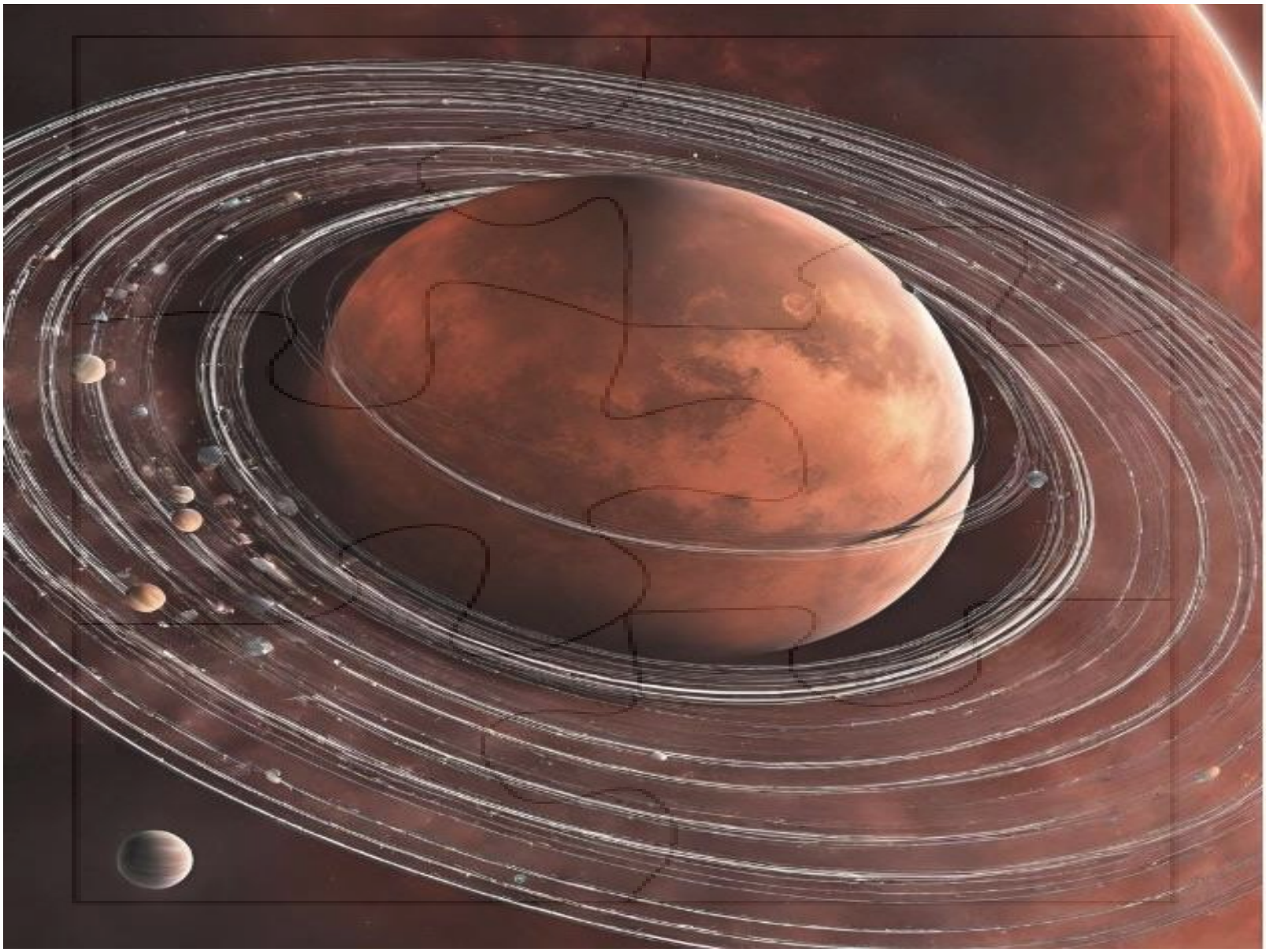
How will you know if students have mastered essential learning?

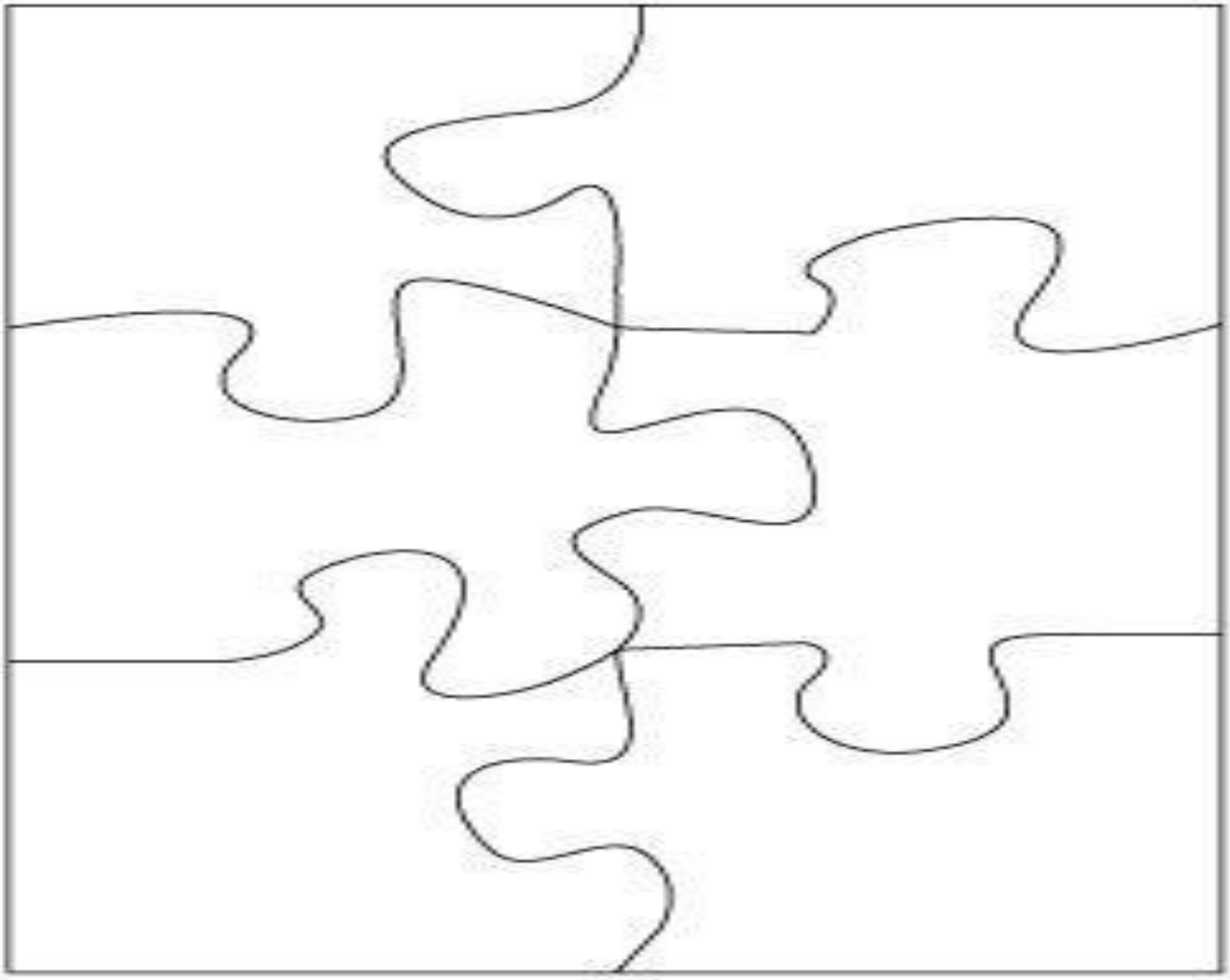
- Students will complete the secret code.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Student inquiry-based learning, collaboration and critical thinking.





Fill in your letters below to reveal the mysterious planet!

_ _ _ _ _ _

Station 1

Hello Ranger detectives! In this station we need your help to plot these several mysterious points to figure out the missing letter and be one step closer to cracking the code! Thank you, detectives, and good luck!

- (-4,6)
- (-4,3)
- (-4,-2)
- (-4,-4)
- (0,-4)
- (4,-4)
- (4,-2)
- (4,3)
- (4,6)

Once you've completed plotting all the points on the graph write down the letter in space 2 and take a puzzle piece to glue onto your worksheet.

Move onto the next station.

Station 2

Hello Rangers, great job so far on being one step closer to figuring out the planet our missing Ranger is at! In this station you are tasked with:

- Taking these 5 standard form equations & converting them to Slope Intercept Form.
- Once that is completed, figure out the common slope from each of the equations.
- Match the number to the letter and write down your letter in space 4.
- Take your puzzle piece and glue it onto your worksheet.
  Have fun and good luck Rangers!

Slope Int. Form

1. 4x - 2y = 8

2. 8x - 4y = 16

3. 6x - 3y = 12

4. 10x - 5y = 30

5. 14x - 7y = 10

Letter Code:

2 = I

7 = H

4 = C

Station 3

Howdy Rangers, we are so close to cracking the code and finding our missing Ranger! Just a couple of more codes we need to crack!

- **In this station we need your help to find the missing factor number that will make the polynomial complete/ multiple the factors to figure out the missing number in the polynomial.**
- **Once you find the missing factors, match your factors to the key code in the bottom of the worksheet to get your missing letter.**
- **Put your letter in space 3 & take your puzzle piece to glue onto your worksheet.**

1. **Polynomial:** $x^2 - ?$
   Factors: (x - 2) (x + 2)

2. **Polynomial:** $2x^2 + 3x - ?$
   Factors: (2x - 1) (x + 2)

3. **Polynomial:** $x^2 + 6x + 9$
   Factors: (x + 3) (x + ?)

4. **Polynomial:** $3x^2 - ?x$
   Factors: 3x(x - 4)

5. **Polynomial:** $4x^2 - 16$
   Factors: 4(x + 2) (x -?)

Key Code:

K = -4, 6, 2, 3, 7
M = 4, 2, 3, 12, 2
N = 4, 2, 3, 10, 2
S = -4, 9, 2, -12, -2

Station 4

Hello Rangers, in this station we need your help to figure out the temperature of the planet (Mean), how old the planet is (Median), and find the common temperature on the mysterious planet (Mode). Then match your numbers to key code in the bottom to get your missing letter and glue your puzzle piece onto your worksheet.

- To find the temperature of the planet, we need to find the mean of the temperature that the planet has had in 2 weeks.

  Data Set: 60, 75, 62, 73, 70, 62, 77, 71, 79, 62, 65, 72, 64, 76

- Using that same data set, find the temperature that the planet has had the most within 2 weeks. (Mode)

- To find the age of the planet use this data set to figure out the median. All of the numbers are in the billions.

  Data Set: 3.1, 4.5, 6.8, 5, 5.5, 8, 7.7, 4.3, 9.4

Key Code:

L= {Mean=69.1, Mode= 62, Median= 5.5}

Y= { Mean=7.86 Mode= 62, Median= 5}

G= { Mean=6.86, Mode= 60, Median= 4.3}

Place the letter onto space 1

Station 5

Detective Rangers you all are doing a fantastic job and are all so close to figuring out the mysterious planet! In this station we need your help to figure out the initial start of where the ranger got taken and how fast the aircraft was moving!

- **Take a look at the first graph, come up with an equation in slope intercept form that represents the graph.**
- **Take a look at the second graph, come up with an equation in slope intercept form that represents the graph.**
- **Now take the y intercept from the first graph and the slope in the second graph and combine the two to create a third equation.**
- **Take the third equation and on the third blank coordinate plane graph the equation.**
- **Now, once that is completed dig into the slime to collect your missing letter! Write that in onto space 6. Take a puzzle piece and glue it onto your worksheet.**

Hint: Slope int. Form: y=mx+b

Slope = $\frac{Rise}{Run} = \frac{y2-y1}{x2-x1}$

Station 6

Hello Rangers, as you can see in this station there is a big linen cloth with a linear function drawn onto it. We need your help to label the different parts of graph.

Label:

- X- axis & Y- axis
- The quadrants of the graph/ positive and negative parts of the coordinate plane
- The domain and range

Once that is completed shine the blacklight pen on one of the corners of the linen cloth to collect your missing letter! Write that letter onto space 5. Take your puzzle piece and glue it onto your worksheet.

Lesson Plan

TITLE: Rocket launch

LENGTH OF LESSON: 90 min

TEKS: Geometry. (B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. G.2(A) determines the coordinates of a point that is a given fractional distance less than one from one end of a line segment to the other in one- and two-dimensional coordinate systems, including finding the midpoint.

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will... build a rocket and investigate the correlation between height and distance of a rocket.

I will... discover the most effective way to build a rocket that will travel the greatest distance.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

- Students understand measuring and units of measurement.
- Students have a basic understanding of number operations.
- Students have a basic understanding of coordinates.

Hook

- Letter from NASA

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice

- Students are being challenged to build the most efficient spaceship after being informed that the missing report was an abduction out of this world.
- Pass out all the materials for building the Rocketship.
- Students will complete 3 trials.
- Launch the rocket to measure the distance.
- As a group, select the best rocket.
- Launch the rocket to measure the first distance from a certain height. (height will be changed based on each individual student in the group).
- Discuss whether the y-intercept (height influences the rocket's distance).
- As a group they will make predictions on how to gain greater distance and select a team member to represent the team.
- Final task students will be changed to determine and predict the distance of a heavier rocket. They will incorporate weight and distance and predict the correlation between the two variables.

RESOURCES/MATERIALS

Observation handouts: Link Click HERE
PowerPoint: Link Click HERE
Heavy rocket predictions : Link Click HERE
Materials:

- Sheet of 8.5 x 11 paper (white or colored)
- Cellophane tape
- Scissors
- Ruler Meter stick or tape measure
- Fat round pencil or dowel (see tip, pg. 45)
- Eye protection
- Drinking straws
- Calculators

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

- Rebuilding the rocket for greater distance.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

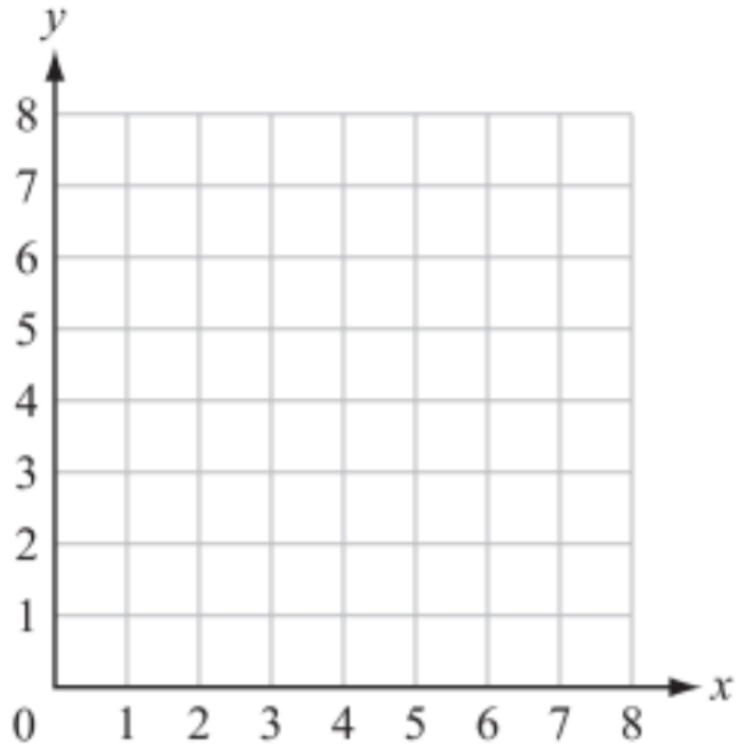
- PowerPoint/ slides that align with the lesson with visuals and diagrams.
- Printed instructions with formulas and steps.

Name:_____

NASA has now sent a new request for a heavier rocket to be launched for supplies and materials needed on Planet Lumina.

If your rocket is heavier, what will happen to your launch? Will the height be affected?

Draw your prediction



Explain your prediction of your graph?

Now consider discance, what will happen to the distance of the rocket? How can you gain more distance with a heavier rocket ?

Name_____

Individual: Launch your rocket

1. Complete 3 rocket launch trials. Ensure that each trial is launched at the same angle.
2. For each trial record the distance of the rocket launch. Start from where the rocket was launched to where the rocket landed.

Trial	Student Name	Distance
1.		
2.		
3.		

Group Trials: As a group, decide on the best rocket to represent your group.

1. **Each person** of the group must complete **one trail** of the rocket launch. Ensure that each trial is launched at the same angle.
2. For each trial record the distance of the rocket launch. Start from where the rocket was launched to where the rocket landed.

Trial	Student Name	Students Height	Distance
1.			
2.			
3.			
4.			
5.			

Competition: Select one team member to represent your group for the class competition

1. **One team member must launch your rocket**. Your group will be competing against another group. Ensure that each trial is launched at the same angle.
2. **Record the distance of the winning team.** Start from where the rocket was launched to where the rocket landed.

Team Name vs Team Name	Students Height	Winner	How much distance was traveled?

Lesson Plan

TITLE: Proportion the Ration

LENGTH OF LESSON: 90 min

TEKS: Algebra.1(A) apply mathematics to problems arising in everyday life, society, and the workplace. 1(F) analyze mathematical relationships to connect and communicate mathematical ideas. 5(A) solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will... apply proportions to ration supplies and solve for x.

I will... analyze and strategically plan the best way to ration supplies.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

- Students have a basic understanding of number operations.
- Students have a basic understanding of ratios.
- Students understand measuring and units of measurement.

Hook

- The detectives are running out of time and supplies.

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice

- Discuss proportions.
- Students are placed into groups and are each given a role.
    - Keeper of list of supplies and quantity
    - Distributor of created proportions/ Calendar
    - Problem collector/ Tally keeper
    - Timekeeper
- As a group the students will be given a mock budget of $13500 for 14 days. They will complete research and create a grocery list for their trip to NASA.
- As a group, students create a supply list.
- As a group they will distribute the items from their list and proportion their meals.
- Students are supposed to make sure the proportions are rationalized evenly amongst the group. The person in charge of the calendar will fill out the calendar.
- After every day the student tally marking is kept track of who got their portion for the day and bring up the problem for the day.
- As a group they will adjust their list and make new proportions as needed.
- The timekeeper lets the group know when there is a next day. And make sure that

they do not miss a day of eating. Note if students do not finish adjusting the proportions they will miss out on a day of eating.
- By the 14th day the group that divides the supplies evenly amongst all group members wins.
- Students will then find out if their teammates were team players or looked out for themselves.

RESOURCES/MATERIALS

- PowerPoint : Link Click HERE

Materials
- Problems
- Supply list Link Click HERE
- Tally Chart Link Click HERE
- Calendar Link Click HERE
- White boards
- Expo markers

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?
- The students will create a plan to rationalize the supplies using proportions.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?
- PowerPoint/ slides that align with the lesson with visuals and diagrams.
- Printed instructions with formulas and steps.

One gram cost $1,000

Thermostabilized foods

Foods in pouches and canned foods can be eaten directly from the pouch or after heating in the ISS' food warmer.

Protein

Tuna
1- Can (170g)

Chicken
1- Can (354g)

SPAM
1- Can (340g)

Fruit

Astronaut Freeze Dried Fruit 50 Peaches
1-Pouch (21g)

Astronaut Freeze Dried Fruit 50 Whole Strawberries
1-Pouch (21g)

Astronaut Freeze Dried Fruit 50 Bananas
1-Pouch (21g)

Astronaut Freeze Dried Fruit 50 Cinnamon Apples
1-Pouch (21g)

Ice cream

Mint Chocolate Chip Ice Cream Sandwich
1-Sandwich (28g)

Neapolitan Ice Cream Sandwiches
1-Sandwich (28g)

Vanilla Ice Cream Sandwiches
1-Sandwich (28g)

Cookies & Cream Ice Cream Sandwiches
1 Sandwich (28g)

Rehydratable foods

Foods that are eaten after adding cold or hot water

Grains
Rice
1-Pouch (250g)

Cereal
1- Pouch (88g)

Powdered beverages

Green Tea
1- Cup (36g)

Coffee
1- Cup (54g)

Natural and semi-dried foods

Processed foods that can be eaten as is.

Bead

1- half a loaf (400g)

Tortillas

1- tortilla (70 grams)

Water

1- Gallon (3,785g)

NOTE: The average person needs 1,000g per day to survive.

Name: _____ Date: _____

Plan your meals for each day and make adjustments with a red pen when needed.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14

Names: _____ Date:_____

As a group you will be given $150,000,000 for 14 days. You will use the **grocery list** provided for your trip to Lumina.

Item Name	Cost per Item ($)	Quantity	Total Cost ($)	Reminding Money

Names:_____ Date:_____

Throughout your journey in space at random times you will have to adjust your calendar. Make sure to document and keep track as your supplies will become limited.

Day	Problems	Adjustments	Who was affected (Group members names)

Lesson Plan

TITLE: Rocket landing

LENGTH OF LESSON: 60 min

TEKS: Algebra 7(A) graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry. 8(B) write, using technology, quadratic functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems.

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will… investigate the effects of a in a quadratic equation to determine if the path of the rocket will be wider or narrower.

I will… determine if my rocket's path is wide or narrow by analyzing the x-intercepts to determine the landing of my rocket.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

- Students understand measuring and units of measurement.
- Students have a basic understanding of number operations.
- Students have a basic understanding of variables, functions, and coordinates.

Hook

- Letter from NASA.

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice

- As engineers the students are being asked by NASA to select the most efficient rocket that will best land on the other planet. They will be observing and analyzing the landing of their rockets.
- Observe two rockets landing from different positionings.
- They will discuss as a group then as a class their conclusions.
- They will discover what makes the rocket go further vs the rocket going higher.
- Work on foldables as students where students will mathematically see that the "a" in the quadratic formula influences the rocket's landing.
- Students will then land their rocket 3 times.
- As a group they will select the best landing based on their data
- Students will display their data neatly on a poster and draw the selected rocket landing. Rubric (Rocket_rubric)
- Students will then present their posters with a gallery walk.
- As a class we will vote on the rocket that will be sent to space.

- Students will then complete an exit ticket where they will determine which parabola is being vertical stretched and which one is being compressed.
- NASA has provided the students with 2 new mission : Link Click HERE

RESOURCES/MATERIALS

Where they will record their observations: (attach)Link Click HERE.
Rubric :Link Click HERE
New Missions :Link Click HERE
Materials:

- Poster Boards
- Coordinate Plane Link Click HERE
- Ruler Meter stick or tape measure
- Rocket
- Eye protection
- White boards
- Expo markers

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

- The students will apply their learning with a problem of 2 paths as they determine the vertical stretch/ compression of the parabola.
- More specifically using the quadratic equation and the effects of a.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

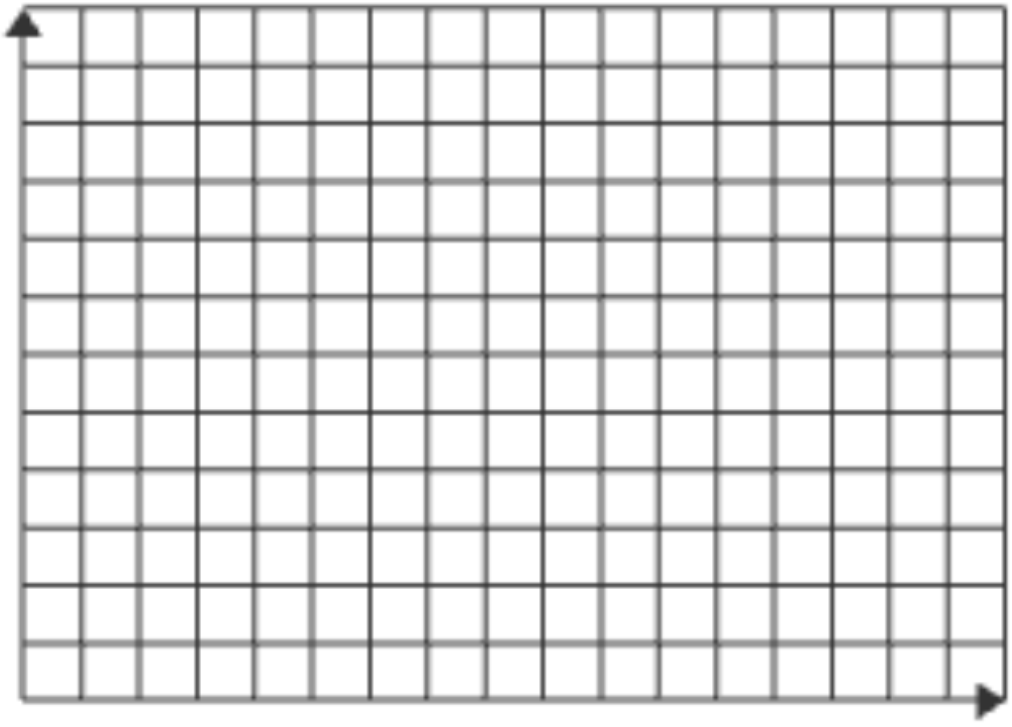
Which strategies will you use to deliver content?

- PowerPoint/ slides that align with the lesson with visuals and diagrams.
- Printed instructions with formulas and steps.
- New Missions

New Mission:

Nasa now wants you to land on a planet farther than the coordinates given. In comparison to your value for when landing on earth, what should “a” be in our quadratic equation for the new further coordinates?

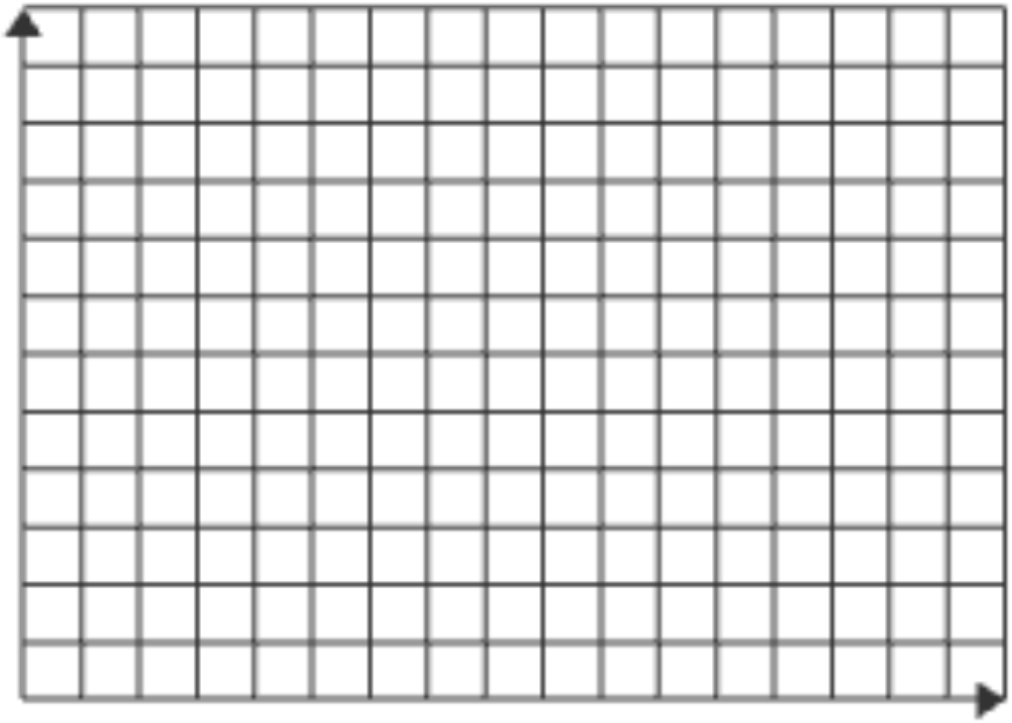
Sketch your conclusion



New Mission:

Nasa now wants you to land on a planet closer than the coordinates given. In comparison to your value for when landing on earth, what should “a” be in our quadratic equation for the new closer coordinates?

Sketch your conclusion



Lesson

TITLE: Population Growth

LENGTH OF LESSON: 70 min

TEKS: Algebra 1(B) Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will... be able to identify the population of specific data, justify results including method used, and calculate population growth.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

Define population, review the population growth formula, and KWL chart.

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice

- Assign groups of 4-5 student members.
- Each group will have a specific station.
- Each station will provide materials and a clue to start the mystery game.
- The first station will give instructions to first find what type of characteristics the suspect has.
- Then the envelop each station have will have a clue where they can find the next clue (outside)
- In different outside areas will hide the clues to students can find them.
- First clue (what type of humans did it)
- When students find out that are aliens, then they need to look for the next clue.
- The next clue will be finding the population of the aliens.
- When they find the population result, they must save all the clues for the next lesson (Surface Area).

RESOURCES/MATERIALS

- Presentation: Link Click HERE
- Clues: Link Click HERE
- KWL chart: Link Click HERE
- Formula sheet: Link Click HERE
- Calculators
- Pencils
- Envelopes
- Loose paper

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

- Sticky note reflection on population increase/decrease factors.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Scaffolding, visuals, KWL table, models, representations, translanguaging

First clue:

Find out what type of population you are looking at.

“In contrast to the human beings, the population specie who is growing around our habitat is different, no one has seen it during the day because they show themselves during the night. They have a different way to move themselves from their habitat into our world”.

a) Zombies
b) Aliens
c) Robots

Be careful with your answer because it is your ticket to find the next clue.

If your answer is a, the next clue would be at

If you answer is b, the next clue would be at

If you answer is d, the next clue would be at

Second clue

Now that you figure out the group of species are alien you have to look for how many of them came into our habitat.

During the spring break intersection Ms. Katie was leaving late because she was in a meeting preparing for the summer camp at Moontwood High School. when she notices 50 aliens at the parking lot, but around the same time Ms. Borunda found 60 more aliens at the University of Texas at El Paso doing some type of chemicals in the science lab. She couldn't figure out what kind of chemical caused it was very late.

What are the total aliens they found in our habitat?

a) 100
b) 120
c) 110

<u>Be careful with your answer because it is your ticket to find the last clue.</u>

If your answer is a, the next clue would be at

If you answer is b, the next clue would be at

If you answer is c, the next clue would be at

Last and most important clue

Finding the population growth for the alien species.

If in March we have a population of aliens that had 110 species, we know the population is growing at a rate of 8%, and we want to know what the population is at the end of the summer camp in June?

Hint: Use the population growth formula.

a) 140
b) 139
c) 145

SAVE ALL YOUR CLUES BECAUSE YOU WILL USE IT NEXT TIME

Population Growth Formula

$$P = P_0 \times e^{rt}$$

- **P** = Total Population after time "t"
- P_0 = Starting Population
- **r** = % Rate of Growth
- **T** = Time in hours or years
- **e** = Euler number = 2.71828.....

Name: _____ Date: _____

K-W-L Chart

Fill in the first two columns before you do your research. Fill in the last column after finishing your research.

Topic: _____

What I Know (K)	What I Want to Know (W)	What I Learned (L)

Ogle, D. (1986). K-W-L: A teaching model that develops active reading of expository text. *The Reading Teacher, 39,* 564-570.

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Lesson Plan

TITLE: Surface area, where the aliens hide

LENGTH OF LESSON: 70 min

TEKS: Algebra 1(B) Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will... be able to create/ construct the place where aliens were hiding by using 3D shapes. Students will be able to find the surface area of the alien's place.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

Review 3D shapes definition.

Properties of 3D shapes

- Faces
- Edges
- Vertices

Provide representations of 3D shapes

Make connections into the new topic Surface Area

Surface Area Formula

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice

- Place students in groups of 4-5 members.
- Students based on the clues they have create a place where the population of 140 aliens can be fit.
- When students have an idea of how the place looks by 3D shapes.
- Activity time:
- Students will create the place using 3D shapes such as cylinder, pyramid or cube.
- When they finish creating the Aliens secret liar, then they must find the surface area of each shape they use.
- Finally, students will calculate the total surface area of the place.

RESOURCES/MATERIALS

- Presentation: Link Click HERE
- Formula handout: Link Click HERE
- Color Paper
- Scissors

- Glue
- Calculators
- Markers
- Colors
- Pencils
- Rules
- 3D representations

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

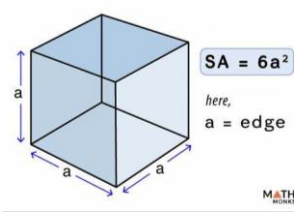
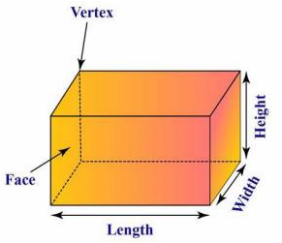
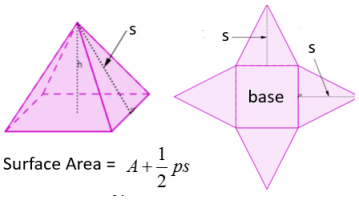
- Sticky note reflection on surface area need to house an unknown population.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Scaffolding, visuals, KWL table, models, representations, translanguaging

SURFACE AREA FORMULAS

Cone	$SA = 6s^2$
	$s = lenght\ of\ the\ side$
Cuboid	$SA = 2(LW + LH + WH)$
	$L = lenght$ $H = height$ $W = width$
Pyramid	$SA = A + \frac{1}{2}ps$
	$A = Area\ of\ base$ $p = perimeter\ of\ base$ $s = slant\ height$

Lesson Plan

TITLE: Separation Techniques

LENGTH OF LESSON: 50 min

TEKS:
Chemistry. (4)(B) Engineering practices. Students should be able to identify problems and design solution using appropriate tools and models.
Chemistry (1)(B) Knowledge and Skills. apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

LESSON OBJECTIVES:
What do you want the students to know and be able to do?
We will… investigate the properties of solids and liquids to determine how to best separate a mixture.
I will… design and perform a step-by-step process to separate the components of a water mixture.

ACTIVATE PRIOR KNOWLEDGE/ HOOK:
Building Background
What do cholera, diarrhea, dysentery, hepatitis A, typhoid and polio have in common?

ACTIVITIES
Direct teach/modeling activities/collaborative activities/independent practice

- Presentation: Instruct students to complete guided notes during presentation of material.
- Task introduction: Show water mixture, direct students to complete "Pre-lab questions" on their student handout.
- Group activity:
  - Instruct students to create a flowchart of the process they plan to follow to separate the component of the water mixture.
  - Instruct students to perform the water filtration activity using the materials provided and following their flowchart.
  - Remind students to write down observations on the "Data Collection/Observations" section of their student handout.
- Post-Lab Analysis: Students complete the "Post-lab questions" on their student handout.

RESOURCES/MATERIALS

- Presentation: Link Click HERE
- Student handout: Link Click HERE
- Closing activity: Link Click HERE
- Reference Sheet: Link Click HERE
- Water mixture (water, sand, rocks/gravel, debris)
- Coffee filters
- Cotton balls

- Sponge
- Beakers or cups
- Small plastic funnel
- Metal mesh or sifter

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

Provide each student with one of the sample scenarios and instruct them to create a flowchart of how they would separate the mixture.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Brainstorming and discussion, manipulatives/experiments, extension activity – separation of mixture 2

Separation Techniques
Closing Activity

1. Which mixture would best be separated by **filtration**?
    a. A mixture of two liquids, each with a different boiling points
    b. A solution of a solid and a liquid
    c. A mixture of solids, in which all parts are the same size
    d. A mixture of solid magnetic and non-magnetic samples
2. Which mixture would best be separated by **magnetism**?
    a. A mixture of two liquids, each with a different boiling points
    b. A solution of a solid and a liquid
    c. A mixture of solids, in which all parts are the same size
    d. A mixture of solid magnetic and non-magnetic samples

3. Create a flowchart for each of the scenarios below that illustrates the process you would follow to separate each of the mixtures:

✓ Scenario 1: What separation technique sequence can be used to separate gravel, nickel pieces and iron dust? (3 different sizes)

✓ Scenario 2: What separation technique sequence would you use to separate a mixture of water, oil, and sand?

✓ Scenario 3: What separation technique sequence would you use to separate the following: Small pieces of pure gold from sandy water. (Gold is not magnetic)

✓ Scenario 4: Create a flowchart for a mixture you would separate using a magnet, then a bucket of water, and then a sieve (in this order).

Separation Techniques

Objective:

To design and perform a step-by-step process to separate the components of a water mixture.

Pre-Lab Questions

1. What are the limits (constraints) that you need to consider when designing your water filtration process?

2. How can you determine how successful your design is?

3. Develop a plan on how your team is going to separate out the different components listed below:

Materials	Tools / Technique
Sand from water	
Sand from gravel/rocks	
Salt from water	
Salt from Sand	

Filtration Design – Flow chart

Data Collection / Observations

Write here any relevant data or observations made throughout the lab activity.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Post-Lab Questions

1. What was the best filtering tool and <u>why</u>?

2. How would you modify your filtration design to improve your overall result?

3. If alcohol was added to your mixture, how would you separate it from the water? Explain.

4. If parasites were still present in your water after undergoing your designed filtration system, how would you remove them from the water? Explain.

Separation Techniques Student Notes

Technique 1: Filtration

Definition	
Properties Separated	Particle size and solubility
Uses	Separate solids from liquids
Limitations	Depending on size of filter, some solids can pass through, does not separate substances that have been dissolved in the liquid.

Technique 2: Evaporation

Definition	
Properties Separated	Boiling point and crystallization of substances
Uses	Dissolved solid(s) in liquids
Limitations	Liquid is lost to evaporation, if more than one solid is present they will crystallize but not be separated.

Technique 3: Distillation

Definition	
Properties Separated	Boiling point differences
Uses	Separate liquids and/or dissolved solids
Limitations	Boiling points must be significantly different from each other

Technique 4: Chromatography

Definition	
Properties Separated	Particle size
Uses	Separate the components of a liquid
Limitations	Slow process, separated components still need to be identified and further separated, only small quantities of liquid can be separated at a time.

Technique 5: Magnetism

Definition	
Properties Separated	Affinity to magnets
Uses	Separate solids, at least one being a magnetic metal
Limitations	At least one solid must be a magnetic metal, multiple magnetic metals cannot be separated, if solid is moist or wet, the magnet will not work properly

Technique 6: Sieving

Definition	
Properties Separated	Particle and substance size
Uses	Separate solid substances of different sizes
Limitations	Substances must be significantly different in size, size of sieve determines which substances will pass through

Lesson Plan

TITLE: Survival of the Fittest

LENGTH OF LESSON: 45 min

TEKS: Algebra (3) System of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. The student is expected to: (C) Solve, algebraically, systems of two equations in two variables consisting of a linear equation and a quadratic equation.

LESSON OBJECTIVES:
What do you want the students to know and be able to do?
We will: Work in teams and solve systems of equations.
I will: Understand the combination of mathematics problems and physical education to make a fun lesson.

ACTIVATE PRIOR KNOWLEDGE/ HOOK:
Building Background
The instructor will let students know that to be accepted to the Detective Academy, they must pass the "Survival of the Fittest" Test.

ACTIVITIES
Direct teach/modeling activities/collaborative activities/independent practice
During each station, one team member needs to oversee the time. By the end of each station, these records need to be reported to the instructors. Before starting each station, instructors need to make sure that students will do a warm-up of about 10 minutes.

Station 1: Math Relay Set up comes to create a relay course. At each cone, teams must solve a math problem before moving on to the next station. There will be three cones, meaning that there will be three math problems. Once each problem is solved, the answer needs to be reported to the instructor to give a thumbs up to the next cone problem.

Station 2: Math Circuit Set up different exercise stations represented by colored papers; red, blue, and yellow
Red: represents 10 push-ups
Blue: represents 10 burpees
Yellow: represents 10 squats
One team member needs to finish all of the series, and at the ends, must solve a math problem so that way the second team member can complete the math circuit and so on, but before the student needs to show the results to the instructor to confirm if it is correct or not.

Station 3: Roll the dice Each team member needs to roll the dice, and the number that appears on the dice will indicate the score that they will have to make on basketball. Before starting, the instructor needs to make sure to write on a paper the number of each team member and monitor everything.
Cool Down Lead the class through static stretching exercises to cool down and promote flexibility.

Closure: Gather the teams and review the records of each station made. Then, the team who made less time is the winner of "The Survival of The Fittest Contest

RESOURCES/MATERIALS

- Presentation: Link Click HERE
- Cones
- Timer
- Basketball ball
- Paper
- Colored paper
- Problems: Link Click HERE

Problems for Station 2:

- What is a system of equations?
- What is an equation?
- Is it possible to have infinite solutions for a system of equations?

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

The assessment will be the problems included in the stations, depending on how they solve it, I would assume they have enough knowledge for the system of equations.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Creating excitement for the Math Olympics competition will make students feel engaged and connected to math, especially because of the combination with P.E.

First Station Problems

Riddle 1: Number Pattern

What are the next two numbers in the sequence: 2, 6, 12, 20, 30,…?

Riddle 2: Alphabet pattern

Find the missing letters in the sequence: A, C, F, J, ?, ?

Riddle 3:

Can you write down eight eights so that they add up to one thousand?

<u>Second Station Problems</u>

In a sequence that grows with a rule to behold,
Each term starts with two, then a secret unfolds.
Add three to the power, that's the way it's defined,
Find the first five terms, keep the pattern in mind.

Start with two plus three, that's your first clue,
Then double the power, add three, and continue.
Reveal the first five, and a challenge we pen,
Find the term that is tenth, what number is then?

Lastly, determine if the terms are all odd,
Use your math skills, not just a nod.

Solve this short riddle, the sequence we've spun,
And you'll see the pattern, your answer begun.

Answer Key
Station 1

Riddle 1: 42 and 56

2+4= 6
6+6=12
12+8=20
20+10=30

30+12= 42
42+14= 56

Riddle 2:

A(1)
C(3)--> +2
F(6)--> +3
J(10)-->+4

J(10) +5= O (15)
O (15)+6= U (21)

Riddle 3

888 + 88 + 8 + 8 + 8 = 1000

Station 2:

- an=2n +3

- n=1, 5
  n=2, 7
  n=3, 11
  n=4, 19
  n=5, 35

- n=1-, 1027

All terms are odd: 2n is even, and adding 3 makes it odd.

Lesson Plan

TITLE: Obstacle Course of strength and knowledge

LENGTH OF LESSON: 45 min

TEKS: Algebra (B) (2) Linear functions, equations, and inequalities. The student applies the mathematical process standards when using properties of linear functions to write and represent in multiple ways, with and without technology, linear equations, inequalities, and systems of equations. The student is expected to:

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will…use our skills and prior knowledge in algebra and the modern-day world to answer trivia questions.

I will… Work as a team to answer trivia questions and try to complete the obstacle course of strength and intelligence as fast as we can.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

- Students will use their basic understanding of algebra to answer trivia questions.
- Students will use their basic understanding of what they learned in previous summer camp lessons to answer the trivia questions
- Students will use their basic understanding of appropriate pop culture modern day things to answer trivia questions

Hook

- We will explain to the students that we are so close to winning the battle and are one step closer to getting back our missing ranger.
- Before we can go into battle we need to train, survival of the fittest!

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice:

- We will set up an obstacle course so that the students will have to work together with their teams to put their brains together and answer questions to move onto the next obstacle.
- We will divide the students up into teams and they will go head-to-head versus another team answering questions and tag teaming each other to see who can complete the course the fastest and can prove their intelligence.
- The questions will be made up from basic algebra 1 skills that were taught throughout the duration of the summer camp, they will also be made up from previous lessons that were taught throughout the summer camp, and just to have a bit of fun the questions

will also be made up from modern day pop culture events.

- In the first station we will have two teams playing from all around the world(basketball). The two teams will form a line and before each member can shoot, they will get asked a trivia question. If they get it right, then they can shoot. If they get it wrong, then the team member must rotate and the next team member in line will try and answer the question correctly. The station will go like that until one team completes the full tour around the world. The winning team will then move on, and the losing team must stay.
- The next station will be “Tug a War'' where two teams will go compete against each other, the winning team will get asked a trivia question at the end and if they get it correct, they gain a point, but if they get it wrong, they will not get the point and the other team has a chance to answer the question. The station will continue in that fashion until the time runs out. Whichever team has the most points will move on and the losing team stays.
- The next station will be a relay race around the basketball court. Each of the 5 members will go to a separate corner of the court and member 5 will remain at the start. There will be a teacher at 2 of the diagonals that will ask the student a trivia question. If they get it wrong, they have the option to answer another question or do 10 jumping jacks and continue. Then the 5th member will get asked a question and if they answer correctly, they will run around the whole basketball court, if they get it wrong then they must wait a few seconds for the losing team to catch up or 10 jumping jacks. The winning team will move on, and the losing team will stay.
- The next station we have will be a cup stack competition. The two teams will need to form a line and each team will have 6 cups stacked in front of them. Before they can start a member of the team will get asked a question and if they get it right, they stack and unstack the cups then the next member in line will go. If they get it wrong the team member will go behind the line. However, each team member must go twice to win. The winning team will stay, and the losing team will stay.
- The next station will be a zig zag run, where we will set up several cones, one for each team. At every other cone the students will get asked a trivia question, must do jumping jacks, or jump rope for a certain amount of time. Depending on how much time is left after each member of the team goes once, they will only go once, or each member must go twice. The winning team moves on, and the losing team stays.
- The last station will be a jump rope station. The students must begin jump roping and then get asked a trivia question. If they get it right they can stop the next member in line. If they get the question wrong, then they will have to jump rope for another 3 seconds.

RESOURCES/MATERIALS

- Question deck: Link Click HERE
- Hula-hoops
- Plastic Cups
- Cones

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

We will know the students have mastered essential learning if each team was able to correctly answer questions and complete the obstacle course.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Student collaboration, kinesthetic movement, manipulatives.

Lesson Plan

TITLE: The Mysterious Route

LENGTH OF LESSON: 40 min

TEKS: (2)(A) determine the coordinates of a point that is a given fractional distance less than one from one end of a line segment to the other in one- and two-dimensional coordinate systems, including finding the midpoint; (1)(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will... Use coordinate points and line segments to create a pathway.

I will... Work with my peers to plot and create our mysterious route to find the missing Ranger.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

- Plotting coordinate points
- Students will review the 4 different quadrants on the coordinate plane and know where to plot their points.
- Students will use their basic understanding of line segments to draw a line through the points to perfect their pathway

Hook

- The students have already landed on the mysterious planet.
- On the mysterious planet, the students have found a paper with coordinate points to help locate the missing ranger.
- We will need the students to plot these points and figure the perfect pathway that the little bots will take as a demonstration the kids will take.

ACTIVITIES

Direct teach/Modeling activities/Collaborative activities/Independent practice:

- By the time they reach this lesson they should already know that the missing ranger is on a different planet and that they have already flown to the mysterious planet.
- Explain that in this lesson they are on the planet, and that we have found a mysterious paper filled with nothing but coordinate points that they must plot together in their groups on a big white paper that I will distribute to each group.
- Explain that when they finish plotting their points, they must use their ruler to draw a line through the points connecting them to make a path for the robots to take and that they will need to figure out how to smooth out the path for the robot.

- Separate the kids into groups maybe 3-4 and hand each group their own quadrant and the only coordinates that they are receiving will be on the x-axis and y-axis and so once they plot those points, they themselves will come up with their own path, where they will work together to graph and connect their points. They will mess around with the lining and play with the bots to figure out a smooth pathway to take.
- Each group will get a different set of coordinate points and at the end of the lesson they will connect their quadrants to create the big coordinate plane with the paths they themselves created to create one big pathway!

RESOURCES/MATERIALS

- Coordinates handout: Link Click HERE
- Little Masty robots
- Big white paper to graph and plot the points (laminated)
- Expo markers
- Rulers
- The paper that has the coordinate points

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

- I will know the students have mastered the essential learning by seeing the coordinate points plotted correctly.
- At the end of the lesson once all the groups have completed their own version of their pathway, they will each share and show us the pathway they came up with.
- I will decide which path is the best for us to use on our trail to find the missing ranger.
- By the end of the lesson the students should have figured out the pathway to missing rangers, and the little bots should be able to smoothly get across the pathway from start to end.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

Small group instruction, manipulatives, inquiry-based learning.

For The Ranger Detectives:

Hello Rangers, glad to see you have all made it here on planet lumina. You are just coordinates away from finding your missing ranger. Below you will find a set of coordinate points that you must plot on your graph. Sound simple? Wait there's more, not only do you have to plot your points, but you must also work together to create a line of path safe enough to travel on! Don't be afraid to mess around with those lines! So, plot those coordinates, connect those points, and make sure it is smooth enough to travel on! Stay safe, and good luck detectives.

Coordinates for Quadrant 1:

(10,0)

(0,9)

Coordinates for Quadrant 2:

(0,9)

(-7,0)

Coordinates for Quadrant 3:

(-7,0)

(0,-8)

Coordinates for Quadrant 4:

(0,-8)

(10,0)

Lesson Plan

TITLE: Central Dogma Battle of the Galactica

LENGTH OF LESSON: 90 min

TEKS: HS Biology (7) (A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA; (B) describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA).

LESSON OBJECTIVES

What do you want students to know and be able to do?

We will… students will demonstrate an understanding of how to properly transcribe DNA to RNA and translate RNA to protein.

I will… facilitate learning by offering support and feedback as they work through the problems independently to reinforce their understanding.

ACTIVATE PRIOR KNOWLEDGE/HOOK

Building background

- Students will have previously understood the components of DNA and RNA.
- Students will have previously understood how to properly transcribe and translate.

ACTIVITIES

Direct teach/modeling activities

- As a class we will review the background knowledge.

Collaborative activities/independent practice

- Battle of the Galactica
    - Class will be divided into two teams, among teams' students will work in pairs (trio if necessary.
    - Class teams will then determine where spaceships will be placed on the game board.
        - Each team will receive a ship to be placed on the game board (6 teams, 6 ships).
        - Teams will use sticky notes on game boards to keep track of ships.
        - *The large white board in the center of the room, ensuring students stay on either side of their game board.
    - How it will work.
        - Questions will be at the front of the class where students must start off grabbing one then return to their pair and solve.
        - Once a question has been solved, they must go to the teacher and give their question number and answer.
        - If correct they may then strike an attack on the opposing team. If wrong,

they must go back to their pair and try again.
- Students will go to the board and call out attack, placing a small sticky note on their team game board to keep track. The teacher will oversee placing strikes on the opposing team (small stickies).

RESOURCES/MATERIALS

- Review questions: Link Click HERE
- Review answer key: Link Click HERE
- Student handout: Link Click HERE
- Large white board with wheels placed in the center of the classroom to divide the two teams.
- On a large poster paper or on white board draw out the following game board.
    - Laminate poster board
- Game pieces will be sticky notes, choosing distinct colors from the strikes students will place on board.
- Prepare review questions and print out cards located at the front of the class ranging in levels of rigor.
- Answer sheets will be available for teachers with question numbers and answers.
- Spaceships:
    - AAAAAA (1)
    - BBBB (1)
    - CCC (2)
    - DD (2)

EXAMPLE: Central Dogma Battle of the Galactica
Questions will be a review from what students have been learning.
Amino Acid Chart: proteincodonwheel.jpeg

CLOSING TASK/ASSESSMENT

How will you know if students have mastered essential learning?

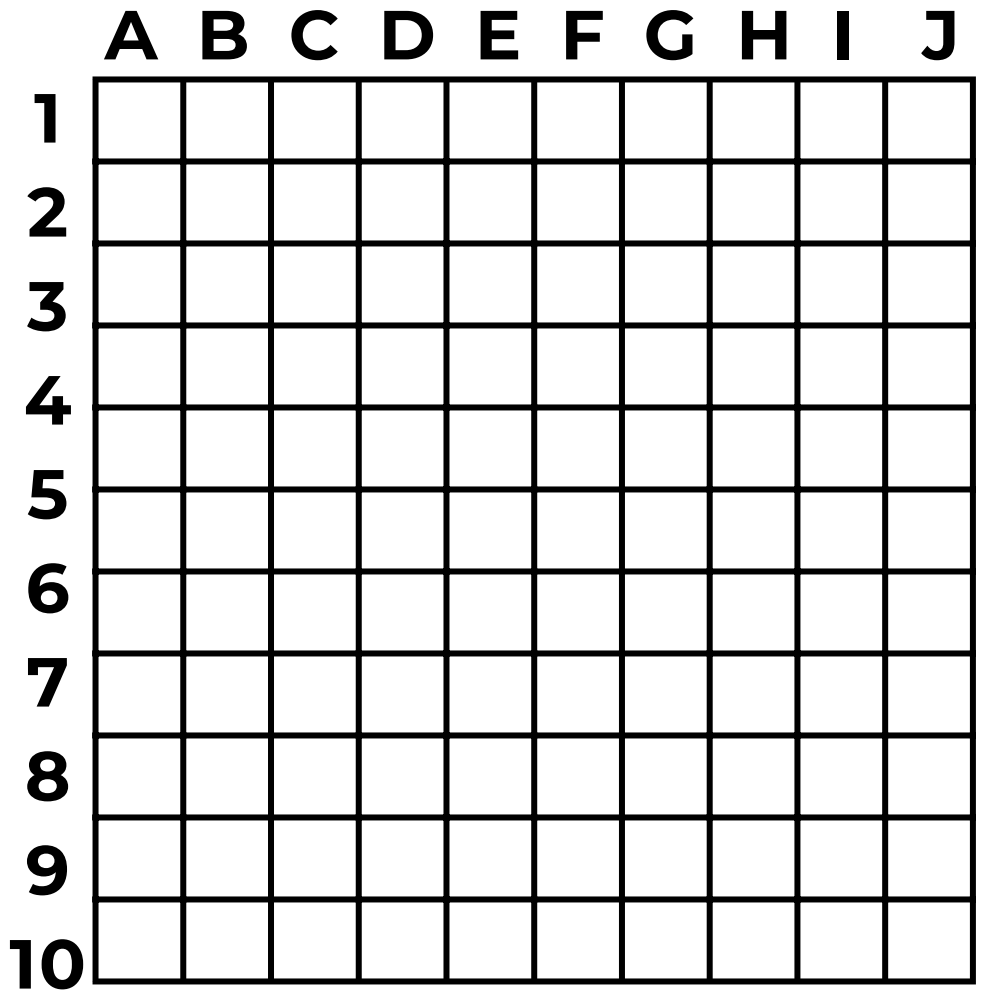
- Observe students' participation and engagement during the hands-on activities and discussions.
- Evaluate students' understanding through their ability to defeat opposing team.

BRAIN COMPATIBLE/DIFFERENTIATION STRATEGIES

Which strategies will you use to deliver content?

- Visual aids, hands-on activities, group work and collaboration

1. Deoxyribonucleic acid
2. Blueprint of life
3. Instructions for making proteins within the cell
4. Adenine
5. Double helix composed of repeating subunits called nucleotides
6. Thymine
7. Cytosine
8. A T C C G T A A C G T G
9. T A C G A A C T G A C T
10. T A C C G T T C T T T T
11. T A C G A A C T G A C C
12. Guanine
13. Four
14. Cytosine
15. Two long strands intertwined
16. Guanine
17. Complementary
18. Cars in the Garage
19. Apples in the Tree
20. Of nucleotides
21. First line: T G A C C T T G G
    Second line: A C T G G A A C C
22. First line: G T G A T G G C A
    Second line: C A C T A C C G T
23. First line: G A G G A G A C T
    Second line: C T C C T C T G A
24. First line: G C A G A C T G T
    Second line: C G T C T G A G A
25. Precipitate
26. Bubbles, possible identity: baking soda
27. Color
28. Color, bubbles, and smell
29. when 'a' is greater than 1 $y = a(x - h)^2 + k$
30. Opposite
31. Circle shape
32. Ellipse/oval shape
33. Vertical Stretch
34. Upward
35. a 90 degree/ from above
36. Vertical Compression
37. From an angle less than 90 degree
38. 5,==
39. Vertical stretch
40. Lumina
41. Vertical stretch or vertical compression
42. 4
43. NASA
44. 6
45. Factor
46. Most/ more of
47. Middle number
48. add all of the number and divide by the total amount of numbers
49. Closer
50. Y=mx+b
51. Vertical demonstration
52. further away
53. horizontal demonstration
54. Counter clockwise
55. X-axis
56. Y-axis
57. 9
58. Joe Biden
59. Students' opinion
60. Student opinion
61. C
62. Pacific Ocean
63. An orchid
64. Yes it does
65. Red wood Tree
66. Mt. Everest
67. 1, the sun
68. Blue Whale
69. Parts of a whole
70. Jaw muscle
71. Mandarin
72. They are equal/ the same
73. Pluto
74. Lumina
75. Milky way
76. The distance is shorter
77. 8
78. The chiefs
79. A cheetah
80. A piano
81. The path that a bullet takes when it leaves the barrel of a gun.
82. X- axis and y- axis
83. Where an offender's activity space intersects a target area, this is where crime happens (crosses). Creating a triangle.
84. A recurrent way of acting by an individual or group toward a given object or in a given situation
85. Bacteria, archea, and Eukarya
86. False! Prokaryotes are less complex, they lack a distinct nucleus and membrane bound organells
87. The nucleus
88. The flagellum
89. Ribosome
90. Prokaryotic cells
91. False!
92. Endocyotis and exocytosis, passive transport, and active transport
93. Eukaryotic cell
94. B
95. Comparative anatomy, molecular biology, or fossil record (any answer)
96. True!
97. A group of individuals that belong in the same species and live in the same area
98. Population growth is the change in the number of members of a species in a given location and time period
99. SA = 6S^2
100. SA = 2(LW + LH + WH)
101. The total surface area considers all the faces of the 3D shape including the flat surfaces and the curved surfaces
102. 110
103. False!
104. True!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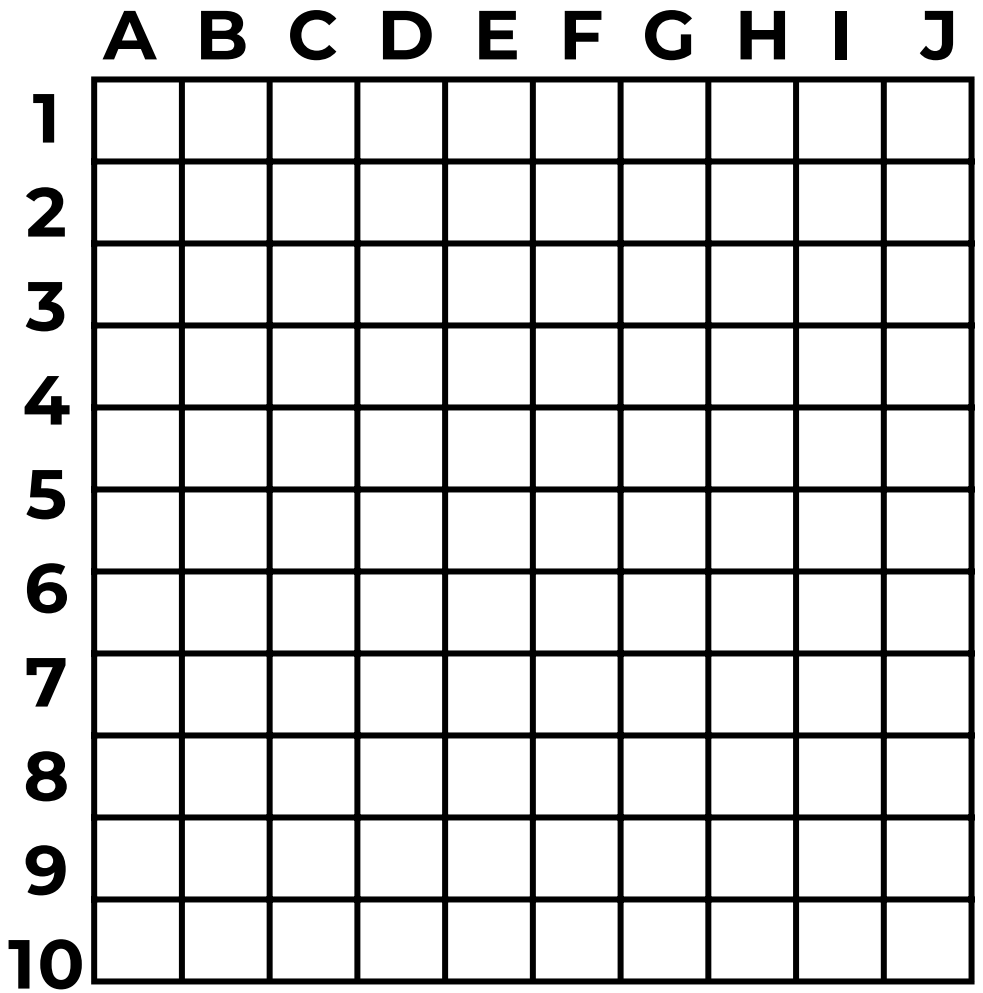
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