ADP MAST ACADEMY
PRESENTS

SURVIVAL THROUGH TIME

2023
SUMMER CAMP
CLINT ISD

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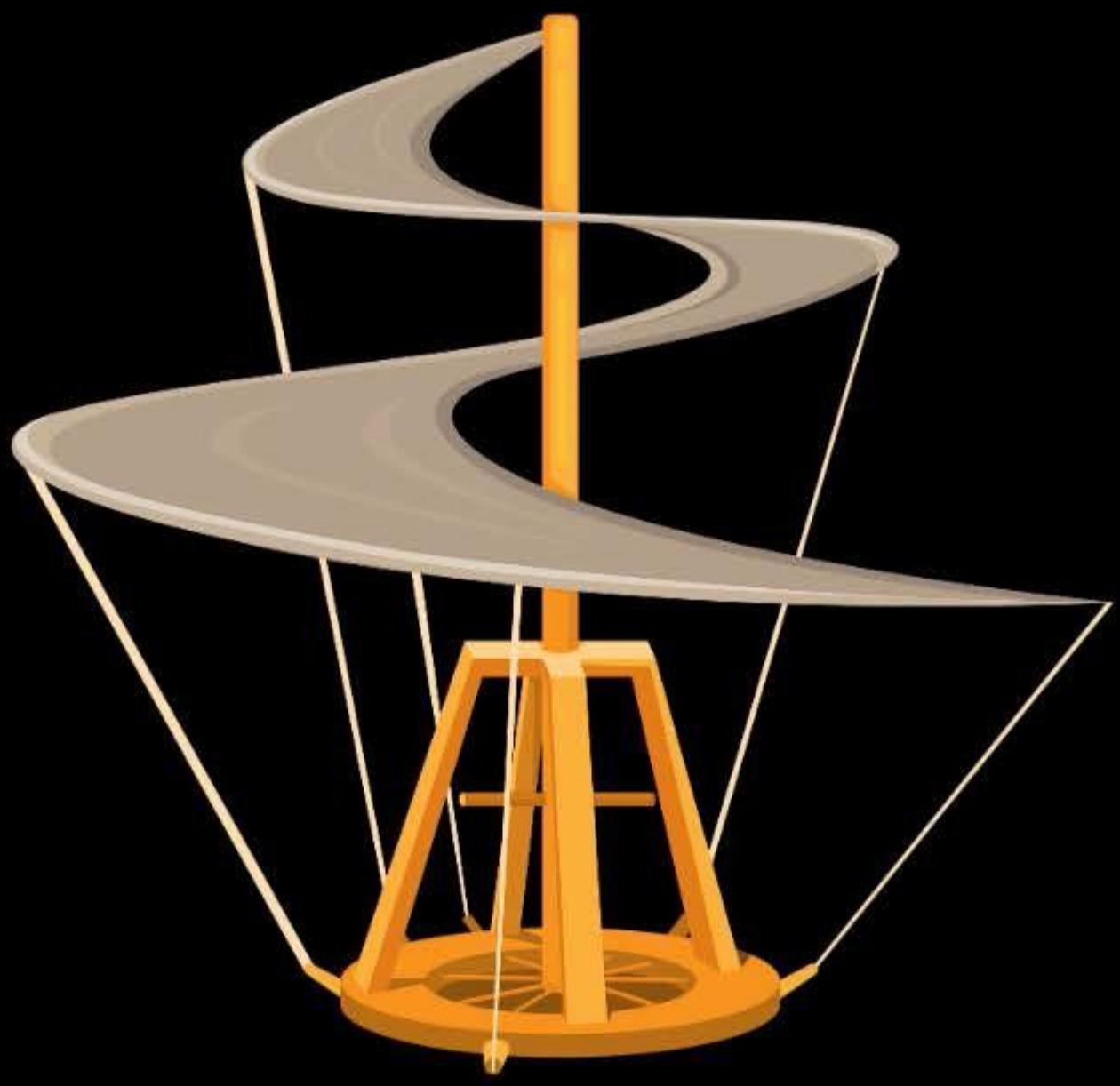
MaST
ADP Math and Science Teachers Academy
THE UNIVERSITY OF TEXAS AT EL PASO



PAST

Lesson Plan: Hunt for a Body

Name of Lesson: Hunt for a Body

Learning (TEKS) Objective:

§112.19. (7.12) Organisms and environments. The student knows how systems are organized and function to support the health of an organism and how traits are inherited. The student is expected to: (A) identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems.

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.

Student Outcome: *Students will be able to… identify major body organs of the system and build team working skills navigating and finding body parts in which they work together to build a character. The character will be used in order to see if they have every part they need to go through time.*

Day of the Week and Time:

Total Length of Lesson: 60-90 mins

Materials (per student), include copies of handouts, paper for foldables, etc.:

- **4 Paper cut outs of head, body, brain, heart, lungs, small and large intestine, diaphragm, kidneys, etc.**
- **4 Pairs of Paper cut outs of legs, and arms**
- **Scissors**
- **Long pieces of paper**
- **Construction paper**
- **Glue**
- **Velcro**

Technology Required (put video, website, etc. links here):

- **https://www.youtube.com/watch?v=gEUu-A2wfSE**

What needs to be prepared/set up ahead of time:

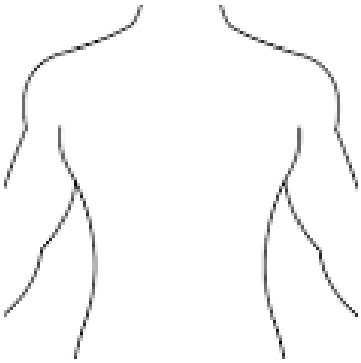
- **4 (of each) Paper cut outs of head, body, brain, heart, lungs, small and large intestine, diaphragm, kidneys, etc.**
- **4 (of each) Pairs of Paper cut outs of legs, and arms**
- **Scavenger Hunt Riddles and Questions**
- **Layout of where everything is going to be glued on**

How to accommodate lesson for students who are English Language Learners or have trouble focusing

- **Sentence stems**
- **Anchor charts**
- **Vocabulary cards**

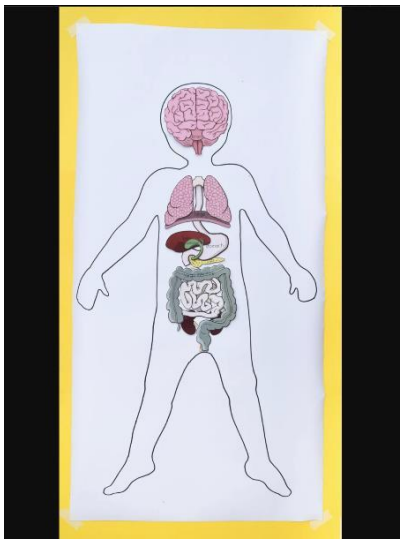
Activity 1: Explanation of Anatomy Duration: 10-15 mins	Notes to Teacher:
Teachers will explain what anatomy is, how anatomy is functional, and can show a video giving a brief explanation of what the subject is about. (video located above)	**This can be either a discussion or a video based introduction!**
Activity 2: Explanation & Rules of Scavenger Hunt Duration: 5-10 mins	
Teachers will explain to students what a scavenger hunt is, (located in section below), and how it incorporates the theme (person traveling through time). Teachers will then place students into groups, there should be 4 groups evenly divided among the class. **Once they are divided, give them a team color (BLUE, RED, GREEN, AND YELLOW) and a team name (can be anything they want). Then read the rules to the students.** **RULES:** *"Each group will receive a different riddle starting in the home room, each riddle will lead to six different locations including home room at different times* ***(NO GROUP SHOULD BE AT ONE LOCATION AT THE SAME TIME)****. While at each location you will be picking up the next riddle and different body parts,* ***(DO NOT pick up any color that is not your team)*** *students must return back to the home room as a group* ***(NOT JUST ONE person, the whole team)*** *to assemble your person! Once the parts are added you either have to name the body parts or functions that they have.* ***(YOU CANNOT MOVE ON TO THE NEXT LOCATION UNTIL YOU ASSEMBLE THE PARTS YOU HAVE AND STATE EITHER NAME OR FUNCTION)*** *REMEMBER to go IN ORDER with the numbers on your cards!"*	***NOTE: All paper materials must be prepared and everything needs to be in their location beforehand *** ***NOTE: In order to win students must have everything in the correct spot***
Activity 3: Scavenger Hunt Duration: 30-60 mins	
The first riddle will be in the home room, that card will direct them all to different locations. (all students will go to every location just at different times!) **MAIN LOCATIONS ARE: library, front of the school, schools football/ soccer field, a science classroom/lab, front office, and as well the main home room.** **RIDDLES FOR THE CARDS:** Everyone should have #6 as the same riddle, every other riddle should be scrambled in order. Every card has a # on it, if the students are not going in order they are not in the right place. 1. **Let's stir up some chemicals together and remember.. you need a lab coat!** 2. **Let's READ about anatomy!** 3. **This is where I use my legs to travel outside and around in circles!** 4. **Where is the head of the school located? (Principal's office)** 5. **Here is where we enter every day and use a buzzer to get in.** 6. **This is where the teacher lives, this is HOME.** **BODY PARTS TO CUT OUT/ MAKE:** Best way to do this is to draw and cut out each organ. When it comes to the legs, arms, and head, outline someone's body and cut directly from the outline to cut out those sections (remember 4 groups= 4 body parts to cut and make!) - **Both pairs of arms and legs** - **The Lungs** - **Small intestine** - **Diaphragm** - **The Heart**	***NOTE: When setting up the locations make sure to make 4 of each riddle, and 4 of each body parts/pairs. *** ***NOTE: when writing the cards make sure the riddles are in different orders for each group so they do not meet at the same location The only location that is the same as everyone else's, is #6, which is back to homeroom again. ***

- **Stomach**
- **Kidneys**
- **Large Intestine**
- **The Brain**
- **The Head portion of cut out**



Something like this is back in the home room, each group should have their own. When going back to assemble the body they should use tape, glue, or velcro to stick the parts on.

<u>The goal is to see which student can finish with the shortest amount of time. Without missing a body part and in the correct order, whoever finishes first wins the game and the game ends. Making whoever didn't win have an incomplete body.</u>



<u>The final product may look similar to this. This is just an example.</u>

<u>Example for the scavenger hunt</u>: *Green team gets riddle #1 in the home room and it says, "Here is where we would READ about the brain", students would work together to know that it is the library (you can ask the librarian to help if present, if not, set the cards OUTSIDE the library). The library or teacher with them would confirm if it's correct, they then would receive or grab a card that has their group color with the next riddle as well as the corresponding body parts (for this example let's say they get a leg and a heart with the next riddle) once they get the body parts students CANNOT move onto the next riddle without going back to home room and adding the body parts to the construction paper TORSO in home room and as well naming either a function, or name of the body part that they are adding to their body in this case a heart that helps pump blood and leg that helps us walk. (they get ONE hint if stuck) whatever you decide to be the hint. They move onto the next number which is #2, and it repeats until the end.*

Activity 4: Reflection	**Duration: 5-15 mins**	***NOTE: this is optional***
Students and Teachers will reflect on the hunt and have a discussion how it went and how would our body function if we were missing a limb.		

Lesson Plan: Castle/Catapult Building

Name of Lesson: Castle/Catapult Building

Learning (TEKS) Objective:
(9) Expressions, equations, and relationships. The student applies mathematical process standards to solve geometric problems. The student is expected to:
(A) solve problems involving the volume of rectangular prisms, triangular prisms, rectangular pyramids, and triangular pyramids;

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(H) understand implicit ideas and information in increasingly complex spoken language.

Student Outcome: Students will be able to use geometric shapes to build a castle. Students will be able to build a catapult and understand the distance and angle it takes to destroy their castles.

Day of the Week and Time

Total Length of Lesson: 90 mins

Materials (per student), include copies of handouts, paper for foldables, etc.: **TOTAL OF 6 GROUPS**

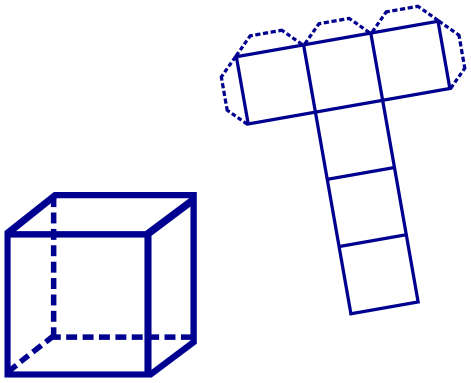
- **24 printable packs (located at the end of this document)**
- **24 packs of colored pencils**
- **24 packs of markers**
- **24 scissors**
- **24 white Elmer's Glue**
- **3 packs of colored paper (200 sheets each pack)**
- **840 popsicle sticks or tongue depressors**
- **500 rubber bands**
- **125 bottle caps**
- **125 ping pong balls**
- **18 rolls of scotch tape**

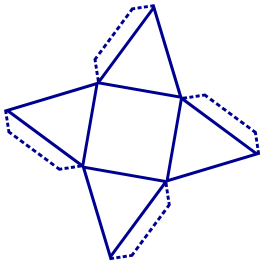
Technology Required (put video, website, etc. links here):	
• Medieval Instrumental Music - Medieval Life • Catapult Instructions (located at the end of this document)	
What needs to be prepared/set up ahead of time:	
• Copies of the printable pack for each group • Sample pictures of models	
How to accommodate lesson for students who are English Language Learners or have trouble focusing	
• Visual representation of final product (catapults and castles) • Sentence stems to aid in collaboration • Vocabulary cards	
Activity 1: Time-Machine to Medieval Times **Duration: 15 mins**	**Notes to Teacher:**
The knights and knightess will be transported back in time to medieval times through the pics and music. Students will create little medieval hats before working on the castles!	Be prepared with costumes and music, as well as a presentation/examples of medieval outfits/hats.
Activity 2: Castle Building **Duration: 45 mins**	Post examples of medieval castles to help students visualize their final product. Tell students to not go overboard when designing the castles, as they'll be destroying them later.
Students will be shown examples of castles then assigned to build a castle with their groups to prepare for enemy battle.	
Activity 3: Destroy the Castle **Duration: 20 mins**	Post example of medieval catapults to help students visualize their final product.
Students will be given material to build their catapult. Students will build their catapult and use it to knock down enemy castles.	
Activity 4: Destroy the Castle **Duration: 10 mins**	Depending on how much space is available, separate groups so that damage to the castles is not extensive.
Students will use ping pong balls to knock down enemy castles. There will be 6 groups, so students can choose who their enemy group is.	

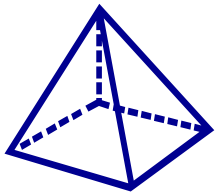
Geometric Nets For 3D Shapes: Printable Pack

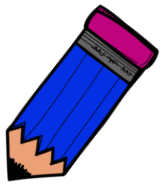
from

Bethany @ MathGeekMama.com









Includes nets with and without tabs!

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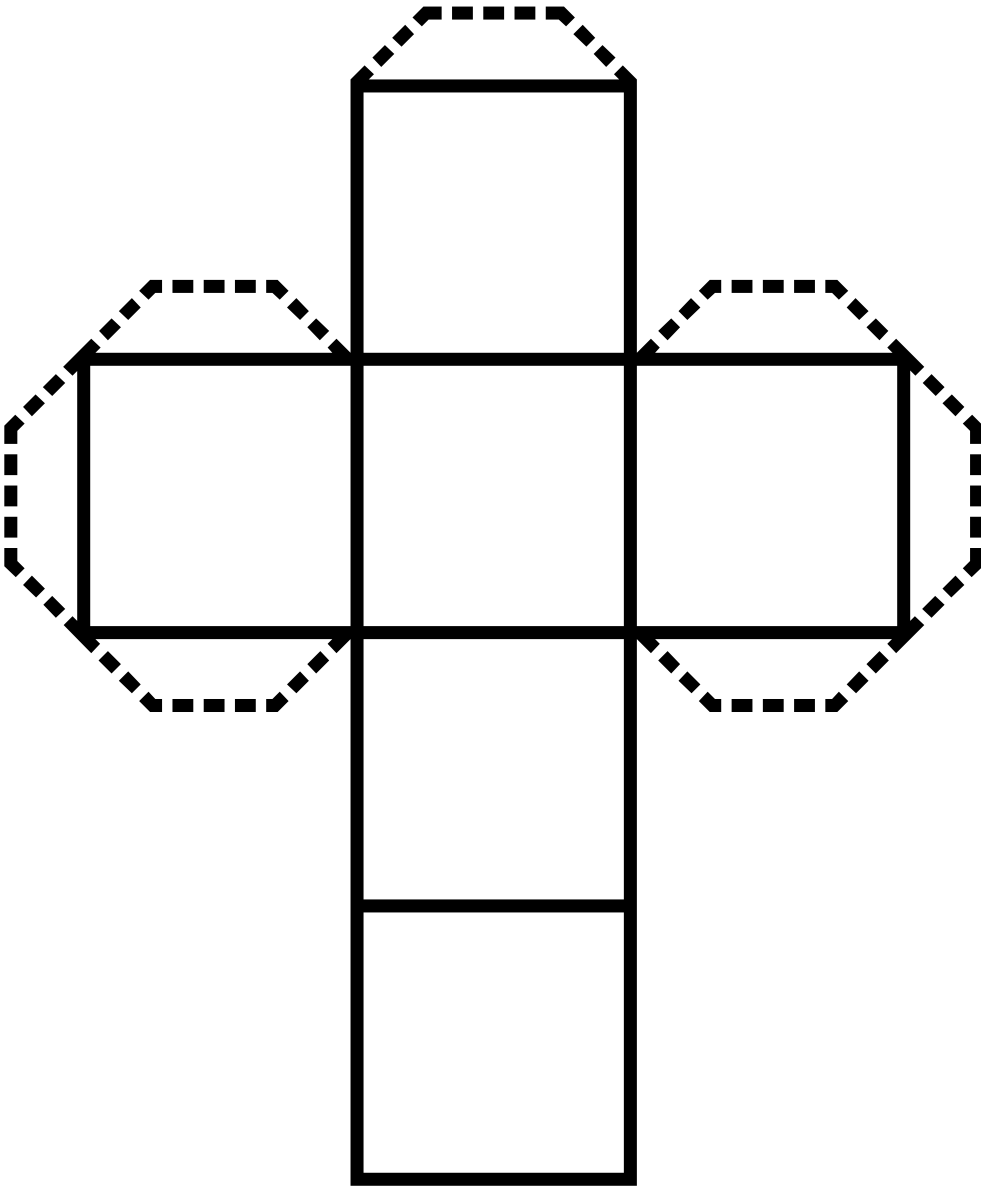
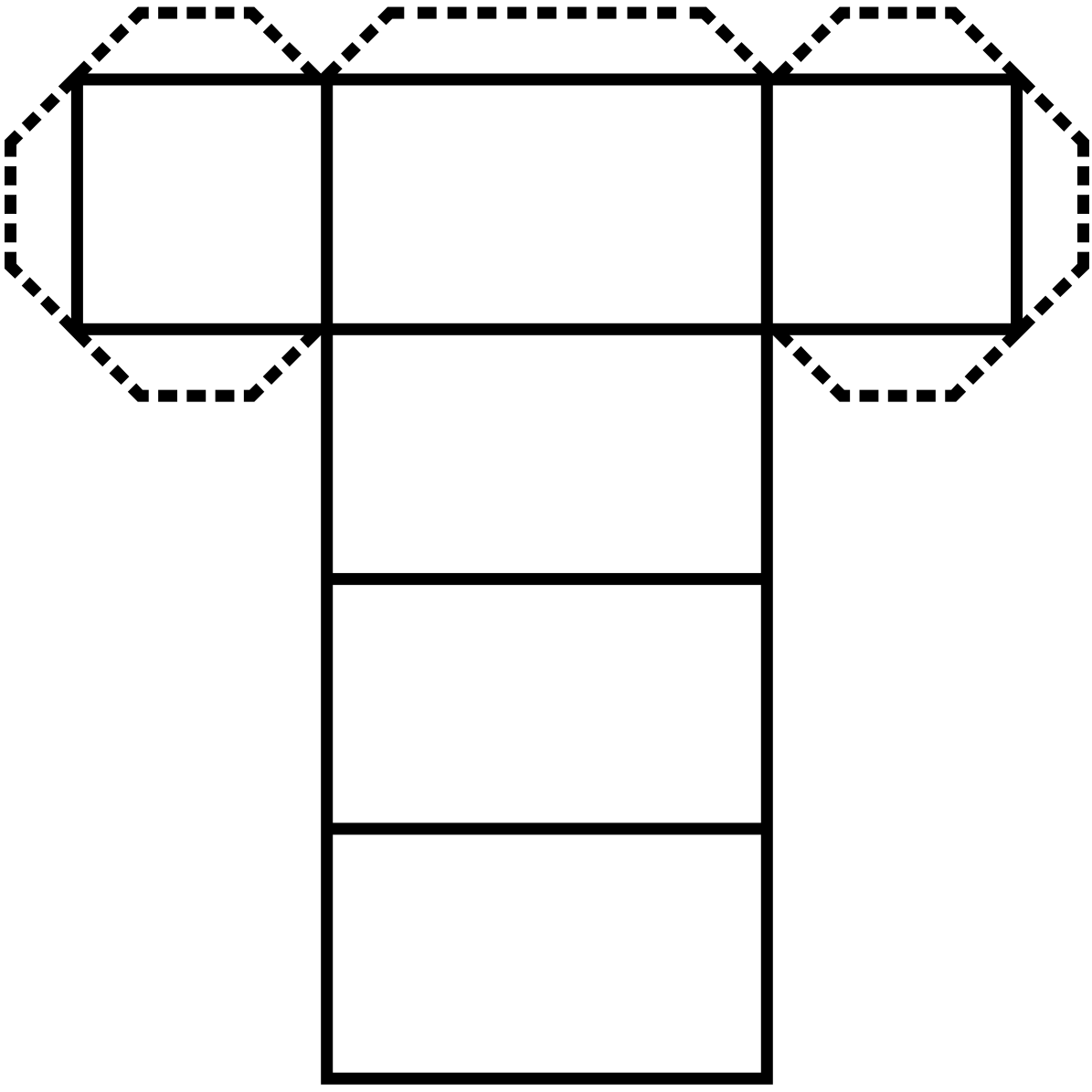
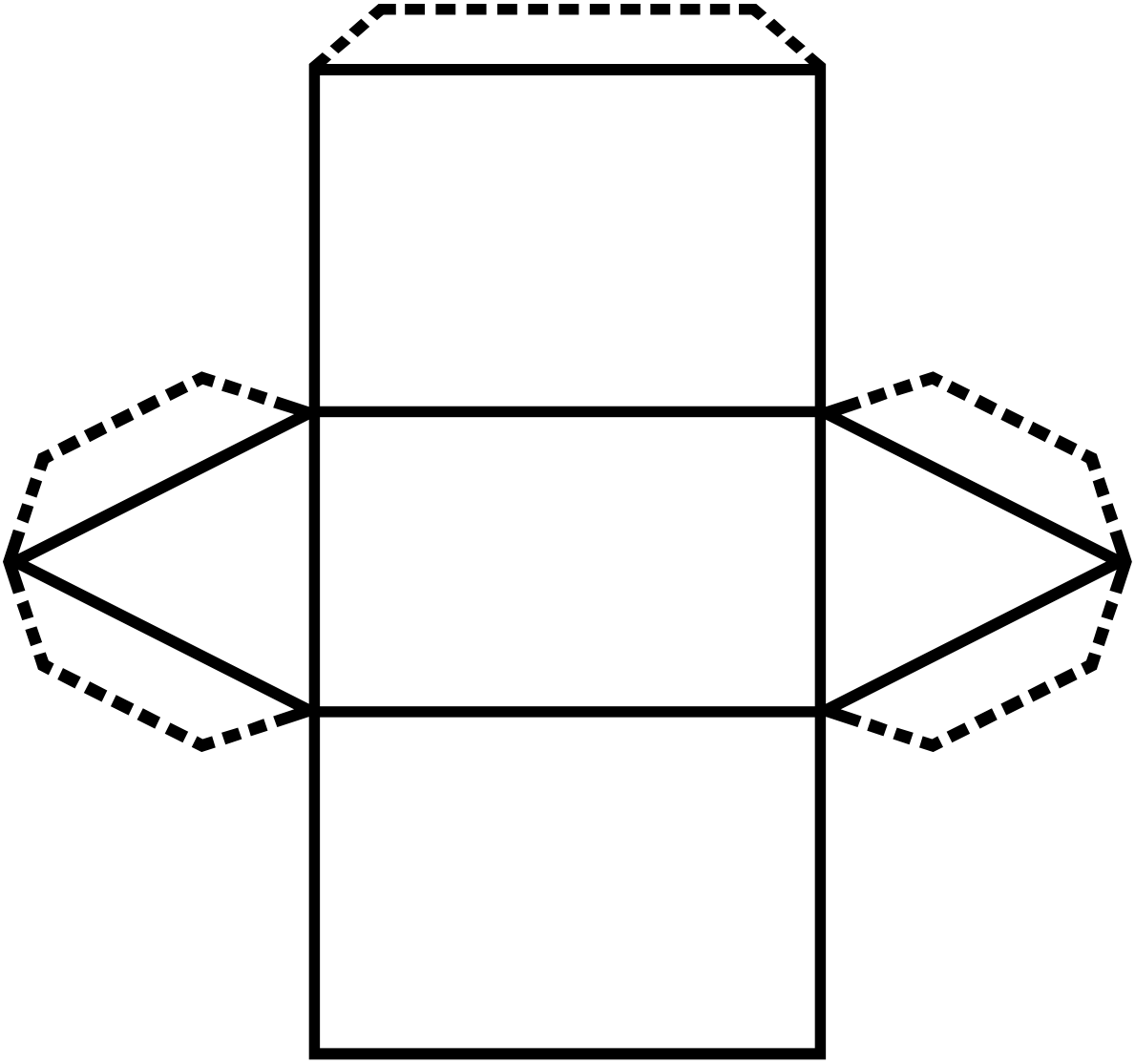


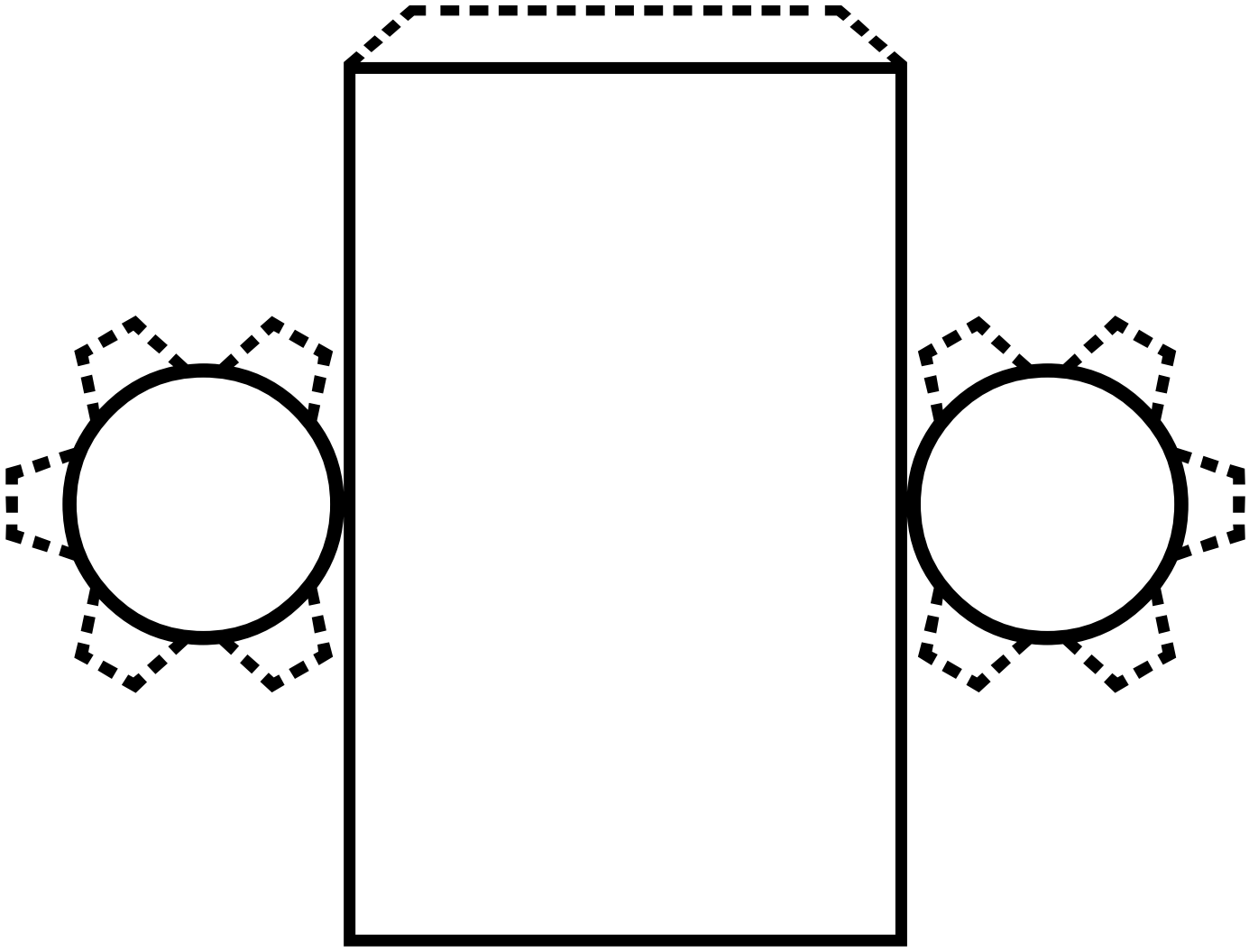
Net of a Rectangular Prism



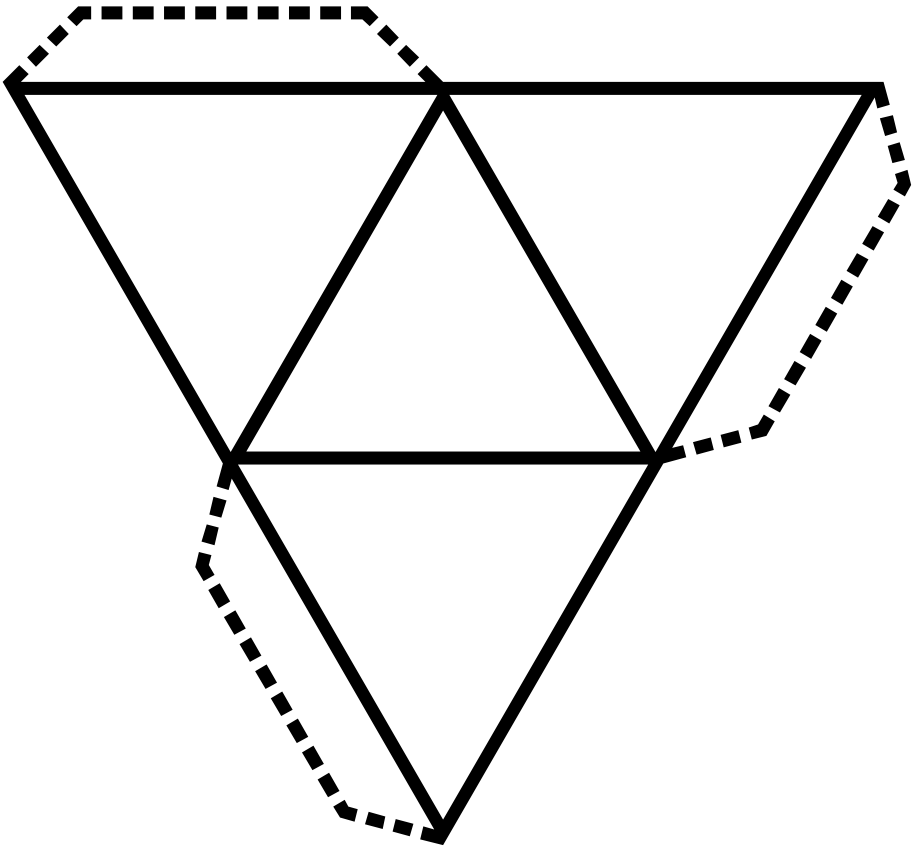
Net of a Triangular Prism



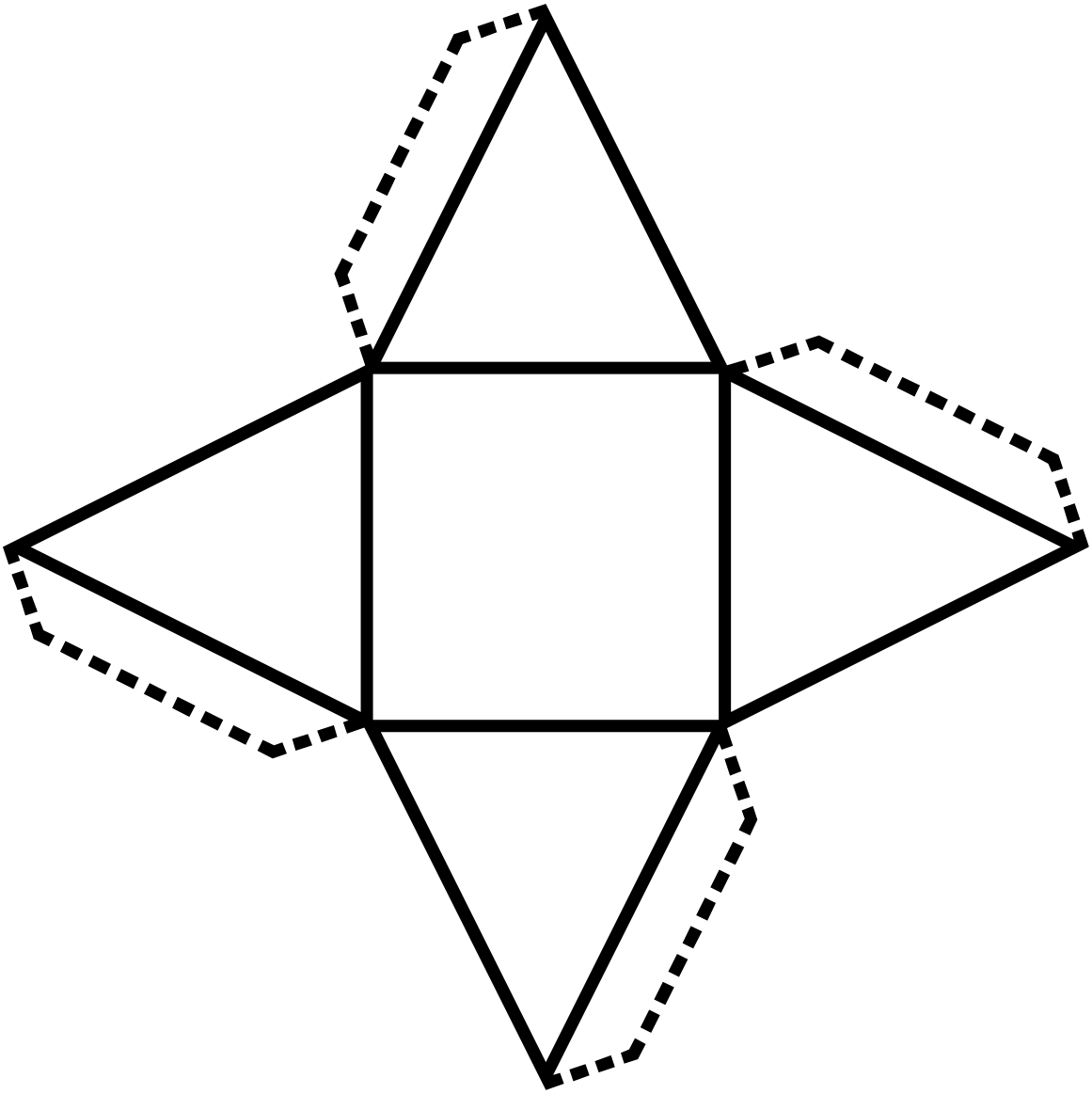
Net of a Cylinder



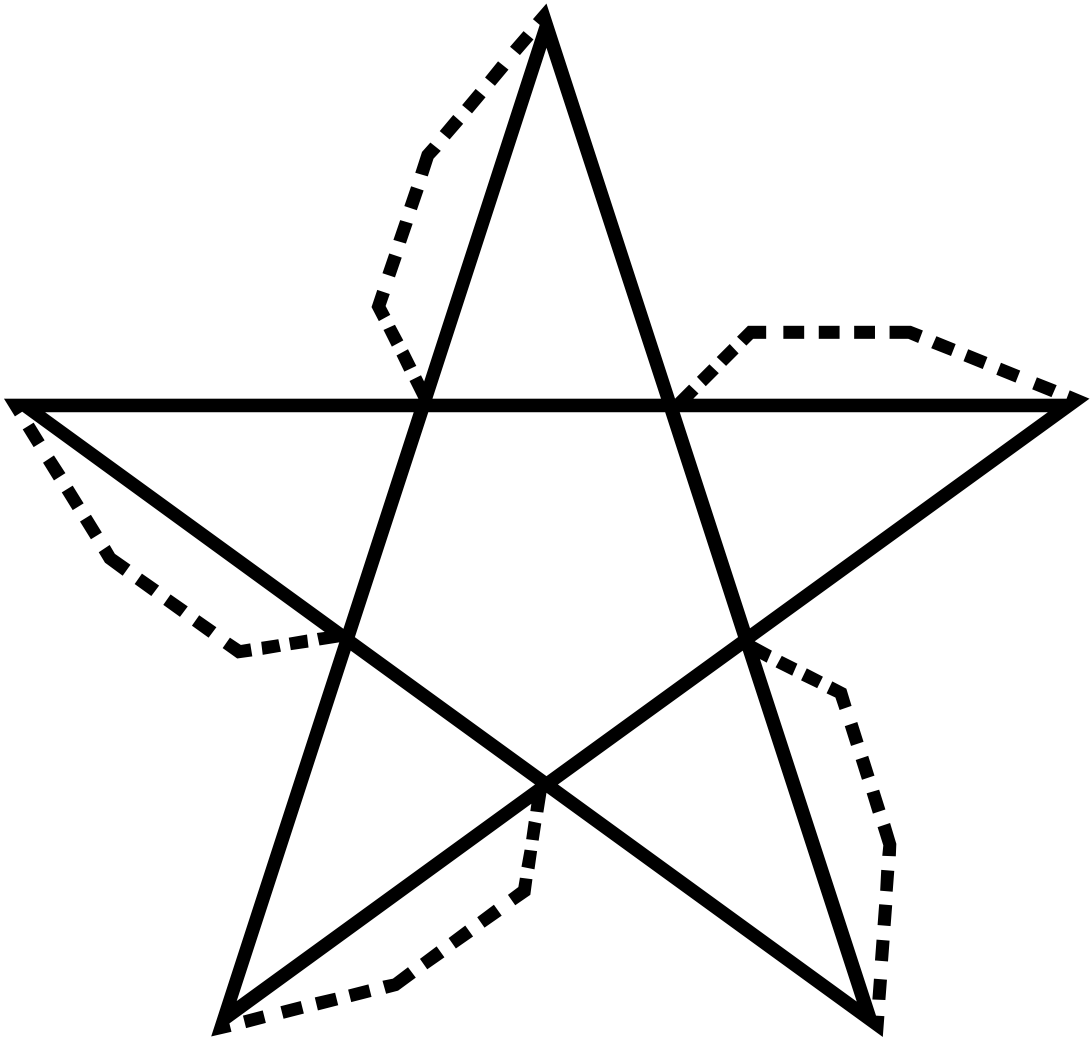
Net of a Triangle-Based Pyramid



Net of a Square-Based Pyramid



Net of a Pentagon-Based Pyramid



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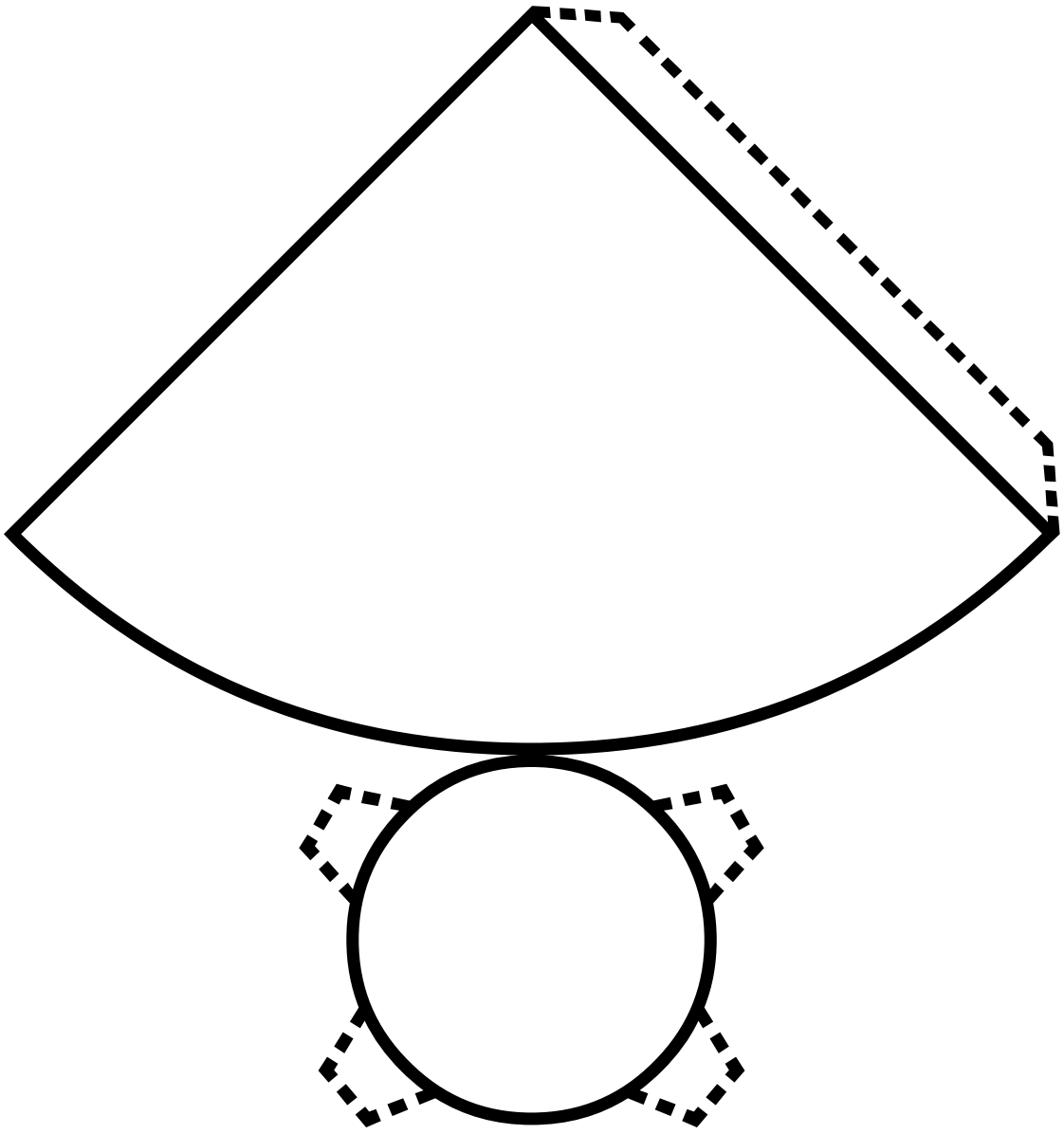

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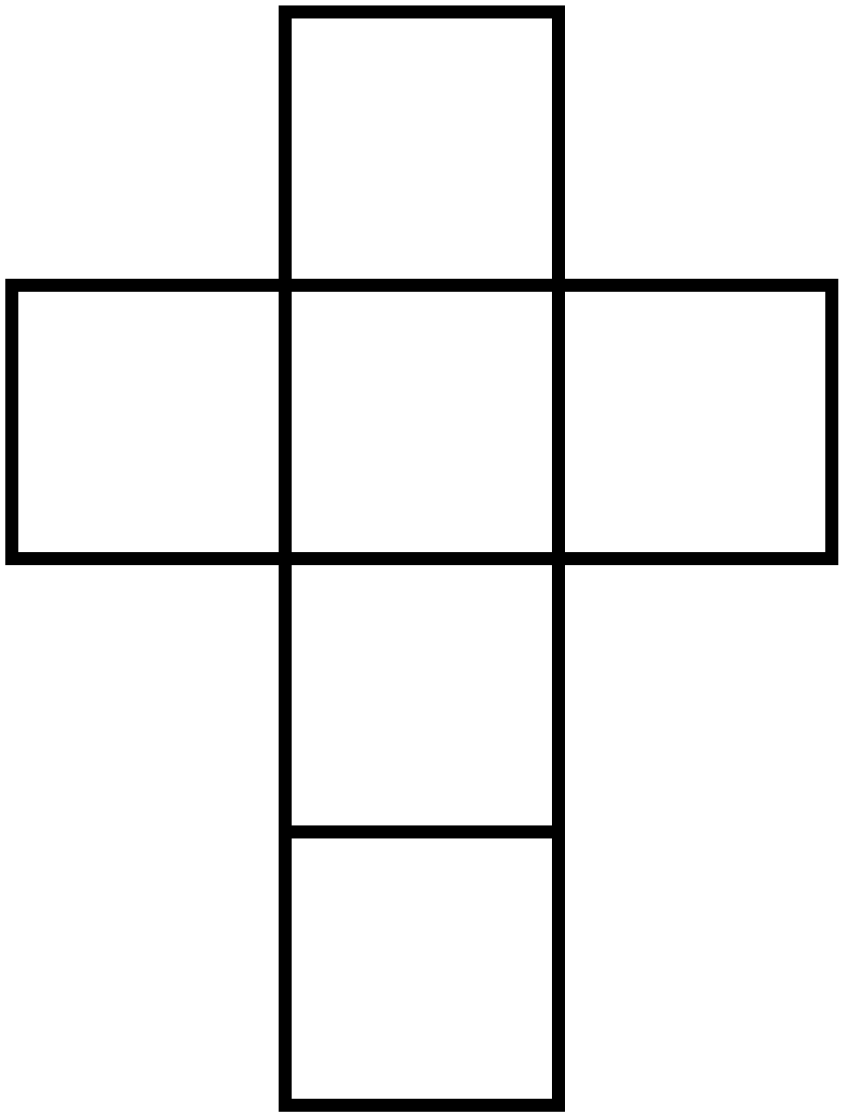
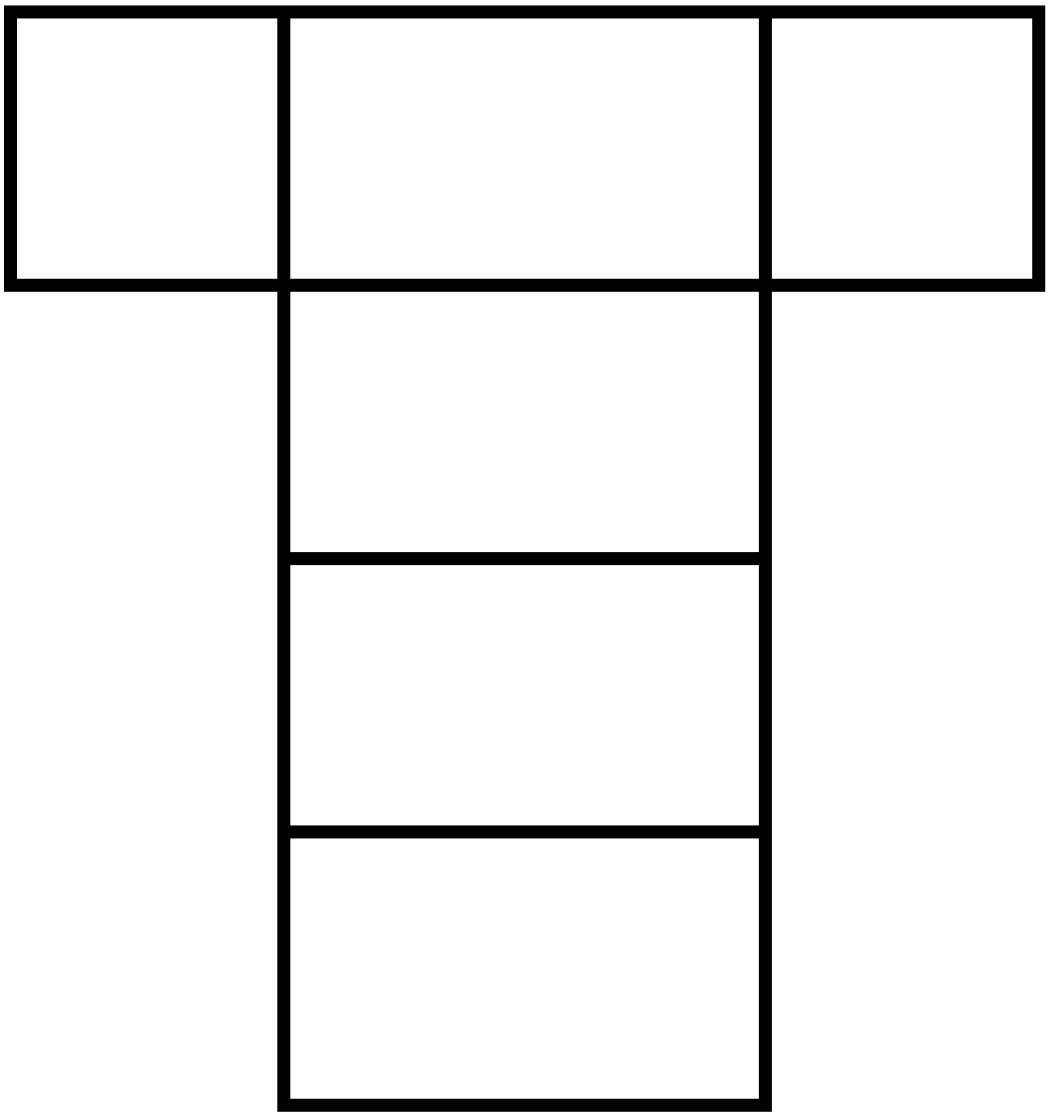
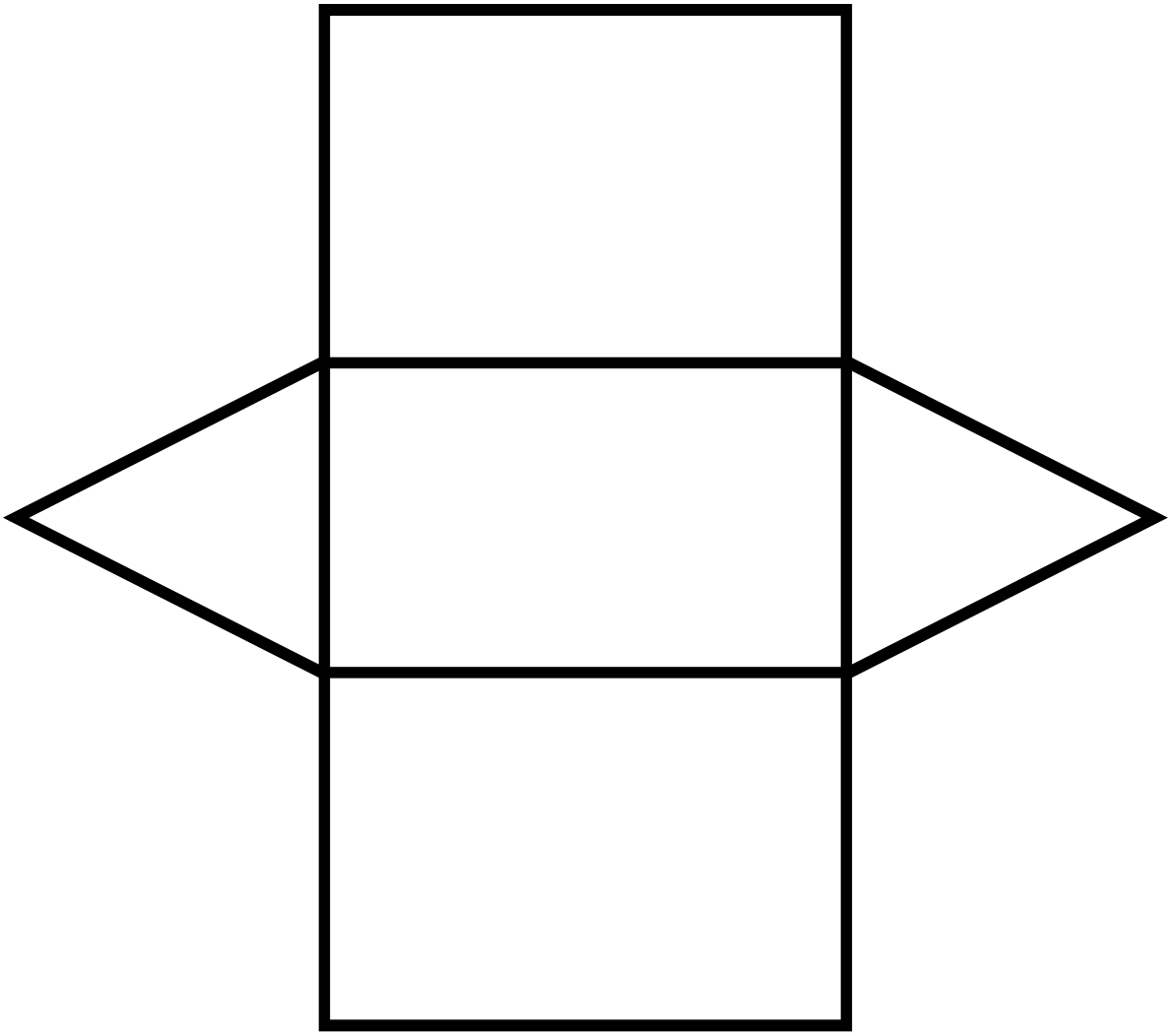


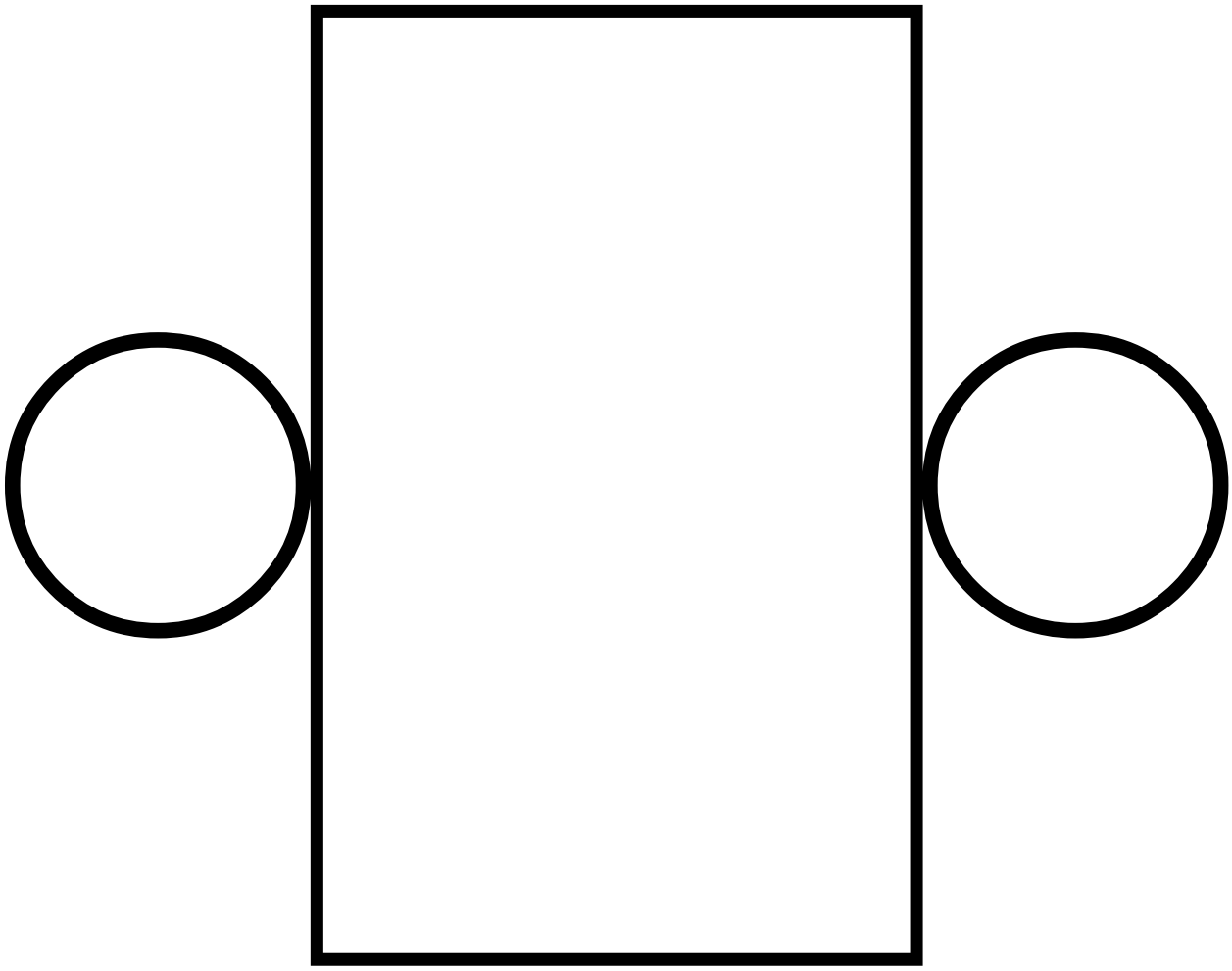
Net of a Rectangular Prism



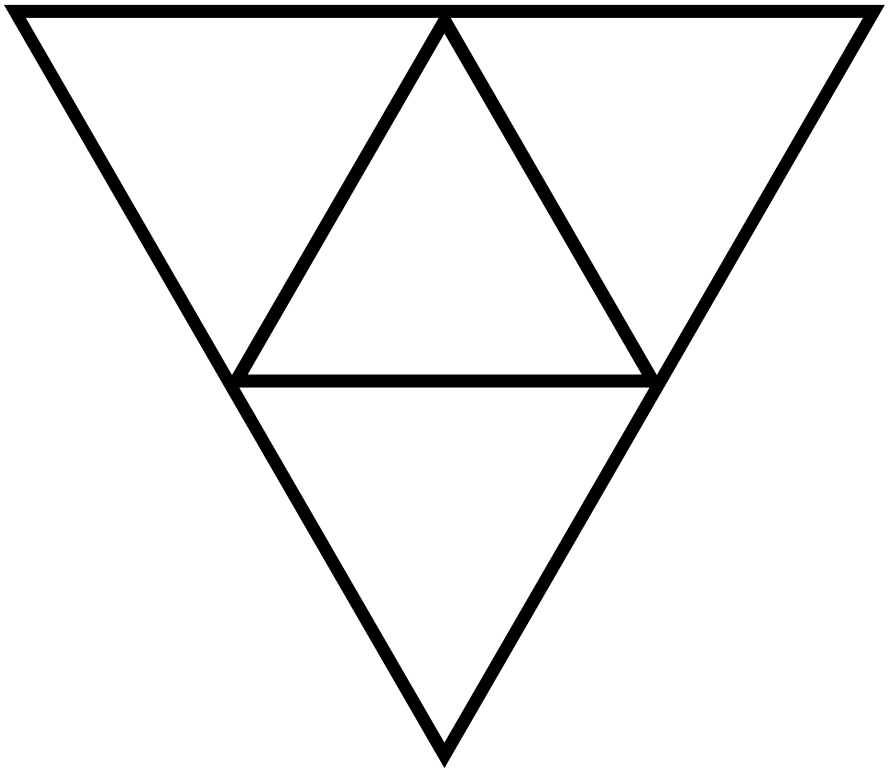
Net of a Triangular Prism



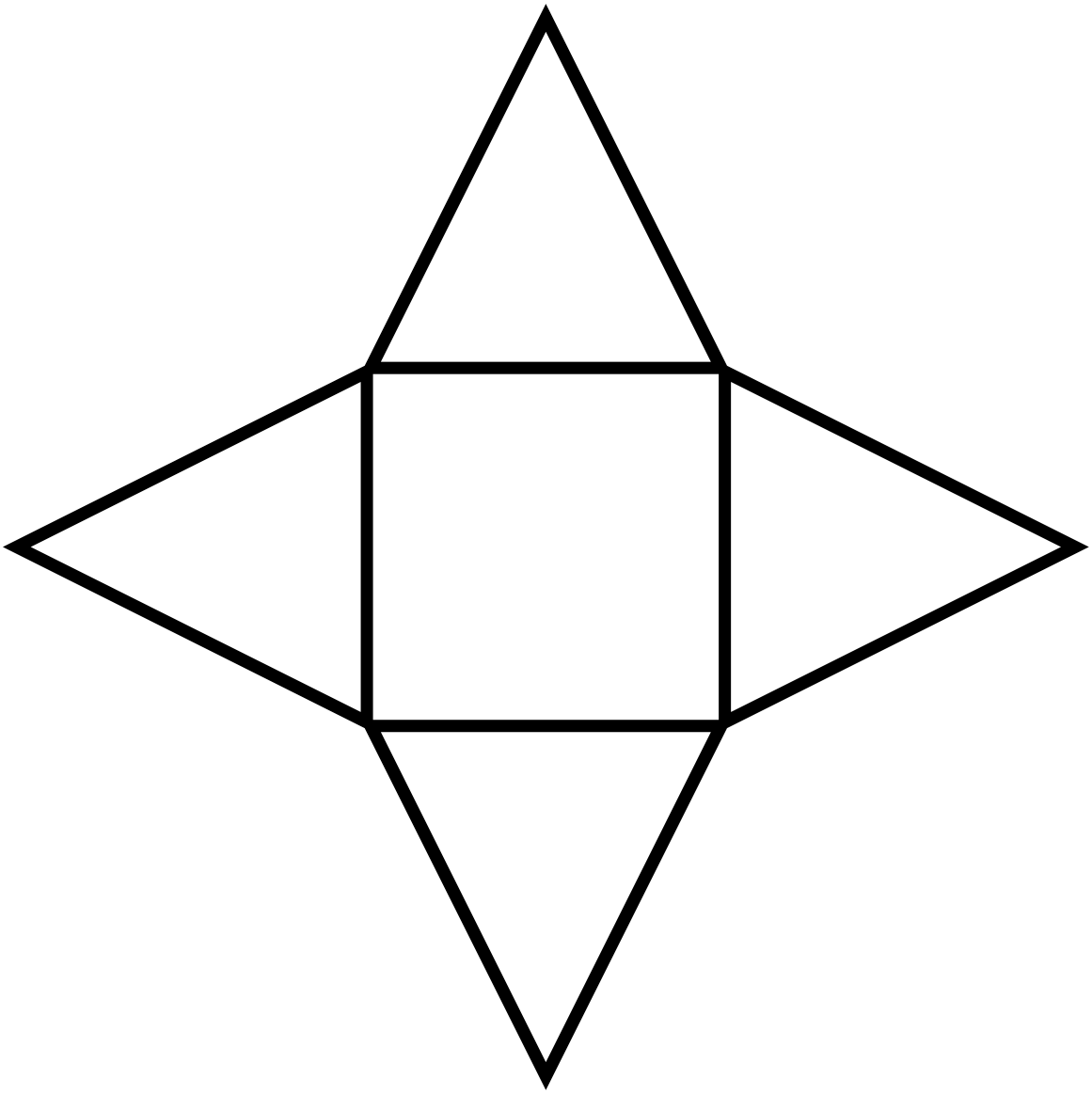
Net of a Cylinder



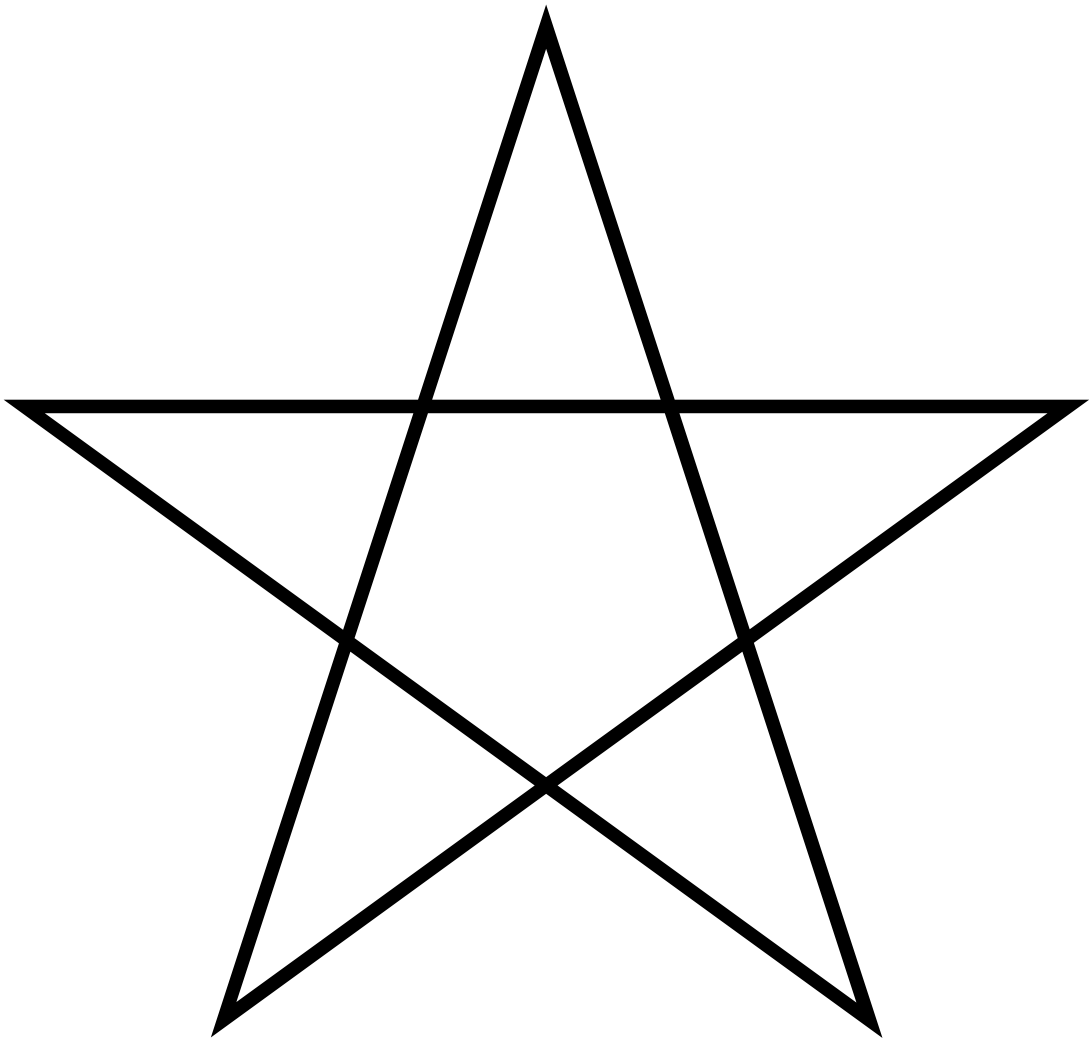
Net of a Triangle-Based Pyramid



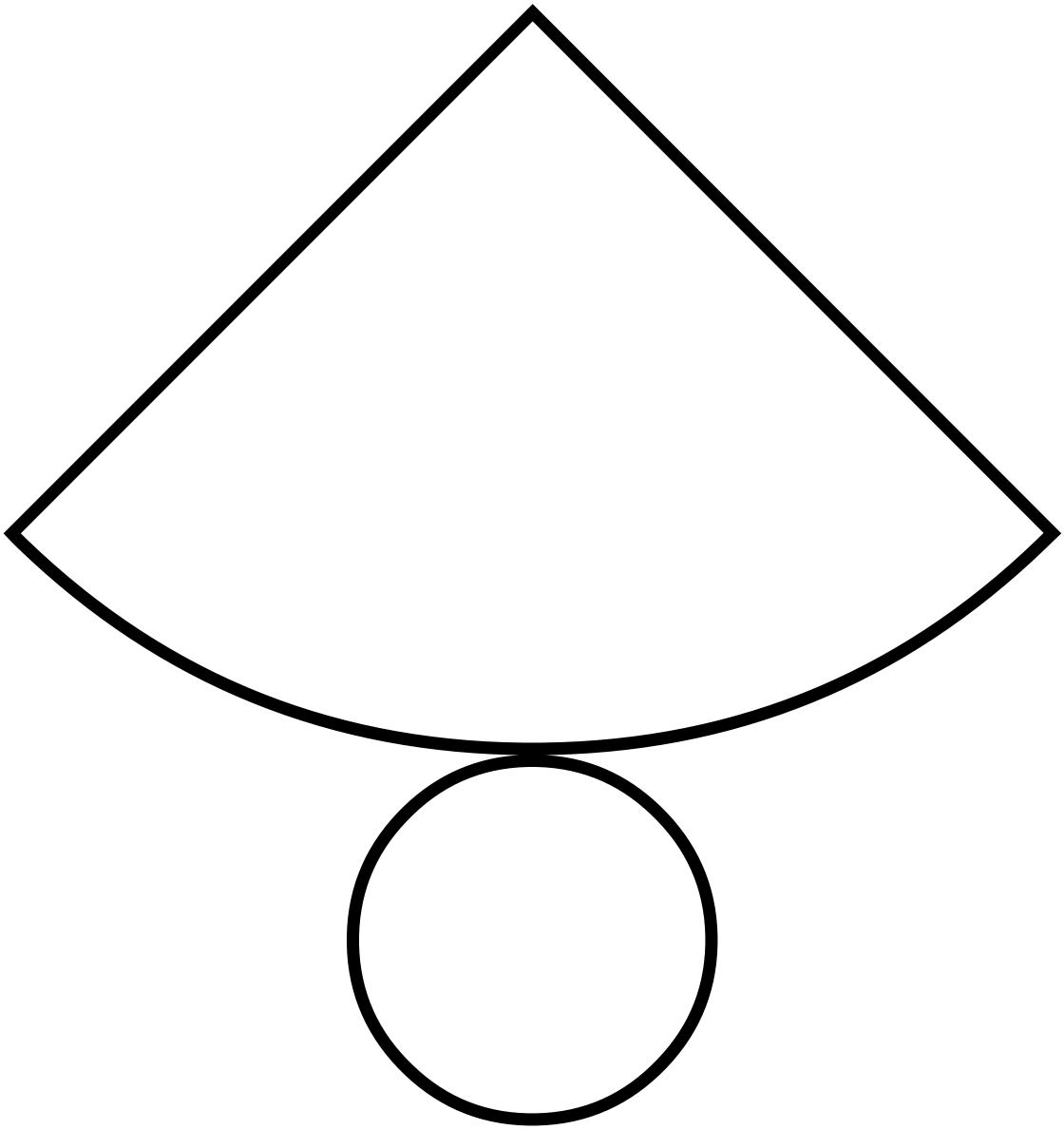
Net of a Square-Based Pyramid



Net of a Pentagon-Based Pyramid



Net of a Cone



Lesson Plan: Art Expression

Name of Lesson: Art Expression

Learning (TEKS) Objective:
7.6 (A) Distinguish between physical and chemical changes in matter.

Language (ELPS) Objective:
19 TAC 74.4(c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.
19 TAC 74.4(c)(4)(C) develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures.

Student Outcome:
Students will be able to identify whether an act is a physical or chemical change by performing the act and using key vocabulary.

Day of the Week and Time:

Total Length of Lesson: 105 minutes

Materials (per student), include copies of handouts, paper for foldables, etc.:

- Origami paper
- Multi-color Text weight paper
- Scissors (per students)
- Tie dye kit (per class)
- Shirt (per student)
- Rubber bands (3 per students)
- Ice (optional)
- Paper Towels
- Plastic bags (six)
- Protective gloves (pair per students)

Technology Required (put video, website, etc. links here):

- Electronic device to look up examples or designs of paper origami and designs for tie dye .

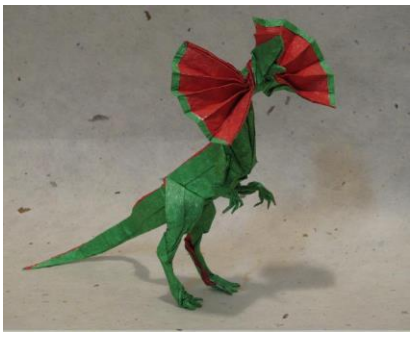
What needs to be prepared/set up ahead of time:

- Examples for paper origamis
- Prepare paper origami material
- Prepare/activate the tie dye kit
- Prepare the workplace with bags

How to accommodate activities for students who are English Language Learners/ have trouble focusing

- Visual aids (examples of paper origami and tie dye shirt)

Activity 1 **Duration:** 10 minutes	**Notes to Teacher:**
Introduction to physical and chemical change. -On the white board/ Electronic board: ● Divide into two sections by drawing a line down the middle. ● Label the left-side Physical Changes. Then label the right-side Chemical Changes.	Prepare probing questions

● Identify what physical changes and chemical changes are and examples… ○ Physical changes: ■ are changes that result in a difference in display without changing the composition (without changing its identity) ■ common changes include: texture, shape, change of state (Boiling point/ Melting point) ■ Example: tearing paper, chewing food, freezing water. ○ Chemical changes: ■ are changes that occur when the substance's composition is changed. When bonds are broken and new ones are formed a chemical change occurs. ■ indicators of chemical changes: changing temperature, color, noticeable odor, formation of a precipitate or bubbles. ■ Example: burning wood, roasting a marshmallow ● Allow students to provide examples. Conduct a discussion with students' responses . (Examples of physical and chemical change.)	
Activity 2 **Duration:** 8 minutes Explanation of origamis being a physical change   Demonstrate example of origamis	Example of origamis. Prepare material.
Activity 3 **Duration:** 45 minutes Students research what origami they want to do. Students complete their own origami.	Monitor students
Activity 4 **Duration:** 2 minutes Class discussion- Wrap up on how this is an example of a physical change.	Lead class discussion
Activity 5 **Duration:** 8 minutes Explanation of tie dye ● Set up work surface: Protect work surface with plastic table cover. ● Prewash fabric: Prewash fabric to remove sizing. **Do not use fabric softener or dryer sheets**. Choose the desired technique. If using wet technique, use directly from the washer. If using dry technique, first dry fabric in dryer.	Prepare the work place. Examples of tie dye shirts. Provide options! Distribute the tie dye colors.

<table>
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- **Mix dye:** wearing protective gloves, add water to dye bottle, filling to line. Replace cap tightly. Shake until dye is dissolved. Use full strength for intense colors. For a lighter shade of color, add more water using extra bottle if needed. Apply dye within 24 hours after mixing. Dye left unapplied after 24 hours will begin to lose concentration and will result in noticeably weaker color intensity.
- **Dry fabric:** apply dye on fabric, checking to make sure dye has penetrated into folds. Do not oversaturate fabric. If dye is applied too close together, the colors may become muddy.
- Wrap, let set, rinse: cover dyed fabric with plastic wrap to keep damp. Let set 6-8 hours or longer for most intense colors. Rinse well with water until the excess dye is removed. Cut rubber bands. wash.

</td><td></td></tr>
<tr><td>Activity 6 Duration: 25 minutes</td><td rowspan="2">Monitor students.</td></tr>
<tr><td>Students research what tie dye design they want to do.
Students complete their own tie dye shirt.</td></tr>
<tr><td>Activity 7 Duration: 2 minutes</td><td rowspan="2">Lead a class discussion to wrap up</td></tr>
<tr><td>Class discussion- Wrap up on how this is an example of a chemical change.</td></tr>
<tr><td>Activity 8 Duration: 5 minutes</td><td rowspan="2">Pick up</td></tr>
<tr><td>Students pick up.</td></tr>
</table>

Lesson Plan: Cracking Codes with DaVinci

Name of Lesson: Cracking Codes with DaVinci

Learning (TEKS) Objective:

(6)(5)(A) represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions. (B) solve real-world problems to find the whole given a part and the percent, to find the part given the whole and the percent, and to find the percent given the part and the whole, including the use of concrete and pictorial models

Language (ELPS) Objective:

19 TAC 74.4(c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.

19 TAC 74.4(c)(4)(C) develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures.

Student Outcome: *Students will be able to… calculate the ratios or proportions of given samples and represent the final answer using the Babylonian numbering system.*

Day of the Week and Time:

Total Length of Lesson: 45 mins

Materials, include copies of handouts, paper for foldables, etc.:

- **Handout of The Rule of Three and Percent Portion (located at the end of the document)**
- **Handout of the Crack the Code Challenge Activity (located at the end of the document)**
- **Handout of the Code Key to find out what is the next time that everyone will travel (located at the end of the document)**
- **Clay for 120 students**
- **1 chopstick (like the ones they give you on the sushi; sharp corners)**
- **200 chocolate coins (this is for all 120 students)**

Technology Required (put video, website, etc. links here):

- Renaissance and Babylonian Remix Music in the background
- Projector/promethean board/elmo (to show how to write on the clay)

What needs to be prepared/set up ahead of time:

- A bag of gummies (at least 30 gummies)
- Markers for the whiteboard
- Renaissance and Babylonian Remix Music in the background (during the activity 2)
- Have the squares of clay cut and ready for each student

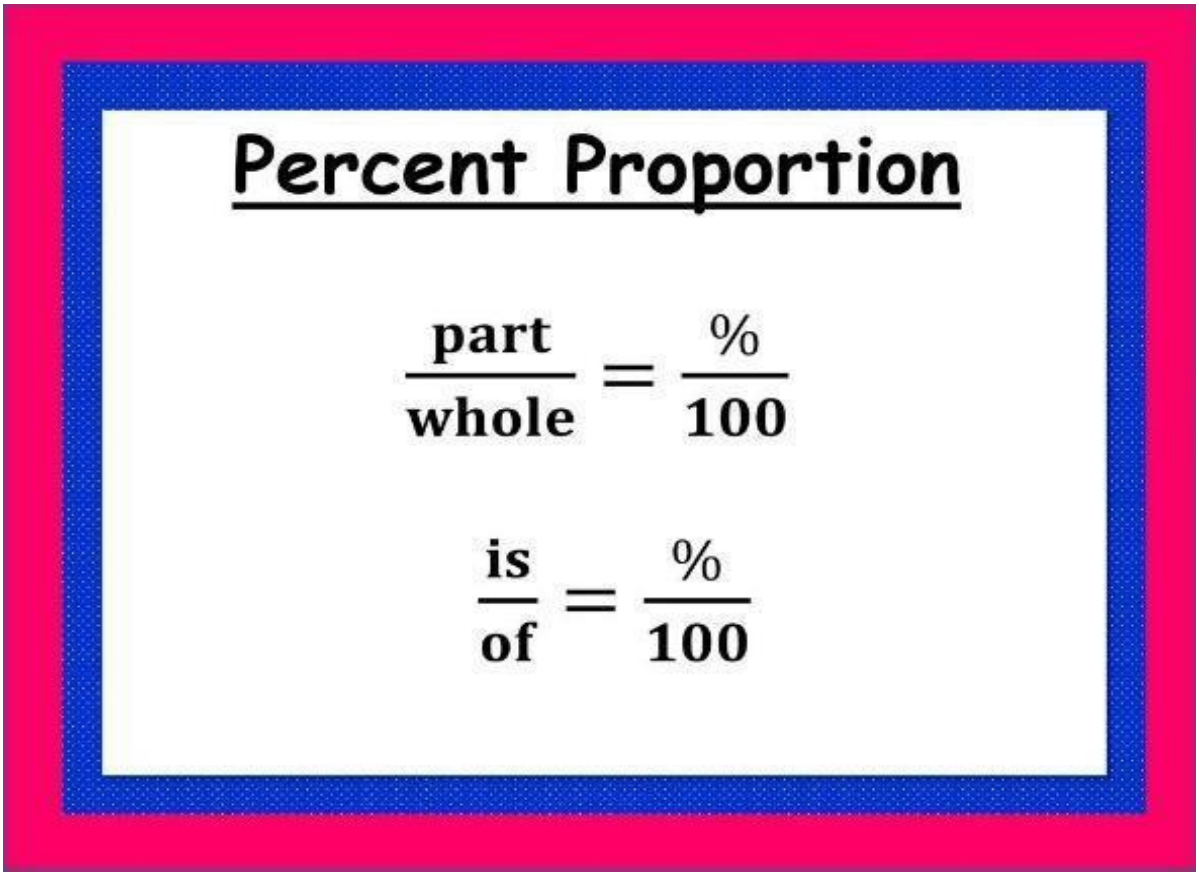
How to accommodate lesson for students who are English Language Learners or have trouble focusing

- Guided demonstration
- Visual representation of instructions
- Sentence stems
- Anchor chart of mathematical steps

Activity 1: Introduction **Duration: 5 minutes**	**Notes to Teacher:**
The teacher explains how the Renaissance period was (briefly explain the culture: music, art, fashion) then explains how mathematics took a major relevance during that period in a typical day of Renaissance: "Symbols and graphs were created during this period and Math was useful to keep on track of animals or bundles of food. Popular food during the Renaissance period for Northern Europeans: Beer, Ale, Cider, Butter. Lower classes: Beans, cabbage, garlic, grains, vegetables, onions."	
Activity 2: Lesson **Duration: 10 minutes**	Teacher should make sure to use the whiteboard while explaining The Rule of Three and Percent Proportion
The teacher proceeds to explain The Rule of Three and Percent Proportion by introducing the example of "wanting to share gummies with someone." (Why gummies? During the Renaissance Period, gummies were the popular candies.) Teacher: "Okay, everyone, so let's say that I have this bag of 30 gummies, and I would like to give half of my gummies to one of you (proceeds to pick a student), so...how many gummies will this student receive if I want to give it the half of it? Students: "15 gummies" Teacher: "Correct, because the half of 30 is 15, right?" Students: "Right!" Teacher: "My whole bag of gummies contains 30 gummies, right? When talking about proportions, a whole represents 100%, so this means that the 30 gummies represent…what percentage?" Student: "100%" Teacher: "Correct…so if 30 gummies are 100%, then 15 gummies (which is half of the 30 gummies, what is the percentage of those 15 gummies?" Student: "50%" Teacher: "Exactly! Very good! Now I will give each one of you a handout of The Rule of Three and Percent Proportion (Teacher proceeds to give the handout) You all did not notice, but, you all used the Percent Proportion rule to know the percentage of the 15 gummies…but now, what if, instead of asking for the percentage of 15 gummies, what if this time I want to give 12 gummies to another student (proceeds to pick another student) What percentage represents the quantity of 12 gummies that I want to give to your classmate? (Proceeds to solve the problem on the whiteboard)"	
Activity 3: Salad for Da Vinci **Duration: 50 minutes**	Teacher should give per table the handout with the challenge activity.
Teacher: "Now, look around to the people that are at your table, these people will be part of your team for the following activity. You all will have to complete the following challenge (proceeds to briefly explain the problem, and starts to give per table a handout with the challenge activity) Once you all finish the challenge activity, please one per team, needs to give me the handout all solved to be able to jump into the next period, but first, you all will need to crack a code…" (Teacher proceeds to explain the importance of cracking codes: "Most famous code breakers in history have been mathematicians who have been able to use quite simple Math to uncovered plots, identify traitors, and influence battles. For math, you develop skills such as critical and analytical thinking. It generates a sense of constructing logical arguments and expose non logical arguments as well.")	

Activity 4: Crack the Code **Duration: 10 minutes**	Teacher should give per table the handout with the cracking the code activity.
Once everyone is done, the teacher will proceed to give the last handout that is related to the results of the Challenge Activity. The first team to get the message right, will get a basket prize theme of the Renaissance. BASKET PRICE: Chocolate coins for everyone and the one that finishes first will have the Renaissance Basket.	

Percent Proportion Handout



"Crack the Code Challenge" Handout

The problem that students could solve for this lesson to crack a code, it could be the following problem:
After painting the Mona Lisa, Leonardo Da Vinci wanted to take a small break. He wants to eat a salad with melons (how odd, isn't?) However, he noticed that he doesn't have his 36 melons, 24 carrots, and 18 lettuces. Now he has 12 melons, 6 carrots, and 3 lettuces.
Answer:

A. **What percentage of melons were stolen?**
B. **What percentage of carrots were stolen?**
C. **What percentage of lettuce was stolen?**

If Leonardo wants to share the 25% of his salad that he made to his friend, how many melons, carrots, and lettuces should he share if his salad contains 3 melons, 2 carrots and one lettuce?
Melons:
Carrots:
Lettuce:

“Code Key” Handout

►=10

1=1

Lesson Plan: Build a Boat

Name of Lesson: Build a boat

Learning (TEKS) Objective: 112.18.(a)(6)(B) calculate density to identify an unknown substance.

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(H) understand implicit ideas and information in increasingly complex spoken language.

Student Outcome: *Students will be able to use the density formula to calculate the density of wood and metal blocks and will use the principle of buoyancy to construct boats.*

Day of the Week and Time

Total Length of Lesson: 1 hour 30 min

Materials include copies of handouts, paper for foldables, etc.:

- **Cardboard (7.5 in x 7.5 in)**
- **Duct Tape**
- **Sheets of copy paper**
- **Plastic tablecloths**
- **Scissors**
- **5 iron metal cubes (1in)**
- **5 pine wood cubes (1in)**
- **1 plastic round jar (54 oz)**
- **Water pump blasters**
- **Plastic kiddie pools or container to hold water**

Technology Required (put video, website, etc. links here):

None

What needs to be prepared/set up ahead of time:

- Have the pool of water ready for students to test their ships.
- Have all the building supplies ready to be passed out to students.

How to accommodate activities for students who are English Language Learners or have trouble focusing

- **Guided demonstration**
- **Visual representation of instructions**
- **Sentence stems**

Engage **Duration:**	**Notes to Teacher:**
Demonstrate the idea of density using wood and metal blocks in water. Using a clear container, fill it with water. The teacher will drop a metal cube block in the water. Next, the teacher will drop a wooden cube block. Ask the class why one block sunk but the other floated and initiate a discussion.	
Explore **Duration:**	

Point out to the class that although the two blocks were the same size (volume), their material was different. Metal has atoms that are closely packed together so it will have a greater mass inside the same volume as the wooden block.	
Explain **Duration:** Explain that materials with a greater mass in the same volume will have a higher density. The difference in density is the reason why the metal cube sank while the wooden cube floated. Since metal is denser than water, the upward thrust of the water molecules could not oppose the weight of the block so it sank, but the wooden block was light enough to be supported by the upthrust. Density allows scientists to study the science of buoyancy.	
Extend **Duration:** Using the idea of buoyancy, explain to the class that cardboard has a lower density than water so they will be using a combination of materials including cardboard to construct boats. The boats must be stable enough not to sink but also movable enough to get from one side of a water pool to the other. After all groups have completed their boats, the class will go outside to a pool of water and place their boats on top. Teams will race their boats to the other side using water guns/pumps	The students can compete for who has the fastest ship and whose ship supports the most weight
Elaborate/Evaluate **Duration:** As students complete their boats, have them document their plans in their journal and write down ways that they incorporate buoyancy into their boat design	

Lesson Plan: Constellations

Name of Lesson: ***Constellations***

Learning (TEKS) Objective:

112. 28. (b)(9)(B) Earth and space. The student describes the characteristics of the universe and the relative scale of its components: categorize galaxies as spiral, elliptical, and irregular.

Language (ELPS) Objective:

19 TAC 74.4(c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.

19 TAC 74.4(c)(4)(C) develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures.

19 TAC 74.4(c)(4)(F) use visual and contextual support and support from peers and teachers to read grade appropriate content area text, enhance and confirm understanding, and develop vocabulary, grasp of language structures, and background knowledge needed to comprehend increasingly challenging language.

Student Outcome: *Students will be able to…* describe the life cycle of stars, compare, and classify stars using the Hertzsprung-Russell diagram, and create a representation of the identified constellation.

Day of the Week and Time:

Total Length of Lesson: 75 – 90 minutes

Materials (per student), include copies of handouts, paper for foldables, etc.:

- **Laptop**
- **Light emitting diode**
- **Copper tape**
- **Button batteries**
- **Cardboard**
- **Paint**
- **Paint brushes**

Technology Required (put video, website, etc. links here):

- https://www.youtube.com/watch?v=o7TjUW1yUL0
- https://www.youtube.com/watch?v=--MGQNhVs3s
- https://docs.google.com/presentation/d/16Cre3iZlWvMdSFsVBASO-DzuctYWcaS-HYDDKtygHso/edit?usp=sharing

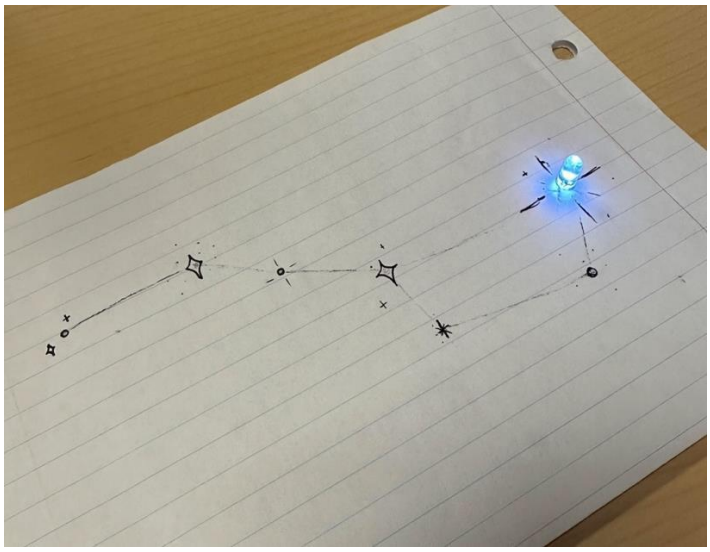
What needs to be prepared/set up ahead of time:

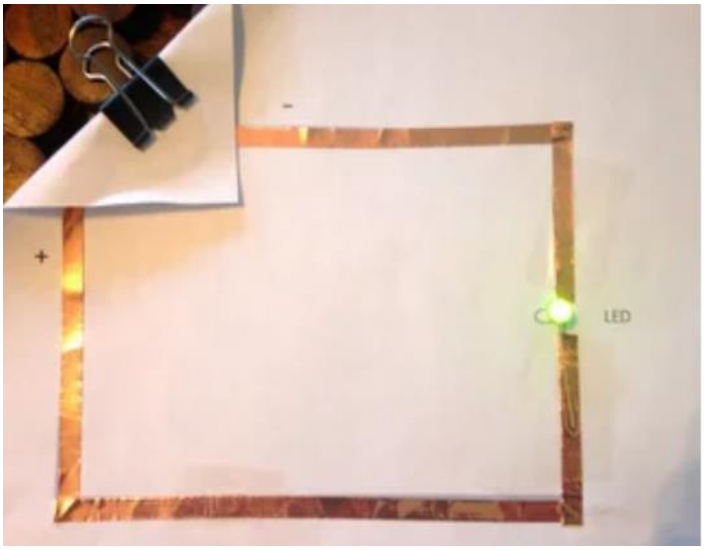
- Example of end result (located at the end of the document)

How to accommodate activities for students who are English Language Learners or have trouble focusing

- Visual representation of end product
- Access to visual representation of instructions
- Key terms and vocabulary list
- Sentence stems

Introduction **Duration: 2-5 minutes**	**Notes to Teacher:**
Begin class by asking students what stars are? Go around class and discuss what our thoughts are, do we have any examples of what they could be.	
Information of Lesson **Duration: 10-15 minutes**	
Now move into the idea of what constellations are. Show class video : https://www.youtube.com/watch?v=--MGQNhVs3s Let's look at the Big Dipper, and explain a short summary of its origin. Look at what stars make up the constellation.	
Activity **Duration: 1:00-1:15 minutes**	
Individually, students will recreate a given constellation using the materials. On a piece of cardboard they will paint one side black (or their preference of night sky). Poking holes, they will allow for diode bulbs to show through on the painted side, while on the back they will wire with copper tape, connecting the circuits. Powering with a button battery. Must also highlight one star that is part of their constellation and provide its name, type, and where it is on the Hertzsprung-Russell diagram.	Little dipper Leo Cancer Gemini Cunis Minor Cunis Major Aries





Lesson Plan: Painting Galaxies

Name of Lesson: Painting the Galaxies

Learning (TEKS) Objective:

112. 28. (b)(9)(B) Earth and space. The student describes the characteristics of the universe and the relative scale of its components: categorize galaxies as spiral, elliptical, and irregular.

Language (ELPS) Objective:

19 TAC 74.4(c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.

19 TAC 74.4(c)(4)(C) develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures.

19 TAC 74.4(c)(4)(F) use visual and contextual support and support from peers and teachers to read grade appropriate content area text, enhance and confirm understanding, and develop vocabulary, grasp of language structures, and background knowledge needed to comprehend increasingly challenging language.

Student Outcome: *Students will be able to… create a visual demonstration of galaxy types using acrylic paint on black canvasses.*

Day of the Week and Time:

Total Length of Lesson: 50 – 70 min

Materials (per student), include copies of handouts, paper for foldables, etc.:

- **Painting canvas or cardboard (7 in x 5in)**
- **Wooden stencils**
- **Acrylic paint of assorted colors**
- **Painting brushes**
- **Plastic tablecloths**

Technology Required (put video, website, etc. links here):

- ➔ https://docs.google.com/presentation/d/16Cre3iZlWvMdSFsVBASO-DzuctYWcaS-HYDDKtygHso/edit?usp=sharing (same presentation used in the previous lesson plan, located before this document)
- ➔ YouTube video link: https://www.youtube.com/watch?v=rKexqK3UKdE

What needs to be prepared/set up ahead of time:

- Pre-selected constellations, these can be printed copies or found through online sources.
- Pre-measured acrylic paint to minimize waste.
- Distribute painting brushes to groups.

How to accommodate activities for students who are English Language Learners or have trouble focusing	
• Visual representation of final product • Sentence stems • Vocabulary cards or key terms	
Engage **Duration: 6 min**	**Notes to Teacher:**
Demonstrate the different galaxy types with a video Play the Youtube video for the class.	
Explore **Duration: 5 min**	
After playing the video ask the students how we tell the different galaxies apart such as through appearance or physical features seen in the video.	
Explain **Duration: 5 min**	
Point out the different features of the galaxies to the students, ensuring they understand the key differences of each galaxy type, such as: the bulge, disc, and halo of spiral galaxies, the oval shape of elliptical galaxies, or the lack of distinct shape in irregular galaxies.	
Extend **Duration: 30 min**	
Tell the class that each student will be painting one of the galaxy types on a black canvas using acrylic paint. The students can use any color they like, but their painting should incorporate the features of that galaxy.	
Elaborate/Evaluate **Duration: 8 min**	
Have students write down in their journals what galaxy they painted and what features distinguish it from other galaxies.	

PRESENT

Lesson Plan: The Power of Hexagons

Name of Lesson: The Power of Hexagons

Learning (TEKS) Objective: 112.26 (b)(2)(D) Scientific and engineering practices: evaluate experimental and engineering designs.

Language Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(H) understand implicit ideas and information in increasingly complex spoken language.

Student Outcome: *Students will be able to… construct a model using the shape of hexagons to support up to 100 lbs of weight.*

Day of the Week and Time

Total Length of Lesson: 40 - 55 mins

Materials , include copies of handouts, paper for foldables, etc.:

- **Rolls of tickets, 40 tickets per student**
- **Packing Tape**
- **Pairs of scissors for each group of students**

Technology Required (put video, website, etc. links here):

- **PowerPoint presentation (located at the end of this document)**

What needs to be prepared/set up ahead of time:

- PowerPoint presentation posted.
- Building supplies ready to be handed out.

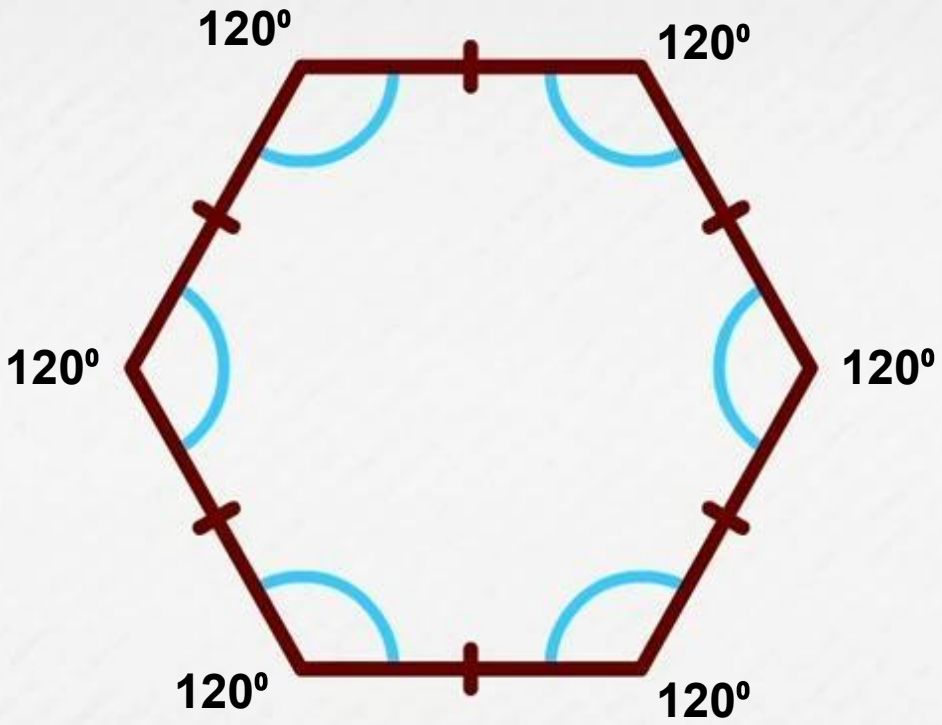
How to accommodate activities for students who are English Language Learners or have trouble focusing

- Provide sample of final product.
- Concise instructions with demonstration of steps.
- Sentence stems

Engage **Duration: 2 mins**	**Notes to Teacher:**
Introduce the hexagon shape and how it has a wide variety of uses in nature and engineering. Since hexagons have 120-degree angles, it best minimizes the perimeter for a given area, which means that the pull of surface tension in each direction is mechanically stable. In fact, when bees make their honeycombs, the initial shape is circular, but the surface tension of the honey causes the hexagonal shape we are familiar with.	

Explore	**Duration: 3 mins**	
Ask the class where else they have seen hexagons in nature or in products they use. Hexagons are also seen in common snowflake patterns and the Giant's Causeway in Northern Ireland.		
Explain	**Duration: 3 mins**	
Point out to students that since hexagons are a mechanically stable shape with a high surface area-to-perimeter ratio, the 6-sided shape is ideal for weight distribution in engineering. For example, the James Webb telescope launched by NASA scientists utilizes the hexagonal shape for the telescope's lens (as opposed to the typical circular shape) that enables far greater resolution pictures to be taken of the universe than compared to the Hubble Telescope.		
Extend	**Duration: 25 mins**	**Detailed instructions with pictures are available in the linked PowerPoint above, also located at the end of this document.** **Have students test the weight of their hexagon chains by constructing shields with them. Provide students with extra tape and tickets to design the handle and shield.**
Have students form groups of 2-3 students. Each group will be given 6 strips of 8.5 tickets and a roll of packing tape. The students will fold the tickets in half to form square-like patterns along each strip of tickets. After all the strips have been folded, the students join two stripes together to form a chain of hexagons. This is repeated for the other 4 strips. Once the hexagon chains have been made, they are stacked on each other and taped all around using the packing tape to create a sheet of hexagons. Students will experiment using books with a weight on top to see how much weight can be supported until failure.		
Elaborate/Evaluate	**Duration: 7 mins**	
After the activity, students write down in their journals what the maximum weight their hexagon creation supported and how they designed their contraption.		

The Power of Hexagons



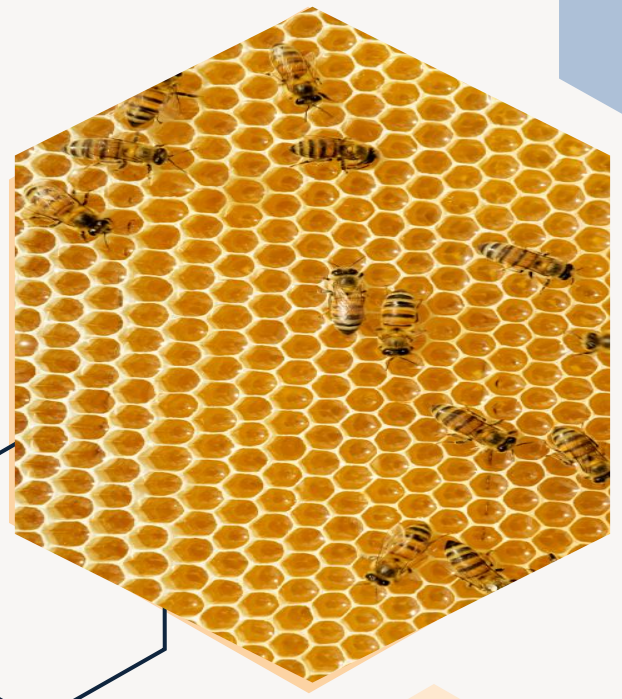
Convex hexagons

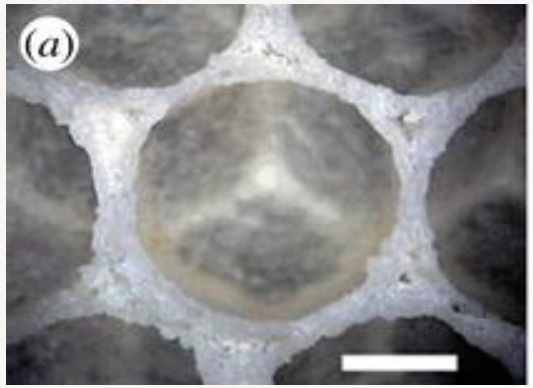
Regular Hexagon

Equilateral Hexagons

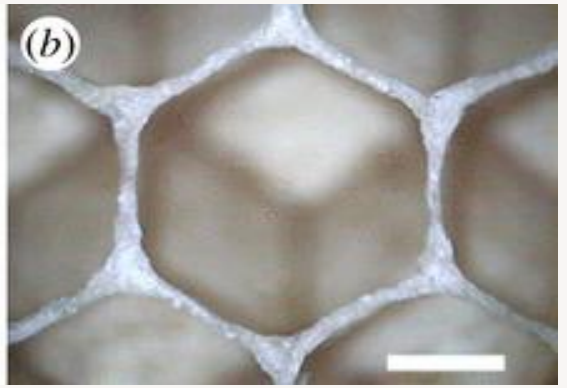
- 6 straight sides of equal length
- 6 congruent interior angles

Hexagons in nature





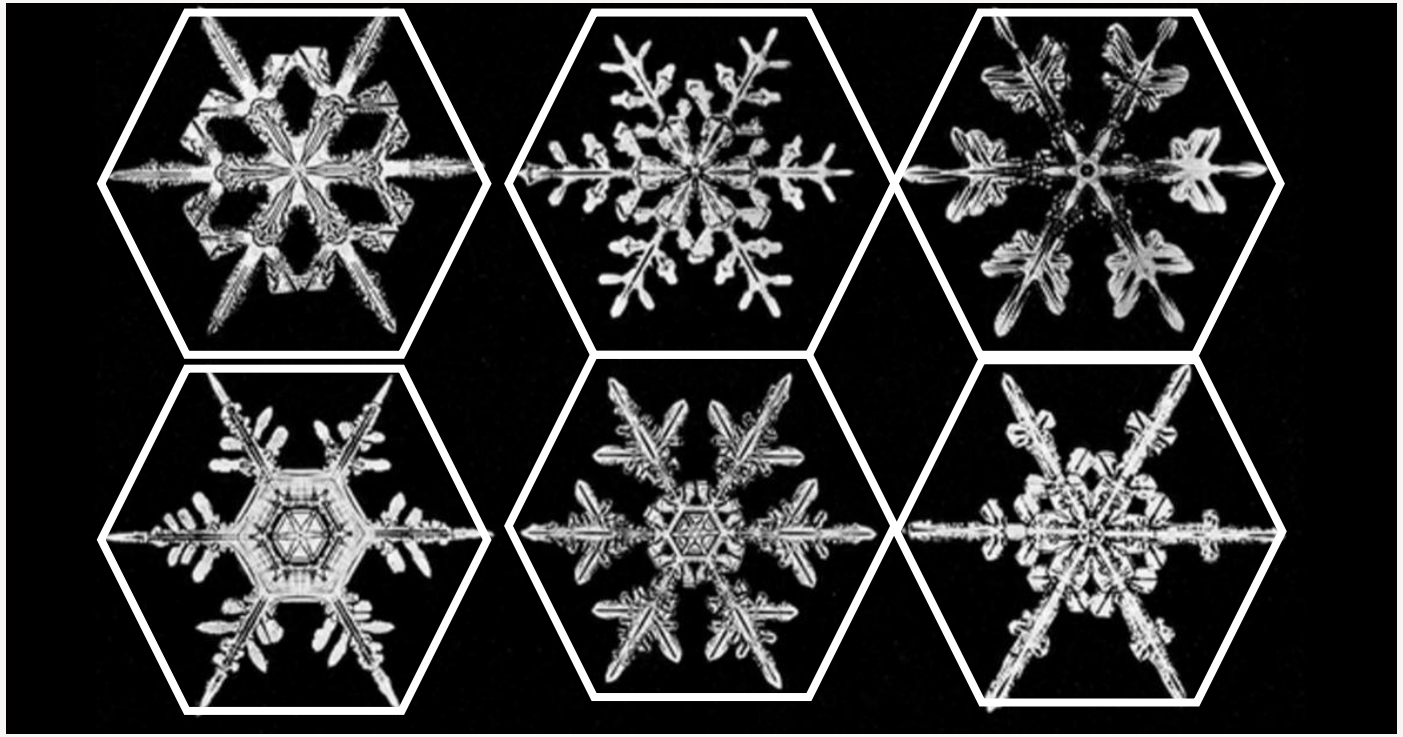
Circular honeycomb cell



Hexagon shape forms after honey is added to the cell

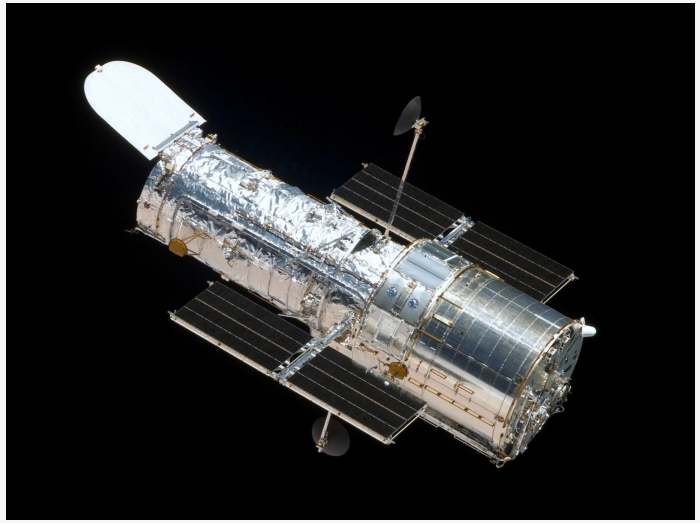
Since hexagons maximize area while minimizing the perimeter, it is the ideal shape for saving space and adding mechanical stability to a structure

Hexagons in nature

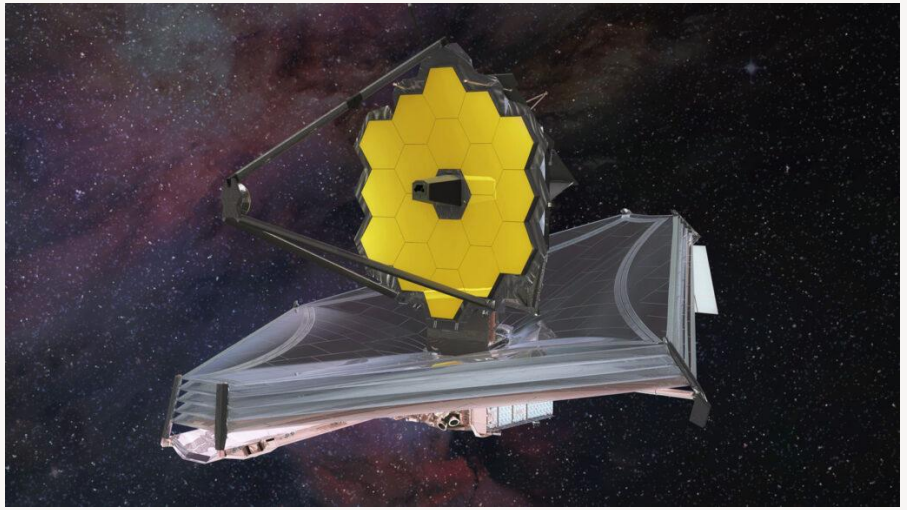


A hexagonal shape can be seen in common snowflakes. The six-arms of snowflakes are made by ice crystals when water vapor freezes onto a dust or pollen particle

Hexagons in Engineering



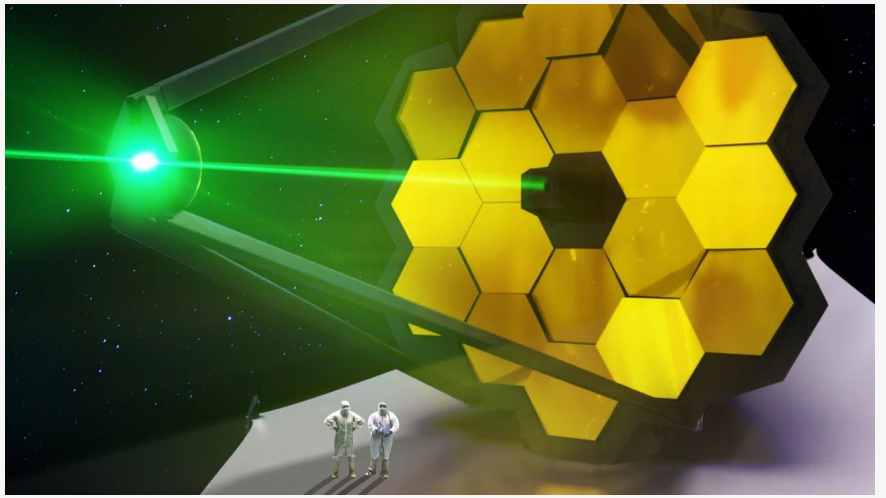
The Hubble Space Telescope launched in 1990 by NASA



The James Webb Telescope launched in 2021

Hexagons in Engineering

Circular lens mirror used in the Hubble space telescope

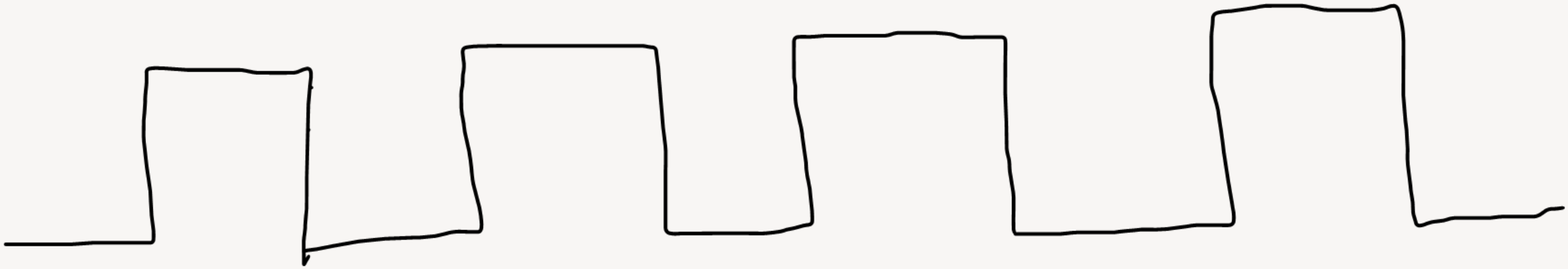


Hexagonal lens used in the new James Webb telescope

Since the James Webb telescope lens uses hexagons instead of circles, the increased surface area allows for greater resolution images to be taken

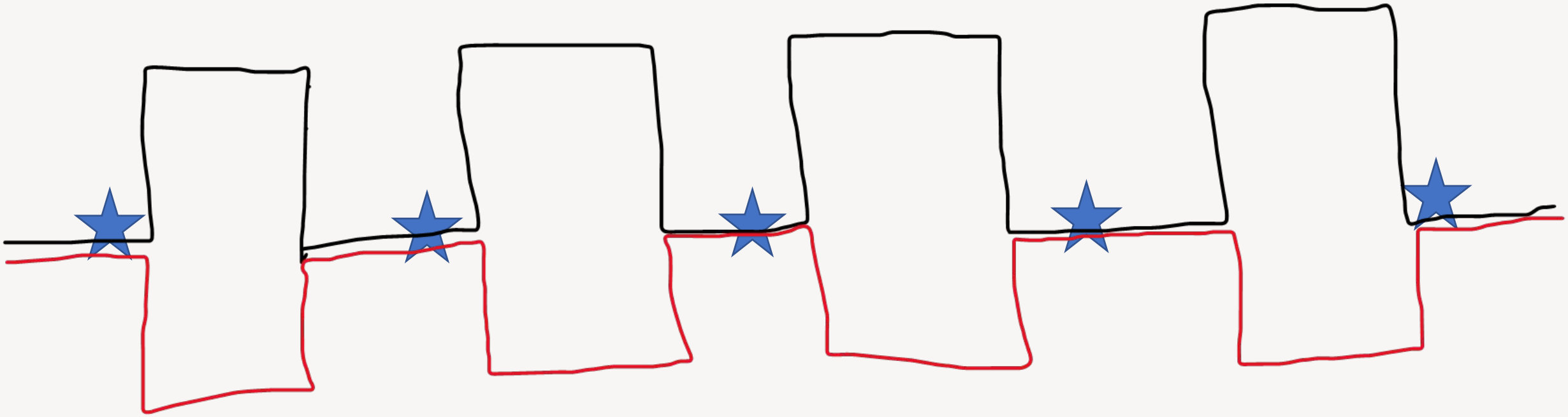
Today's challenge:

- **In groups of 2-3 students, fold your strips of tickets in half until all the tickets are folded**
- **Take each strip of folded tickets and create the structure seen below**



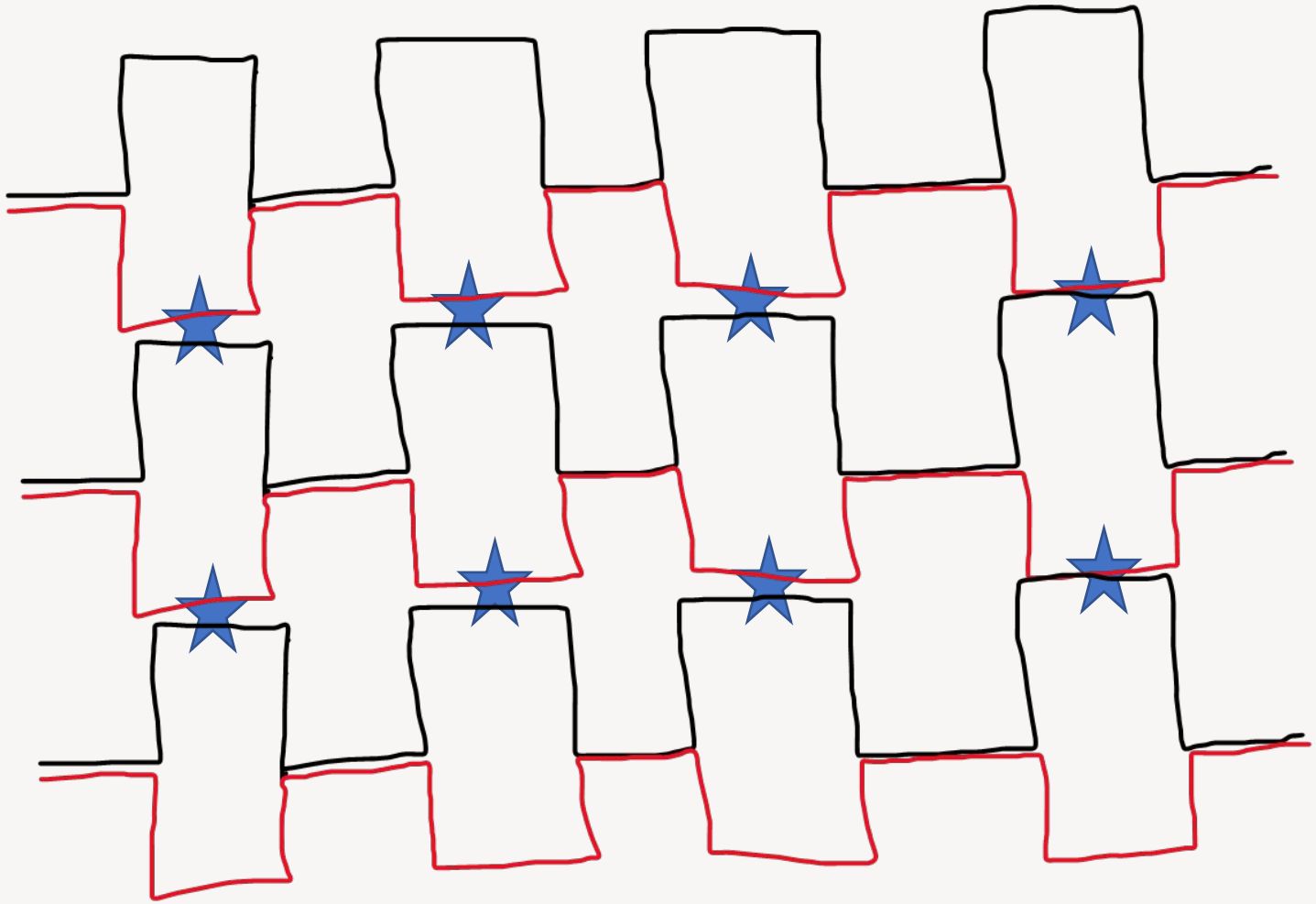
Today's challenge:

- Next, place two strips together in the manner shown below
- Tape the stripes together using the packing tape. Place tape where the blue stars are located
- Repeat for the other four stripes



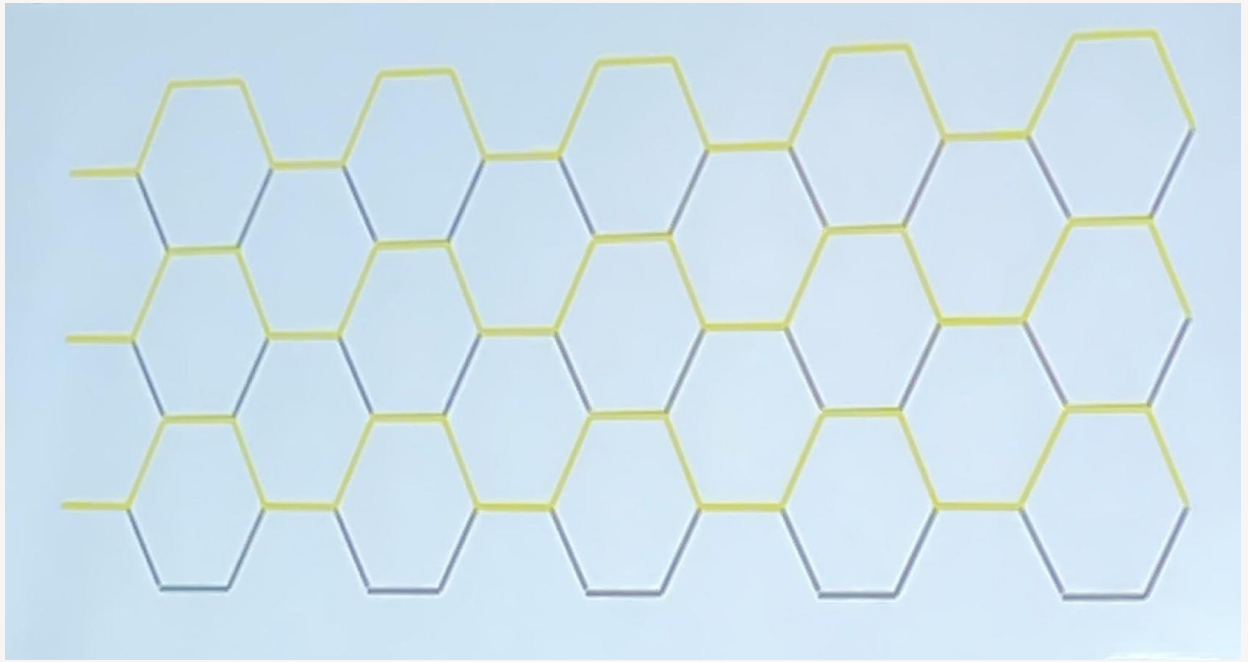
Today's challenge:

- **Now tape all the stripes together. Place the tape where the blue stars are located**



Today's challenge:

- **Finally, apply tape to close the cells.**
- **The finished product should like a sheet of hexagon cells**
- **Test your designs using books with a weight on top and observe the failure mode**



Lesson Plan: Periodic Table Battleship

Name of Lesson: Periodic Table Battleship

Learning (TEKS) Objective: 112.20 (b)(5)(C) Interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements.

Language Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.

Student Outcome: *Students will be able to… analyze and describe information on a periodic table square.*

Day of the Week and Time:

Total Length of Lesson: 45 minutes

Materials include copies of handouts, paper for foldables, etc.:

Periodic table battleship board (1 per student)

- To create the board:
  - manila folder (1 per student)
  - printed periodic tables (2 per student)
  - page protectors (2 per student)
  - Stapler
  - Periodic table battleship instruction (1 per partners)
  - Expo markers (1 per student)
  - Paper towels or expo erasers (1 per students)
  - Paper clips (1 per students)

Technology Required (put video, website, etc. links here):

- N/A

What needs to be prepared/set up ahead of time:

To create the board:

- Use 1 manila folder and 2 periodic tables that have been inserted into page protectors.
- Staple the periodic tables to the inside of the manila folder.
  Sample set up image located at the end of this document.

How to accommodate activities for students who are English Language Learners/ have trouble focusing

- Sentence stems to initiate dialogue
- Guided statements with fill-in-the-blank
- Vocabulary cards
- Anchor charts with visual instructions
- Guided demonstration of battleship game

Activity 1 **Duration:** 10 minutes	**Notes to Teacher:**
Introduction on the arrangement of the periodic table, such as periods (patterns), groups (families), etc.	Prepare probing questions.

Activity 2	**Duration:** 5 minutes	Distribute materials Tip: have boards, markers, and erasers in baskets. Model the instructions of the game.
Group students together in pairs. Distribute periodic table battleship board, 1 expo marker, and 1 eraser to each student. Have students paper clip the boards together. Distribute the first round of the instructions.		
Activity 3	**Duration:** 25 minutes	Monitor students Timer
Set the timer for 25 minutes. Students will begin playing the periodic table battleship game.		
Activity 4	**Duration:** 5 minutes	Lead a class discussion to wrap up Pick up
Class discussion- Wrap up on how this is an example of a chemical change. Students pick up.		

Sample set-up

Lesson Plan: Where is the Water Table?

Name of Lesson: Where is the water table?

Learning (TEKS) Objective: 112.19 (b)(8)(C) The student knows that natural events and human activity can impact Earth systems. The student is expected to: model the effects of human activity on groundwater and surface water in a watershed.

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.

Student Outcome: *Students will be able to… describe how excessive pumping of groundwater can deplete the water table and alter the environment.*

Day of the Week and Time:

Total Length of Lesson: 40 - 55 mins

Materials, include copies of handouts, paper for foldables, etc.:

- **Clear buckets (3.5 gallon)**
- **Bucket lids with spout for 3.5-gallon bucket**
- **Plastic Pail/Drum Pump**
- **Plastic cups (8 oz)**
- **Dixie cups (2 oz)**
- **Water-proof plastic storage container (80 Qt)**

Technology Required (put video, website, etc. links here):

- Youtube video (https://www.youtube.com/watch?v=oNWAerr_xEE)

What needs to be prepared/set up ahead of time:

- Have all the bucket lids pre-cut for inserting and withdrawing water.
- Have a supply of water available for the activity.
- Make sure hand-held pumps are correctly setup to siphon out water in the correct direction.

How to accommodate activities for students who are English Language Learners or have trouble focusing

- Guided demonstration of activity
- Sentence stems to guide conversation

Engage **Duration: 5 mins**	**Notes to Teacher:**
Demonstrate how the water table functions: Play the Youtube video (https://www.youtube.com/watch?v=oNWAerr_xEE) of an animated description of groundwater for the class.	

Explore **Duration: 2 mins**	
After playing the video, use a large cup to scoop out water from a clear bucket. Ask the class how fast the water line goes down when lots of water is scooped out versus at a slower rate	
Explain **Duration: 3 mins**	
Explain that the water getting scooped out is meant to simulate water getting pumped out from wells connected to groundwater sources. If too much water is pumped out, the water line or water table goes lower underground, affecting human wells and plants from accessing water with their roots. The water that is added to the bucket is meant to simulate rain and river water replenishing the aquifer.	
Extend **Duration: 20 mins**	
Have the class form four groups. Two groups will be assigned to each bucket. The buckets will have a hand water pump meant to deplete water from inside the container. At the top of the bucket lid will be a hole for students to add water into the bucket. Two groups will handle the water pumps on each bucket and two groups will add water into the bucket. Change the size of the cup that students use to add water for each bucket (one larger, one smaller) to simulate differences in rainwater. Set a timer for 5 min and have the teams compete to either completely drain the bucket or reach a water line drawn on the bucket.	
Elaborate/Evaluate **Duration: 10 mins**	**Ask the class reflective questions after the activity such as whether it will be easier or harder for plant roots to access depleted water table levels.** **Another reflective question would be to ask how water pumping from oil drilling would affect water availability in the desert.**
Have students record their observations from the activity in their journal and relate them to the relationship of excessive pumping of groundwater on the water table.	

Lesson Plan: Dilation – Change the World

Name of Lesson: Dilation – Change the World

Learning (TEKS) Objective:

111.28 (b)(3)(A) generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation; (C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation.

Language Objective:

19 TAC 74.4(c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.
19 TAC 74.4(c)(4)(C) develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures.

Student Outcome: *Students will be able to… use scale factors to build an object of the present.*

Day of the Week and Time:

Total Length of Lesson: 120 - 140 minutes

Materials, include copies of handouts, paper for foldables, etc.:

- **Wooden sticks**
- **2 containers of playdoh**
- **7.5x7.5in cardboard pads (to serve as the base)**
- **White glue**
- **Tape**
- **Magazines**
- **Pipe cleaners**

Technology Required (put video, website, etc. links here):

Dilation Examples:

Dilation Powerpoint (located at the end of the document)

What needs to be prepared/set up ahead of time:

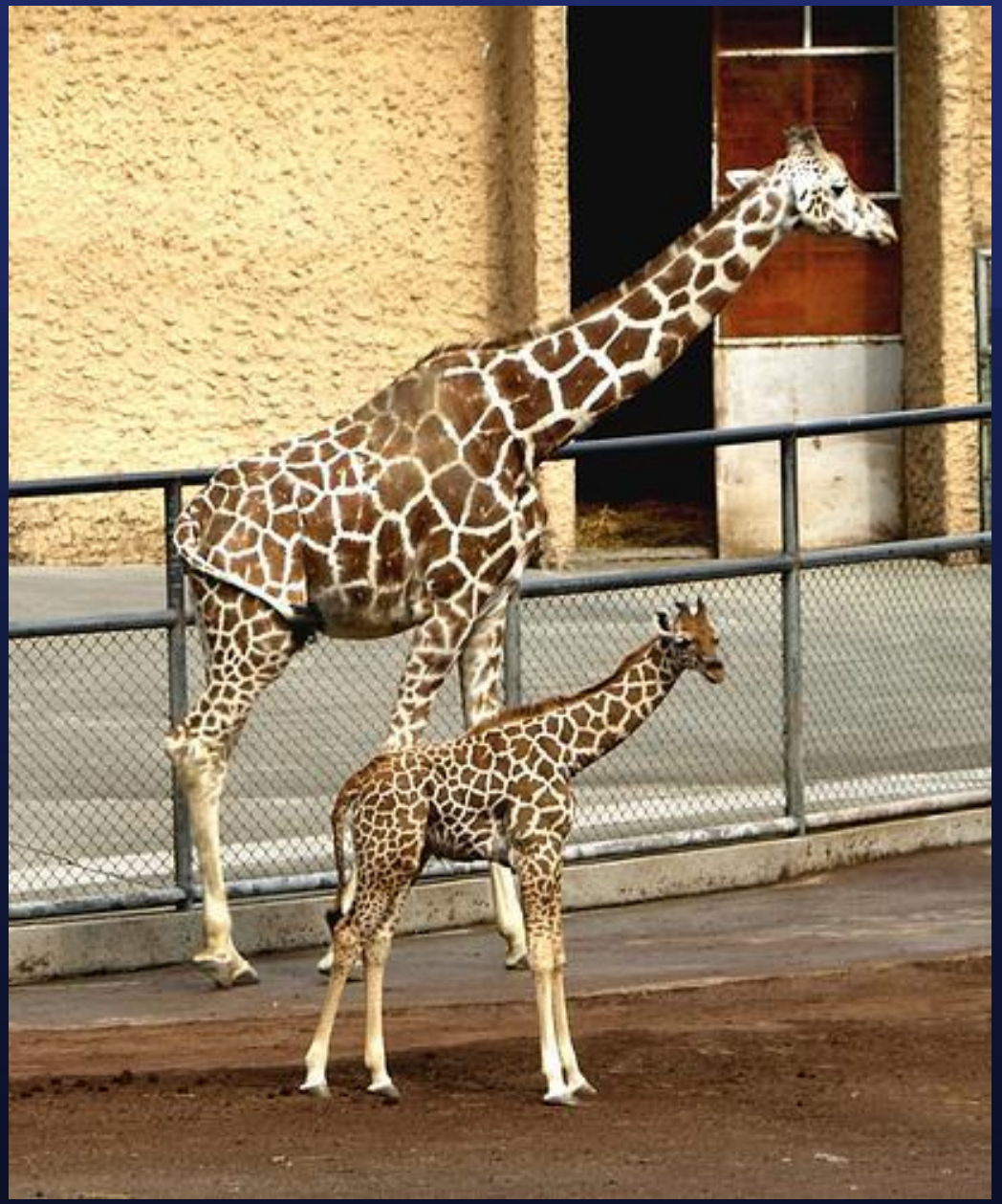
- A model of a building/object that has been dilated.
- Materials distributed to groups.

How to accommodate lesson for students who are English Language Learners or have trouble focusing

- Sample of final product
- Vocabulary cards or key terms
- Sentence stems

Activity 1: **Duration: 15 mins**	**Notes to Teacher:**
Students will be introduced to the concept of dilation. Students will see how objects/buildings can be enlarged/decreased. Students will see how we can use scale factors to change the size of an object.	**Present pictures of dilation in the real world (presentation linked above and pdf located at the end of this document.) Have students make observations of the structures.**
Activity 2: Mini-Architects **Duration: 20 mins**	
Students will research and select an object/building of their choosing. They will find the dimensions of their object/building and determine a scale factor that will best allow them to build their model. Measurements: Pencil: 7.5 inches Popsicle Stick: 4.5 inches Dolley Stick: 12 inches	
Activity 3: **Duration: 70 mins**	**Simpler models will take less time to construct.**
Students will use their materials and scale factor to build their model.	
Activity 4: Building a New World **Duration: 15 mins**	**Move the seats to make an open space on the floor when putting the models together.**
Students will present their models to the class. They will tell us what their model is based off and tell us whether their scale factor enlarged or decreased their object. We will put the models together to form a mini city.	

What Changes Do You Notice?




100x
30x
30.0x
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1.0x
0.6x
ANDROID AUTHORITY


BRICKSET

Lesson Plan: Bridge Building

Name of Lesson: Bridge Building

Learning (TEKS) Objective:

111.28 (b)(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; (C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.

Language (ELPS) Objective:

19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(H) understand implicit ideas and information in increasingly complex spoken language.

Student Outcome: *Students will be able to… use architectural design strategies to create a wooden bridge to hold the student's weight.*

Day of the Week and Time:

Total Length of Lesson: 100 – 120 mins

Materials (per student), include copies of handouts, paper for foldables, etc.:

- **Wooden craft sticks**
- **White Elmer's glue**
- **Paper**
- **Pencil**
- **Ruler**
- **Weights/pennies/things to put on bridge**

Technology Required (put video, website, etc. links here):

- **YouTube video (https://youtu.be/si_XHdgMSDU)**

What needs to be prepared/set up ahead of time:

- YouTube video set-up
- Sample bridge
- Distribute materials to student groups
- Research of each main bridge to be used in opening discussion

How to accommodate lesson for students who are English Language Learners or have trouble focusing

- Sample of final product
- Subtitles on video
- Vocabulary cards or key terms
- Sentence stems to drive collaboration

Activity 1: Intro **Duration: 10 mins**	**Notes to Teacher:**
Introduce different types of bridges and what they must withstand (camelback truss, warren truss, bailey truss) Play Building Bridges Youtube video.	
Activity 2: Duration: 15 mins	Research each of the bridges in advance. Using images of each will help students visualize the magnitude of the bridges.
Lead discussion on video recap. Highlight the different types of bridges used throughout history. Include a few famous examples: Golden Gate Bridge, Brooklyn Bridge, Sydney Harbour Bridge, Tower Bridge in London, Akashi-Kaikyo Beidge. For each bridge discuss: 1) Year of completion 2) Location 3) Length 4) Main usage (commercial, private, public) 5) Key architectural designs	
Activity 3: Duration: 60 mins	Ideal groups should be composed of 3-4 students. Sketch component may be skipped. It is beneficial to include this step as it aids students to discuss and finalize their ideas prior to beginning the construction. It also helps minimize waste.
Separate students into small groups. Instruct students to create a sketch of a bridge they believe will hold the weight of one of their group members. Allow students to brainstorm, create the sketch, and obtain approval prior to starting the construction of their bridge. Monitor students as they create their bridge.	
Activity 4: Duration: 20 mins	Instruct the group members to help each other to stand on the bridge. Stading on one foot on top of the bridge helps in maintaining balance (see picture below)
Instruct students to share the main structural components of their bridge. Have all groups test the stability of their bridge by having one of the group's members stand on it. Hold a class discussion on how each bridge can be improved and what contributed to the success or failure of the bridges.	

Lesson Plan: Music of the Mountains

Name of Lesson: ***Music of the Mountains***

Learning (TEKS) Objective:
112.20 (b)(9)(A) describe the historical development of evidence that supports plate tectonic theory. (B) relate plate tectonics to the formation of crustal features.

Language Objective:
19 TAC 74.4 (c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.
19 TAC 74.4 (c)(2)(H) understand implicit ideas and information in increasingly complex language commensurate with grade-level learning expectations.
19 TAC 74.4 (c)(4)(E) read linguistically accommodated content area material with a decreasing need for linguistic accommodations as more English is learned.

Student Outcome: *Students will be able to… describe the formation of mountains and the role of plate tectonics in mountain building.*

Day of the Week and Time:

Total Length of Lesson: 60 – 80 mins

Materials include copies of handouts, paper for foldables, etc.:

- **Laptop**
- **Handout of Music Staff (located at the end of the document)**
- **Pencil**

Technology Required (put video, website, etc. links here):

- *Noteflight,* Musical Composing Software
- Article: https://www.nationalgeographic.com/science/article/mountains
- How North America Got its Shape https://www.youtube.com/watch?v=jzqnUvE66HA
- Sample Song: https://www.noteflight.com/scores/view/5c1ad19619f2427da146affbcc789686f9997bc6

What needs to be prepared/set up ahead of time:

- Printed handout of Music Staff (located at the end of the document)

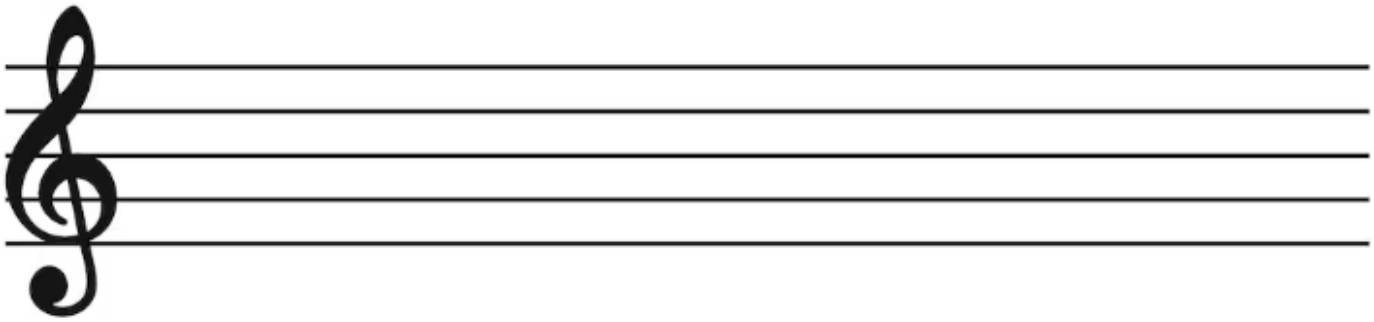
How to accommodate activities for students who are English Language Learners or have trouble focusing

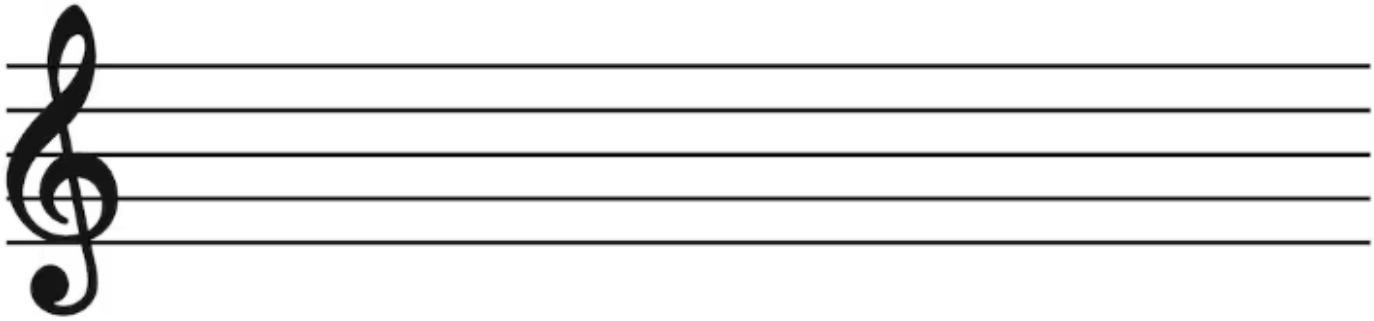
- Visual and auditory demonstrations will be given during class.
- Activity Turn and Talk will allow students to discuss in small groups their thoughts on the reading.

Introduction **Duration: 5-7 minutes**	**Notes to Teacher:**
Lead a class discussion: Who enjoys music? What kind of music? We'll be listening to a small excerpt of a piece by a composer that took them 10 million years to make. (show audio of song) Ask students if they know our composer. (show them image of the mountain, then show them image aligned with music staff) Our composer is this mountain, by using the peaks of their form we aligned them with a music staff and we're able to create unique songs.	

Information of Lesson	**Duration: 7-10 minutes**	
How do Mountains form? (have students read article) (Turn and talk once they've finished, as a class come back and share what we learned) https://www.youtube.com/watch?v=jzqnUvE66HA Answer initial questions then elaborate on what plate tectonics are and how they can form not only mountains but ocean basins, volcanoes, and earthquakes.		
Activity	**Duration: 45 minutes**	Sample image and music staff are located at the end of this document. (5-10 min. on instructions) - tempo - note durations - pitch
Make your own song! Find an image of a mountain you'd like to base your song on. Open image in new tab then align your music staff hand out to the peaks you'd like to emphasize. Begin marking your *notes*. Once you've marked them open Noteflight. Create an account then select *create.* (small demonstration of how to use software)		
Closing	**Duration: 10 minutes**	
Students share their songs. Showing an image of their mountain, students will play their song for the class.		

Music Staff Handout

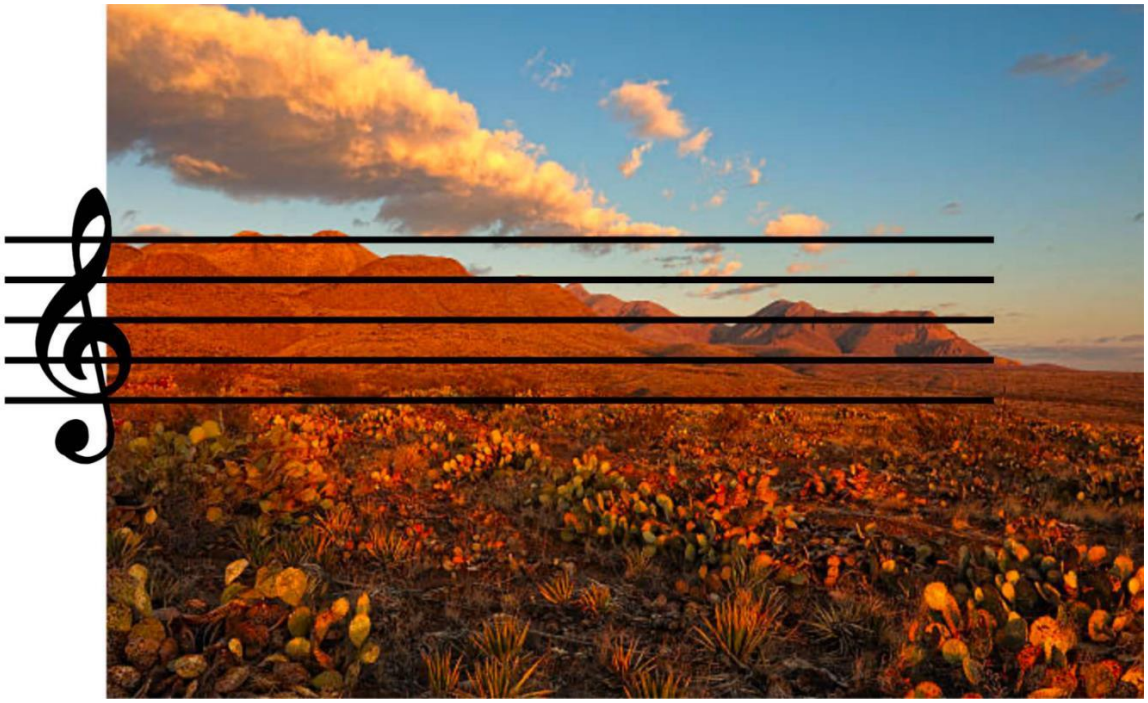




Activity Samples

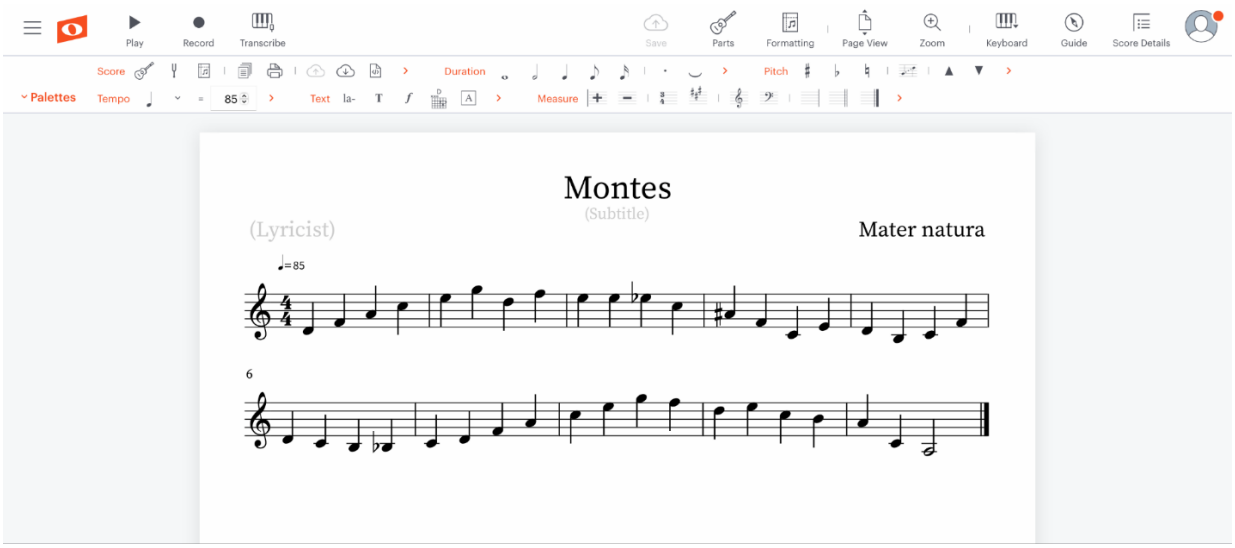
Step 1: Sample mountain range.

Step 2: Sample music staff overlay on mountain.



Step 3: Sample music staff overlay on mountain with notes.

Step 4: Input music notes on “Noteflight” website.



Lesson Plan: Green House Foods

Name of Lesson: Green House Foods

Learning (TEKS) Objective:
112.28. (b)(11)(A) use scientific evidence to describe … the release and absorption of greenhouse gases influence climate; (B) use scientific evidence to describe how human activities, including the release of greenhouse gases.

Language Objective:
19 TAC 74.4(c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.
19 TAC 74.4(c)(4)(C) develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures.

Student Outcome: *Students will be able to… create greenhouse gasses Lewis structures and describe the effect of the main greenhouse gases on climate change.*

Day of the Week and Time:

Total Length of Lesson: 40-55 mins

Materials include copies of handouts, paper for foldables, etc.:

- **Toothpicks**
- **Gummy bears**
- **Gum drops**

Technology Required (put video, website, etc. links here):

YouTube videos:

- https://www.youtube.com/watch?v=SN5-DnOHQmE
- https://www.youtube.com/watch?v=SzcGTd8qWTg
- https://www.youtube.com/watch?v=9dzSRdez9Gw (stop at 1 min and 23 sec)

What needs to be prepared/set up ahead of time:

- Prepare YouTube videos
- Check audio
- Distribute materials (toothpicks, gummy bears, and gum drops) to student groups.

How to accommodate lesson for students who are English Language Learners or have trouble focusing

- Guided demonstration of activity
- Visual instructions
- Vocabulary list or key terms

Activity 1: Explanation on Greenhouse Gases, Climate Change, and Lewis Dot Structures (simplified) Duration: 10-15 mins	**Notes to Teacher:**
Teacher will discuss with students about greenhouse gasses, and climate change. Discuss how greenhouse gases incorporate into our world and its importance. Demonstrate how Lewis structures work. Use videos linked below to aid in the introduction of the topic.	

Activity 2: Making Lewis Structures **Duration: 20-30 mins**	Create a list of pre-selected greenhouse gases to be used in the activity. Suggested molecules: - Methane - Nitrous oxide - Carbon dioxide - Ozone - Carbon monoxide - Sulfur dioxide Create color coding chart based on gummy bear and gum drop colors.
Students will work together or alone to create the Lewis structure of the major greenhouse gases. Elements will be color coordinated. Students will make a color key of the elements and as well will make a chart that organizes/ shows the greenhouse gas Lewis structures and then replicate it with candies. In the chart, students will include how that gas is used.	
Activity 3: Reflection **Duration: 5 mins**	
Students and Teachers will reflect on the topic and have a discussion on why it's important we know about weather changes.	

Lesson Plan: Fibonacci Scavenger Hunt

Name of Lesson: Fibonacci Scavenger Hunt

Learning (TEKS) Objective:
111.27. (b)(5)(A) generalize the critical attributes of similarity, including ratios within and between similar shapes. (5)(C) solve mathematical and real-world problems involving similar shape and scale drawings.

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.

Student Outcome: *Students will be able to… students will be able to identify patterns and similarities in nature. Students will be able to calculate nth iterations to obtain the Fibonacci Sequence.*

Day of the Week and Time:

Total Length of Lesson: 120 minutes

Materials include copies of handouts, paper for foldables, etc.:

- **Journal/notebook**
- **2 white papers and 1 colored paper**
- **Pencils**
- **Colors / markers**
- **Scissors**

Technology Required (put video, website, etc. links here):

- Projector/Elmo (to model how to make the 6-door foldable)

What needs to be prepared/set up ahead of time:

- 4 stations set up outdoors:
  - Stations are located at the end of this document
  - Each station will have a "poster"
  - Print stations on regular copy paper in landscape format

How to accommodate lesson for students who are English Language Learners or have trouble focusing

- **Vocabulary and key terms**
- **Sentence stems**
- **Visual aids at each station**

Activity 1: Foldable **Duration: 20 minutes**	**Notes to Teacher:**
1. Explain to students what the Fibonacci Sequence is and how it looks visually who created it and how do you calculate it. 2. Provide each student with a colored piece of paper to create a 6-door foldable. 3. Label the foldable as the "Fibonacci Sequence." Each tab will be labeled as 1,2, 3… iterations (6 iterations total.) Inside each tab will contain the number that belongs to the corresponding iteration. 4. Explain to students the 4 stations and how much time they have for each station, give them the necessary materials for each station.	- Show a picture of Fibonacci. -Show a picture of the Golden Ratio. - Tell students the story of this sequence (relate the Fibonacci spiral with the golden ratio, show them the spiral.) - If showing the formula, have students calculate one iteration using the formula. - Model the foldable for students.

5. Students must leave their folders inside the classroom. There is a wildcard in which students can look at their foldable to check on anything, but it can be used only in one station and only once.	This activity is to be completed individually but students can discuss amongst themselves.
Activity 2: Station 1 Duration: 25 minutes ● Each student will be provided with a pencil and white paper. ● Instructions: Find 4 different flowers or plants that have the number of petals or leaves are in the Fibonacci sequence and draw them in the paper.	
Activity 3: Station 2 Duration: 20 minutes ● Each student will be provided with a pencil and white paper or its journal to write down findings. ● Instructions: Can the Fibonacci sequence be found on trees? If so, what part of the tree?	
Activity 4: Station 3 Duration: 25 minutes ● Each student will be provided with a pencil and a white paper or their journal to calculate the 4th iteration. ● Instructions: Collect the number of pinecones that correspond to the 5th iteration (students should collect 2 pinecones)	For this station, it would be preferable to have another teacher to monitor.
Activity 5: Station 4 Duration: 25 minutes ● Each student will be provided with a pencil and a white paper or their journal to calculate the 6th iteration. ● Instructions: Use rocks to create the Fibonacci sequence up to the 6th iteration. Lay them on the ground and wait for instructions. ● After students complete this last station, go and check with them. Then, once they are clear to go, prompt them to go to the classroom and wait.	
Activity 6: Reflection Duration: 5 minutes ● Once every student is back in the classroom, have them reflect by writing down what is something they learned, found interesting, or they liked of this lesson in their journals.	Teacher may write on the board these questions: 1. What is something that you learned today? 2. What is something you found interesting? 3. What is something you liked?

STATION 1

Find 4 different flowers or plants that its number of petals or leaves are in the Fibonacci sequence and draw them in a paper

STATION 2

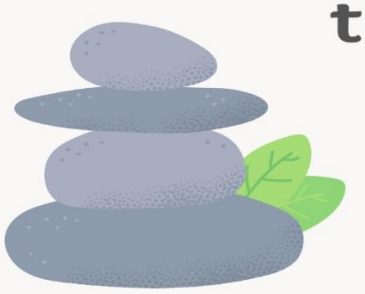
Can the Fibonacci sequence be found on trees? If so, what part of the tree?

STATION 3

Collect the number of pine cones that correspond to the 4th iteration.

Station 4

Use rocks to create the Fibonacci sequence up to the 6th iteration. Lay them on the ground and wait for instructions.



FUTURE

Lesson Plan: An Evolutionary Robot Body Part

Name of Lesson: An Evolutionary Robot Body Part

Learning (TEKS) Objective:
112.19. (b)(14)(A) define heredity as the passage of genetic instructions from one generation to the next generation.

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participate in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(H) understand implicit ideas and information in increasingly complex spoken language.

Student Outcome: *Students will be able to… Apply the evolutionary process by creainge a 3D futuristic robot body model that has "evolved" with time.*

Day of the Week and Time:

Total Length of Lesson: 100-120 mins

Materials (per student), include copies of handouts, paper for foldables, etc.:

- **Cups**
- **Toilet paper rolls**
- **Bendy Straws**
- **Fuzzy Noodle Things**
- **Paper**
- **Paint**
- **Pencils**
- **Foil**
- **Markers**
- **Colored Pencils**
- **Rulers**
- **Scissors**
- **Glue**

***The amount will vary depending on what students decide to use.**

Technology Required (put video, website, etc. links here):

Simple explanation on evolution:

- https://www.youtube.com/watch?v=vnktXHBvE8s

Examples for building models:

- https://www.youtube.com/watch?v=KKvIygrPQvE
- https://www.youtube.com/watch?v=svMXxXSEJoY

What needs to be prepared/set up ahead of time:

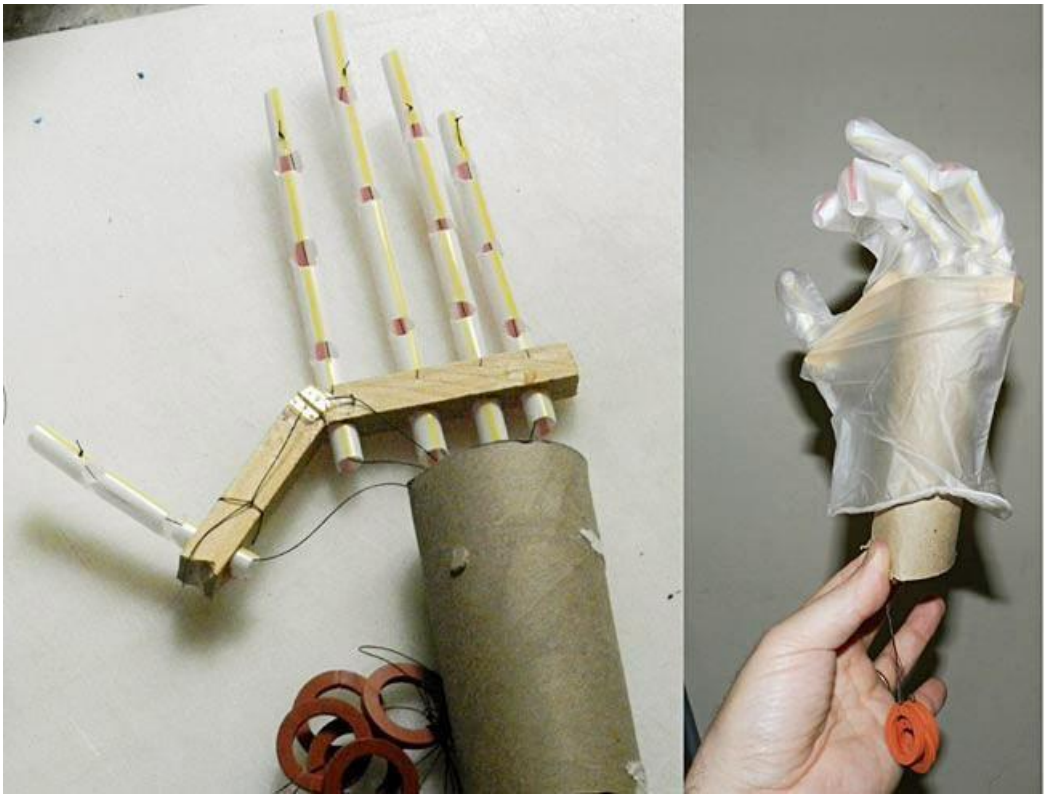
- Distribute materials to student groups
- Prepare YouTube video
- Check audio for video

How to accommodate lesson for students who are English Language Learners or have trouble focusing	
• Demonstrate sample activity • Provide access to internet for searching of ideas • Vocabulary or key terms • Turn on translation on YouTube video	
Activity 1: Understanding of Evolution Duration: 10-15 mins	**Notes to Teacher:**
Short explanation of what evolution is and how it ties in with the theme. Show the video and have a brief discussion on this topic and question what students know about it. Link for video found above.	Show video to help drive discussion.
Activity 2: Explain, Examples, and Group Forming Duration: 5 mins	Activity can be performed individually or in groups.
Teachers will explain and guide students on what the project is about. Teachers will give each pair of students their own scenario (examples located at the of the document), and will create a body part that can live in that environment. Provide them with examples and videos that they can replicate a body part or introduce ideas. Photo examples are located at the end of the document.	
Activity 3: Building of Model Duration: 60-90 mins	Distributing a set of materials to groups can help limit waste.
Students will create a 3D "robotic" body part model. The body part chosen is decided by students and may use any of the materials provided. This model that they make needs to be functional (have a purpose in their scenario.) Students are encouraged to create a moveable body part.	
Activity 4: Present Duration: 15-20 mins	Provide students with a time limit for their presentation.
Students will present their chosen limb and describe its purpose, what makes it unique, how it evolved with their human, and how it could help them in a future world.	

Sample Scenarios

- Losing a limb on a planet fully made of water.
- Losing a limb on a planet fully made of rocks and caverns.
- Losing a limb on a planet that has a forest but is completely dark (never gets light; only light is through nature, ex: leaves. Animals that glow)
- Losing a limb on a planet that has desert storms.
- Losing a limb while living in a spaceship.
- Losing a limb on a rotating, no gravity planet.
- Losing a limb on a planet that is futuristics and advanced.
- Losing a limb on a planet that is extremely hot for 14 hours a day and cools down extremely for only 10 hours.
- Losing a limb on a planet that is filled with dinosaurs.
- Losing a limb on a planet that accelerates through time (1 day on these planet= 5 years on earth)

Samples



Lesson Plan: Survival of the Fittest

Name of Lesson: Survival of the Fittest

Learning (TEKS) Objective:
112.27 (b)(10)(A) Observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms. (11)(B) explain variation within a population or species by comparing external features, behaviors, or physiology of organisms that enhance their survival such as migration, hibernation, or storage of food in a bulb.

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(H) understand implicit ideas and information in increasingly complex spoken language.

Student Outcome: *Students will be able to… understand that adaptations of a species will allow it to survive in a mystery environment.*

Day of the Week and Time:

Total Length of Lesson: 50 – 60 mins

Materials include copies of handouts, paper for foldables, etc.:

The amount will vary depending on which materials students use.

- **Cardboard**
- **Pipe cleaners**
- **Felt sheets**
- **Pom poms**
- **Feathers**
- **Googly eyes**
- **Clay**
- **Paint**
- **Brushes**
- **Wooden craft sticks**

Technology Required (put video, website, etc. links here):

What needs to be prepared/set up ahead of time:

- Distribute the materials students will use to create their animals
- Create scenarios of varying types of environments
- Prepare questions of food web

How to accommodate activities for students who are English Language Learners/ have trouble focusing

- Provide sample products (located at the end of the document)
- Vocabulary or key terms
- Sentence stems for answering probing questions

Activity 1 **Duration:** 10 minutes	**Notes to Teacher:**
Introduction to adaptations/ history of animals and plants adaptations. (variation within a species that enhances their survival) Key adaptations allowing the species to survive. Key question: Can my animal survive in a mystery environment? What do you think the future will be like? What will it look like? What will the animals look like? Etc.	Prepare probing questions
Activity 2 **Duration:** 10 minutes	Distribute materials. Activity can be completed individually or in groups.
Explanation of project: Provide a few scenarios of different types of environments to students. Instruct students to select one of the environments and to design an organism with characteristics that would allow it to survive in their selected environment. Demonstrate example of animals and plants (located at the end of the document)	
Activity 3 **Duration:** 40 minutes	Monitor students. Approve sketches of designed organisms.
Provide students the opportunity to research different adaptations for different animals and plants. Instruct students to create a sketch of their organism and submit it for approval. Once approval is given, instruct students to create their organism using the provided materials. Students complete their own species with unique adaptations.	

Sample Products

Lesson Plan: Periodic Table Spaceship

Name of Lesson: Periodic Table Spaceship

Learning (TEKS) Objective:

112.18. (b)(6)(5) know that an element is a pure substance represented by a chemical symbol and that a compound is a pure substance represented by a chemical formula.

Language Objective:

19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborate spoken language.

Student Outcome: *Students will be able to…use the periodic table to identify the atoms and the number of each kind within a chemical formula.*

Day of the Week and Time:

Total Length of Lesson: 60 - 80 minutes

Materials (per student), include copies of handouts, paper for foldables, etc.:

- Spaceship Systems Status Handout (located at the end of the document)
- Small items to use as "spaceships"
- Dry-erase markers

Technology Required (put video, website, etc. links here):

None

What needs to be prepared/set up ahead of time:

- Assembled "spaceship" folders

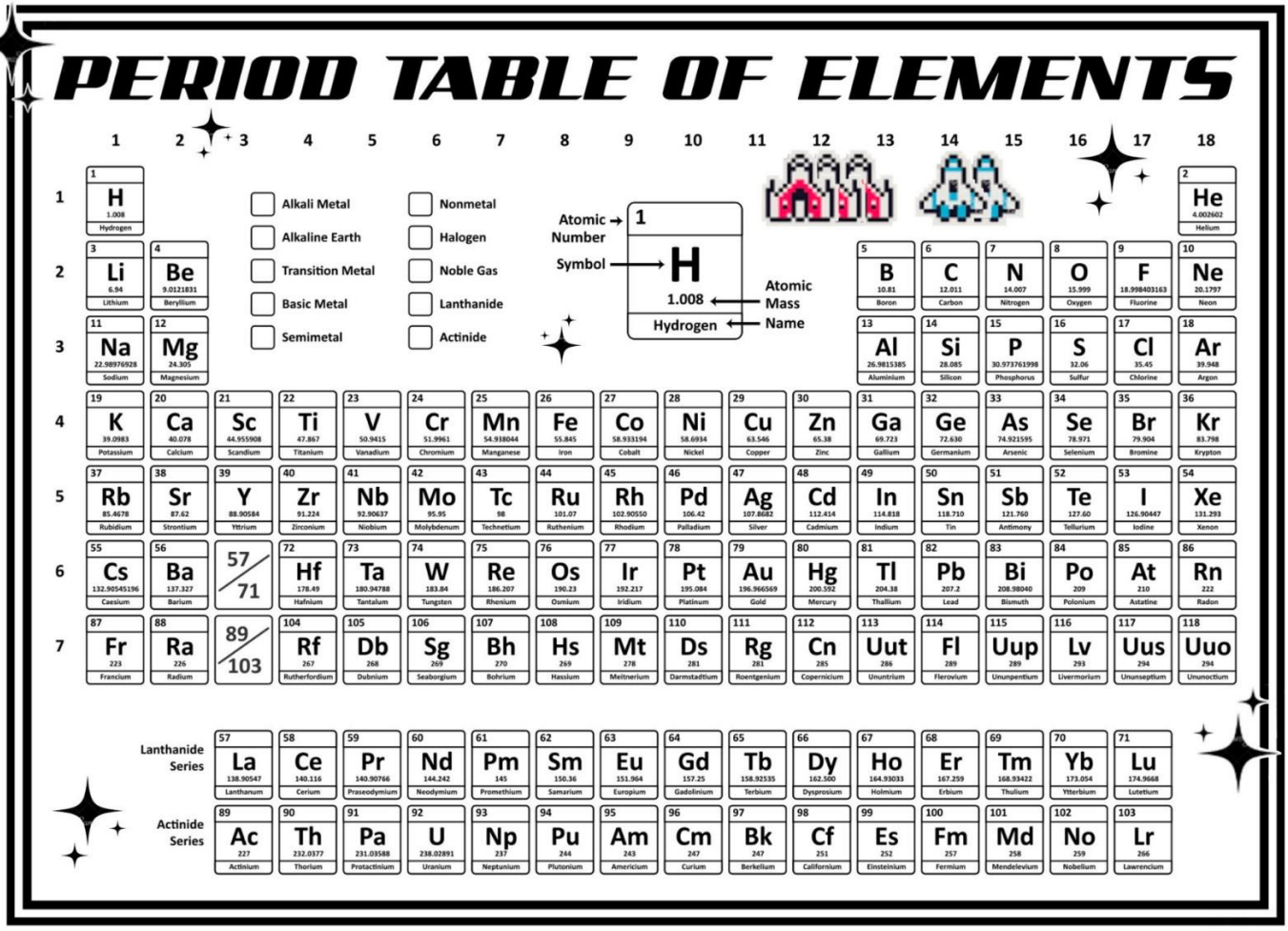
How to accommodate activities for students who are English Language Learners or have trouble focusing

- Demonstration round of activity
- Activity Turn and Talk will allow students to discuss in small groups their thoughts on the reading
- Activity will be completed in pairs

Introduction **Duration: 5 minutes**	**Notes to Teacher:**
Provide a chemical formula (NaCl) and ask students to dissect what they see. After 5 minutes, turn and talk with the person next to you. Share what you saw. Come together and begin sharing as a class what we saw, annotating what the students think.	
Information of Lesson **Duration: 5-10 minutes**	Writing/explanation will be on white board.
After students have finished sharing, the teacher will then correct the annotations. Elaborating on the chemical formula, how many elements are there. They will then relate it to the periodic table, emphasizing where you can find these elements on the table and how to locate then (i.e. groups / periods)	

Activity **Duration: 55 minutes**	Examples of Chemical Formulas:
In pairs, students will play Spaceship. Students will be given a Chemical formula at random. Using the Spaceship pieces place on their corresponding element if you have two or more of that element place multiple Spaceships on that element. Students take turns calling out the groups/periods they wish to target, once they've destroyed all Spaceships opponents will call out what they have destroyed.	• NaCl • CaI_2 • H_2O_2 • CO_2 • $HgCl_2$ • $NaHCO_2$ • CH_2Cl_2
Closing **Duration: 2-3 minutes**	
If time allows, students can play multiple rounds where winners play winners and a champion identified.	

Spaceship Systems Status Handout



Lesson Plan: Escape the Ship Math Olympics

Name of Lesson: Escape the Ship/Math Olympics

Learning (TEKS) Objective:
111.28.B (5)(I) write an equation in the form y = mx + b to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations. (5)(B) represent linear non-proportional situations with tables, graphs, and equations in the form of y = mx + b, where b ≠ 0

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.

Student Outcome: Students will be able to… represent non-proportional linear equations in the form $y = mx + b$, where $b \neq 0$ with tables and graphs.

Day of the Week and Time:

Total Length of Lesson: 60 mins

Materials include copies of handouts, paper for foldables, etc.:

- **Pencils**
- **Calculator**
- **Colored tape: black and red**
- **Copy paper**
- **1 Treasure chest or container where a combination-number lock can be placed**
- **1 Combination-number lock**
- **Rubber ducks**

Technology Required (put video, website, etc. links here):

- Elmo or whiteboard (to show students how to solve linear equations)

What needs to be prepared/set up ahead of time:

- 5 different stations will need to be set up around the gym
- Set up the tape grids on the floor (5 grids in total)
- Translation sheet (locate at the end of the document)
- Puzzle with hieroglyphs
- Different maps will need to be made so that groups will go to different stations.

How to accommodate lesson for students who are English Language Learners or have trouble focusing

- Vocabulary cards or key terms
    - One variable inequality
    - One variable equation
    - Solution
    - Root
    - X-intercept
    - Zero
- Sentence stems for each station
- Purposeful grouping of varying language levels

Activity 1: Introduction (Review) Duration: 15 minutes	**Notes to Teacher:**
Review with the students how to solve a linear equation and a linear inequality. Students will find the solutions to both a linear equation and linear inequality, which will help them in the escape room activity.	
Activity 2: Instructions/Story of the activity Duration: 5 minutes	
In this activity, students will be given a backstory of what their objective is. Backstory: "It is the year 2386. The human race has used up all of the Earth's resources. Earth is no longer habitable. You and your crew are aboard the Ship EP. You are in route to Pizza Planet, a planet that has been discovered to be habitable. On its trek to Pizza Planet, the Ship EP finds itself stuck in an asteroid field. Your ship has suffered serious damage, and an asteroid finds itself in the control room. Little do you know; the asteroid is an egg containing an alien species whose instinct is to hunt. You must escape the ship before the alien gets to you!" Instruction: "Your job is to escape the ship before the alien hunts you down. You must complete a series of tasks to find the key to the escape pod. You will solve linear equations and linear inequalities to help you in finding the key."	
Activity 3: 5 Stations Giant Gymnastic Graphing Duration: 1hr 30 minutes	
STATION 1: Location: Gym Goal: Students will be given a set of coordinate points where they all must stand on a human-sized grid and form the linear equation. This linear equation will direct them to the next station. Station 1 (copy located at the end of the document)	Split students into 4 groups max and adjust accordingly.
STATION 2: Goal: Students will be given a futuristic hieroglyph translation sheet in which they will decipher a hieroglyphic puzzle whose code will tell them where to go next. Station 2 (copy located at the end of the document)	The encrypted code will tell them "*Go to Station 3"*
STATION 3: Goal: Students will be given a linear equation and they will find the points that help make the line. Each student will represent a point on the graph and they must do a gymnastic figure to pass onto the next station.	Equations need to be made where they will point in the direction of Station 4 (positive slope) y=x+3 y=2x-2 y=5x+4 y=3x-1 y=9x+4
STATION 4: Goal: Students will finally reach the treasure chest. They will think that they have finally found the key, but when they open the chest, they will be surprised with one more task.	
STATION 5: Goal: Students will complete a maze in which they will determine if the slope is positive or negative and find the slope given a graph. When they finish the maze, they will have successfully escaped the ship. Station 5 (copy located at the end of the document)	There will be a piece of paper that will say "Go to Station 5 for one more task."

(0,1) (1,2)

(2,3) (3,4)

(-5,3) (-3,1)

(-1,-1) (1,-3)

(-4,-4) (-2,-2)

(0,0) (2,-2)

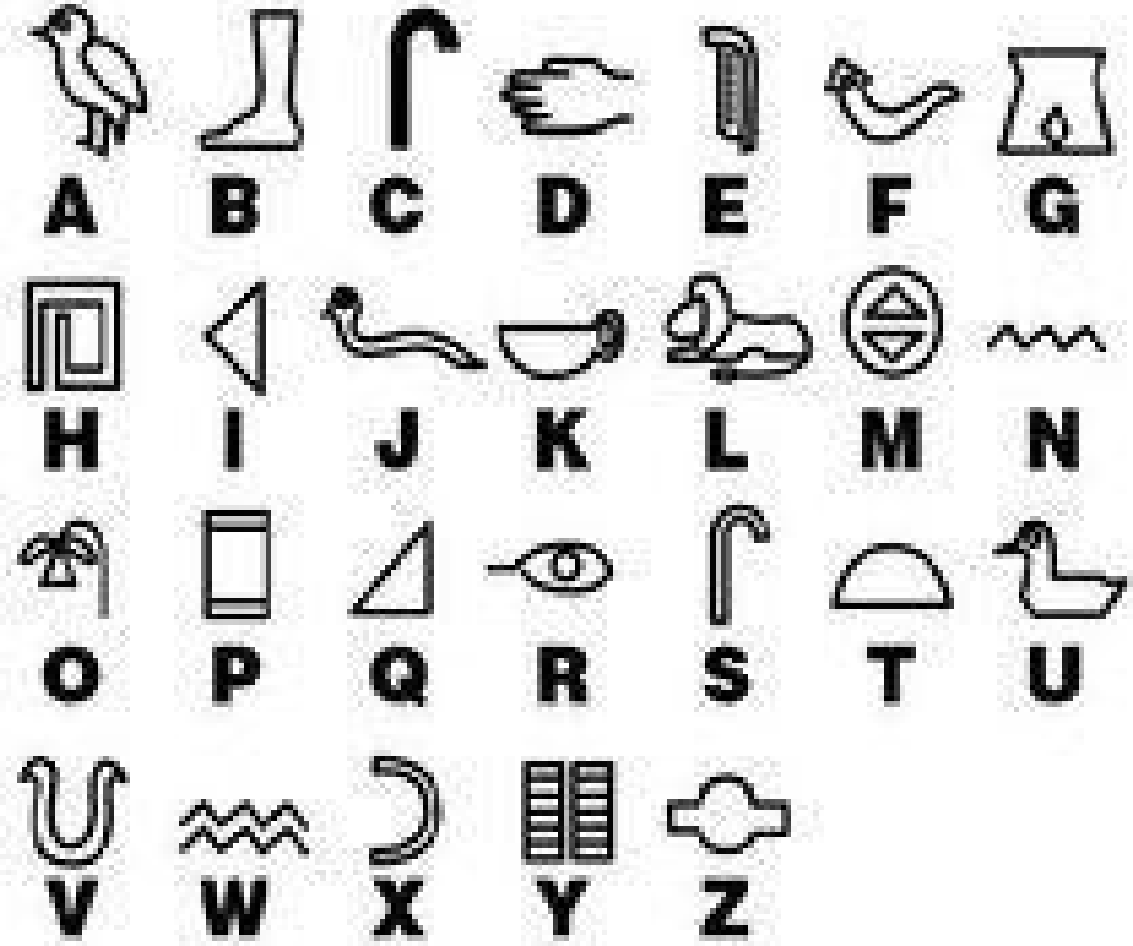
(4,4) (2,2)

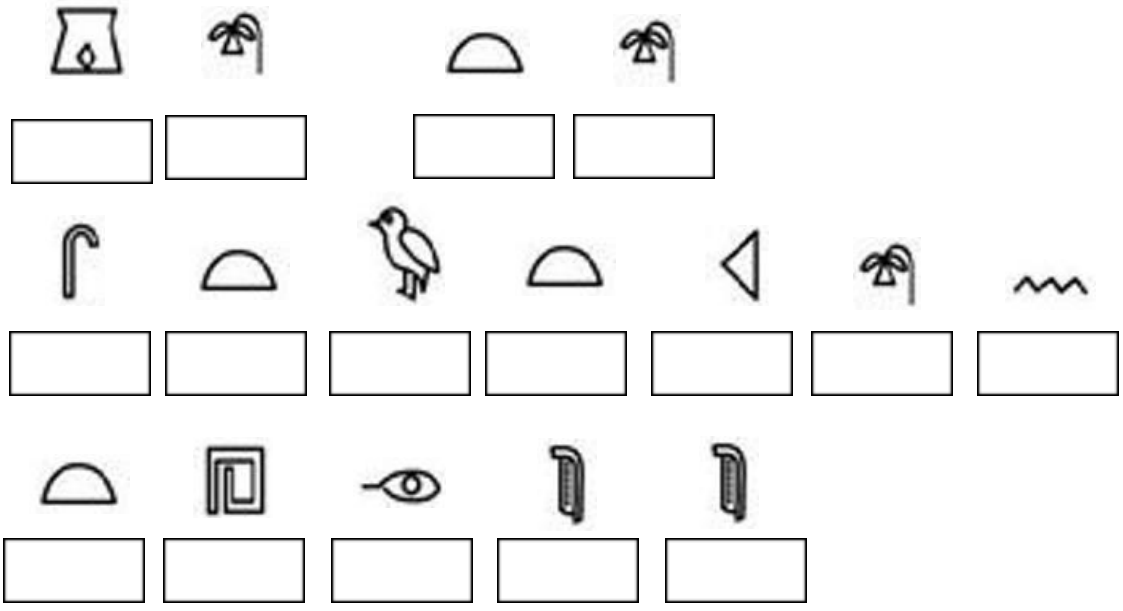
(0,0) (-2,-2)

(0,2) (1,3)

(2,4) (3,5)

ANCIENT EGYPT
HIEROGLYPHICS

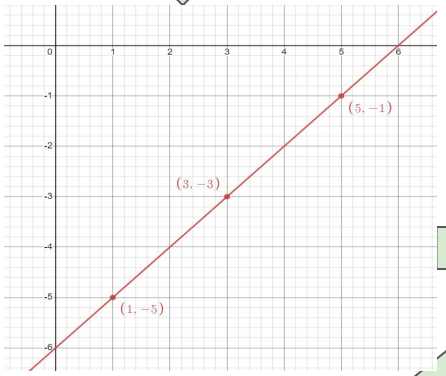




START

y = 5x+3

Positive



y = x+6

y = -9x+9

Negative

y = x-10

Positive

y = 6x+6

y = -3x-5

Slope = -3

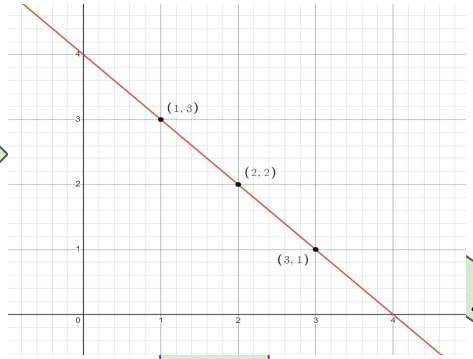
y = x-6

Slope = 3

Slope = -9

y = -12x-12

Negative

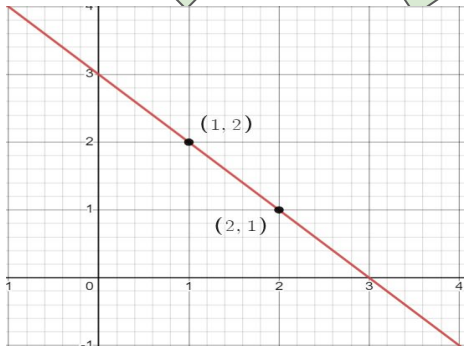


y = -x+4

y = 10x+2

Positive

Negative



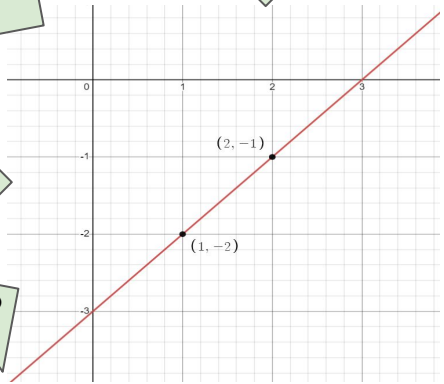
Positive

y=-x-4

y = 8x+8

Positive

y=x



y = x+3

y = x-3

y = -x+3

You've Found The Key

END

Lesson Plan: Spaceship Testing

Name of Lesson: Spaceship Testing

Learning (TEKS) Objective:
112.18 (b)(7)(B) investigate and describe how Newton's three laws of motion act simultaneously within systems such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.

Language (ELPS) Objective:
19 TAC 74.4(c)(3)(E) share information in cooperative learning interactions.
19 TAC 74.4(c)(3)(G) express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics.
19 TAC 74.4(c)(2)(H) understand implicit ideas and information in increasingly complex spoken language.

Student Outcome: *Students will be able to… create a container that protects an egg from cracking after being dropped from a height.*

Day of the Week and Time:

Total Length of Lesson: 90 mins

Materials include copies of handouts, paper for foldables, etc.:

- **Eggs**
- **Popsicle sticks**
- **Wooden sticks**
- **Sheets of copy paper**
- **Masking tape**
- **Cotton balls**
- **Pipe cleaners**
- **Rubber bands**
- **Glue guns**
- **Glue sticks**
- **Twine balls**
- **Toy parachutes or plastic cloth cut in 10inx10in**

Technology Required (put video, website, etc. links here):

- Youtube video (https://youtu.be/y3InF19dzlM)

What needs to be prepared/set up ahead of time:

- Distribute materials to student groups
- Warm up glue guns
- Prepare YouTube video
- Check audio for video

How to accommodate activities for students who are English Language Learners or have trouble focusing

- Sample of product
- Vocabulary cards or key terms
- Purposeful grouping of varying language
- Visual instructions

Engage	**Duration: 7 min**	**Notes to Teacher:**
Demonstrate Newton's Laws of Motion with a video (linked above) Play the Youtube video of crash tests for the class. Lead a class discussion on how the mannequins move inside the car before and after the crash.		
Explain	**Duration: 8 min**	
Using the video, point out each of Newton's laws of physics. The crash serves as the force that alters the regular motion of the car as in law #1. The buckled mannequin experiences less force during the crash because its acceleration is decreased by the seat belt as in law #2. And the mannequin bounces back after the collision because two interacting objects apply forces in equal magnitude but opposite directions as in law #3		
Extend	**Duration: 60 min**	Have students sketch out their designs on a spare sheet of paper and figure out their expenses BEFORE acquiring supplies.
In the future, food will be grown on other planets and used to help support human life back on Earth. Tell the class that they have been hired by an international space agriculture company to transport food items back to earth. The students must construct space capsules to protect an egg returning from outer space. The capsules must prevent the egg from cracking when dropped from a height. Remind them that they should design constraints, similar to seat belts, to decrease the force the egg experiences on collision.		
Elaborate/Evaluate	**Duration: 15 min**	
Instruct students to their design sketch plans to write down how the features correspond to Newton's laws of motion.		

MaST

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