ADP MAST ACADEMY

CANUTILLO HIGH SCHOOL

CANUTILLO STEM GAMES

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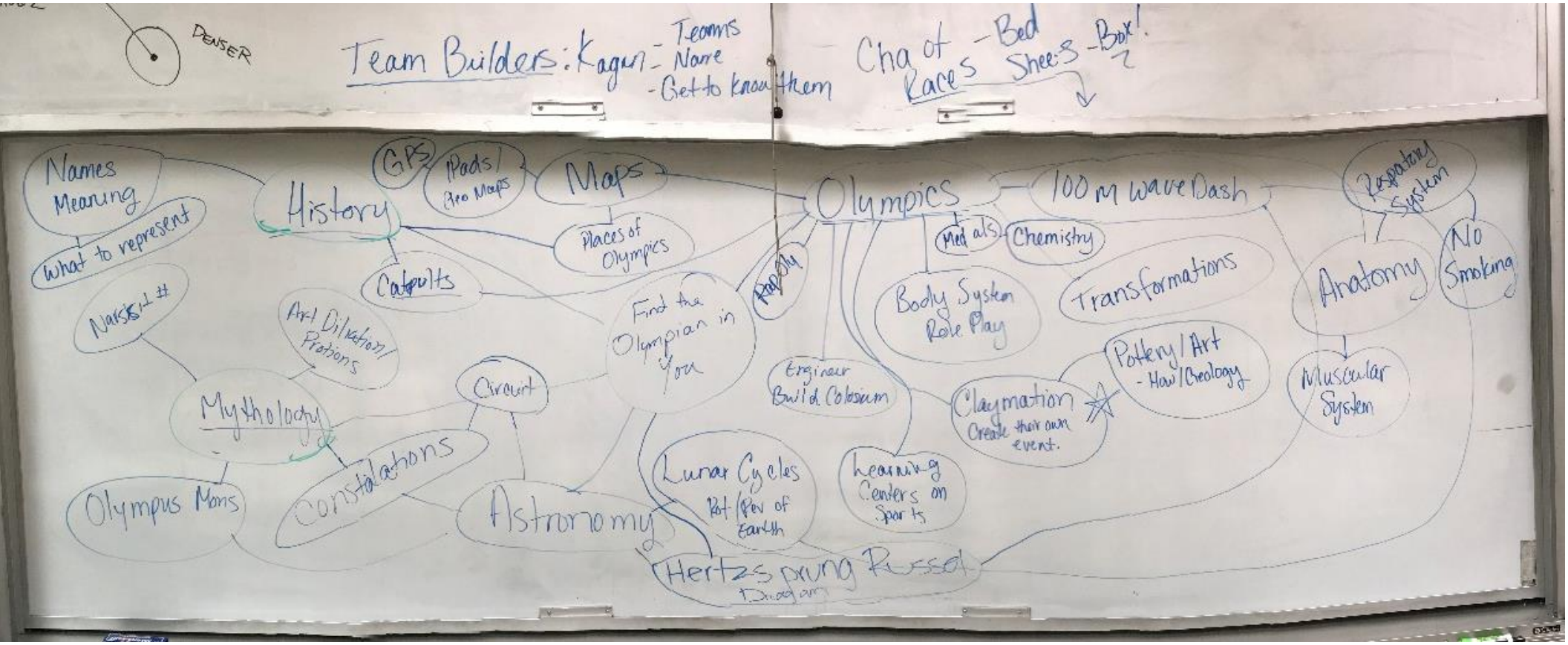
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	Monday 18	Tuesday 19	Wednesday 20	Thursday 21	Friday 22	
8:30-8:45		Get Ready for the Day				
8:45-9:00			Team Builder (Mueve la canasta) Rebecca, Francia			
9:00-9:15	Intro (Marco, Cesar & Dani)	Opening Ceremony Mentor (AUDITORIUM)			Doodle (Marcela & Dani)	
9:15-9:30					Team Builder (Troy & Chidimma) (Wink Killer)	
9:30-9:45						
9:45-10:00	Team Builder (Name Game)(Marco, Rebecca, Marcela			GPS-Places of Olympics Part 1 (Rebecca & Troy)		
10:00-10:15	Tour of Campus (High School help) 10:00-10:15			Team Builder (Human Knot) (Ale & Dani)		
10:15-10:30			Lunar Cycle (Marcela & Cesar)			
10:30-10:45						
10:45-11:00		History of Greek Gods (Troy & Karen)				
11:00-11:15					100 m Wave Dash (Yuli & Marco) Add 15 minutes or l	
11:15-11:30	Flag Tessellation (Francia & Troy)	Team Builder (Blanket name game) (Cesar & Tr	Cha-Cha Slide Part 1 (Troy & Yuli)	GPS-Places of Olympics Part 2 (Rebecca & Troy	Team Builder (Cesar & Chidimma) (Strips)	
11:30-11:45						
11:45-12:00	Lunch	Lunch	Lunch	Lunch	Lunch	
12:00-12:15						
12:15-12:30						
12:30-12:45		Graphing Constellations Part 1 (Ale & Yuli)	Cha-Cha Slide Part 2 (Troy & Yuli)	GPS-Places of Olympics Part 3 (Rebecca & Troy)		
12:45-1:00	Chariot Racing (Marco and Marcela) GYM			Team Builder (Musical Chairs) (Francia & Karen)		
1:00-1:15						
1:15-1:30		Graphing Constellations Part 2 (Ale & Yuli)	Team Builder (Giants, wizards & elves) (Marcela, M			
1:30-1:45		Bathroom Break (5 min)				
1:45-2:00					Learning Centers (Ale & Francia)	
2:00-2:15						
2:15-2:30	Engineering Design Process (Troy, Dani, Chidimma & R					
2:30-2:45		Constellations (Chidimma & Dani)				
2:45-3:00	PVC Pipe (Yuli, Ale)					
3:00-3:15	Team Theme Song (Chidimma & Marco)	Engineering Project (Troy, Dani, Chidimma & Re	Engineering Project (Troy, Dani, Chidimma & Rebe	Olympus Mons (Cesar & Chidimma)	Engineering Chariot (Troy, Dani, Chidimma & Rebecc	
3:15-3:30	Notebook (Karen, Marclea)	Notebook (Karen, Marclea)	Notebook(Karen, Marclea)	Notebook (Karen, Marclea)	Notebook (Karen, Marclea)	
3:30-4:00	Recap & Prep (Arrange Songs)	Recap & Prep			Recap & Prep	

	Monday 25	Tuesday 26	Wednesday 27	Thursday 28	Friday 29	
8:30-8:45		Team Builder (The Square) (Troy & Francia)	Introduction		White Sands	8:30-8:45
8:45-9:00					Mentors arrive at this time.	2:15-2:30
9:00-9:15	Team Builder (Star Rope) (Yuli & Marco)					2:30-2:45
9:15-9:30		Archimedes Volume (Ale & Rebecca)			Arrive to School	2:45-3:00
9:30-9:45						3:00-3:15
9:45-10:00						3:15-3:30
10:00-10:15			Obstacle Course + Ceremony			3:30-4:00
10:15-10:30			Tug of War + Ceremony			4:00-4:15
10:30-10:45						4:15-4:30
10:45-11:00		Chemical Reaction (Yuli & Marcela)				4:30-4:45
11:00-11:15						4:45-5:00
11:15-11:30	Planet History (Cesar & Francia)	Team Builder (How Much Do You Use?) Troy & (	Quidditch + Ceremony	Downtown Scavenger HuntChihuahua's Stadium S	Arrive	5:00-5:15
11:30-11:45					Set up/ instruction	5:15-5:30
11:45-12:00	Lunch	Lunch				5:30-5:45
12:00-12:15	Team Builder (Cesar) (Helium Stick & Dani)		Lunch			5:45-6:00
12:15-12:30						6:00-6:15
12:30-12:45					Play on dunes	6:15-6:30
12:45-1:00						6:30-6:45
1:00-1:15						6:45-7:00
1:15-1:30			Music Olympics		Dinner	7:00-7:15
1:30-1:45	All-Star (Karen & Marcela)					7:15-7:30
1:45-2:00					Star party?	7:30-7:45
2:00-2:15						7:45-8:00
2:15-2:30						8:00-8:15
2:30-2:45					Awards	8:15-8:30
2:45-3:00			Chariot Racing	Planetarium		8:30-8:45
3:00-3:15	Engineering Chariot (Troy, Dani, Chidimma & Rebecca)	Catapult Put (Dani & Karen)	15 extra for either Music or Chariot		Pack and leave	8:45-9:00
3:15-3:30	Notebook	Notebook	Instructions for next day field trip			
3:30-4:00	Recap & Prep	Recap & Prep				

D-J Karen

Hey, yeah (we the best)

All I do is STEM STEM STEM no matter what

Got science on my mind I can never get enough

And every time I step up in the classroom'

Everybody hands go up

And they stay there

And they stay there

And they stay there

STEM games, STEM games, STEM games

'Cause all I do is Math Math Math

And if you goin' in put your hands in the air

Make 'em stay there

<u>Gods plan</u>

Yeah they learnin' they learnin' they learning they learning
They learning from us, yuh

We've been really stressed, don't start no trouble with me
Tryna keep it peaceful for the camp can't you see?
If you pull up late it's a problem for me
You know how I like it when you learnin' from me
I don't want to lecture so you won't be bored
Yes I see the things that you learnin' from me
Hope you learn a lot about greek history
You gon tell the story to your parents for me

Stem camp, Stem camp
We can't do this on our own, ay, no, ay
Ellen watchin' this camp close, yep, close
Summer games about to start, ay, start, ay
Might go down S.T.E.M., yeah, wait
We go hard on hallway G, ay, Way
I make sure the valley learn, Yuh
And still

Good things
It's a lot of good things that they learnin' and learnin' and learnin' and learnin'
They learnin' from us
Good things
It's a lot of good things
That they learnin' and learnin' and learnin' and learnin'
They learning from us
Yuh, ay, ay

She say "do you love me" I tell her "only partly I only love my job and my students im sorry"
Chariotssss I got them waiting in the lobby
Stadiummm we'll fill them up until the nose bleeds
And you know me
Turn the O3 into the 02, Chem
Without 40 students there'd be no me
Imagine if we never had the signees

Stem camp, Stem camp
We can't do this on our own, ay, no, ay
Ellen watchin' this camp close, yep, close
Summer games about to start, ay, start, ay
Might go down S.T.E.M., yeah, wait
We go hard on hallway G, ay, Way
I make sure the valley learn, Yuh
And still

Good things

Its a lot of good things that they learnin’ and learnin’ and learnin’ and learnin’
They learnin’ from us
Good things
Its a lot of good things
That they learnin’ and learnin’ and learnin’ and learnin’
They learning from us

All I do is STEM STEM STEM no matter what

Got science on my mind I can never get enough

And every time I step up in the classroom'

Everybody hands go up

And they stay there

And they stay there

And they stay there

STEM games, STEM games, STEM games

'Cause all I do is learn learn learn

And if you goin' in put your hands in the air

Make 'em stay there

Apps

Pano Tuner


Protractor


SkyView


QR Code Scanner


Map Coordinate

Responsibilities

Journal

- Your Journal will be a reflection of the knowledge gained during the day and will be collected at the end of the day.

Activities

- Participate and collaborate with your assigned group.
- Follow teacher instructions and assigned group roles.
- Phones are to be out ONLY if the activity calls for it.

Games

- Friendly competition is encourage.
- Display good sportsmanship.
- Keep in mind your safety and the safety of those surrounding you.

Glue this side down

Welcome to the wonderful world of science, technology, engineering, and mathematics!

"The most important thing in the Olympic Games is not winning but taking part; the essential thing in life is not conquering but fighting well."
Pierre de Coubertin

Our job as your teachers is to guide you to be a better student and to always fully
BELIEVE IN YOURSELF

- Login to School account.
- Open Google Classroom.
- Class Code: klqsus

Procedures

Entering the Classroom

Before the start of the day you must:

- Look for your Journal, this will be your assigned seat and group for the day.
- Do NOT rearrange Journals or move to another seat.
- Silence phone and store away.
- BE Prepared

Class Dismissal

- Prior to dismissal, gather all class materials and return them to their proper place.
- Complete Journal and exit ticket.

Restroom/Water break policy

- Breaks will be allowed as long as teacher grants permission.

Tardiness

- If you are late you must quietly walk to your seat without disturbing others.

Important Dates

June 27th – Field Day
bring clothes to get soaked and wet.

June 28th – Downtown/Planetarium
leaving Canutillo HS @ 9:00 AM

June 29th – White Sands
leaving Canutillo HS @ 3:00 PM

Classroom Expectations

Always be:

Respectful

Responsible

Safe

Respectful:_____

_____

_____

_____

_____

_____

Responsible:_____

_____

_____

_____

_____

_____

Safe:_____

_____

_____

_____

_____

_____

Engineering Design Process

Ask

Define the Problem, Identify Constraints, Identify Criteria

Imagine

Research, Generate Ideas, Communicate Ideas

Plan

Diagram, Materials, Procedures

Create

Build prototype

Test

Record Data, Evaluate

Improve

Consider, Modify

Repeat Phases V and VI as necessary

Share

Present – share design process.

Instructional Lesson Plan

Content Area(s)/Course: Geometry	Lesson Topic: Flag Tessellations
Teacher: Troy Payne & Francia Ortega	Date: Canutillo STEM Games 2018

TEKS objective:

G(3)(A) Coordinate and transformational geometry. The student uses the process skills to generate and describe rigid transformations (translation, reflection, and rotation) and non-rigid transformations (dilations that preserve similarity and reductions and enlargements that do not preserve similarity). The student is expected to: describe and perform transformations of figures in a plane using coordinate notation.

Student Outcome(s):

Students will see transformation on a shape can make a puzzle called a tessellation from any of the three regular polygons (Square, triangle, hexagon)

Materials

- **Index Card**
- **iPads**
- **Paint**
- **Paint Brushes**
- **Cardboard**
- **Prezi** (http://prezi.com/et1xk6rskovt/?utm_campaign=share&utm_medium=copy)
- **Online Game** (http://www.shodor.org/interactivate/activities/Tessellate/)

Instructional Delivery - Activities

1. **Small presentation**
   - What a Tessellation is.
   - Examples of tessellations
   - How to make one (Square)

   Website- online tessellations (square)

   - They have to use the square (no exceptions)
   - Show how one side moves to the other
   - Let them play
   - The lines can't cross each other

2. **Each student will create their own on an index card (guided) and create a stencil**
   - Using the document camera get an index card and make a design. You can pick one. Or copy what I do.
   - Draw your design then cut it out and tape it to the other side. Get creative.
3. **Create a team flag (poster board): remainder of time (45 minutes until lunch)**
   - Now as a group you will create one.

- Get poster board. On the left bottom corner cut out a 6in by 6in square.
- As a team come up with a design. You make look one up if you can't figure it out.
- Next get your design and place it in the middle of the remaining poster board.
- Trace your design and cut it out. Make sure it's in the middle you need room around your cut out design.
- Next tape your first design to the cut-out design.
- Now you have a stencil.
- Starting at the top left corner of your sheet start painting. Your stencil will help you create your pattern.

Total Duration Aprox.
1hr 15min

Instructional Lesson Plan

Content Area(s)/Course: Physics	Lesson Topic: Engineering Design Process Chariots
Teacher: Rebecca E. Ortiz	Date: Canutillo STEM Games 2018

TEKS objective:

130.402.c.9a

130.412.9

Student Outcome(s):

Students will become familiar with the Engineering Design Process and complete their own chariot in the process.

Materials

- Cardboard
- Box cutters (1 per group)
- Exacto Knives (1 per group)
- 2 Cones
- Rope (12 feet per group)
- Full Blanket Sheet (1 per group)
- Butcher Paper
- Acrylic Paint
- Hot Glue Gun with Glue
- Duct Tape (1 role per group)
- Packaging Tape (1 role per group)
- Sliding folder for Portfolio (1 per student)
- Engineering Design Process Cover Papers.
- Prezi presentation: https://prezi.com/szir9r8jiqxj/chariot-challenge/
- 'Ask' Handout (1 per student)
- 'Imagine' Handout' (1 per student)
- Graph Paper (1 per student)
- 'Test/Improve' Handout (1 per student)
- Rubric for Chariots. (3 per group)

Instructional Delivery - Activities

Day 1
(90 minutes)

Materials: 'ASK' Handout, 'IMAGINE' Handout, Graph Paper, Prezi, Engineering Design Process Cover Papers.

Welcome students and remind them about the Blanket Races they have just completed and the main idea of the camp: Olympics. Place students in their groups from the start using the Flag Tessellation groups. (should be 3 per group).

1. Use the Prezi presentation to introduce the project and guidelines. (minutes)
   They are all written in each step and well outlined. Introduce the idea that they will now be creating their own chariot! We are traveling back in time as Chariot racing was one of the first six events when the Olympics began. We will be using the Engineering

Design Process to complete this project. Next Slides (4-9) will briefly explain what each Phase covers. Stopping at Slide 10 to elaborate on the use of the portfolio in our project. Pass Portfolios out. Say we will present all information collected in this portfolio at the end of our camp. A copy of each document used needs to be collected. Moving on, Pass out 'ASK' Handout with Slide 11. Explain that there are two different medals that can be earned during this project, For Appearance and Engineering.

2. Using Slides 12 and 13, students will be asked to fill out everything for the 'ASK' Handout.
   Give them about **5 minutes** for this. Be specific on what you would expect of them. Their *goal/problem* should answer whether they would like theirs to LOOK the best (win appearance) or do they want it to be the fastest (Win Engineering). (the racing will be going around a cone and only one on one) This is answered individually. Explain their materials = most likely what is written in *restrictions*, along with any other requirements they might think stops them.
3. Slide 14, Pass out 'IMAGINE' Handout.
   In this phase, they are asked to research, brainstorm, and sketch. They will have **10 minutes** to research their INDIVIDUAL design. Look at different styles, and designs that there were. Begin to brainstorm how you would like to build your own. Draw a rough draft. Remind them about uniqueness, do not pick the first imagine when they google chariot, as many other groups might have already done so. Be strict on the Research.
4. Now using Slide 15, students will come together with their groups and in the next **10 minutes** discuss their ideas. Which will they use? Why do they think these are the best? Write down any key points. Who will be the charioteer? Why? What will be the armor?
   Be aware of the materials you have before you and how you could use them
   Carboard is the main component, but there are other materials, paper, tape, rope, fabric, hot glue.
5. Pass out GRAPH PAPER. Using Slide 16, they will have **20 minutes** to complete a final blueprint on their Graph Paper. Be very neat as this is your blueprint!!! Have team name and team member names on the blueprint.
   Be detailed and write down how much material you will need. This should be a full on, architectural blueprint. With dimensions. Draw out your charioteer and their armor as well. Teachers should go around checking that they are being specific. Where will their flag go? Their team name? Who is pulling?
6. **5 minutes**. Now, Showing Slide 17, portfolios will be put together piece by piece. There should be a cover page showing Engineering Design Process. Write your Team name in the top left corner and your Name in the top right hand corner.
   Next is ASK Cover page. Behind this, place your ASK Handout.
   Next is IMAGINE Cover page. Behind this, place your IMAGINE handout.
   Place all portfolios in the middle of your table. Notice there is only ONE blueprint. *Copies must be made and placed inside each of their portfolios* (along with 2 extra copies for the next day). Simply place the blueprint in one of the portfolios, in the front.

Day 2
(30 minutes)

Materials: Blueprints for each group, Cardboard, Boxcutters, Exacto knives, duct tape and packaging tape.

1. Have students sit in their groups. **5 minutes** to explain that today they will have 20 minutes to create their skeleton. Hand out both types of tape to each group. Cardboard should be unlimited and not necessarily counted on. Have them write their names on the inside of the tapes so that they are not 'lost' during the next couple of days. Make major cuts, their chariot should have a form by the end of the day. Be very strict on the box cutters and exacto knives. Remind them about the engineering design process.
   Also be organized with the cardboard.
2. During the **20 minutes**, go around keeping them on track.
3. At the 20 minute mark, have them start cleaning up. Give about **5 minutes**.

*****When the chariots are being put away, be sure to keep their tape, blueprints, flags and any useful cardboard pieces together.*****

Day 3
(115 minutes)

Materials: Cardboard, Boxcutters, Exacto knives, duct tape, packaging tape, butcher paper, rope, and blanket.

Continue Phase 4: Creating!!!

1. **5 minutes** to get organized and have them prepared to work. Pass out their rope (12 feet to each group) along with their sheet of blanket. Remind them of their requirements as they continue to work on them. Each day they work on their chariots, students will grab their chariots and materials from the day before and simply get started.
2. Get to building. By the **30 minute** mark, there should be a complete standing figure. Be sure to follow your blueprint! Make sure the students are diligently working. Always cutting, always gluing. Remind them of materials they are allowed to use.
3. Next, you have **50 minutes** to secure that figure. Make sure it is stable and even start pulling your person on it. Continue checking back on your blueprint. Everyone should be working. Have someone cutting, someone gluing.
   Also, be sure that they have secured their blanket and rope onto the chariot.
   Remind them about their charioteer and the armor they decided to put on them. In these 50 minutes they should begin creating them.
4. Use the next **25 minutes** to have the students cover their chariot completely in butcher paper.
5. **5 minutes** to clean up.

*****When the chariots are being put away, be sure to keep their tape, rope, blanket, blueprints, flags and any useful cardboard pieces together.*****

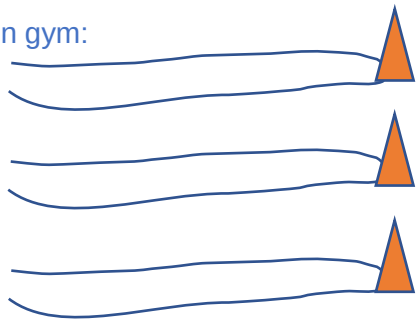
Day 4
(75 minutes)

Materials: Cardboard, 'TEST/IMPROVE' Handout, Boxcutters and Exacto knives, tapes, butcher paper.

1. **BEFORE TEACHING,** try to have the chariots ready for them in the gym to save moving time. They will be able to bring their chariots up after.
2. **10 minutes** to explain and move to gym.
   Pass out the 'TEST/IMPROVE' handout.
   We will be going to the gym to test our chariots. You will not race. But you must do 2 trial runs and record your times for each. You will pull your charioteer on your chariot, do turns, fast,

slow, different ways of pulling and record all of your findings. IF you see any changes you wish to apply (and can) while we are at the gym, try to hold back as there will be time for that.

Set up in gym:



Just like for the real race, students must start at one end of the gym and go around a cone then come straight back. SHOW THEM. Ask only one member of each team to

3. They will have **30 mins** to complete this part.
   After you are satisfied with your testing.
4. We will return to the class and move onto PHASE VI. IMPROVE. They will have **20 minutes** to fix their chariot in case it was damaged during the trial runs.
5. They will have **5 minutes** to clean up and get into the classroom.
6. One they are done, they will have another **5 minutes** to record their findings. BE SURE TO RECORD THE CHANGES they have also made, and WHY you completed those changes. Why didn't it work?
7. **5 minutes** to Put your papers into your portfolio!!!

Day 5
(90 minutes)

Materials: Cardboard, Boxcutters, Exacto knives, duct tape, packaging tape, butcher paper, paint, rope, and blanket

1. **20 minutes** to do another trial run for their chariots again…turns, fast, slow, different types of pulling…some teams MAY NOT want to use this time, just have them move onto the next steps.
2. **20 minutes** to completely cover their chariot in butcher paper. Do not let them get lazy. Chances are that some paper from before got torn off so ask them to redo big parts. We are only worried about the outside of the chariot.
3. **45 minutes** to finish their armor (have it painted) and paint their team name on their chariot. Ask where/how they will put their flag? Time flies so keep reminding them about how much time they have continuously. Also ask them to be unique, the committee will be looking at the design.
4. **5 minutes** to clean up.

Day 6
(45 minutes)

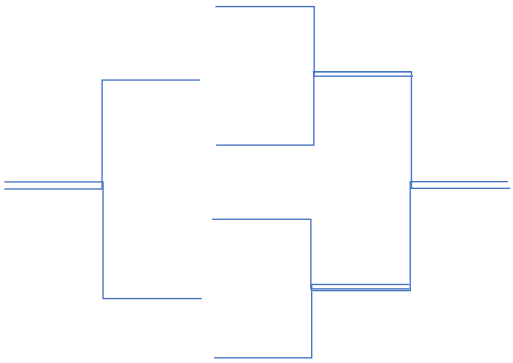
1. Explain to the students that this is their final day to work on their chariot. Remind them to stay on topic.
2. **35 minutes** to have their chariots covered, painted, unique design, their blanket on the chariot, flags ready, and their charioteer's armor ready.
3. **5 minutes** to clean up and be ready in their class.

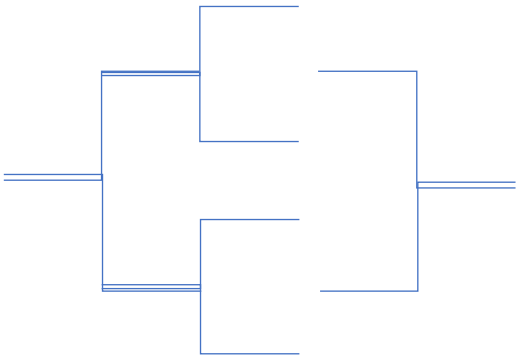
Day 7
(90 minutes)

1. **5 minutes** to explain that they will be giving a presentation on their chariots. This of this as a science fair project or a car show where they are to show off the best parts of their chariot. What was their thought process during the entire process? When they tested it, did it work the way they wanted? Why/why not? What changes did they have to make? They should explain each part of the Engineering Design Process and how it affected their chariots. They will present this to teachers and be graded. Hand out portfolios so that they utilize their information.
2. **15 minutes** to ready their presentation for the next day.
3. **30 minutes** for the judging.
   Allow the students about 5 minutes to get ready for their presentations. They should have their flag on their chariot and their charioteer with armor ready for a *fight.*
   Each round should take 5 minutes for the students to be able to explain their chariot. Allow for one minute transition time.
   Each round, a teacher will move onto the next chariot.
   The rubric explains what each team is to be tested on.

	Team1	Team2	Team3	Team4	Team5	Team6	Team7	Team8
Round 1	Teacher1	Teacher2	Teacher3	Teacher4	Teacher5	Teacher6	Teacher7	Teacher8
Round 2	Teacher8	Teacher1	Teacher2	Teacher3	Teacher4	Teacher5	Teacher6	Teacher7
Round 3	Teacher7	Teacher8	Teacher1	Teacher2	Teacher3	Teacher4	Teacher5	Teacher6

   At the end of the judging, have students place their portfolios back in the classroom and get ready to walk to the gym, this is where the extra time is helpful.
4. **5 minutes** to walk to gym
5. **35 minutes** for racing. This is the bracket we used.





Each chariot will be raced at least twice so be sure to stress how they need to be careful. If their chariot is deemed as untraceable, they will forfeit the rest of their races.
Let the students have fun. A suggestion is to record the finish line because some will come in very close and you do not want a *close call*. Have the chariots who are ready to race on the line and the ones next on deck.
Make sure everyone is cheering the teams on as they compete.

Total Duration Aprox. 535 minutes.

Chariot Rubric

Team Name:_____

	1 (Emerging)	2 (Developing)	3 (Proficient)	4 (Excellent)	Points
Aesthetics	Chariot design was unattractive.	Chariot design was minimally attractive and required plenty improvement.	Chariot design was mostly visually attractive, but design could have been polished to be improved.	Chariot was carefully designed creating a visually attractive chariot.	
Creativity	Student follows a set of directions to complete chariot, but copied idea straight from a source.	Chariot somewhat original, but mostly based off of an existing chariot project.	Chariot is mostly original.	Chariot is unique and well created.	
Design Process	Some students understood none to a couple steps of the engineering design process and did not apply them to their project.	Some students understood a few of steps of the engineering design process and partly applied them to their project.	Students somewhat understood the steps of the engineering design process and mostly applied them to their project.	Students all understand the steps of the engineering design process and applied them perfectly to their project.	
Knowledge	Students do not know their project and are unable to present their chariot.	Students somewhat know their project and can explain a bit of their chariot	Students know most of their project and can explain a majority of their chariot.	All students know their project very well and can explain each part of their chariot without hesitation.	
				Total points =	

IMAGINE

Research:

Have people done this project in the past? What do you like from their design? What do you dislike?

Sketch

Think of, what materials you would like to use? how much? what is the general design? where will the charioteer be kneeling? how will the three other team members pull?

ASK

Goal/Problem:

What would you like to accomplish from this project?

Restrictions

What might be holding you back?

Outcome:

How will accomplishing your goal (solving the problem) benefit you or the class?

Requirements :

What must be on my chariot?

TEST

Canutillo Olympic Trials

Run 1	Time
Run 2	Time

IMPROVE

What errors occurred while you tested your chariot? Did something work differently than you had expected?

Fixing our battle scars

What improvements (and where) did you have to make to your chariot? Did this change the overall idea of your chariot?

5 min Ms. Pena

15 min for entrance of all teams

5 min closure Ms. Quintana

5 min come back to class.

DANI: Good morning Canutillo High School!!! Welcome to the first Canutillo STEM Games. PAUSE My name is Ms. Pena and I am the Canutillo Science Teacher and one of this year's MaST Academy mentor.

I'm excited to have each and every one of you here today! You have been working very hard the entire year and its finally time to have some summer fun! PAUSE Today, in our 12th year of MaST academy summer camps we are excided to host it in our very own Canutillo High School.

PLAY BACKGROUND MUSIC LOUDER FOR 5 SECONDS

Over 100 thousand people wanting to get a glimpse of this event, but, only a very few selected people have had the opportunity to be present.

This year's summer camp would not be possible without our dedicated sponsors. We would like to thank ADP, Ellen Esposito and our dedicated scholars.

Now I would like to introduce this year's mentor teacher Ms. Quintana

XENA: Good morning ladies and gentlemen, I am honored to be part of this years Canutillo STEM Games. MaST Academy has given me the opportunity to present this year's teams.

As I call your team name please come up to the left part of the stage with your flag.

Holding the mad scientist gold flag, please welcome

TEAM (nerds)

The team members are: Mr. Payne, Ms. Ortega, Ms. Ikeakor, Ms. Diaz, Ms. Ortiz, Ms. Lugo, Mr. Gallegos, Mr. Vasquez, Ms. Ortega, Ms. Olivas & Ms. Cardoza

TEAM (INSERT TEAM NAME)

The team members are:

TEAM (INSERT TEAM NAME)

The team members are:

TEAM (INSERT TEAM NAME)

The team members are:

TEAM (INSERT TEAM NAME)

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TEAM (INSERT TEAM NAME)

The team members are:

TEAM (INSERT TEAM NAME)

The team members are:

Lets give a round of applause to all the teams.

Science, Technology, Engineering, and Math studies have never been more in demand than in today's society. This year's summer camp is not only dedicated to learning but also to experiencing STEM at its finest.

This is why we welcome you, we salute you for your courage and we wish you happy summer games!

Instructional Lesson Plan

Content Area(s)/Course: Earth and Space Science	Lesson Topic: Greek History
Teacher: Karen Olivas	Date: Canutillo STEM Games 2018

TEKS objective:
Earth and Space Science

2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

6 (C) Relevance. The interacting components of Earth's system change by both natural and human-influenced processes. Natural processes include hazards such as flooding, earthquakes, volcanoes, hurricanes, meteorite impacts, and climate change. Some human-influenced processes such as pollution and nonsustainable use of Earth's natural resources may damage Earth's system. Examples include climate change, soil erosion, air and water pollution, and biodiversity loss. The time scale of these changes and their impact on human society must be understood to make wise decisions concerning the use of the land, water, air, and natural resources. Proper stewardship of Earth will prevent unnecessary degradation and destruction of Earth's subsystems and diminish detrimental impacts to individuals and society.

(11) Solid Earth. The student knows that the geosphere continuously changes over a range of time scales involving dynamic and complex interactions among Earth's subsystems. The student is expected to:
(C) analyze changes in continental plate configurations such as Pangaea and their impact on the biosphere, atmosphere, and hydrosphere through time;

Student Outcome(s):

We will learn what is science, how the earth has changed, and about the natural processes that affect earth by creating our own god/goddess and creating a myth explaining a natural phenomenon.

We will… learn what is science, how the earth has changed, and about the natural processes that affect earth.
I will… create my own god/goddess and create my own myth explaining a natural phenomenon/process.

Materials

- Laptop/Phone/Tablet
- Power Point
- Projector

- Greek view puzzle (pre-cut it)
- Scissors
- Blue Paint
- Paint brushes
- Paper plates
- Pangaea puzzle
- 4-inch Styrofoam ball
- Matching cards
- Sandwich baggies
- Neon Expo marker
- Greek Star
- Puppet Template
- Needles
- Sowing Thread
- Glue Gun
- Glue Sticks
- Felt Sheets
- Googly Eyes
- Yarn
- Craft Feathers
- Permanent Markers

Instructional Delivery - Activities

Activity 1. (10 min)

- Kahoot

https://play.kahoot.it/#/?quizId=3f3b9aab-06e3-4d67-ab66-75282380c1bc

Activity 2 (40 min)

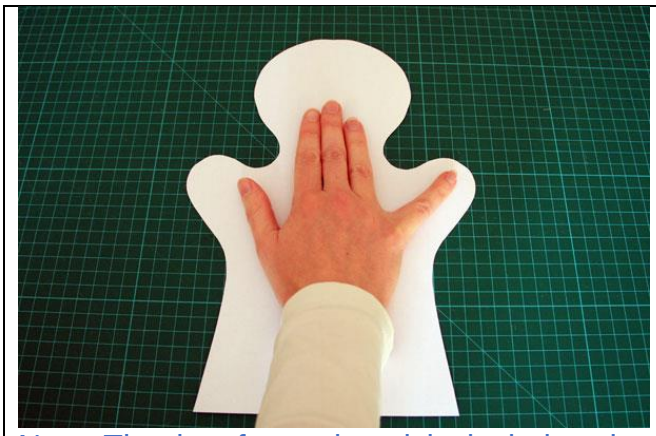
- Describe science vs. creationism
- Power Point
- Complete Greek world view (Plate)
- Complete Pangaea puzzle

Activity 3 (40 min)

- Greek Gods and Goddesses Matching activity

Activity 4 (90 min)

- Create own God/Goddess-puppet, puppet story must include a myth explaining a natural phenomenon/natural processes



Note: The time for each activity includes clean up, transitioning, etc.

Further Instructions

1. The "Greek-Plate.pdf" will need to be cut into the puzzle pieces and the students will receive the pieces, blue paint, and a paper plate to glue their puzzle pieces onto.
2. The "pangaea-MaST.pdf", the students will receive the puzzle pieces on pg. 6. They will receive the styrofoam ball, paint it blue, and then they will glue the puzzle pieces onto the styrofoam ball.
3. The "Lesson_Greek online.pdf", has the Olympian Gods and Goddesses Chart on page 7, which the students will receive and draw on the black lab table using a Neon Expo Marker. Pages 15 and 16 contain the answers to the chart, which the students will receive a set of cards cut out (Greek_Cards.pdf). They will use the internet to match the cards to the chart.
4. The "Greek-Star.pdf", students will fill it out to create their myth about their God/Goddess involving a natural process, and after they complete this star then will build their puppet using the template we provide.
5. The "Greek Lecture.pptx" has the powerpoint that we will use through the class as we are working through the activities.

Total Duration Aprox. 180 min

7th grade Lesson Plan: It's Greek to me: Greek Mythology

Overview
This series of lessons was designed to meet the needs of gifted children for extension beyond the standard curriculum with the greatest ease of use for the educator. The lessons may be given to the students for individual self-guided work, or they may be taught in a classroom or a home-school setting. This particular lesson plan is primarily effective in a classroom setting. Assessment strategies and rubrics are included. The lessons were developed by Lisa Van Gemert, M.Ed.T., the Mensa Foundation's Gifted Children Specialist.

Introduction

Greek mythology is not only interesting, but it is also the foundation of allusion and character genesis in literature. In this lesson plan, students will gain an understanding of Greek mythology and the Olympian gods and goddesses.

Learning Objectives
After completing the lessons in this unit, students will be able to:
- Understand the Greek view of creation.
- Understand the terms Chaos, Gaia, Uranus, Cronus, Zeus, Rhea, Hyperboreans, Ethiopia, Mediterranean, and Elysian Fields.
- Describe the Greek view of the world's geography.
- Identify the names and key features of the Olympian gods/goddesses.
- Create their own god/goddess.
- Create their own myth explaining a natural phenomenon.

Materials
- *D'Aulaires' Book of Greek Myths* by Ingri and Edgar Parin D'Aulaire
- *The Gods and Goddesses* of Olympus by Aliki
- *The Mighty 12: Superheroes of Greek Myths* by Charles Smith
- *Greek Myths and Legends* by Cheryl Evans
- *Mythology* by Edith Hamilton (which served as a source for this lesson plan)
- A paper plate for each student
- Internet access to look up relevant sites

IMPORTANT NOTE
Do not give student(s) the filled-in copy of the Gods/Goddesses chart. That is your answer key.

Lesson 1: Greek creation mythology

Although when we think of mythology we think of a collection of stories, there is a beginning to them. Understanding the beginning of the story, the creation of the world, gives us a framework to build upon as we learn about the different myths.

The short answer to how the Greeks viewed the creation of the world is this: Scary old gods came first; they got stomped down by their kids, who were better looking, younger gods. These gods created humans. Humans and gods fought for supremacy, and the humans won a few rounds but eventually got trounced and became more and more miserable.

Now, the longer answer: In the beginning, the universe was without form. It was not nothing; there was matter, but it was unorganized, shapeless, mixed up and dark. This was called Chaos.

After Chaos, more divinities, or gods, came into being.

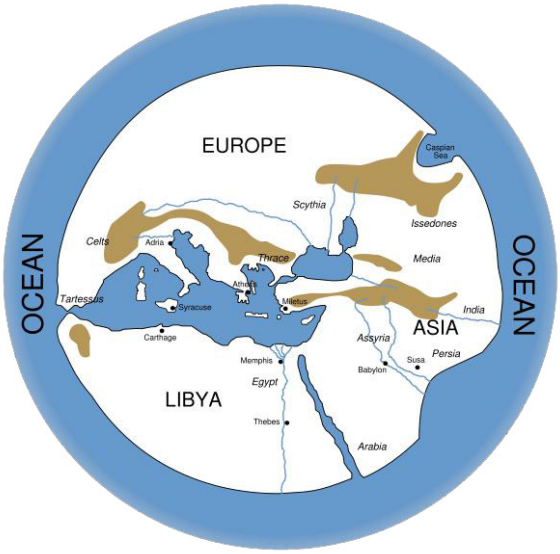
Gaia, the Earth, held up Uranus, the sky. Gaia and Uranus had a bunch of kids. First they had a bunch of monsters including the Cyclops, and then they created the Titans as the second generation. Uranus hated all the Titans and was actually quite ugly about it – but there are only a couple of Titans that you need to remember: first, Oceanus, the god of the sea, and then Cronus, the strongest and best one of all. Gaia was pretty ticked at Uranus for being a jerk, so she helped Cronus overthrow him.

So, let's keep this straight. Cronus is Uranus's son. Cronus became the king (bye-bye Uranus), and married his sister, Rhea – another Titan. It's like a soap opera. This was called the Golden Age because men, who had been made by a Titan named Prometheus, were living in harmony. Everything was hunky dory.

It didn't last, though, because Cronus heard a prophecy that one of his sons would dethrone him, so every time his wife, Rhea, had a baby, he swallowed it. Rhea got a little sick of seeing all of her children swallowed alive, so she tricked Cronus when her sixth child, Zeus, was born; she wrapped up a rock to look like a baby and had Cronus swallow that instead. Zeus rescued his previously swallowed siblings, and all was right with the world.

World View

The Greek view of the world was a little different than ours. The Greeks believed that the world was flat, but circular, like a paper plate. At the center of the Universe was Greece.



Their world was divided by the Mediterranean, which means "Middle of the Lands" in Latin. The river Ocean flowed around the world in a clockwise motion.

In the north lived the Hyperboreans – an extremely happy people for whom life was sweet. When the old people became tired of living, they threw themselves into the sea. This was a land of constant vacation where people were said to live for 1,000 years.

In the south lived the Ethiopians. In Greek drama, mention is often made of various gods being in Ethiopia, meaning really far away. So, if I say I parked in Ethiopia this morning, would that mean I'm close to my office or far away? The Ethiopians were said to be on good terms with the gods and liked to entertain them.

To the west were the Elysian Fields. This was the closest the Greeks got to the idea of heaven; only the best and brightest of the dead people got to go there.

To Do

1. Read The Gods and Goddesses of Olympus by Aliki.

2. Draw your own representation of the Greek view of the world on the paper plate using colored pencils and the map on the previous page as a guideline. Be sure to include the Ethiopians, the Hyperboreans and the Elysian Fields on your map.

3. Write a one-paragraph essay comparing the Greek view of the world to the contemporary view of it, including at least two points of comparison and two of contrast. You can follow this guideline:

- ▶ Directions for Paragraph: Begin with a topic sentence. Here is an example:
  The Greek view of the world both resembles and differs from the contemporary view.
- ▶ Next, list two ways the views are similar. Here are examples:
  - The Greek view resembles the contemporary view in that _____.
  - Additionally, the views are similar because _____.
- ▶ Next, list two ways the views are different. Here are examples:
  - However, the Greek view is not the same as the contemporary view because the Greeks believed _____.
  - The Greeks also thought _____.
- ▶ Last, you will state a conclusion. Here's an example:
  Therefore, even though the views have similarities, they differ in important ways.

Lesson 2: The Olympian gods

Use the information in this lesson to begin to fill in the gods and goddesses chart at the end of this lesson; you will also need to do your own research to complete it. Now that you understand the way that the Greeks viewed the beginning of the world, you are ready to learn about the Olympian gods.

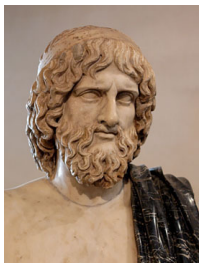
First, we have to explore exactly what we mean by "Olympian gods." Mount Olympus is a real mountain in the north of Greece. Gradually, it became associated less and less with an actual mountain and more with an imaginary place high above the earth. According to the ancient Greeks, the gate to Olympus was made of clouds and it was guarded by four goddesses, the Seasons. Each god had his or her own dwelling place, but Olympus was home base.

There were up to 14 gods considered Olympian gods. Seven of them were Zeus and his siblings, and seven others were children of Zeus. Sometimes only 12 will be listed. The Greeks and Romans shared mythology, so you will find two names for most gods.

Zeus

Zeus was the king of the hill. He was dominating, powerful and had a soft spot for pretty women. He could be terrifying when angry. His symbols were the thunderbolts, or lightning bolts made for him by the Cyclopes (his uncles); the eagle; and the scepter, or rod. Please copy this information onto your chart.

Hades



Hades, or Pluto, was the god of the underworld and of the dead. He was called the same names by the Romans, but they also sometimes called him Dis or Dis Pater. He was Zeus's brother and married Persephone after kidnapping her against her will. He was gloomy and frightening.

Poseidon

Next, we have Poseidon, or Neptune, as the Romans called him. He was Zeus's brother, and he was the god of the sea and also earthquakes. He often is shown with a three-pronged spear called a trident that was made for him by his nephew, Hephaestus, and/or a fish.

Hera

Our first goddess is Hera. She sits on the right side of Zeus and is his wife. Of course, she's his sister, too, but that's the way it was on Olympus. Hera's Roman name is Juno, and she is the queen of the gods. She is the guardian of marriage and was well-loved by the Greeks; it's kind of sad that she's the goddess of marriage but her own marriage was so bad. She was often jealous of her husband's girlfriends and did mean things to them, even the ones who didn't want anything to do with him, but she could be tender and loving as well. The peacock was her symbol. In fact, the circles in a peacock's tail are said to be the eyes of her 100-eyed servant, Argus.

Athena

Next is Athena, or Minerva, the daughter who sprang fully formed from the head of Zeus after a major headache. She is the goddess of wisdom and war and also the protector and namesake of the city of Athens. She preferred reason to violence unless she was pushed. She turned Arachne into a spider for bragging that she could spin better than Athena. She was very competitive and is often pictured with her helmet and a spear. She carried Zeus's shield, called the aegis. The owl was her bird. Can you see it in her hand?

Apollo

Apollo was a twin. His Roman name was the same as his Greek name. He was the god of the sun or light, poetry, music and medicine and was famous for his oracles (wise women to whom he gave his power to predict and interpret the future). He was very proud and also protective of his mother and sister. His symbols were the gold bow and arrows, and he often appears golden and shining. He wears a laurel wreath in memory of Daphne, who didn't want to be his lover and prayed to Mother Earth for help escaping him; she was turned into a laurel tree.

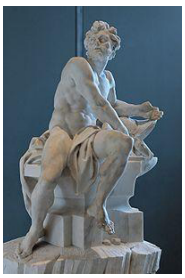
Artemis

Artemis was Apollo's twin. Her Roman name was Diana, and she was the goddess of hunting, chastity and the moon. She protects women and small children, is fiercely independent and particularly dislikes men. In pictures, she is seen accompanied by three hunting hounds, a bow and a fawn.

Ares

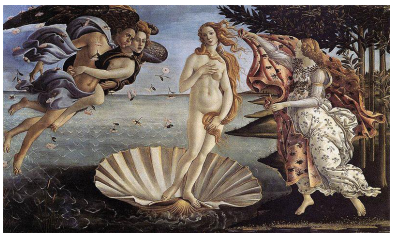
Ares or, as he is known by his Roman name, Mars, was the god of war. He would fight on both sides, if possible. He was young, strong and handsome, and liked to dress in battle clothes even when he wasn't fighting.

Hephaestus



Hephaestus, or Vulcan, was born lame and was further crippled when he was thrown from Olympus by his mother, Hera, in a rage. He was the only Olympian with a disability. He was unhappily married to Aphrodite and worked as a blacksmith in the gods' forge.

Aphrodite



Hephaestus's wife, Aphrodite, whose Roman name was Venus, was the goddess of love and beauty. She was born out of sea foam when the blood of Uranus dropped into the ocean. She was the mother of Eros and was irresistibly charming, fickle, vain and competitive. Her symbol was a cestus, or magic belt, that made everyone fall in love with the wearer; sometimes she would lend it to humans. This is a famous painting of the birth of Venus, or Aphrodite, by Botticelli.

Dionysus

Dionysus was the partier of the mountain retreat. He was Zeus's son by another woman, who was driven crazy by Hera and her jealousy. Dionysus went all around teaching people how to make wine and having a good time. Eventually, Hestia gave up her throne for him, and he lived on Olympus. He was the god of wine, of course, and also vegetation.

Hermes

Hermes, or Mercury, was the god of science and invention, but he is best known as the messenger of the gods. He is often pictured with a winged helmet and sandals. He is said to have invented the alphabet, boxing and gymnastics! In this painting by Goltzius, you can see his helmet with wings; he's not wearing his famous sandals, though.

Demeter

Demeter was the goddess of the crops and the harvest. She is also known as Ceres (Roman) and sometimes Deo. Her symbols include a torch, a crown, a scepter and stalks of grain. She is often portrayed with her daughter, Persephone, who was kidnapped by Hades and taken to the underworld. By the time she was rescued, she'd eaten six pomegranate seeds, so she couldn't escape the underworld entirely. Her mother was so frantic that winter draped the land and no crops would grow. A deal was struck, and Persephone was allowed to return to her mother for half of the year. So each year, when she returns to the underworld, fall comes, then winter – but when she returns to her mother, spring and summer come again.

Hestia

Hestia was Zeus's sister and the goddess and protectress of hearth and home. She is also known by her Roman name, Vesta. She was gentle and kind and was very popular with the Greeks. She didn't have a lot of adventures, so she's rarely pictured in art.

Now, use at least two sources in addition to what you read here to fill in your chart (next page) completely. Write down the sources you used on the back of the chart.

Book suggestions

- *D'Aulaires' Book of Greek Myths* by Ingri and Edgar Parin D'Aulaire
- *The Mighty 12: Superheroes of Greek Myths* by Charles Smith
- *Greek Myths and Legends* by Cheryl Evans

(If your library doesn't have these, check around Dewey Decimal No. 398.2. That's where Greek mythology is.)

Web references

- greece.mrdonn.org/myths.html
- www.mythweb.com
- mythman.com
- loggia.com/myth/content.html
- pantheon.org/areas/mythology/europe/greek/articles.html

OLYMPIAN GODS & GODDESSES CHART				
Greek name	**Roman name**	**Realm**	**Symbol**	**Facts / Characteristics**
Zeus				
Hera				
Poseidon				
Hades				
Athena				
Apollo				
Artemis				
Aphrodite				
Hermes				
Ares				
Hephaestrus				
Hestia				
Demeter				
Dionysus				

Lesson 3: Mythology biographical poem

A biographical poem, or biopoem, uses a simple but specific structure to describe the most important facts about someone. Your assignment is to write a biopoem about one of the gods or goddesses you have studied. You may choose any god or goddess (except Aphrodite, because she's the example below). The blanks on this page are for your rough draft. When you're done, copy your final version onto a separate sheet of paper and, if you would like, decorate it. Please attach this sheet to your final draft.

Follow this format exactly, please:

Greek Name_____,

I am (list four traits) _____, _____, _____, _____.

I am [a relative] of (1-3 people) _____.

Lover of (1-3 things or people) _____.

Who feels/protects (1-3 things) _____.

Who needs (1-3 things) _____.

Who fears (1-3 things) _____.

Who gives (1-3 things) _____.

Resident of _____,

Roman Name_____.

Example (you may not use this goddess):

Aphrodite,
Goddess of Love, Desire, Beauty and Fertility.
A daughter of Zeus and Dione; wife of Hephaestus.
Lover of sons Aeneas and Cupid and brother Ares.
Who protects sailors.
Who needs a chariot.
Who fears War, Athena and Hera.
Who gives Helen to Paris, a magic belt to Hera, and Medea to Jason.
Resident of Mt. Olympus.
Venus.

Lesson 4: Olympians quiz

Time to test yourself – and beware, answers may be used more than once!

A. Zeus
B. Hera
C. Poseidon
D. Hades
E. Athena
F. Apollo

1. _____ This god's Roman name is Neptune.

2. _____ Name the goddess of war.

3. _____ His symbol is the thunderbolt.

4. _____ Her Roman name was Juno, and her symbol was the peacock.

5. _____ Name the god of the underworld.

6. _____ Name the twin of Artemis.

7. _____ Name the goddess of wisdom.

8. _____ Name the very jealous wife of Zeus.

9. _____ Name the god of the sun, poetry, music and medicine.

10. _____ His Roman name is Jupiter.

11. _____ This god is anti-social and doesn't like people.

12. _____ Name the wealthiest god.

A. Artemis
B. Aphrodite
C. Hermes
D. Ares
E. Hephaestus
F. Hestia
G. Demeter
H. Dionysus

13. _____ Name the goddess of hunting and twin of Apollo.

14. _____ Name the goddess of hearth and home who gave up her throne for Dionysus.

15. _____ Name the mother of Persephone; her Roman name is Ceres.

16. _____ This god's Roman name is Bacchus.

17. _____ His symbols are winged sandals and a winged helmet.

18. _____ Name the only handicapped god.

19. _____ This god's Roman name is Mars, and he is the god of war.

20. _____ Her Roman name is Vesta.

21. _____ Her Roman name is Diana.

22. _____ His symbol is fire and a hammer, and his Roman name is Vulcan.

23. _____ His Roman name is Mercury, and he is the messenger of the gods.

24. _____ Name the god of wine.

25. _____ She was the goddess of love and beauty.

26. If you could have dinner with one god or goddess, who would it be and why?

_____

_____

_____

27. Which god or goddess do you think would make the best president and why?

_____

_____

_____

28. Imagine that Zeus has come to you and said that Olympus is lacking a god or goddess, and he needs you to help. Invent a new Olympian and describe him or her below.

Name: _____

Roman Name: _____

Connection to Olympus (related to another god or goddess? Married to a god or goddess?):

_____

Powers: _____

Symbol: _____

Personality traits: _____

_____

Friends: _____

Enemies: _____

Lesson 5: Putting it all together

Myths are a way of understanding the world. This lesson has been about Greek mythology, but every culture has myths. Myths define social customs and beliefs, explain natural and psychological phenomena, and provide a way for people to discuss things that cause anxiety.

Mythology is all around us. Here are just a few examples of places we find myths today:

- **Days of the week** – Wednesday (Woden or Odin – Norse god); Thursday (Thor – Norse god); Friday (Freya – Norse goddess); Saturday (Saturn – Roman god who ruled before Jove)
- **Cars** – Toyota Avalon and Cressida, Cadillac El Dorado, Honda Odyssey, Mercury
- **Shoes** – Nike
- **Tires** – Midas
- **Astronomy** – Constellations like Orion, the Argo, all of the planets and the Pleiades. The Milky Way itself was supposedly the road over which the stars traveled to Jupiter's palace.

- **NASA** – The first part of U.S. space program was Project Mercury, named after the messenger of the gods because the project's purpose was to send a message to the Soviets that America was in the space race. The Gemini Project was next; Gemini is Latin for "twins," and the project was called this because the capsule held two astronauts. Apollo astronauts rode on Saturn rockets.

Myths also make great stories. They come up in literature all over the place, from really serious stuff like Dante to comic strips. Myths inspire music; actually the word music comes from the mythological muses who inspired art of all kinds. Painters such as Michelangelo and Botticelli were inspired by myths. Even children's movies are a good place to look for myths; you will find them everywhere, including *Snow White*, *Star Wars* and *The Lord of the Rings*.

Can you find at least three examples of mythology connections in the world?

1. _____

2. _____

3. _____

Lesson 6: Create your own myth

Hopefully myths inspire you, too, because you are about to create your own myth! As you know, myths were often used to explain natural phenomena. Your challenge is to create your own myth to explain some natural phenomenon or land formation. It could be anything from the origin of hurricanes to how the Grand Canyon or a mountain range was created. You will tell this myth in a story format.

Here are the guidelines:
1. Your story must involve at least two Olympian gods or goddesses. It may contain other gods or goddesses as well.
2. Your story must explain some natural phenomenon (such as a weather event) or some geological feature (a mountain range, a large valley, a sea, an ocean, a polar ice cap, etc.).
3. Your story should be at least 350 words.
4. Your story must have a clear beginning, middle and end.
5. Your story should clearly show that you know something about Greek mythology. You will do this by including details about the Olympian gods and goddesses that show you know their powers, symbols and personalities.

Here are some ideas to get you thinking:
- Where did the Rocky Mountains come from?
- Where did the Mississippi River come from?
- What made the North and/or South Pole(s)?
- Why is Earth the third planet from the sun?
- Why is it dark at night?
- What is in the middle of the earth?

Assessment

Lesson 1

Greek map of the world rubric

Contains all required elements properly labeled	**60**
Neatly done	**15**
Demonstrates insight into Greek mythological world	**15**
Commendable use of color	**10**
TOTAL	**100**

Greek world comparison paragraph rubric

Strong topic sentence	**10**
Correct format	**10**
Contains two similarities	**20**
Contains two contrasts	**20**
Strong concluding sentence	**10**
Logical, thorough argument	**30**
TOTAL	**100**

Lesson 2

Olympian gods & goddesses chart rubric

All fields completed thoroughly	**70**
Used at least two sources in addition to provided information	**30**
TOTAL	**100**

Lesson 3

Mythological bio poem scoring rubric

Contains all required elements	**60**
Correct format	**20**
Neatly written or typed	**10**
Demonstrates insight into god or goddess	**10**
Creativity	**Maximum 7-pt bonus**
TOTAL	**100 (+ up to 7)**

Lesson 4

Olympians quiz scoring rubric

Matching section	**25**
Creation of god or goddess	**20**
Question 26 & Question 27	**5**
TOTAL	**50**

Key to Olympians quiz: matching

1. C	**9.** F	**17.** C
2. E	**10.** A	**18.** E
3. A	**11.** C	**19.** D
4. B	**12.** D	***20.*** F
5. D	**13.** A	**21.** A
6. F	**14.** F	**22.** E
7. E	**15.** G	**23.** C
8. B	**16.** H	**24.** H
		25. B

Lesson 6

Create your own myth-scoring rubric

Explains natural phenomenon or geological formation	**15**
Includes at least two gods or goddesses	**20**
Meets minimum word length	**10**
Has clear beginning, middle and end	**5**
Demonstrates depth of understanding of Greek mythology	**15**
Writing is clear, focused and conveys the story in an interesting way	**15**
TOTAL	**80**

Answer key: Olympian gods & goddesses chart

GREEK NAME	ROMAN NAME	REALM	SYMBOLS	FACTS/ CHARACTERISTICS
Zeus	Jupiter	Supreme ruler of the gods; lord of the sky; rain god	Thunderbolts or lightening, eagle and scepter (rod)	Dominating, powerful and had a soft spot for pretty women
Hera	Juno	Queen of the gods; protector of marriage	Peacock	Wife of Zeus; well-loved by the Greeks; often jealous of husband's girlfriends, but she could be tender and loving
Poseidon	Neptune	God of the sea and earthquakes	Trident (three-pronged spear)	Did not mix with mortals, and he was anti-social
Hades	Pluto	God of the underworld and of the dead	Cornucopia and scepter	Very wealthy; rarely visited Olympus; married to Persephone
Athena	Minerva	Goddess of wisdom and war	Shield, helmet and spear	Daughter of Zeus who sprang out of his head fully formed; the owl is her bird
Apollo	Apollo	God of sun or light; poetry, music and medicine	Gold bows and arrows	Famous for his oracles; proud & protective of his mother and sister; wears laurel wreath in memory of Daphne; has a twin named Artemis
Artemis	Diana	Goddess of hunting, chastity and the moon	Three hunting hounds, bow and fawn	Protects women & small children; she is fiercely independent & particularly dislikes men
Aphrodite	Venus	Goddess of love and beauty	Girdle and mirror	Born out of sea foam; wife of Hephaestus; mother of Eros; interesting, charming, fickle, vain, competitive

Answer key: Olympian gods & goddesses chart

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Ares	Mars	God of war	Spear and helmet	Would fight on both sides; young, strong, prime of life; likes to dress in battle clothes
Hephaestus	Vulcan	God of fire	Ax and tongs	Son of Zeus and Rhea; only god with a handicap; married to Aphrodite
Hestia	Vesta	Goddess of hearth and home	Hearth and its fire	Zeus' sister; protectress of hearth and home; very popular
Demeter	Ceres	Goddess of earth and crops	Torch, crown, scepter and stalks of grain	Often portrayed with her daughter, Persephone, who spends time in the underworld, at which time it becomes winter
Dionysus	Bacchus	God of wine and vegetation	Grapes, wine cups or wineskins, a pinecone-headed staff called a thyrsus	Went around teaching people how to make wine and party; Zeus' son

Activity: A Plate Tectonic Puzzle

Introduction

The Earth's crust is not a solid shell. It is made up of thick, interconnecting pieces called tectonic plates that fit together like a puzzle. They move atop the underlying mantle, a really thick layer of hot flowing rock.

By examining evidence such as similar rock layers in various places, fossilized desert belts, the distribution of fossils, and the physical shapes of continents, scientists have concluded that the Earth's continents were once all connected to form a "supercontinent" called Pangaea that was surrounded by an enormous ocean. In this activity, students will use the different kinds of evidence to reconstruct how the Earth may have looked approximately 220 million years ago.

Objectives

Students will:

- use logic and the evidence to reconstruct the position of large islands and continents as they appeared 220 million years ago.
- understand the theory of continental movement and plate tectonics.
- describe how scientists use different kinds of evidence to form theories.

Time Frame

Two class periods (40 minutes each)

Materials

- Globe or world map
- Answer page

Per pair of students:

- Reproducibles of instructions and continent cutouts pages
- Scissors
- Glue or tape
- Sheet of paper
- Ruler or compass

Procedure

Prior Knowledge

1. Introduce students to the concept of continental movement and plate tectonics. Call on volunteers to tell what they know about plate tectonics. Display a globe or world map. Have students look carefully at the continents. Discuss with them how Europe, Africa, South America, and North America might fit together as puzzle pieces. Discuss what might explain this fit. Point out that millions of years ago the continents were joined together in one supercontinent called Pangaea. Using some of the same evidence that scientists use, they will reconstruct this supercontinent.

Exploration

2. Have students work in pairs. Distribute the materials to each pair. Provide time for them to review the instructions page.

3. Explain that the landmasses they will be cutting out represent the continents and some of the larger islands of the Earth the way scientists think they appeared 220 million years ago. On a separate sheet of paper, have students draw a large circle, about 8 inches in diameter, to represent the globe. Then have them cut them out the islands and continents. Using the legend on the instructions page, call on volunteers to identify what each symbol stands for.

4. Tell students they are going to use the evidence (symbols) on the continents and islands to reconstruct Pangaea, the supercontinent. Using the globe or world map as a reference, discuss with students in what general area the continents should be positioned. Ask them to identify what they should look for to determine which continental boundaries should be joined.

5. Using the physical shape of continents, age of rock layers, fossilized desert belts, and the distribution of fossils, have partners fit together the continents and islands. Remind them that not all the boundaries may touch and that there might be areas of water separating some of them. Once students are sure the landmasses are in the correct position, have them tape or glue them onto the world map. Have them label their maps along with the time period.

Wrap-up

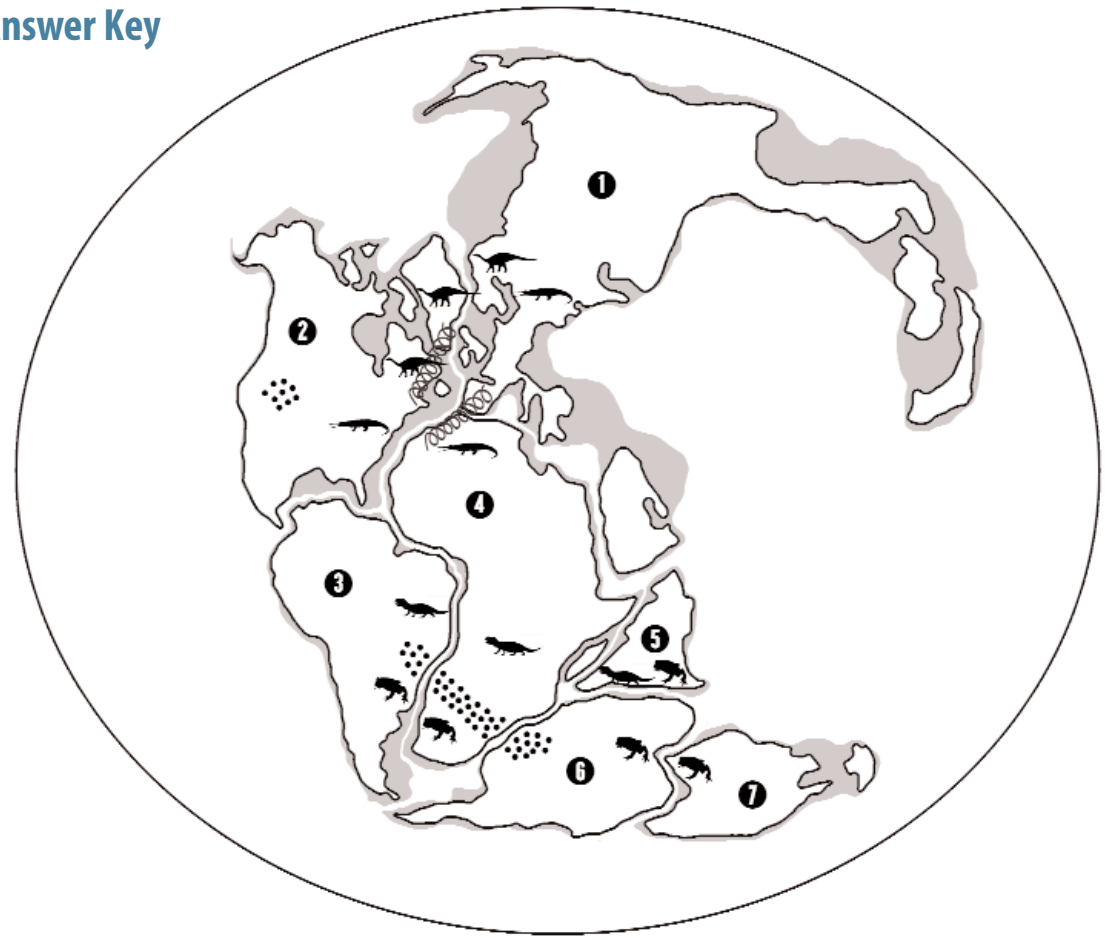
6. When students have completed the activity, have them compare their world maps. Call on pairs to discuss how they reconstructed the supercontinent and what evidence led to their decisions. Call on volunteers to identify the continents and islands.

7. Display the answer page and have students compare it to their completed Pangaea maps.

Extension

Students can further explore plate tectonics by visiting Plates on the Move (ology.amnh.org/earth/plates) on OLogy, the Museum's website for kids. This interactive feature examines the huge impact that plate tectonics has on the Earth, including the formation of oceans, continents, and mountains, and the occurrence of events such as earthquakes and volcanic eruptions.

Answer Key



A Plate Tectonics Puzzle

Solve the puzzle to discover what the Earth looked like 220 million years ago.

1. What's the code? Use the legend to identify the symbols on each island or continent.

2. Puzzle me this. Look at the shapes of continents and islands. What landmasses seem to fit together?

3. Let's rock! Examine the evidence and try to match up landmass boundaries that show similar rock strata, fossilized desert belts, and dinosaur fossils.

4. Hold that Pose. Look over the arrangement of the continents and islands and decide if the position of any of them should change. When you are satisfied with your map of Pangaea, tape or glue it down on the world map.

Did You Know?

- Tectonic plates are made of both continental and oceanic crust. The land that we see is the continental crust, about 30 kilometers (19 mi) thick. Under the sea, the heavier oceanic crust is much thinner, about 8 to 10 kilometers (5 to 6 mi) thick.

- Plates move about 8 centimeters (3 in) per year. That's about as fast as a fingernail grows in a year!

- The tallest mountains in the world are still growing. About 60 million years ago, the Himalayan Mountains formed when the Indian Plate crashed into the Eurasian Plate. Today the two plates are still colliding and the Himalayas continue to rise.

- Los Angles sits on the Pacific Plate that is moving northwest and San Franciso sits on the North American Plate that is moving southeast. Moving towards each other at the rate of 5 centimeters (2 in) a year, someday these two cities may be neighbors!

A Plate Tectonics Puzzle

LEGEND

1. Europe & Asia
2. North America
3. South America
4. Africa
5. India
6. Antarctica
7. Australia

landmasses BELOW sea level

landmasses ABOVE sea level

basalt

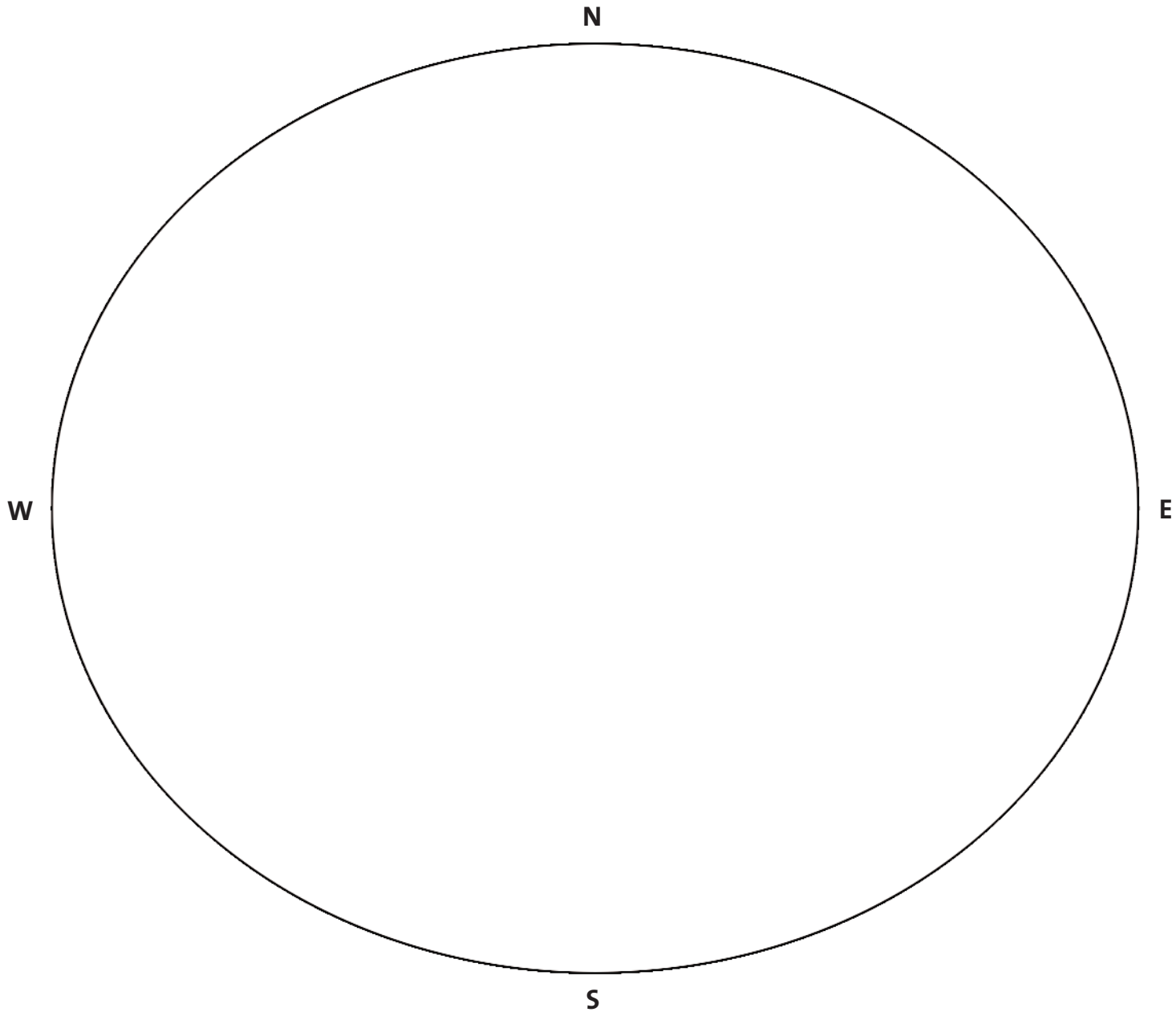
desert

amphibian

Plateosaurus

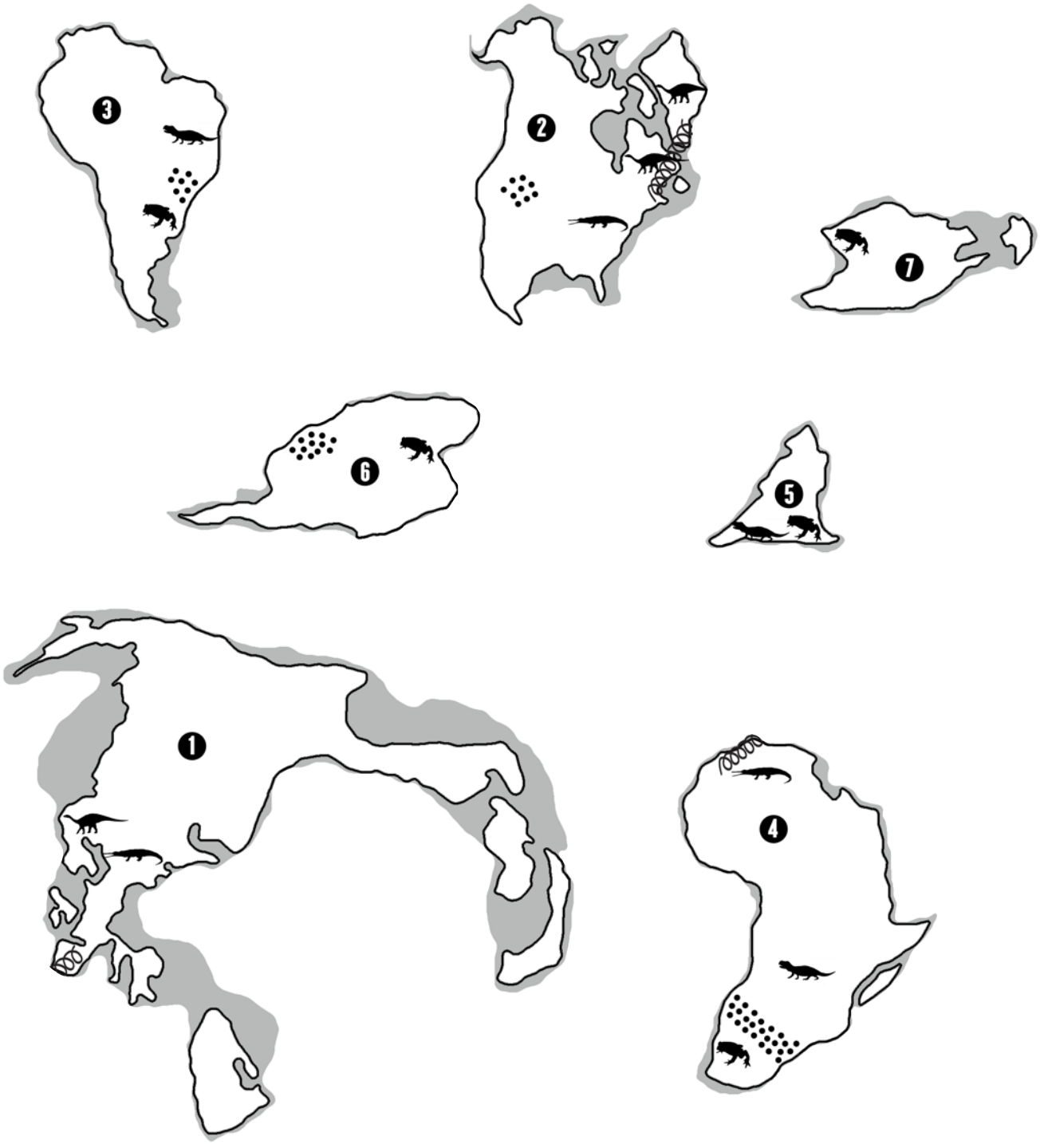
Phytosaur

Rhynchosaur



A Plate Tectonics Puzzle

LANDMASSES TO CUT OUT



Jupiter	Supreme ruler of the gods; lord of the sky; rain god
Thunderbolts or lightening, eagle and scepter (rod)	Dominating, powerful and had a soft spot for pretty women
Juno	Queen of the gods; protector of marriage

Peacock	Wife of Zeus; well-loved by the Greeks; often jealous of husband's girlfriends, but she could be tender and loving
Neptune	God of the sea and earthquakes
Trident (three-pronged spear)	Did not mix with mortals, and he was anti-social

Pluto	God of the underworld and of the dead
Cornucopia and scepter	Very wealthy; rarely visited Olympus; married to Persephone
Minerva	Goddess of wisdom and war

Shield, helmet and spear	Daughter of Zeus who sprang out of his head fully formed; the owl is her bird

Apollo	God of sun or light; poetry, music and medicine
Gold bows and arrows	Famous for his oracles; proud & protective of his mother and sister; wears laurel wreath in memory of Daphne; has a twin named Artemis

Diana	Goddess of hunting, chastity and the moon
Three hunting hounds, bow and fawn	Protects women & small children; she is fiercely independent & particularly dislikes men
Venus	Goddess of love and beauty

Girdle and mirror	Born out of sea foam; wife of Hephaestus; mother of Eros; interesting, charming, fickle, vain, competitive
Mercury	God of science and invention
Helmet and winged feet	Said to have invented the alphabet, boxing and gymnastics

Mars	God of war
Spear and helmet	Would fight on both sides; young, strong, prime of life; likes to dress in battle clothes
Vulcan	God of fire

Ax and tongs	Son of Zeus and Rhea; only god with a handicap; married to Aphrodite

Vesta	Goddess of hearth and home
Hearth and its fire	Zeus’ sister; protectress of hearth and home; very popular

Ceres	Goddess of earth and crops
Torch, crown, scepter and stalks of grain	Often portrayed with her daughter, Persephone, who spends time in the underworld, at which time it becomes winter
Bacchus	God of wine and vegetation

Grapes, wine cups or wineskins, a pineconeheaded staff called a thyrsus	Went around teaching people how to make wine and party; Zeus’ son

Science vs Creationism

Kahoot

- https://play.kahoot.it/#/k/3f3b9aab-06e3-4d67-ab66-75282380c1bc

Science vs. Creationism

- Religion and science are often considered to be separate domains, one dealing with the natural world and the other with moral perspectives.
- Person arrives at a personal philosophy

Science

- Science is a process by which we obtain testable explanations regarding phenomena of the material universe
- Science is restricted to natural events that can be observed repeatedly, measured, tested for reliability, and many times used to predict future outcomes.
- “rejection of authority,” or don’t necessarily believe what a person says just because he or she says it
- investigate the problem before making a decision of what is right or wrong.

Science

- Observation of the natural world

1. Observation of a Natural Event: repeatable.
2. Formulate a Problem: asking a question
3. Formulate an Hypothesis: An hypothesis is a tentative answer to the question proposed
4. Hypothesis Testing:
5. Accept or Reject Hypothesis:

Creationism

- arts and religion are other ways of seeking order
- Supernatural and other types of untestable experiences, which may or may not be real, are outside the realm of science because they cannot be observed, or observed in a way conductive to testing by scientific methodology.
- Science has no way of investigating the supernatural because by definition, supernatural processes are not testable and they usually do not obey natural laws.
- Most family structure, political entities, and religions are based on Authority

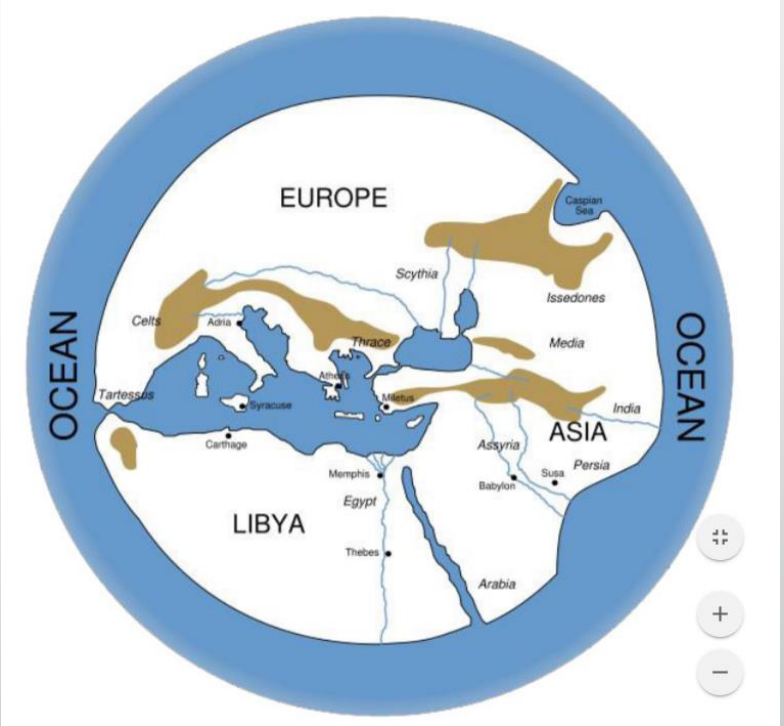
Greek View of Earth and Pangaea

Complete Greek View Plate Puzzle

- With a partner

Greek View of Earth

- Greeks believed that the world was flat
- Circular, like a paper plate
- Center of the Universe was Greece.
- Earth divided by the Mediterranean
- Ocean flowed in a clockwise motion.

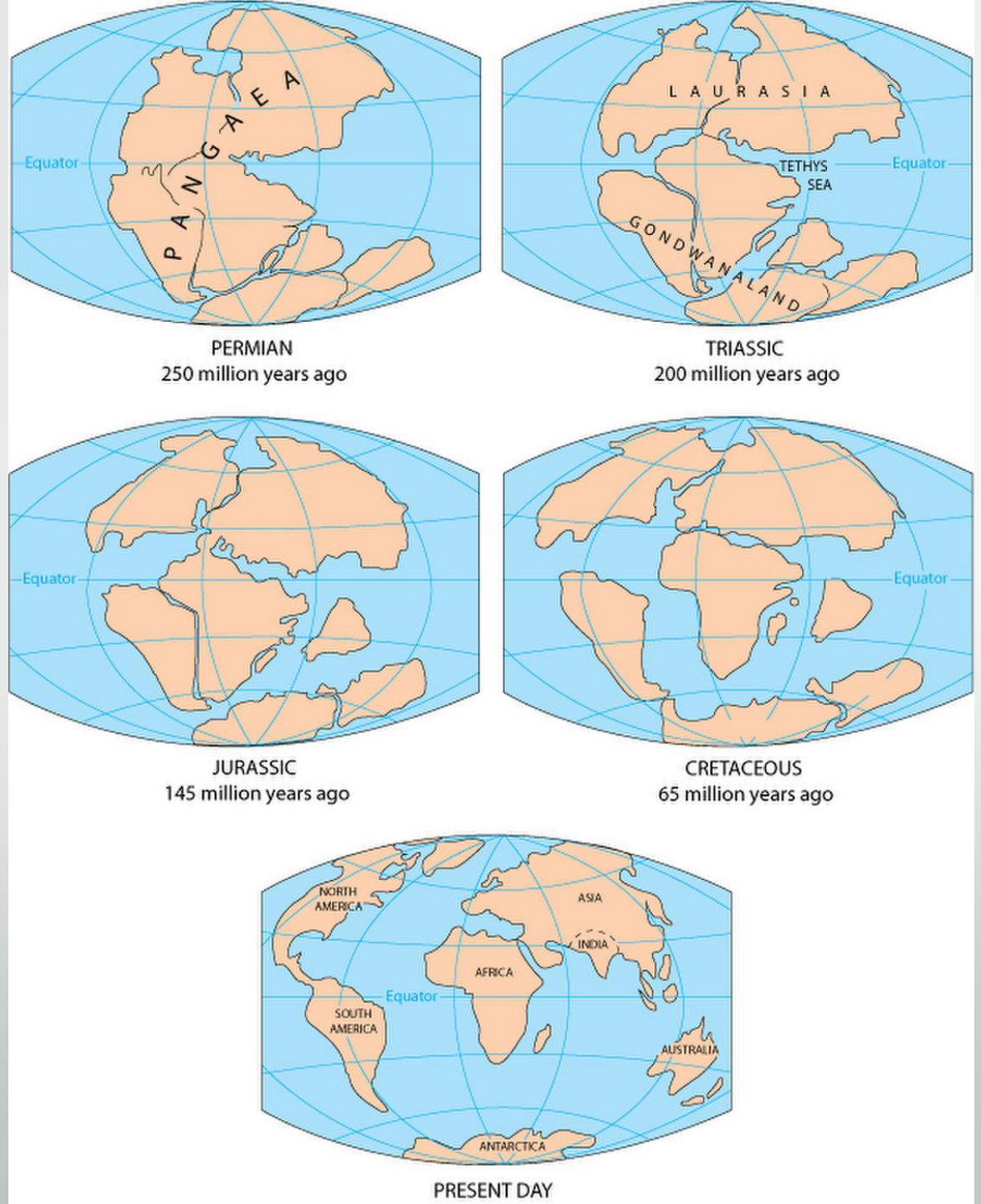


Complete Pangaea Globe Puzzle

- With a partner

Pangaea

- 300 million years ago Earth didn't have seven continents
- one massive supercontinent called Pangaea
- surrounded by a single ocean called Panthalassa
- Theory of plate tectonics explains Pangaea
- Alfred Wegener (The Origin of Continents and Oceans, 1915)
- Coal deposits, plant fossils


PANGAEA
Equator
PERMIAN
250 million years ago
LAURASIA
TETHYS SEA
Equator
GONDWANALAND
TRIASSIC
200 million years ago
Equator
JURASSIC
145 million years ago
Equator
CRETACEOUS
65 million years ago
NORTH AMERICA
ASIA
INDIA
AFRICA
Equator
SOUTH AMERICA
AUSTRALIA
ANTARCTICA
PRESENT DAY

Greeks Gods and Goddesses

Complete matching cards activity

- In a group of four match the terms to the correct god/goddess
- You may use your electronic device to research
- Draw this chart onto the poster board to place the cards there

OLYMPIAN GODS & GODDESSES CHART				
Greek name	Roman name	Realm	Symbol	Facts / Characteristics
Zeus				
Hera				
Poseidon				
Hades				
Athena				
Apollo				
Artemis				
Aphrodite				
Hermes				
Ares				
Hephaestrus				
Hestia				
Demeter				
Dionysus				

Review Answers

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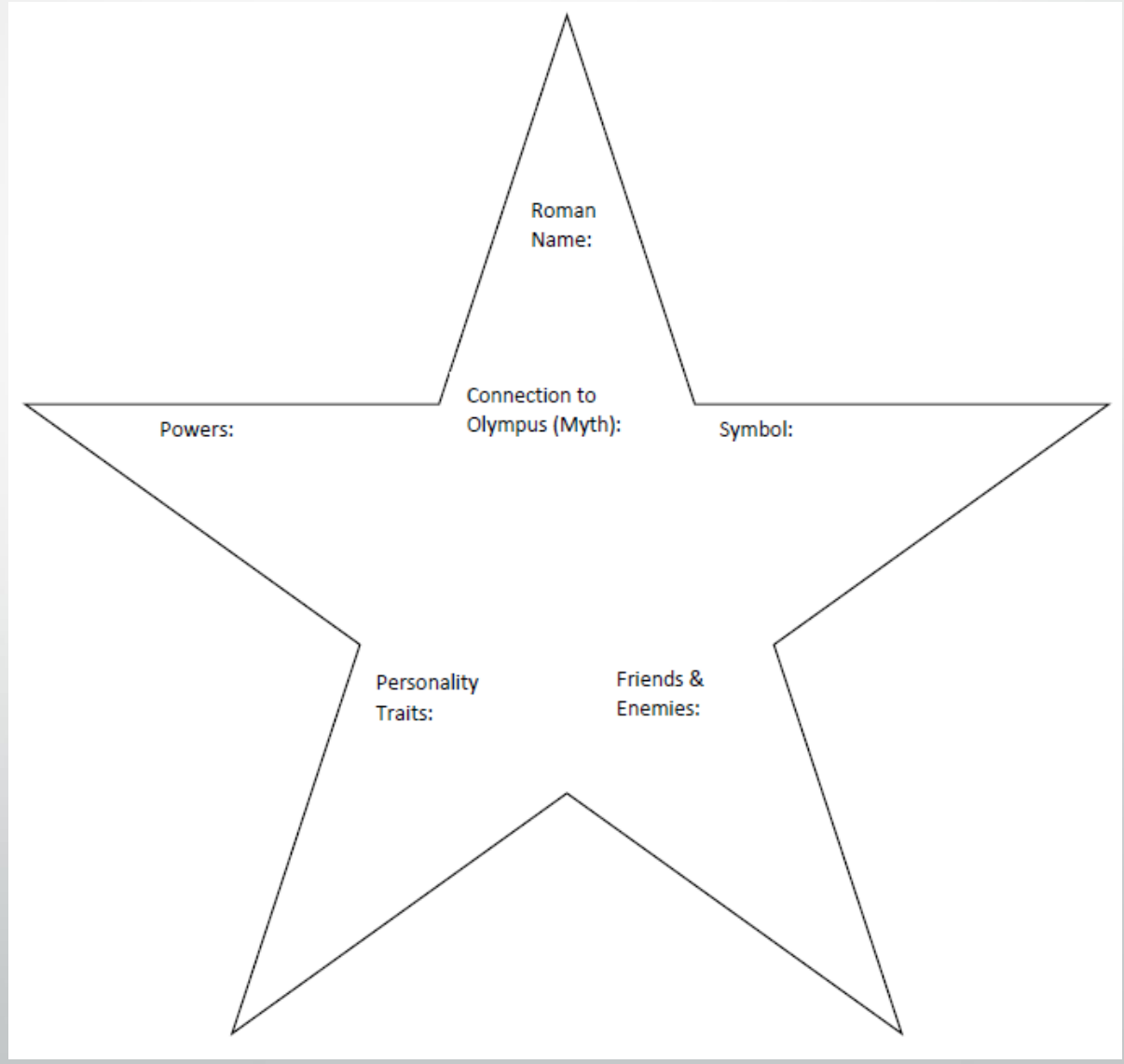
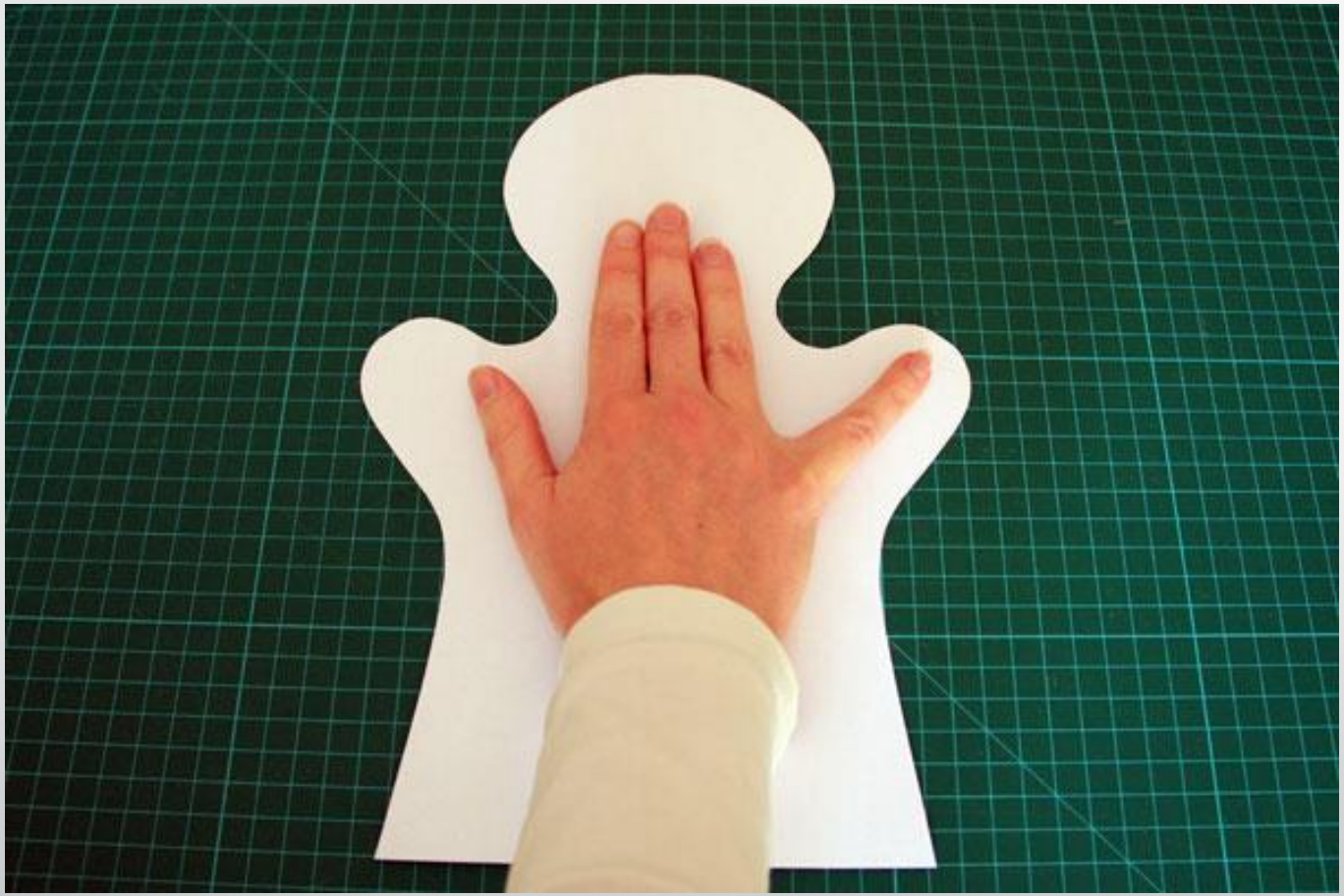
Earths Natural Processes

- Flooding: river bursts its banks water spills onto the floodplain, heavy rain
- Earthquakes: rock underground breaks along a fault, sudden release of energy causes seismic waves that make the ground shake.
- Volcanoes: Magma rises through cracks in Earth's crust, pressure released as a result of plate movement, magma explodes, lava cools, forms new crust
- Hurricanes: Warm ocean water plus Earth’s eastward rotation, ocean water reaches 82°, warm air rises= thunderstorm, upper and surface level winds combine, Caribbean god of evil Hurrican
- Other: meteorite impacts, tsunamis, etc.
- Human Influenced: climate change, air and water pollution

Create your own Greek God/Goddess

- 1st, complete info about your God/Goddess
- Make sure you discuss one of Earth's natural processes or human influenced processes
- Build your god/goddess w/materials provided using the template provided





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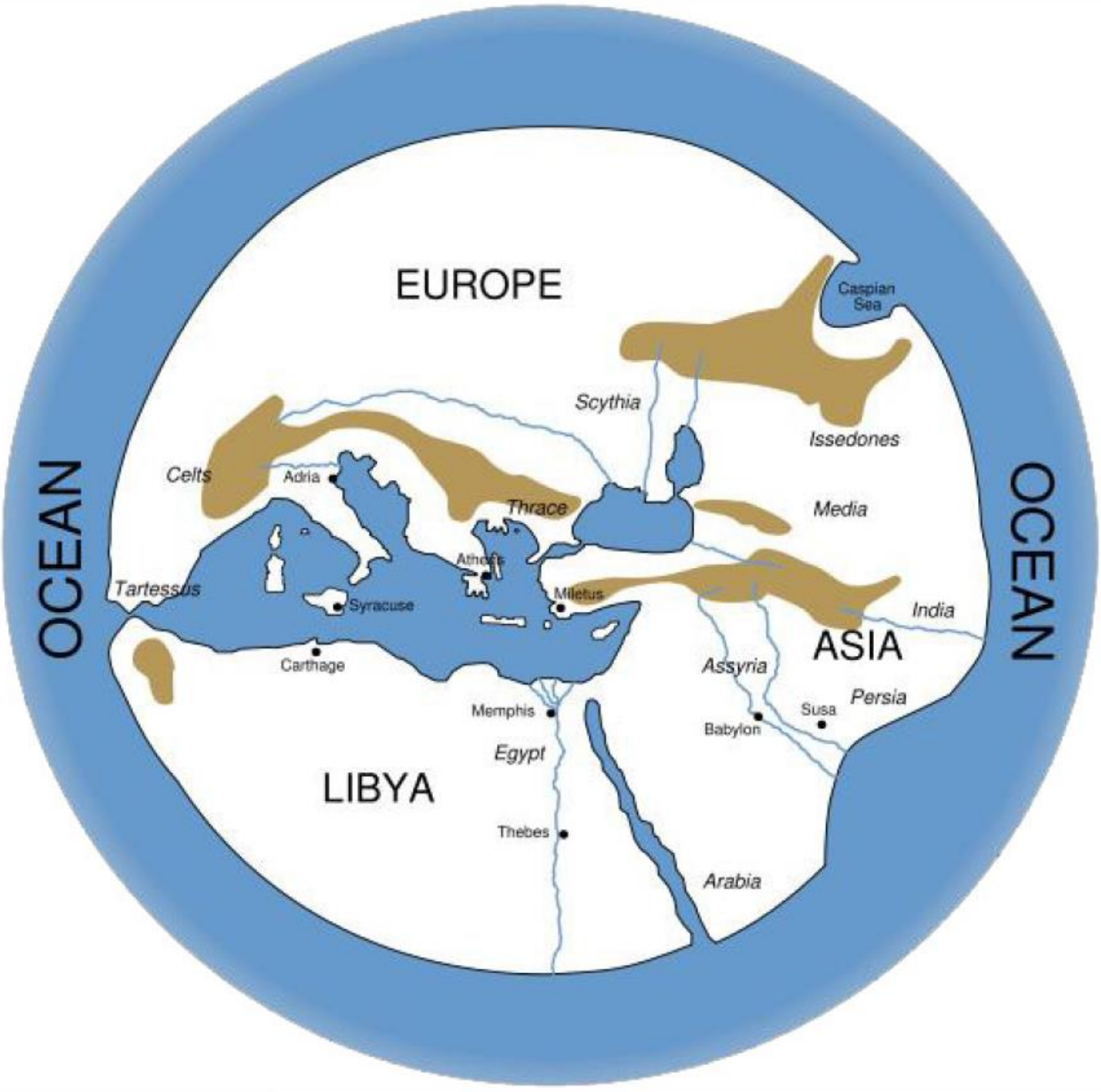
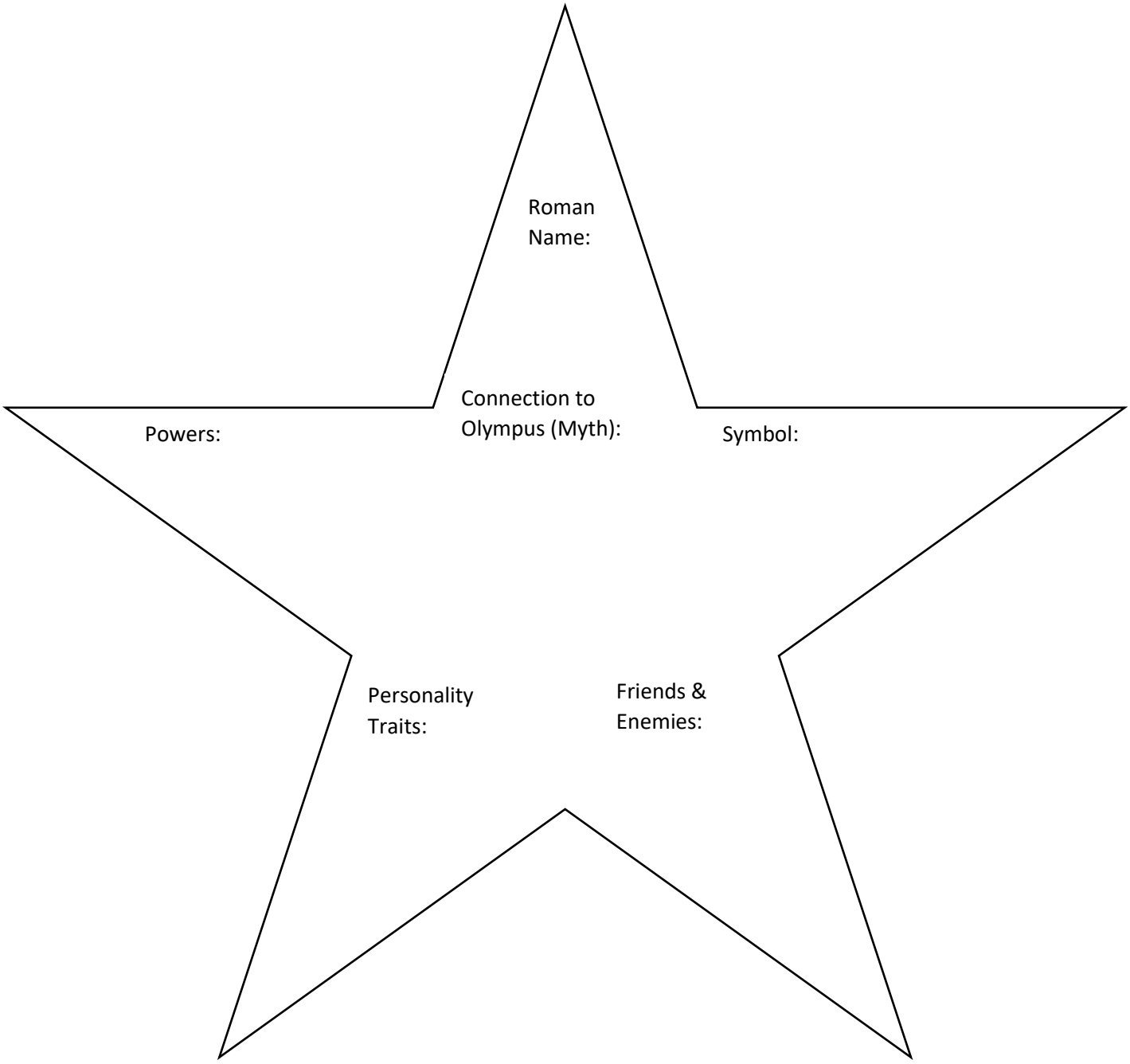

EUROPE
ASIA
LIBYA
OCEAN
OCEAN
Caspian Sea
Scythia
Issedones
Celts
Adria
Thrace
Media
Athens
Tartessus
Syracuse
Miletus
India
Carthage
Assyria
Persia
Susa
Babylon
Memphis
Egypt
Thebes
Arabia


Roman Name:
Connection to Olympus (Myth):
Powers:
Symbol:
Personality Traits:
Friends & Enemies:

Instructional Lesson Plan

Content Area(s)/Course: Mathematics (Algebra)	Lesson Topic: Graphing Constellations
Teacher: Alejandra Lugo & Yuliana Cardoza	Date: Canutillo STEM Games 2018

TEKS objective:
Algebra 6(A) 7(A) 8(A) 2(a)

- Determine the domain and range of a linear function in mathematical problems
- The students will be able to determine the domain and range of quadratics functions and represent the domain and range using inequalities
- The students will be able to graph quadratic functions on the coordinate plane

Student Outcome(s):

- Students will learn how to write linear equations given two points. Students will learn how to restrict domain and range.

Materials

- Regular graphing paper (2 per student)
- Secret Equations & Personalization rules
- Secret Coordinates
- Markers
- Lab Top

Instructional Delivery - Activities

1. Introduce the lesson as a personalization of a constellation. To review slopes, play Mr. Slope Says. (5 minutes)
    a. Rules are the same as Simon Says. Instead of giving other rules only ask students to show you positive, negative, zero & undefined slope.
2. Students will be given Secret Equations & Personalization rules. In this worksheet students will be given 4 linear equations that graph a constellation. Around this constellation, students will personalize their constellation following the requirements in the worksheet. (45 minutes)
3. Have the students post their personalization on the wall and do a gallery walk. During the gallery wall, students will be able to determine the linear equations for at least 3 personalization. (15 minutes)
4. Students will now be given Secret Coordinates. Students will have two coordinate points and will determine the equation for the segment connected to the two points. (30 minutes)
5. Students will now use DESMOS graphing online calculator to write their equations. This equations will show the constellation that they received. (20 minutes)

Total Duration Aprox. (115 minutes)

Constellations

$y = -2x + 19\ \{8 \leq x \leq 12\}$

$y = \frac{1}{8}x + 2\ \{0 \leq x \leq 8\}$

$y = -5x + 55\ \{12 \leq x \leq 13\}$

$y = x - 23\ \{10 \leq x \leq 13\}$

Personalize it

Requirements:

- Drawing must live in all four quadrants
- Must include at least:
    - 5 lines with positive slope
    - 5 lines with negative slope
    - 5 lines with zero slope
    - 5 lines with undefined slope
    - 5 parabolas
- Draw and label the x and y axis
- Drawing must have a title
- Imagination is required!!

Gallery Walk!

Visit at least 3 drawings and find the start and end points of 1 positive, 1 negative, 1 zero and 1 undefined slope for each drawing. Write the equation of the line.

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Drawing Title: ______________	Equation of the line: ______________
(,), (,)	Quadrant: ______________

Pisces Remember that these are segments!!	(-4, 16), (-5, 15) (-5, 15), (-3, 13) (-3, 13), (-4, 16) (-3, 13), (-5, 10) (-5, 10), (-7, 6) (-7, 6), (-3, 8) (-3, 8), (0, 9) (0, 9), (4, 10) (4, 10), (5,11) (5, 11), (6, 10) (6, 10), (5, 9.5) (5, 9.5), (4,10)

Leo Remember that these are segments!!	(-9, 6) (-8, -5) (-8, -5), (-6, -1) (-6, -1), (-2, 1) (-2, 1), (-3, 3) (-3, 3), (-2, 6) (-2, 6), (0, 5) (0, 5), (0,0) (0, 0), (1, -2) (1, -2), (-3, -4) (-3, -4), (-9, -6)

Scorpio Remember that these are segments!!	(-5, -3), (-6, -4) (-6, -4), (-4, -6) (-4, -6), (-2, -5) (-2, -5), (-1, 2) (-1, 2), (0, 5) (0, 5), (4, 7) (0, 5), (4, 6) (0, 5), (4, 4)

Taurus Remember that these are segments!!	(0, 11), (10, 10) (10, 10), (15, 9) (15, 9), (13, 5) (13, 5), (15, 3) (15, 9), 920, 11) (20, 11), (22, 9) (10, 10), (9, 11) (9, 11), (8, 13) (8, 13), (0, 17)

Ursa Minor Remember that these are segments!!	(10, 20), (8,16) (8, 16), (7, 12) (7, 12), (8, 8) (8, 8), (11, 5) (11, 5), (9, 1) (9, 1), (5, 5) (5, 5), (8, 8)

Lyra Remember that these are segments!!	(0, 5), (4, 3) (4, 3), (-2, 0) (-2, 0), (0, 5) (-2, 0), (-3, -8) (-3, -8), (-6, -9) (-6, -9), (-5, -3) (-5, -3), (-2, 0)

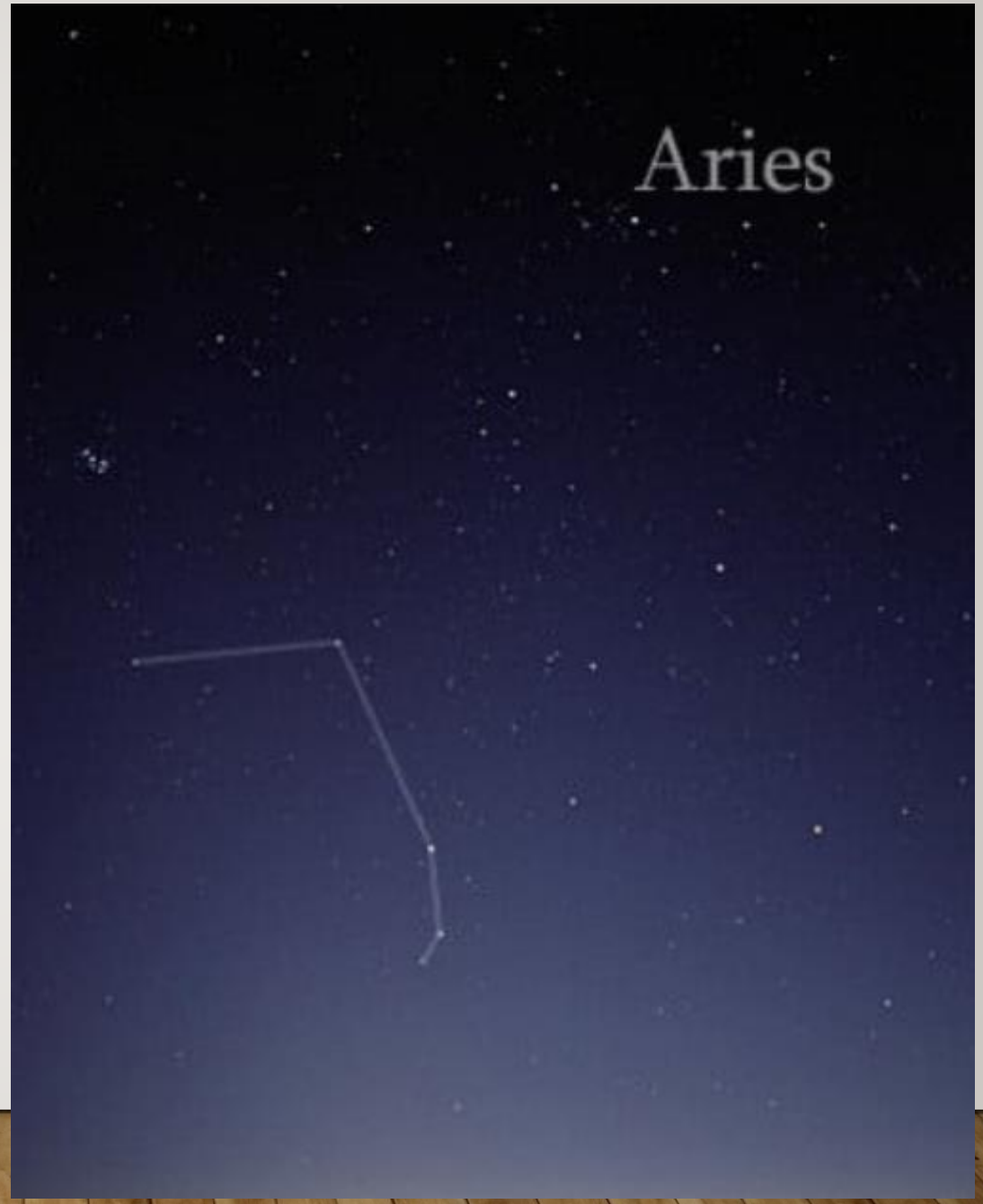
Geminis Remember that these are segments!!	(-4, -23), (0, -15) (0, -15), (-4, -7) (-4, -7), (-6, -5) (-6, -5), (-8, -3) (-8, -3), (0, 5) (0, 5), (5, 0) (5, 0), (10, -2) (10, -2), (15, -1)

Orion Remember that these are segments!!	(0, 15), (-3, 12) (-3, 12), (-1, 10) (-1, 10), (-2, 12) (-2, 12), (1, 15) (-1, 10), (0, 9) (0, 9), (1, 3) (1, 3), (3, 4) (3, 4), (4, 7) (4, 7), (2, 11) (2, 11), (0, 9) (1, 3), (-1, -3) (-1, -3), (5, -2) (5, -2), (4, 3) (4, 3), (3, 4) (4, 7), (8, 7) (8, 7), (7, 10) (8, 7), (4, 4)

GRAPHING CONSTELLATIONS

CONSTELLATION

- $y = -2x + 19\ \{8 \leq x \leq 12\}$
- $y = \frac{1}{8}x + 2\ \{0 \leq x \leq 8\}$
- $y = -5x + 55\ \{12 \leq x \leq 13\}$
- $y = x - 23\ \{10 \leq x \leq 13\}$



PERSONALIZE IT

- Requirements:
  - Drawing must live in all four quadrants
  - Must include at least:
    - 5 lines with positive slope
    - 5 lines with negative slope
    - 5 lines with zero slope
    - 5 lines with undefined slope
    - 5 parabolas
  - Draw and label the x and y axis
  - Imagination is required

GALLERY WALK

- Visit at least 3 drawings and identify find the start and end points of
    - 1positive slope
    - 1 negative slope
    - 1 zero slope
    - 1 undefined slope
- Write the equation of the line for each set of points

MR. SLOPE SAYS

- Rules
  - If Mr. Slope doesn't say it, don't do it
  - If you flinch, you're out
  - If you hesitate, you're out
  - Last one standing wins!!

GROUP TIME!

- Using the constellations assigned to your group, you will have 30 min to come up with the equations that make up the constellation
- Don't forget to restrict the domain and range for your equations
- When finished, input your equations on Desmos Calculator
- Take a screenshot of your constellation and upload the picture into an assignment in google classroom

Instructional Lesson Plan

Content Area(s)/Course: Astronomy	Lesson Topic: Where are the Constellations?
Teacher: Chidimma Ikeakor & Daniela Ortega	Date: Canutillo STEM Games 2018

TEKS objective:
AST 5 (C) recognize and identify constellations such as Ursa Major, Ursa Minor, Orion, Cassiopeia, and constellations of the zodiac.

Student Outcome:
Identify common constellations in the sky that are visible in the current season.

Materials

- constellation cut out circles sheet
- black butcher paper (one sheet per group, about 3 ft. long)
- black butcher paper (one sheet for entire class, about 10-12 ft. long
- chalk, assorted colors
- flashlights (1 per partnership or group) or cell phone flashlight
- Glow in the dark sticks and stars (6 stars per student, unlimited glow-sticks per student)
- Paper clips
- Toilet paper rolls (1-2 per group)
- Tape

Instructional Delivery - Activities

Activity 1 **Duration 10 mins**

Teacher will show a 5-minute video on constellations, and then go into a PowerPoint on why constellations are relevant, how they are used by humans, and 3 major constellation stories of the Greeks (Callisto the Bear, Cassiopeia, and Orion the Hunter).

https://www.youtube.com/watch?v=MZffhapfOgg

Activity 2 **Duration: 25 minutes**

Students will be put in groups of 3-4 students and given a sheet of constellations, a piece of black butcher paper, chalk, tape, and 1-2 toilet paper rolls. Students will cut out one disc and tape it to the tissue roll. With a paper clip, students will punch holes into the paper. Using either a flashlight or their phone camera's flashlight, students ill shine the light through the tissue roll and

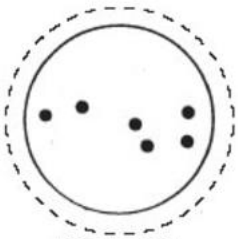
project the constellation onto the black butcher paper. Another student will plot the points onto the paper with chalk. As a team, they will work together to get as many constellations as possible onto the paper.

Activity 3 **Duration: 30 minutes**

Students will now make their own constellations. They have the restrictions placed on them that they can only use 6 glow in the dark stars, unlimited glow sticks, and tape. They must also create a story of why their constellation exists in the sky, and it must include at least one Greek god/goddess. When they are ready to make their constellation, they will show their drawing and story to the teacher, who will then give them their glow sticks and stars. Students can then go up to the black butcher paper and tape their constellation up. **As the teacher passes out sticks, make sure to break them so that they are already glowing. At the end, the students can look at their sky in the dark!

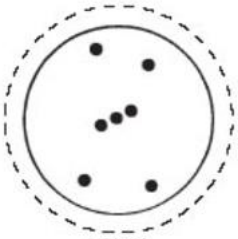
Total Duration Aprox. - 1 hour

Example of Students' constellations and Sky

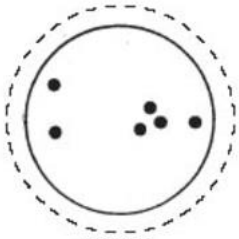


URSA MAJOR,
the Great Bear

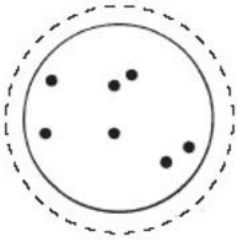
SCORPIUS,
the Scorpion



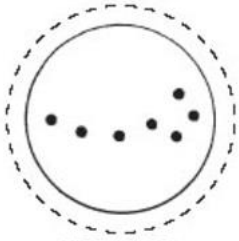
ORION,
the Hunter



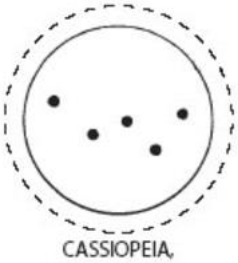
TAURUS,
the Bull



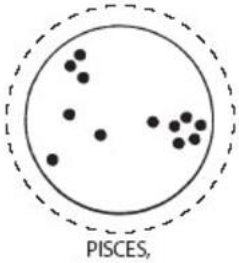
PEGASUS,
the Flying Horse



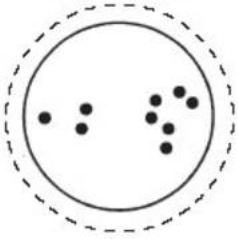
URSA MINOR,
the Little Bear



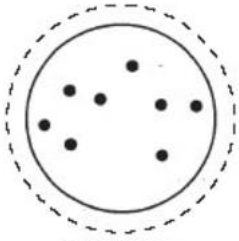
CASSIOPEIA,
the Queen



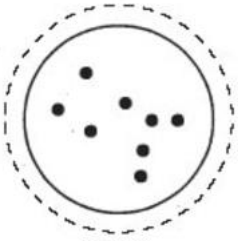
PISCES,
the Fishes



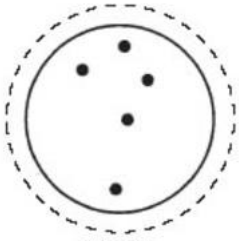
LEO,
the Lion



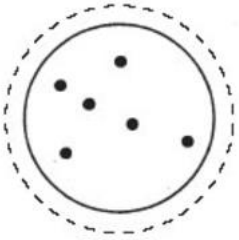
SAGITTARIUS,
the Archer



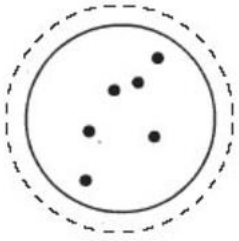
GEMINI,
the Twins



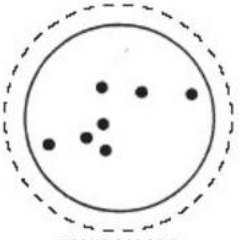
BOOTES,
the Herdsman



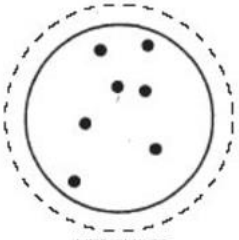
CYGNUS,
the Swan



PERSEUS



CANIS MAJOR,
the Big Dog



HERCULES

Where
are the
Constellations?

How do the stars work in the sky

- **Stars** rise in the east and set in the west, just like the Sun and Moon **do**.

What are constellations?

- A **constellation** is a group of stars that make an imaginary shape in the night sky.

How are stars beneficial to us

- For agriculture
- Navigation
- Now a days, constellations determine how stars are named.

Callisto the Bear

Callisto was a huntress and one of Artemis' followers, meaning that she lived a life of chastity. Zeus fell in love with her and seduced her, causing her to get pregnant. When Artemis heard of this, she turned Callisto into a bear out of anger of breaking the huntress code. Callisto gave birth to a son and named him Arcas. While he was hunting one day, he came across a bear. Zeus, seeing that Arcas was about to unknowingly kill his mother, turned Arcas into a little bear and placed both Callisto and Arcas into the sky as constellations. This is why the Big and Little Dipper (Callisto and Arcas) are always next to each other in the sky.

Orion the Hunter

Orion, son of Poseidon and Euryale, was the most handsome man and a hunter. Artemis, the goddess of hunting, fell in love with him. As this was against her vows of chastity, her brother, Apollo, dared her to hit a small target in the ocean. Artemis, not knowing that the target was Orion, struck him and killed him. Devastated, she placed him in the stars as a constellation so that she would always be able to see him.

Cassiopeia the Queen

Queen Cassiopeia bragged that her daughter, Princess Andromeda, was the most beautiful creature in all the sea, enraging Poseidon (who was the god of the sea). As a punishment, he sent her into the sky and flipped her upside-down.

Instructional Lesson Plan

Content Area(s)/Course: Science - Astronomy	Lesson Topic: Lunar Cycles
Teacher: Marcela Diaz & Cesar Vasquez	Date: Canutillo STEM Games 2018

TEKS objective:
Ast. 5A: Observe and record the apparent movement of the Sun and the moon during the day.
Ast. 7A: Observe and record data about the lunar phases and use that information to model the Sun, Earth, and Moon system;
Ast. 7B: Illustrate the cause of lunar phases by showing positions of the Moon relative to Earth and the Sun for each phase

Student Outcome(s): Students will be able to clearly identify and describe the phases of the moon. They will have basic understanding as to why and how often they occur. They will be able to accurately predict the main phases of the moon for the next two weeks.

Materials

- ping pong balls (9/two students)
- styrofoam balls (1/student)
- Chopsticks/skewers (1/student)
- Lamps
- Black foam board (1/ per 2 students)
- yellow acrylic paints
- Sponge brushes
- hot glue guns
- Calendar template (1 per student)
- black and silver sharpies
- exacto knife
- Moon pies chocolate (1 per student)
- Vanilla Frosting
- lamps

Instructional Delivery - Activities

Activity 1 - Lunar Lollipop Duration: 5 minutes
Students will each be provided a styrofoam ball and skewer. They will poke the ball with the chopstick holding it like a lollipop. The will stand facing the lamp, while holding their lollipop moon in front of them. They will slowly turn away from the lamp (moving counter-clockwise) and observe the changing “shape” of the “moon” as the move away from the light.

Activity 2 - Intro and Moon Phases Video Duration: 10 minutes
Students will watch a BrainPOP video to gain a basic understanding of the lunar cycle and its period.
https://www.youtube.com/watch?v=tGlGUK7D6xI

Activity 3 - Foam board Model Duration: 40 minutes
Students will work in assigned pairs for this whole activity. Each pair of students will be given a black foam board so that their heads can fit through. As a pair, they will paint half of 8 ping pong balls with black sharpie and 1 ball completely yellow with acrylic paint. Then, when each pair is done painting, they will come up to a teacher and get help hot-gluing their moons and sun on their board. Once the glue has dried, the student pairs will be responsible for labeling the sun and every moon phase. Students must add arrows connecting each phase counterclockwise, and label arrows. Finally, the

students will be able to stick their head in the board as if their head is Earth and they will be able to visually see each cycle of the moon. *Note: each ping pong ball (except the one representing the sun) must be colored only half way, some students may try to shade in each moon phase, but that doesn't work. This can lead to a good discussion about why we only see one side of the moon.*

Activity 4 - Calendar predictions Duration: 20 minutes

Student will be provided with a blank template of the month. Using the information and labels from their models. Students will fill in the next main phases of the moon for the month of June (noting the next full moon is on field trip day). Critical thinking extension: 1) At what phase will the moon be on Halloween 2018. 2) At what phase will the moon be on Christmas 2018. *Note: the calendar and moon phase dates provided were used to fit in with the current dates of the camp.*

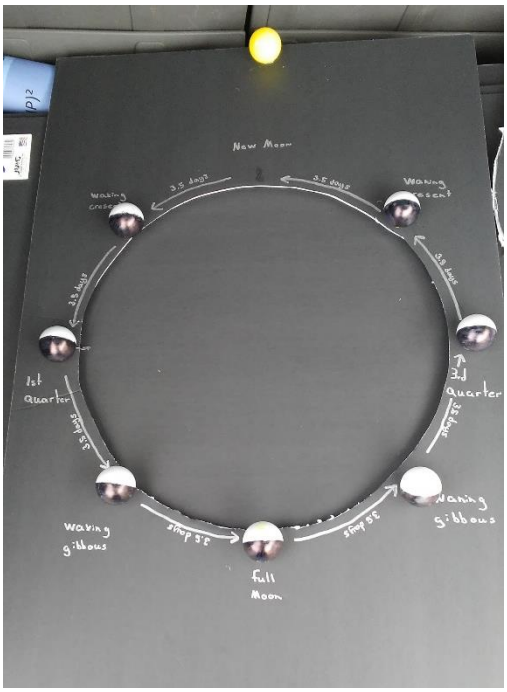
Activity 5 - Moon Pie Duration: 15 minutes

Students will be given one moon pie. They will form new groups standing around their model. One person per moon phase, which they must then model with their moon pies (use frosting to make phase shape). Finally they must place their moon pie models in correct order with other students' phases.

Total Duration Aprox. - 90 minutes

Pictures/Samples:

(Activity 5) Students completed moon pie activity.



(Activity 3) Lunar Cycle foam board model.

Save

2018 JUNE

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Save

2018 JUNE

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

www.free-printable-calendar.com

Instructional Lesson Plan

Content Area(s)/Course: Mathematics (Geometry)	Lesson Topic: Cha- Cha Slide
Teacher: Troy Payne & Yuliana Cardoza	Date: Canutillo STEM Games 2018

TEKS objective:

- GEO.(c) 3.a- Describe and perform transformations of figures in a plane using coordinate notation

Student Outcome(s):

- Students will learn how to turn a shape from one side of a coordinate plane to another side using translation, rotation, reflection & dilation.

Materials

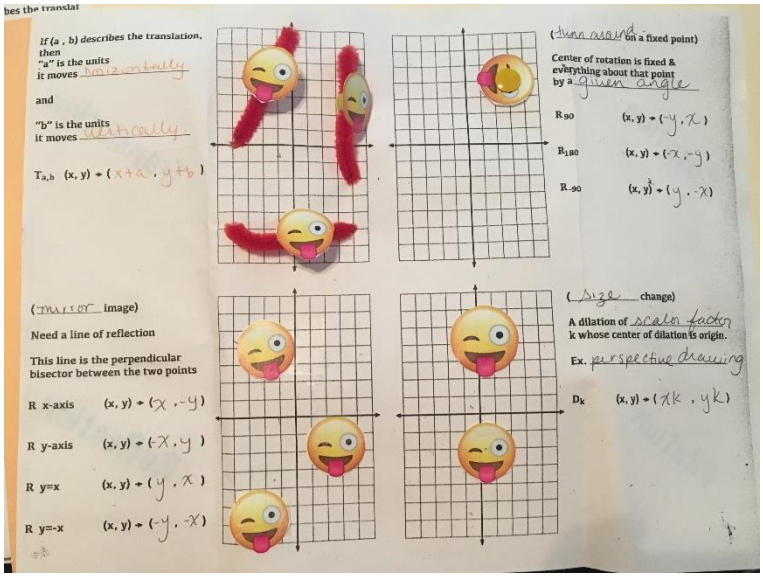
- Plickers
- Dance floor space
- Cha- Cha slide
  - https://www.youtube.com/watch?v=wZv62ShoStY
- Graphing paper (1 per student)
- Interactive foldable (1 per student)
  - Patty Paper (1 per student)
  - Pipe Cleaner (1 per student)
  - Emojis (10 per student)
  - Push Pins (1 per student)
  - Glue gun stick (2-3 centimeters per student)
  - Beads (3 per student)
- Glue Guns (1 per group)

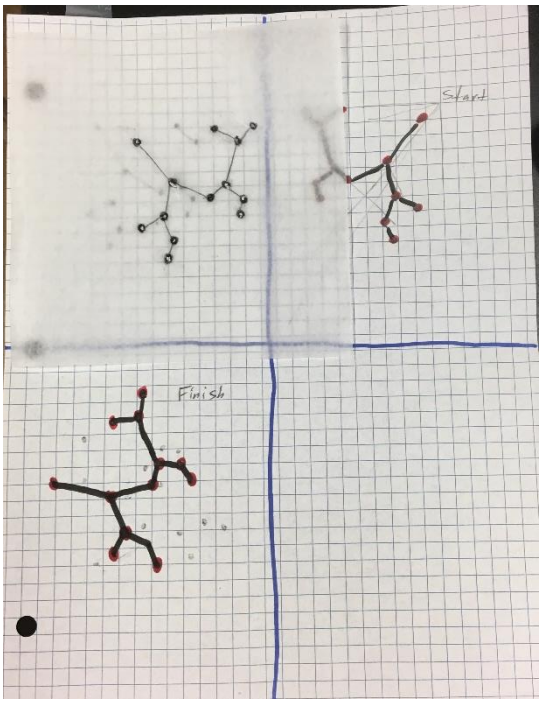
Instructional Delivery - Activities

1. Begin with a quick class discussion regarding transformations. (5 min)
   a. What is a transformation?
   b. Can you give me a real life example for each transformation?
2. Dance the entire song of Cha-Cha Slide (about 5 minutes)
3. Introduce Plickers. Plickers is a QR code that is unique to each student (you will have to create an account and enter student's names into this website.)
4. Ask students the following questions using Plickers. Afterwards discus questions (5 minutes)
   a. What part of the song shows a translation? (a. "Turn it around" b. "Clap your hands" c. "Slide to the left" d. "Criss-cross")
   b. What part of the song shows a rotation? (a. "Turn it around" b. "Clap your hands" c. "Slide to the left" d. "Criss-cross")
   c. What part of the song shows a reflection? (a. "Turn it around" b. "Clap your hands" c. "Slide to the left" d. "Criss-cross")
   d. What part of the song shows a dilation? (a. "Turn it around" b. "Clap your hands" c. "Slide to the left" d. "Hands on your knees")

5. Began on the foldable. As you go through the foldable discus each step using the cartesian plane. (picture attached) (45 minutes)
    a. For Translation: poke holes with a paper clip and insert pipe cleaner with one bead on each slide. Glue one emoji to each bead
    b. For Rotation: use the push pin to poke a hole on one emoji and through the foldable. Using the glue stick to secure the push pin.
    c. For Reflection: use tape to tape one of the eyes to the paper.
    d. For Dilation: paste 1 small emoji and 1 big emoji.
6. Have students look up their horoscope constellation. Have them draw it on one of the quadrants. Have students complete each transformation (except dilation) to it and write how they transformed it using the patty paper to trace each translation. (30 minutes)
7. Have student post their constellation on the wall and have a gallery walk. Have students determine how students moved their constellation from one side to the other side.

Total Duration Aprox. 90 minutes





Identifying Transformations

Visit at least 3 Constellations and name the transformations. Describe the transformation

Constellation Example:
The transformations performed were:

1. Rotation - 90 degrees to the right
2. Translation – 6 units to the left and 3 units up
3. Reflection – across y=x

Name of Constellation:
The transformations performed were:

1.
2.
3.

Name of Constellation:
The transformations performed were:

1.
2.
3.

Name of Constellation:
The transformations performed were:

1.
2.
3.

Name of Constellation:
The transformations performed were:

1.
2.
3.

Name of Constellation:
The transformations performed were:

1.
2.
3.

CHA-CHA SLIDE

WHAT ARE TRANSFORMATIONS?

- General term for four specific ways to manipulate the shape of a point, a line, or shape.
- The original shape of the object is called the pre-image and the final shape and position of the object is the image under the transformation
- The types of transformations are:

LETS DANCE!

https://www.youtube.com/watch?v=wZv62ShoStY

FOLDABLE TIME!

FIND YOUR SIGN CONSTELLATION

- Find your sign constellation
- Draw it on the graph paper
- Title your constellation
- Trace it on the patty paper

CONSTELLATION TRANSLATION

- Individually, transform your sign constellation using the patty paper
- Each constellation must have at least one
  - Translation
  - Rotation
  - Reflection
- Only draw your initial and final transformation

Rotation

Translation

Dilation

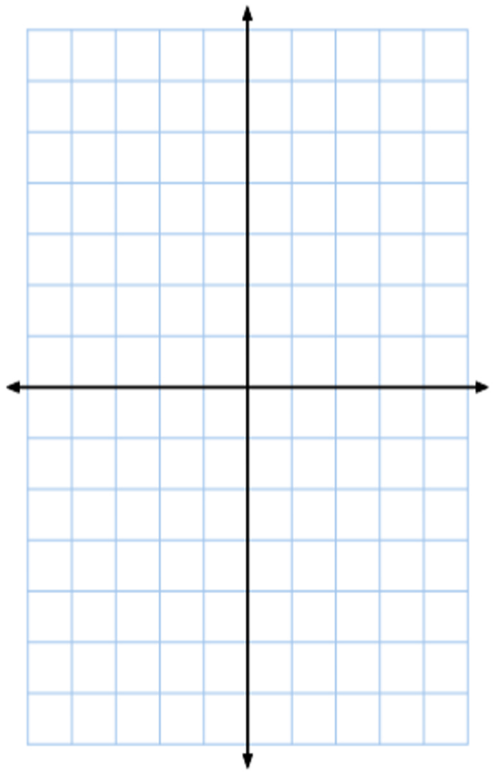
Reflection

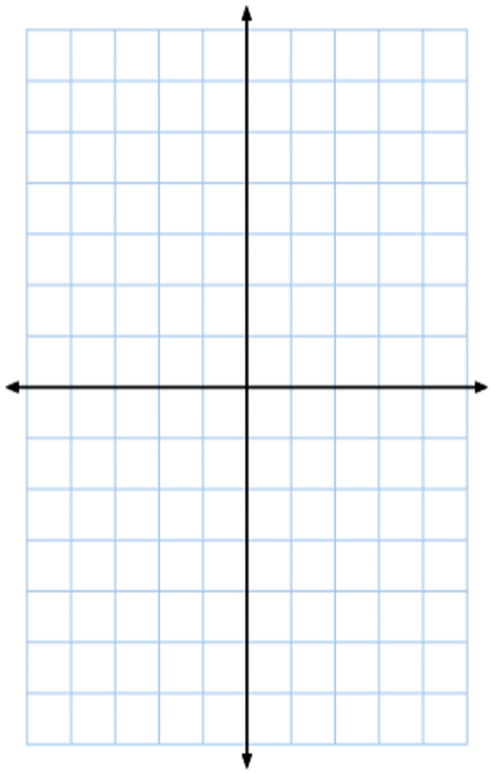
If (a , b) describes the translation, then
"a" is the units
it moves _____

and

"b" is the units
it moves _____

$T_{a,b}$ (x, y) → (,)





(_____ on a fixed point)

Center of rotation is fixed & everything about that point by a _____

R_{90} (x, y) → (,)

R_{180} (x, y) → (,)

R_{-90} (x, y) → (,)

(_____ image)

Need a line of reflection

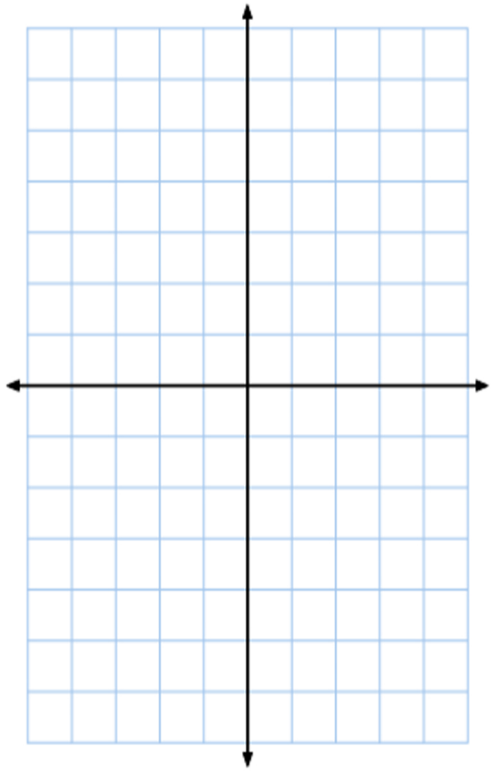
This line is the perpendicular bisector between the two points

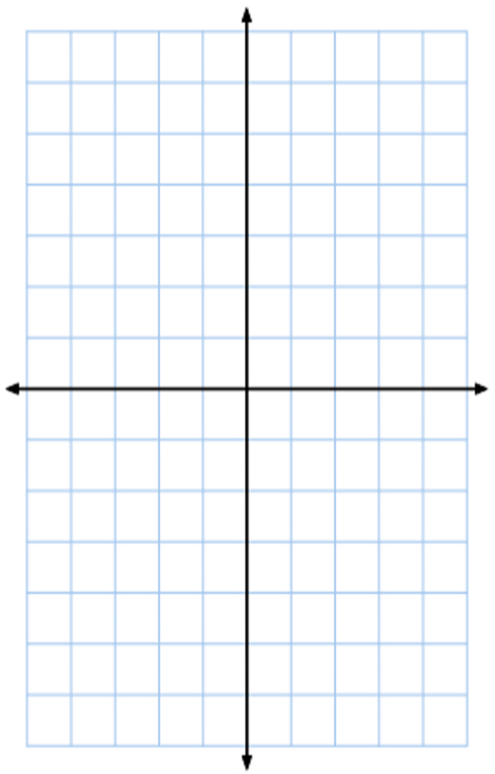
R x-axis (x, y) → (,)

R y-axis (x, y) → (,)

R y=x (x, y) → (,)

R y=-x (x, y) → (,)





(_____ change)

A dilation of _____
k whose center of dilation is origin.

Ex. _____

D_k (x, y) → (,)

Instructional Lesson Plan

Content Area(s)/Course: Geography,	Lesson Topic: GPS Places of Olympics
Teacher: Troy Payne & Rebecca Ortiz	Date: Canutillo STEM Games 2018

TEKS objective:

S.S. (4) Geography. The student understands the factors that influence the locations and characteristics of locations of various contemporary societies on maps and globes and uses latitude and longitude to determine absolute locations. The student is expected to: (A) locate various contemporary societies on maps and globes using latitude and longitude to determine absolute location;

Student Outcome(s):

Students will learn how to locate places using latitude and longitude.

Materials

- iPad: Google Maps
- Foam Globes
- Sewing pins
- Foldable

Arena

- Popsicle sticks
- Gardening Foam
- Cardboard
- Rubber Bands
- Toilet Paper Rolls
- Poster board
- Glue
- Hot Glue
- Scissors

  Sharpie Pens

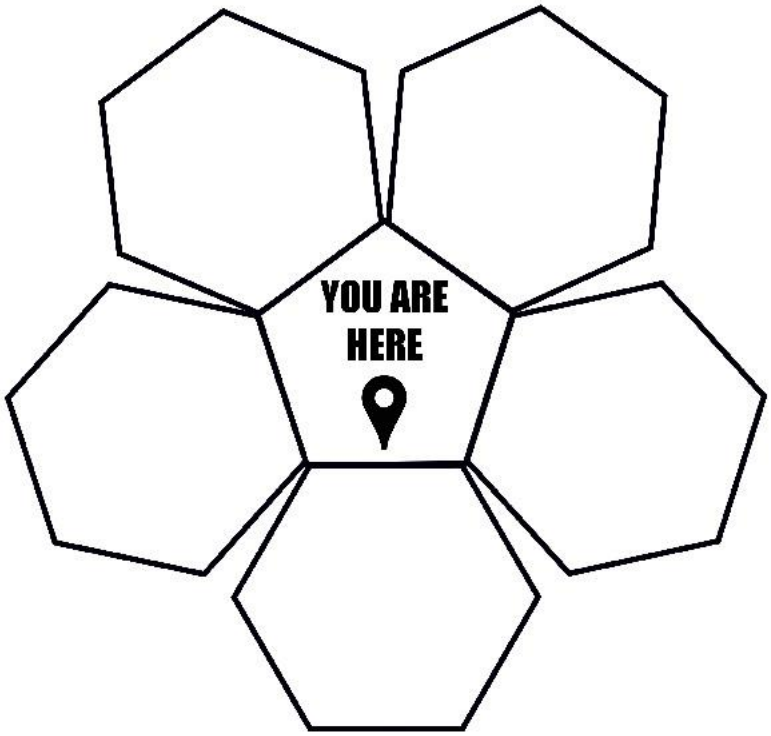
Instructional Delivery - Activities

1. **Show them a graph, and ask the students for what the 'coordinates' of the written place is.**

Start talking about maps and what do we know about them, how we use them.
Before there were phones, locations were found by what? (LAT AND LONGITUDE)
Talk about lat and long, what are they??? Degrees, and what are they? Everything can be found with the lat and long, they are unique. Give an example of how to find a location.
Ex: Give students the latitude and longitude of Canutillo, and ask them to tell us what location it is (have iPads) 31.897507, -106.585721
Look at the Globe/Google Maps/Website.
Play Game practicing Lat and Long. https://www.purposegames.com/game/longitude-and-latitude-quiz

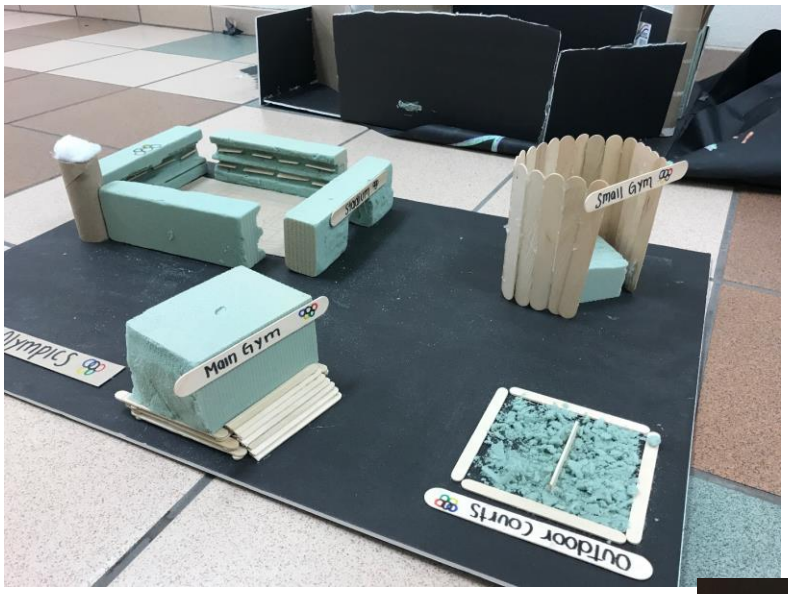
2. **Foldable will have two places and three coordinates, student will have to find locations and coordinates.**

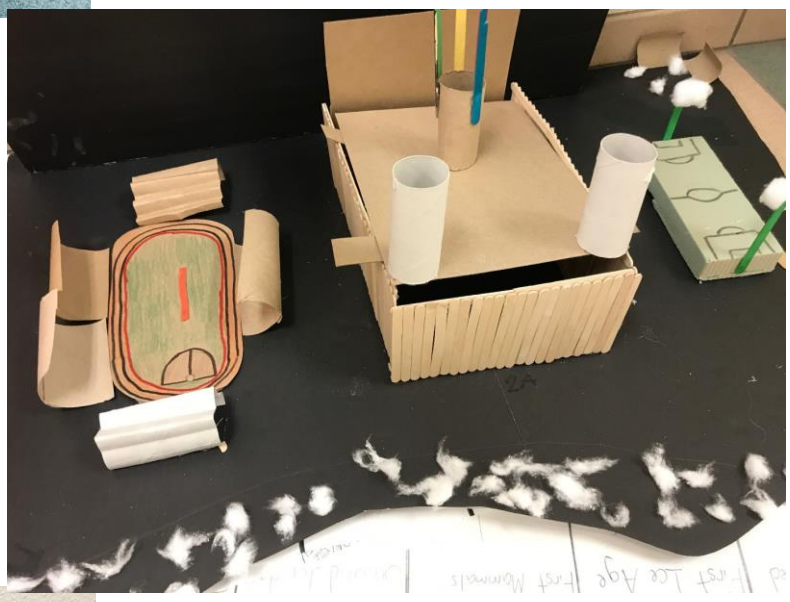
Then find places on foam globe using Sewing pins



3. **Students will build Olympic arena in a city. They will be using the engineering design process to draw and sketch as a group to come up with a stadium idea then will have to actually build their stadium.**

Total Duration Aprox.


Small Gym
Main Gym
Outdoor Courts



Instructional Lesson Plan

Content Area(s)/Course: Geography – Algebra 1	Lesson Topic: Olympus Mons
Teacher: Cesar Vasquez & Chidimma Ikeakor	Date: Canutillo STEM Games Camp 2018

TEKS objective:
(3) Geography. The student understands how physical processes shape patterns in the physical environment.
(4) Geography. The student understands the patterns and characteristics of major landforms
(B) describe different landforms and the physical processes that cause their development;
(3) Linear Functions. The student applies the mathematical process standards when using graphs of linear functions
(A) determine the slope of a line given a table of values, a graph, two points on the line

Student Outcome(s): Students will understand the process by which volcanoes are made. Also, students will be able to identify the slope of a line using two points on a line.

Materials

- FORM 1A (1 for every student)
- Shoe Box for every pair
- FORM 1B (only 1 per classroom)
- FORM 1C (1 for every pair)
- Small animals printouts
- 1 jar of Playdoh for every pair
- Paint
- Crayons and Markers
- Construction Paper
- Elmer's Glue
- 4 different types of sand
- 4 Cups for every group of 4
- 4 blank papers for each group of 4
- FORM 1D (1 for every student)
- A protractor for every student

Instructional Delivery - Activities

Activity 1 – Volcano Discussion and Olympus Mons video Duration: 15 minutes

Using FORM 1A students will look up different facts about volcanoes. They will be responsible for filling out every empty box on the paper. The students can locate all these volcanoes and their general location on their stress globe (optional). After seeing and researching different volcanoes on Earth, the students will now see a video of why there is a huge volcano way bigger on Mars! https://www.youtube.com/watch?v=ySFpJ-clnzU

Activity 2 – The creation of Olympus Mons Duration: 60 minutes

Woah! The future is here and humans have now colonized Mars! Mars now has an atmosphere and all the biomes Earth has. Using FORM 1B the teacher will assign pairs and give each pair of students a random biome out of the 5 different ones. Depending on the biome each student gets, they will have to create a diorama where Olympus Mons sits in that specific biome. The only requirements are for FORM 1C to be glued as a background for Olympus Mons and for their decorations to match their ecosystem assignment. Students will decorate using their animal cutouts, construction paper, Playdoh, paint, and their markers/color pencils.

Activity 3 – What is Slope? Duration: 5 minutes

M = (y2 – y2)/(x2-x1) What is the slope of the volcano? We need to find the slope of the mountain to save all the animals! Students will find two points using their cartesian plane which should be behind Olympus Mons. The students will pick two points on the graph and find the slope of which the lava will fall out. If students do not remember how to find the slope of a straight line, then it is their responsibility to look it up or get assistance from the teacher. Using a marker, the students will write the slope of their Olympus Mons anywhere on the outside of the box.

Activity 5 - Slope of failure Duration 45 minutes

The teacher will give a brief explanation of what slope of failure is and the angle of repose. The teacher will then give a brief demonstration of how the students are to carry out the experiment and fill in their FORM 1D. Each group of 4 will then go to a lab table where there are 4 different sand samples in 4 different cups and 4 blank pieces of paper. The students will carry out their experiment and see what the angle of repose for every grain is using protractors. Finally, each student will complete their FORM 1D.

Activity 4 – Volcanoes Quizzizz trivia game Duration 10 minutes (If time allows)

Students will now go on to Quizzizz to play a trivia game about volcanoes which the teacher will project. Link to Quizziz: https://quizizz.com/admin/quiz/5b2ad533f9b3b7001944a7ce

Total Duration Aprox. - 135 minutes

Volcano Name	Location	Height	Last Erupted
Pacaya	14°22′51″N 90°36′04″W Guatemala		
Mt. Stromboli		3031 ft	
Sakuraji			May 2, 2017
Kil		4091 ft	
Mt. Cleveland	52°49′20″N 169°56′42″W Alaska		
Mt. Erebus			2011
Volcan de Colima			January 2017

FORM 1A

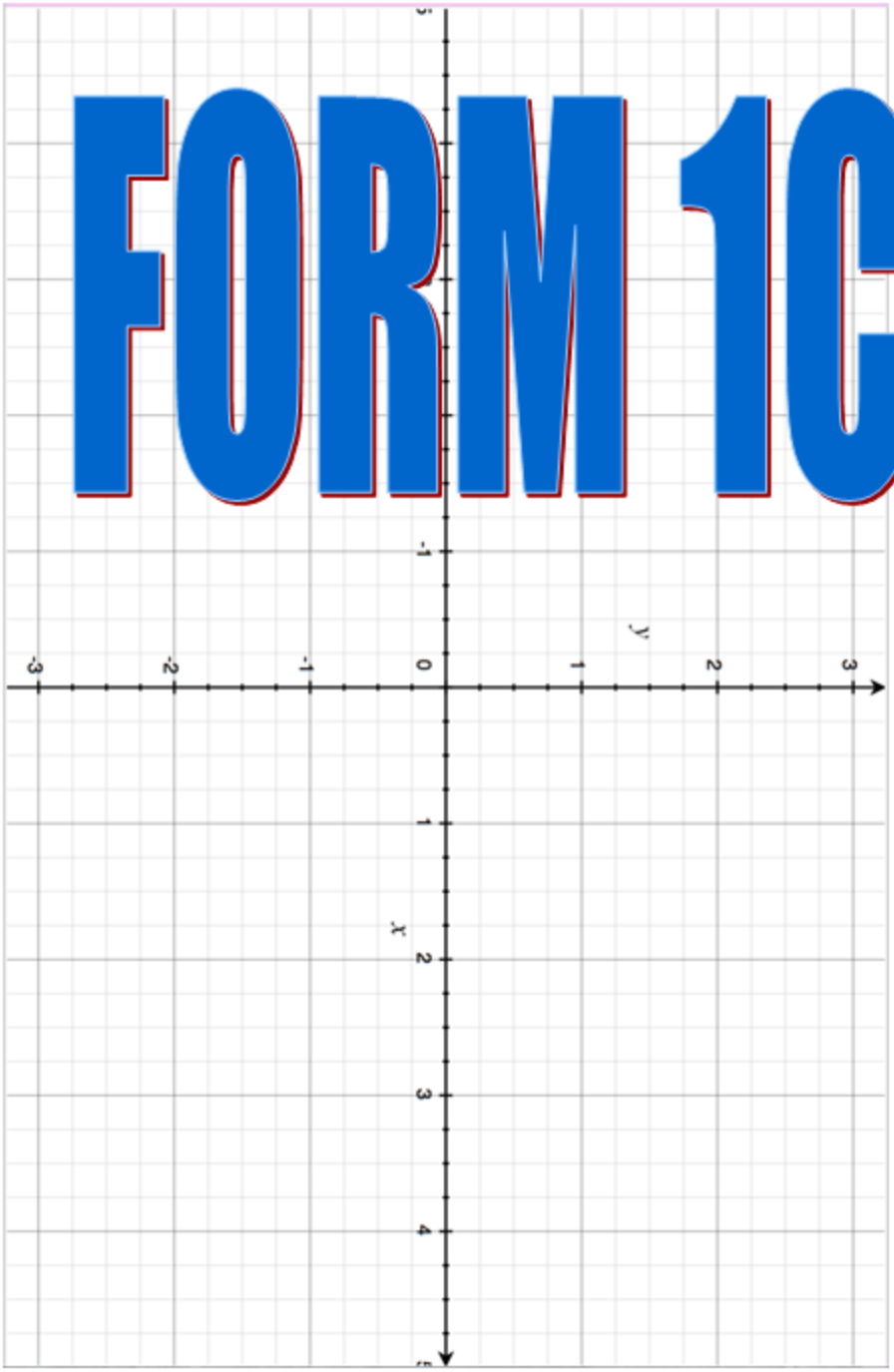
Volcano Name	Location	Height	Last Erupted
Pacaya	14°22’51”N 90°36’04”W Guatemala	8373 ft	March 2, 2014
Mt. Stromboli	38°47’38”N 15°12’40”E By Sicily	3031 ft	April 13, 2009
Sakurajima	31°35’N 130°39’E Japan	3665 ft	May 2, 2017
Kilauea	19°25’16”N 155°17’12”W Hawaii	4091 ft	May 17, 2018
Mt. Cleveland	52°49’20”N 169°56’42”W Alaska	5675 ft	May 17, 2017
Mt. Erebus	77°31’47”S 167°09’12”E Antartica	12448 ft	2011

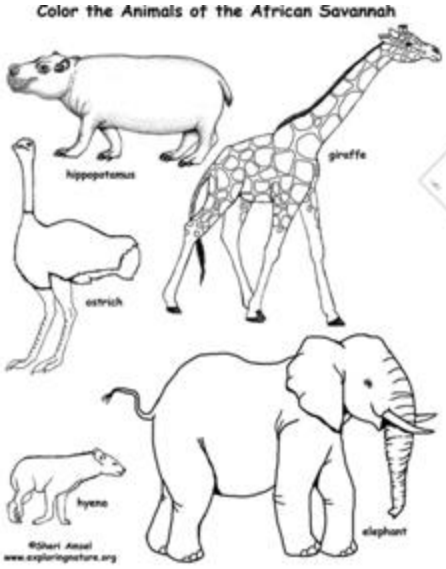
Answer Sheet for FORM 1A

GRASSLAND	GRASSLAND	GRASSLAND	GRASSLAND
TROPICAL RAINFOREST	TROPICAL RAINFOREST	TROPICAL RAINFOREST	TROPICAL RAINFOREST
ARCTIC	ARCTIC	ARCTIC	ARCTIC
DESSERT	DESSERT	DESSERT	DESSERT
AQUATIC	AQUATIC	AQUATIC	AQUATIC

FORM 1B

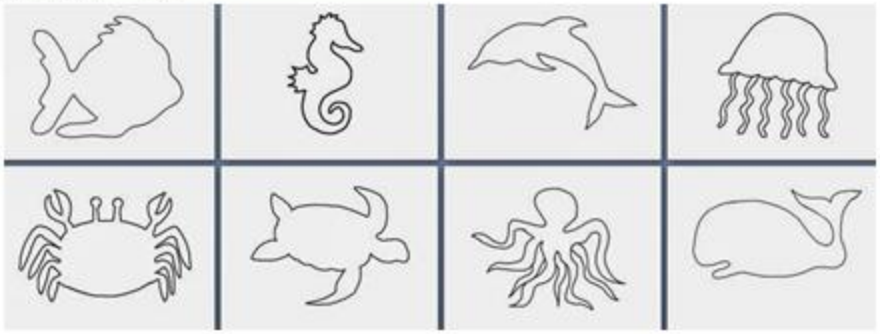
FORM 1C




Color the Animals of the African Savannah
hippopotamus
giraffe
ostrich
hyena
elephant
©Sheri Ansel
www.exploringnature.org


These are the types of animals you would find on the North or South Poles.


Color the Desert Animals
©Sheri Ansel



Example of Biome

	Using your protractor, predict the angle of steepness	Result (Angle)	Draw your pile of sand TO SCALE!
A (Red Sand)			
B (Black Sand)			
C (Blue Gravel)			
D (Pebbles)			

Instructional Lesson Plan

Content Area(s)/Course: Physics	Lesson Topic: Wave Anatomy and Wave Resonance
Teacher: Mr. Gallegos	Date: Canutillo STEM Games 2018

TEKS objective:

7) The student knows the characteristics and behavior of waves.

Student Outcome(s):

The student is expected to:

(B) investigate and analyze characteristics of waves, including velocity, frequency, amplitude, and wavelength, and calculate using the relationship between wavespeed, frequency, and wavelength.

(D) investigate behaviors of waves, including reflection, refraction, diffraction, interference, resonance, and the Doppler effect.

Materials

- Wave Anatomy & Resonance Lab Foldable
- 8-500 mL Graduated Cylinders
- 8-Tunning Forks w/different frequencies
- 8-1ft. PVC Pipes(3/4in.)
- Meter Sticks
- Fourth Slide link: https://vignette.wikia.nocookie.net/sound-waves/images/8/8c/Standing_wave.gif/revision/latest?cb=20160330143043
- Video (Sixth Slide) link: https://archive.org/details/SF121

Instructional Delivery – Activities

I. Pre-Introduction

Pass Wave Anatomy & Resonance Lab Foldable as students enter the class or place Wave Anatomy & Resonance Lab Foldable on students desks before they enter the class.

II. Introduction – 10 min.

Start lesson by asking students about different forms of waves they are familiar with? You will receive responses such as light, microwaves, waves at the beach, sound, earthquakes, and maybe even crowd waves and/or hand wave. Mention any of the above that students haven't mentioned.

After this small discussion categorize the waves into mechanical waves or electromagnetic waves. For example: light and microwaves are electromagnetic waves while all others are mechanical waves. Explain to students that the main difference between mechanical and electromagnetic waves is the medium. All mechanical waves need a medium to be able to travel and transfer energy while electromagnetic waves don't need a medium to create energy and travel. Clarify that sound is a mechanical wave, since sound travels through air particles.

III. Wave Anatomy – 10 to 15 min.

At this time have students refer to the Wave Anatomy & Resonance Lab Foldable and follow along as you progress through the PowerPoint presentation. First slide provides the title of “Wave Anatomy”. The second slide is an animated slide that covers the different parts of a wave. Please make note and notify students that the order of parts in the PowerPoint presentation is different than that on the foldable. The purpose of this discontinuity is for students to pay attention and not simply copy from the presentation straight onto the paper. As you conclude with this slide, go back to the Wave Anatomy & Resonance Lab Foldable and check for student understanding of the wave anatomy and more importantly that students have either labeled each definition of a part with the correct term or labeled the corresponding part of the wave on their image. The ultimate goal of becoming familiar with wave anatomy is for students to know and identify the wavelength of a wave. With this knowledge you are now able to proceed to the third slide of the presentation which introduces the relationship between wavespeed, frequency, and wavelength. At this moment please clarify and explain to students that the Greek symbol lambda, λ, is used to identify wavelength. Students have previous knowledge of velocity or speed and have just acquired new knowledge on wavelength; all they need to identify now is frequency. Frequency is the ratio of one cycle to unit of time (second) which is measured in Hertz. That is 1cycle/second is 1 Hertz. Therefore, the formula for wavespeed is derived from the relation and we can say that velocity is directly proportional to frequency and wavelength. It is important to note that when it comes to waves, velocity is not distance over time. Now the ground work has been set for you to tell students that the ultimate goal of the lesson is to determine the speed of sound. Proceed to next part.

IV. Resonance Lab – 30 min.

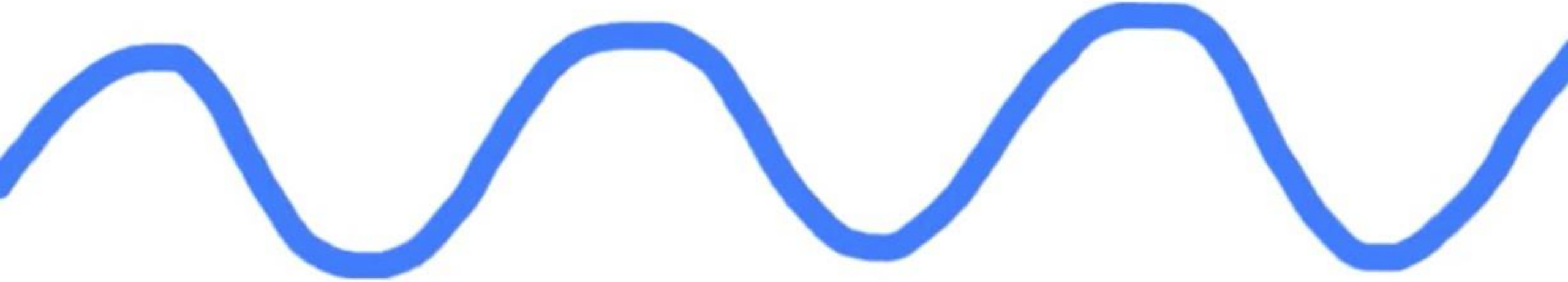
Refer to Resonance Lab portion of the Wave Anatomy & Resonance Lab Foldable and go over procedure to conduct the lab. Randomly call on students to recite the steps of the procedure. Now the teacher will demonstrate procedures by helping students with the first set of data students will record on the data table provided on the Wave Anatomy & Resonance Lab Foldable. As teacher continues with demonstration teacher will explain to students how resonance works. To make this explanation a bit more simple there is a link on the image provided on the fourth slide of the presentation, just click on the image while in presentation mode. The teacher explains to students that the sound they are looking for is produced when the reflection of the sound traveling down the pipe gets in phase with the sound itself to create a louder sound or amplify the volume. Remind students that as they collect data all they need for now is the length of the Air Column (L) in cm and the frequency of the tuning fork at the lab station. Students are given 2-3 minutes to complete each station. Set a timer for 3 minutes but if the teacher sees students have completed their tasks then the teacher can start to cut the time shorter. Once students have collected their data they can rotate to the following station. Rotations will be in ascending alphabetical order on the tuning forks with G jumping back to A. Once rotations have been completed students should be back at the station

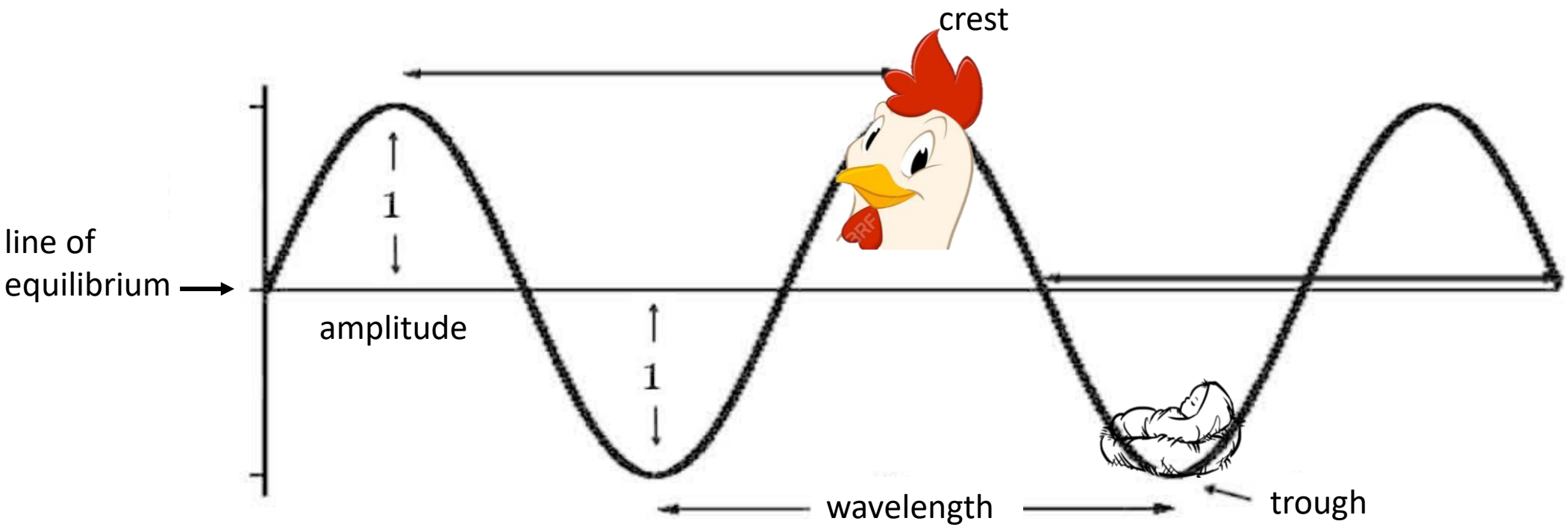
	they originally started at and now they can proceed to the calculations part of their lab. Students are provided with two formulas on the Wave Anatomy & Resonance Lab Foldable. One is to determine the wavelength of the tone produced by each tuning fork while the other is the wavespeed formula. Students will calculate wavespeed for each frequency provided, then they will find the average wavespeed by adding all the wavespeeds calculated and dividing by 8.
V.	Music Bottles – 45 to 50min. Tune Group Instructions Play
VI.	Conclusion – 10 to 15 min. Refer to wavespeed calculations of the Lab portion of the Wave Anatomy & Resonance Lab Foldable and discuss with students what relationship can they observe on their calculations for each tuning fork. Using the fifth slide of the PowerPoint presentation compare the velocity or wavespeed of several of the waves forms mentioned at the beginning of class and confirm to students that the speed of sound is 343 m/s which approximately converts to 767 miles per hour. Also refer back to resonance and ask students where they expect to see resonance in real life. If students have read the last portion of the Wave Anatomy & Resonance Lab Foldable they will probably mention the famous Tacoma bridge disaster. At this moment conclude the lesson by clicking on the image provided on the sixth slide of the PowerPoint presentation while in presentation mode. There is a link on the image that will take you to a short clip of the Tacoma bridge disaster.
Total Duration Aprox. 1hr 45min to 2hrs	

NOTE FROM YULI:

1. Please include all attachments, and links. Ex. Foldables, video links, QR codes, handouts etc. Everything you used must be included. These will be included in the materials. When you send your final lesson plan, send all attachments on the same email.
2. Step by step description of your lesson plan. Include timing for each small activity. Be detailed! These lesson plans are shared on our MaST Academy website.
3. Make it easy for me!! If you have questions text me. 915-497-6539

WAVE ANATOMY



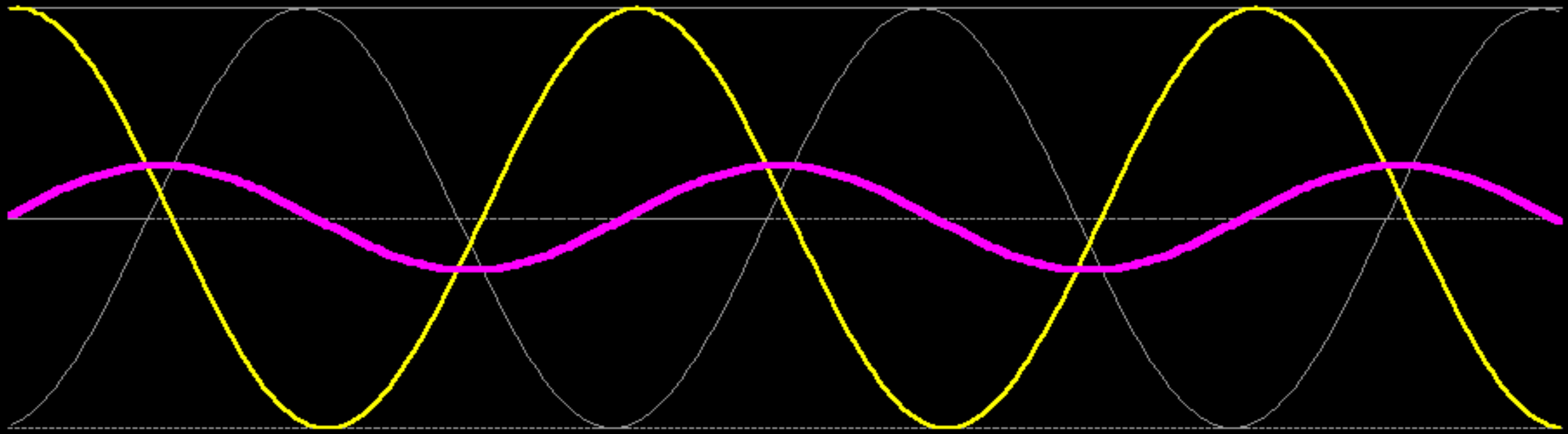

crest
line of
equilibrium
amplitude
1
1
wavelength
trough

wavelength

$$v = \lambda \cdot f$$

velocity

frequency



WAVE FORM	WAVESPEED
EARTHQUAKE	$12.5\ ^{km}/_{s}$
SOUND WAVES	$????\ ^{m}/_{s}$
CROWD WAVE	$20\ ^{seats}/_{s}$
OCEAN WAVES	$2\text{-}23\ ^{m}/_{s}$

Wave Anatomy

Objective

Identify the parts of a wave.

Background

Many types of waves exist, including electromagnetic waves and mechanical waves. Waves move in different ways and have different properties.
In the diagram below, identify the parts of a wave by using the provided definitions.

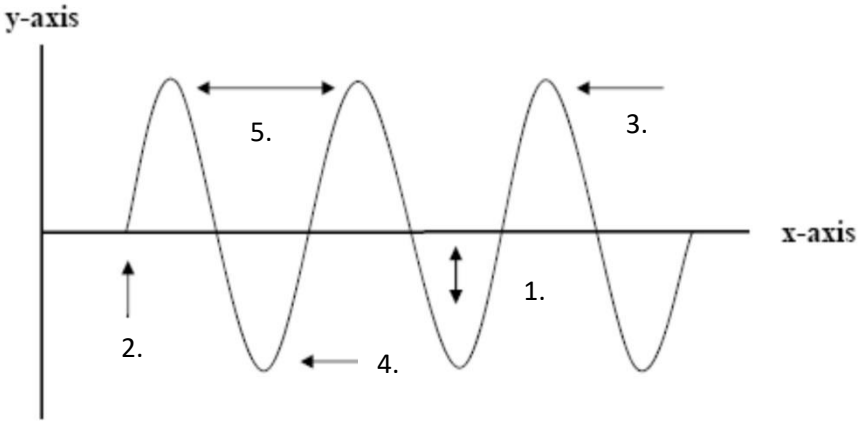
1. The distance from the line of equilibrium to a crest or trough of a wave.

2. Represents the original position of the medium.

3. The highest point of the wave above the line of equilibrium.

4. The lowest point of the wave below the line of equilibrium.

5. The distance between two consecutive crests or troughs.



Lab

Objective

1. Find the wavelength of the tone produced by a tuning fork using resonance.
2. Calculate the speed of sound.

Procedure

At each station you will find a 500mL graduated cylinder (w/water), tuning fork, PVC pipe, and a meter stick.

Starting at your station and rotating towards the following note:

1. Place PVC pipe inside 500mL graduated cylinder without letting go of the PVC pipe.
2. Strike tuning fork on the heel of your shoe or the lip of the PVC pipe.
3. Quickly place tuning fork over the opening of the PVC pipe.
4. Listen carefully while you slide the PVC pipe up and down the 500mL graduated cylinder until the loudest sound is heard (resonance) and stop. **KEEP PVC PIPE IN PLACE WITHOUT MOVING IT.**
5. Use the meter stick to measure the length (L) of the air column in cm from the water level to the top of the PVC pipe and record it in the data table.
6. Record the frequency (F) in Hertz (Hz) that is stamped on the tuning fork in the data table.

Proceed to the following station and repeat, recording data in the data table.

Calculations

1. Use the following formula to calculate the **wavelength (λ)** of each tuning fork:

$$\lambda = 4L$$

Note: The length of the air column is in cm. Convert from cm to m to calculate the wavelength.

2. To calculate the **speed of sound (v)** for each tuning fork use the following formula:

$$v = \lambda F$$

Note	Length of Air Column (L) in cm	Wavelength (λ) in m	Frequency of Tuning Fork (F) in Hz	Speed of Sound (v) in m/s
C				
D				
E				
F				
G				
A				
B				
C				

Calculate the average speed of sound.

Avg. Speed of Sound _____

Waves

All matter is made of atoms and molecules that are in constant random motion or state of vibration. All matter has a natural frequency where the majority of atoms and molecules vibrate in unison. This is the resonance frequency. There was a famous bridge disaster that was caused by resonance. In the 1940's a bridge in Tacoma, Washington was destroyed when it started vibrating due to blowing winds, The vibrations increased and increased until the bridge was torn apart. The natural resonating frequency of the bridge had been created by the winds.

In this lab, you are going to use the concept of resonance of sound waves to determine the wavelength of a tone from a tuning fork and then determine the speed of sound.

Sound is ordinarily transmitted in air. The vibrating end of a tuning fork set air in motion. The sound can be reinforced by a closed-end tube, like a graduated cylinder. The compression wave is sent down the tube, reflected, and sent up the tube. If the reflected compression waves are in phase with those from the tuning fork, then the sound is louder, or reinforced, and resonance occurs. Musical instruments depend on resonance for their operation. Without resonance, the notes you hear would not be as loud.

Instructional Lesson Plan

Content Area(s)/Course: Mathematics (Algebra & Physics)	Lesson Topic: Learning Centers
Teacher: Alejandra Lugo	Date: Canutillo STEM Games 2018

TEKS objective:

Archery

Algebraic Reasoning

(2) (D) Patterns and structure. The student applies mathematical processes to connect finite differences or common ratios to attributes of functions. The student is expected to: determine a function that models real-world data and mathematical contexts using finite differences such as ... average velocity, and average acceleration.

Shot put

Algebra 1

(7)(A) Quadratic functions and equations. The student applies the mathematical process standards when using graphs of quadratic functions and their related transformations to represent in multiple ways and determine, with and without technology, the solutions to equations. The student is expected to: graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including *x*-intercept, *y*-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry

Javelin Throw

Algebra 1

(1)(D) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to: communicate mathematical ideas, reasoning, and their implications using multiple representations, including … language as appropriate

Long Jump

Physics Beginning of Year

(4) Science concepts. The student knows concepts of force and motion evident in everyday life. The student is expected to:

(A) describe and calculate an object's motion in terms of position, displacement…

Discuss Throw

Algebra 1

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

(G) write an equation of a line that is parallel or perpendicular to the X or Y axis and determine whether the slope of the line is zero or undefined

Student Outcome(s):
At the end of the activity, the students should be able to see how math is related and incorporated into some of the Olympic events.

Materials

Archery

Paper and pencil

Phone

Stopwatch or phone

Toy bow and arrow

Target

Shot put

Cotton ball

Calculator

Phone

Paper and pencil

Javelin Throw

Straws

Paper and pencil

Aluminum foil

Tape

Phone

Long Jump

Paper and pencil

Phone

Discuss Throw

Paper and pencil

Paper plates

Tape

Stapler

Aluminum foil

Phone

Instructional Delivery - Activities

There are 20 mins per station and the students rotate clockwise. They scan a QR code to learn some facts about the olympic sport. Then they calculate, solve, or create a graph for each station. A paper with directions for each station is included along with the worksheet the students will complete.

Archery

The the students will measure how far the target is from where they're standing and how many seconds it takes for their arrow to hit that target. Then they will calculate the velocity of the arrow.

Shot put

Students will see how long it takes for the ball to hit the floor once they have thrown it. They will create a parabola, graph it, and identify its characteristics.

Javelin Throw

Each student tries throwing the straw at different angles to see how far it goes. They record each of these in a table.

Long Jump

Have each student try the long jump and record their distance. Then they answer a displacement problem.

Discuss Throw

The group creates their own discus out of the materials provided. They throw it at different slopes : zero, undefined, positive and negative. They record this or take a picture and send them to you through email or in this case, google classroom.

At the end, you can have a discussion to relate the sports with the math and what you have been seeing in class.

Total Duration Aprox. 110 minutes (20 mins per station)

Archery

Instructions

1. Scan the QR code on the top of the page for some facts about the sport
2. Measure the distance from where the archer is standing to the target and record it on the worksheet
3. Get in position to shoot the arrow (for a “How to” website scan the QR code at the bottom of the page)
4. One person has a phone to record the time starting as soon as the arrow is thrown and stop the time as soon as you hear it hit the window
5. Record this time on the worksheet
6. Repeat this two more times and record

Group Name:

Archery

Distance (cm): _____

Trials	Time (seconds)
1	
2	
3	

Average Time: _____

Find the velocity (v=d/t) (for t use the average time you calculated)

Javelin throw

Instructions

1. Scan the QR code and answer the questions
2. Use a straw as your javelin
3. You will change the first straw by adding weight or making it longer.
4. Throw your javelin according to the angle on the table for both, the regular straw, and the one you have modified.
5. Record distance in the table

Group Name:

Javelin

Video questions

1. How much does the men's javelin weigh?

2. What is the technique used when throwing the javelin?

Fill in the table.

	Distance (cm)	
Angle (when you let go of the javelin)	Regular Straw	Altered Straw
45˚		
90˚		
180˚		

At what angle did the straw go the furthest? Why?

Do you think the modifications you did to the straw affected the throw in a positive or negative way? Why?

Discus throw

Instructions

1. Scan the QR code for facts and to see how the discus is thrown
2. Create your own discus using the materials provided

Once you have your discus ready, remember Mr. Slope says?

Think of the floor as the x-axis, you standing is the y-axis and the discus will form the line.

Throw the discus at a Zero Slope, Undefined Slope, Positive Slope, Negative Slope

Take pictures/videos of these. You will be turning them in an assignment folder in google classroom.

Shot Put

Instructions

You will be throwing the cotton ball and creating a graph with the parabola of the path the cotton ball takes.

1. Scan the QR code to see how you will be creating the quadratic equation
2. For the trial make sure you record:
    a. the distance the cotton ball travels
    b. height (highest point the cotton ball reaches)
    c. the time the ball takes to hit the floor once it’s released
    d. calculate velocity

Group Name:

Shot Put

Standard From of a quadratic equation: $\mathbf{a}x^2 + \mathbf{b}x + \mathbf{c} = 0$

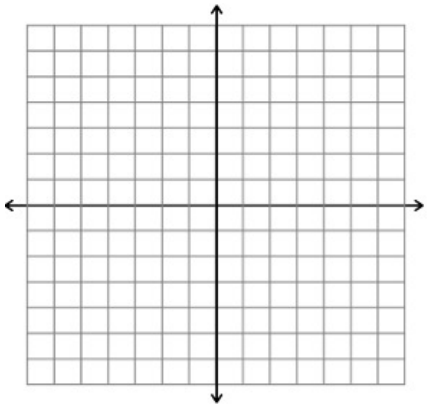
Given: The changing position of the ball as it falls down will be $981\ cm/s^2$

		Measurements
a	Gravity affecting cotton ball	**$-981\ cm/s^2$**
	Distance (cm)	
	Time (sec)	
c	Height (cm)	
b	Velocity (cm/s^2) (v=d/t)	

Create the quadratic equation according to your data.

Using a calculator or your phone, graph the equation and draw how it looks. (Fit your parabola on the calculator screen: **Menu – 4a**)

Find	How to find on Calculator	Your answer
Vertex	Menu-6-9-2	
y-intercept	Menu-5-1	



x-intercept	Menu-5-1	

Long Jump

Instructions

1. Scan QR code to watch a quick video on long jump
2. Each of you try it! (Everyone has three tries)
3. Measure the distance from the tape to where your feet landed
4. Record your distances

Group Name:

Long Jump

Name	Distance Traveled (cm)		

The world record for the longest long jump was broken by Mike Powell in the Olympics of 1991. The distance jumped was 8.95 meters.

The 8.95 m is the displacement (change of position of an object). I can be found using velocity, acceleration and time. Try out the following problem using the formula

$$d = v_o t + \frac{1}{2} a t^2$$

An object is moving with a velocity of 5.0 m/s. It accelerates constantly at 2.0 m/s/s, (2 m/s^2), for a time period of 3.0 s. What is its displacement during this acceleration?

Instructional Lesson Plan

Content Area(s)/Course: Science- Astronomy	Lesson Topic: Earths History
Teacher: Francia and Cesar	Date: Canutillo STEM Games Camp 2018

TEKS objective:
(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

Student Outcome(s): Students will understand the history of Earth and compare to make connections with their own timeline.

Materials

- 40 white poster boards (1 for every student)
- Markers
- Crayons
- Calculators (they can use their phones)
- 80 Paper Bowls (2 per each student)
- Hot glue gun
- A pack of big paper clips
- Yarn (one bundle is enough for everyone)
- Tempera Paint (green, blue, white, red) Markers can be a substitute to the paint
- Paint brushes

Instructional Delivery - Activities

Activity 1 - History of Earth Video Duration: 5 minutes
Students will start by watching a video on the history of Earth (its timeline).
https://www.youtube.com/watch?v=3rHXrA80NH4

Activity 2 – Earths Timeline Duration: 30 minutes
Each student will now get their poster board and draw a line through the middle (longways). Then each student will divide the top portion of their poster boards in 5 equal parts. Now, the teacher will give each student a strip randomly which have 5 numbers. These strips will tell the students which events they will have to draw on the top portion of their timeline (Earths timeline). They can refer to the projector where they can see all the events that they saw on the video.

Activity 3 – Personal Timeline Duration: 45 minutes
Next, students will divide the bottom portion of their poster board with 5 equal parts (same as the top). They will now make their own timeline. HOWEVER!! Their timeline must be directly proportionate to the events they have for Earth. For example, if the student is 15 years old then each year of their life is 300 million years in Earth's age. They must color and decorate to the best of their ability.

Earth is formed *Drawing* 4.6 BYA	The First Ice Age *Drawing* 2.9 BYA	Eukaryotic cells appear *Drawing* 1.6 BYA	Dinosaurs roam the earth *Drawing* 230 MYA	Pyramids of Giza are built *Drawing* 4,500 YA
Cesar is Born *Drawing* 22 Years Ago	Cesar Starts 3rd grade *Drawing* 13.8 years ago	Cesar joins his HS soccer team *Drawing* 7.6 years ago	Cesar finishes his Junior year in college *Drawing* 1.1 years ago	Cesar walked in the building *Drawing* 11 min ago

Activity 4 – Making a Globe Duration 30 minutes

A teacher will assign a student one of the Earth events that the students portrayed to each student. Instructions on making the globe https://www.youtube.com/watch?v=UXDuXWuLiAE. After all globes are completed, they can be hung by the ceiling by the teachers.

Total Duration Aprox. - 125 minutes

1) 4.6 BYA - Earth is formed
2) 4.5 BYA - The moon is formed
3) 3.5 BYA - Unicellular life started (prokaryotes)
4) 2.9 BYA - First Ice age
5) 2.5 BYA - Oxygen is found in the atmosphere and oceans
6) 1.6 BYA - Eukaryotic cells appear
7) 420 MYA - Plants and coral reefs appear
8) 375 MYA - Vertebrates with legs appear
9) 230 MYA - Dinosaurs roam the Earth
10) 65 MYA - Meteor drives dinosaurs to extinction
11) 45 MYA - First Mammals appear
12) 6 MYA - Hominids and chimpanzees diverge from a common ancestor
13) 70,000 YA - Second major ice age
14) 11,000 YA - Development of agriculture
15) 4,500 YA - Pyramids of Giza were built
16) 1543 - Modern scientific revolution
17) 1760 - First industrial revolution
18) 1969 - Landing on the moon
19) 2018 - World Cup begins
20) 5 Billion years in the future - Earth is destroyed by the red giant

- 1) Earth is formed (red and black)
- 2) Water starting condensing in liquid form (gray)
- 3) First Ice Age (white and blue)
- 4) Plants start to appear (Pangea) (green and blue)
- 5) Meteor drives dinosaurs to extinction (green and blue with smoke)
- 6) Second ice age (white and blue)
- 7) Present day (green and blue)
- 8) Earth is destroyed by the red giant (red and black)

Instructional Lesson Plan

Content Area(s)/Course: Science- Astronomy	Lesson Topic: Hertzsprung Russell Diagram
Teacher: Karen Olivas and Marcela Diaz	Date: Canutillo STEM Games 2018

TEKS objective:
AST.11 A Identify the characteristics of main sequence stars, including surface temperature, age, relative size, and composition;
AST.11 B Characterize star formation in stellar nurseries from giant molecular clouds, to protostars, to the development of main sequence stars;
AST.11 G Use the Hertzsprung-Russell Diagram to plot and examine the life cycle of stars from birth to death.

Student Outcome(s): Students will identify the stages of the life cycle of a star. Students will create their own HR Diagram to plot stars by temperature and luminosity.

Materials

- colored paper/construction paper
- printed set of star life cycle
- printed sets of star circles template (template included)
- large post-it paper
- glue gun
- paint (acrylic works best)
- googly eyes
- Sponges
- kiddie pool
- butcher paper (about 6 ft long)

Instructional Delivery - Activities

Activity 1 - Star Life Cycle Logic Lineup Duration: 15 minutes

In groups of 5, each student will be given a paper with one stage of the life cycle of a star (protostar, red giant, etc). Teacher will provide a logic riddle or instructions. Each group must follow instructions to lineup each “life cycle stage” in the correct sequence. (Can use the “cartoon” pictures for the first two riddles.” The last two logic riddles will result in the real star life cycle sequence.

**Note: each stage will be printed in a different colored sheet.

Riddle 1

Director- stellar nebula

1. The planetary nebula and the white dwarf are not next to each other.
2. The red giant is not first or in the middle.
3. Neither the white dwarf nor the average star are next to the red giant.

Answer: White dwarf, average star, planetary nebula, red giant

Riddle 2

Director- stellar nebula

1. Only the massive star is next to the supernova.
2. The black hole/neutron star is as far from the supernova as possible.
3. The red supergiant is second.

Answer: black hole/neutron star, red supergiant, massive star, supernova

Riddle 3

Director- stellar nebula

Answer: Average Star, Red Giant, Planetary Nebula, White Dwarf

1. The white dwarf and the planetary nebula are right next to each other.
2. The average star is after the red giant.
3. The red giant is after the planetary nebula.

Riddle 4

Director- stellar nebula

1. The supernova is not on an end.
2. The black hole/neutron star is as far from the massive star as possible.
3. Either the black hole/neutron star or the supernova are last.
4. The red supergiant is closest to the massive star.

Answer: Massive star, red supergiant, supernova, black hole/neutron star

Activity 2 - Powerpoint Duration: 10 minutes

Teacher will give a short lecture to provide star information. Power Point shared on Google Slides, includes videos.

Activity 3 - HR Diagram activity Duration: 15 minutes

In groups of 4, students will plot “star circles” on a large post-it graph paper. (Teachers would have already labelled the axes by temperature and luminosity. There are about 100 stars so each student should plot about 25 stars. Information on star circles template: Name/Brightness/Temperature)

Activity 4- Class 3D HR diagram Duration: 20 minutes

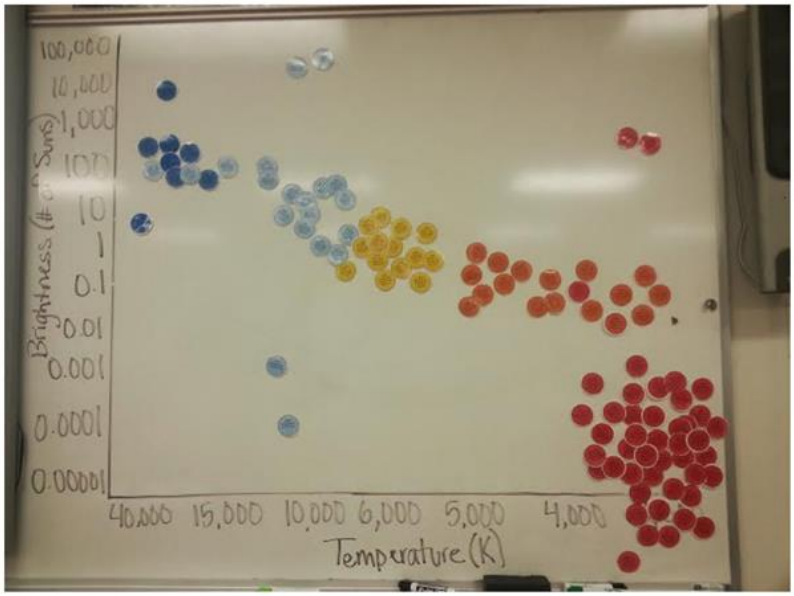
Teachers will assign one star to each student. Each student will then color and decorate a ½ styrofoam ball according to its location on the HR diagram. They should also personalize it according to the life stage of the star. When they are done they will glue their styrofoam star on a 3D class set on butcher paper.

Activity 5- Nuclear fusion Duration: 30 minutes

Teacher will call out elements randomly from the periodic table as well as its atomic number (using a megaphone if available), up to Fe (iron 26). Students must create groups according to the atomic number, when teacher sees there are properly grouped she will then say “nuclear fusion”. Students will then “fuse” their wet sponges. (Teachers will have a periodic table that they can use as a reference in case students don’t hear the atomic number called out.)

Total Duration Aprox. - 90 min

Pictures/ samples:



All-Star Lesson

Life Cycle of Stars

Classifying Stars with an HR Diagram

Nuclear Fusion

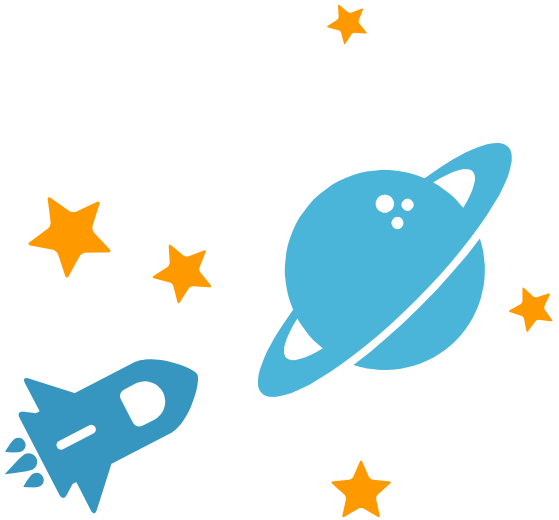
Logic Line-up

Riddle 1

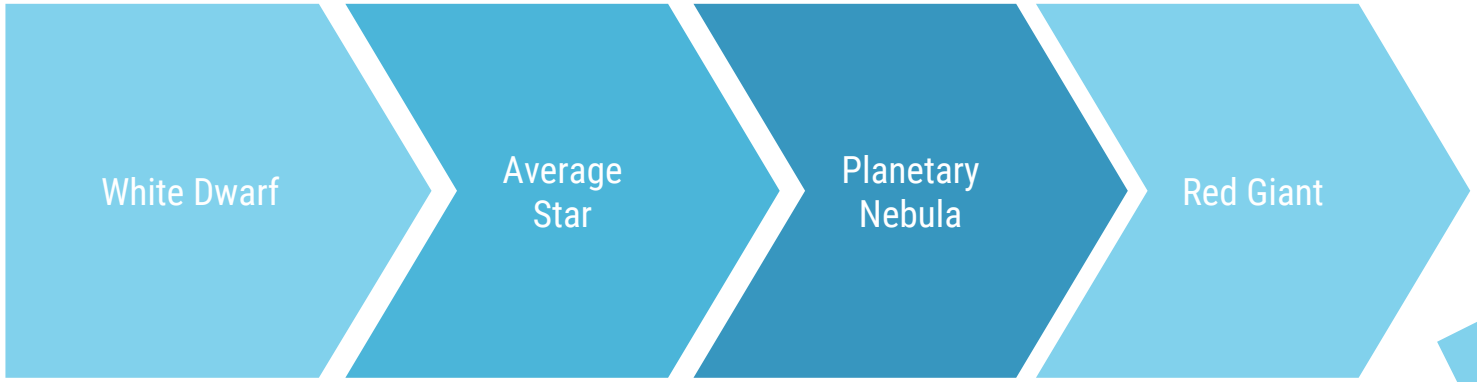
Need: Planetary Nebula, white dwarf, Red giant, average star

Director- stellar nebula

1. The planetary nebula and the white dwarf are not next to each other.
2. The red giant is not first or in the middle.
3. Neither the white dwarf nor the average star are next to the red giant.



Answer for Riddle 1



Logic Line-up - *change cards*

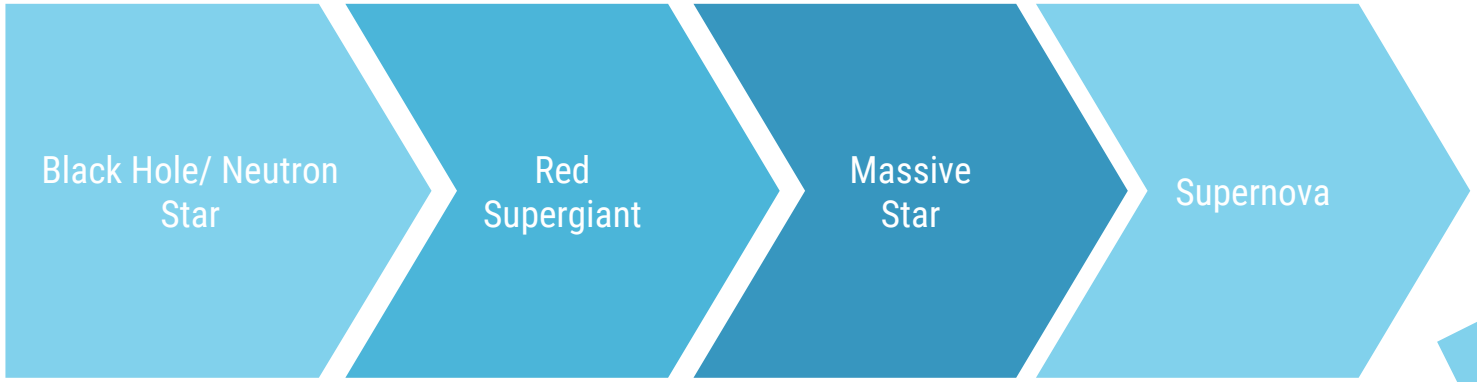
Riddle 2

Need: Massive Star, Supernova, black hole/neutron star, red supergiant

Director- stellar nebula

1. Only the massive star is next to the supernova.
2. The black hole/neutron star is as far from the supernova as possible.
3. The red supergiant is second.

Answer for Riddle 2



Logic Line-up - *change cards*

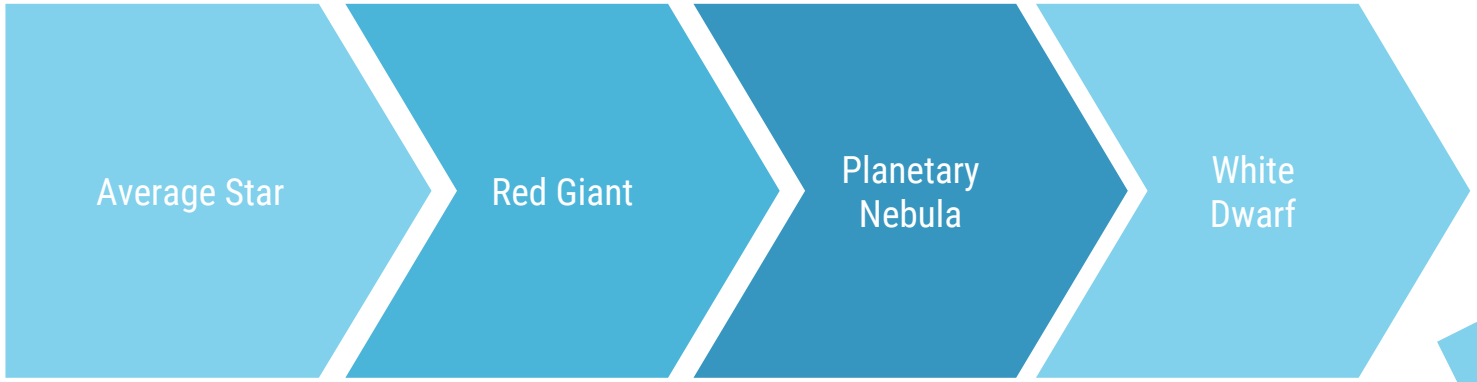
Riddle 3

Need: White dwarf, red giant, planetary nebula, average star

Director- stellar nebula

1. The white dwarf and the planetary nebula are right next to each other.
2. The average star is after the red giant.
3. The red giant is after the planetary nebula.

Answer for Riddle 3



Logic Line-up - *change cards*

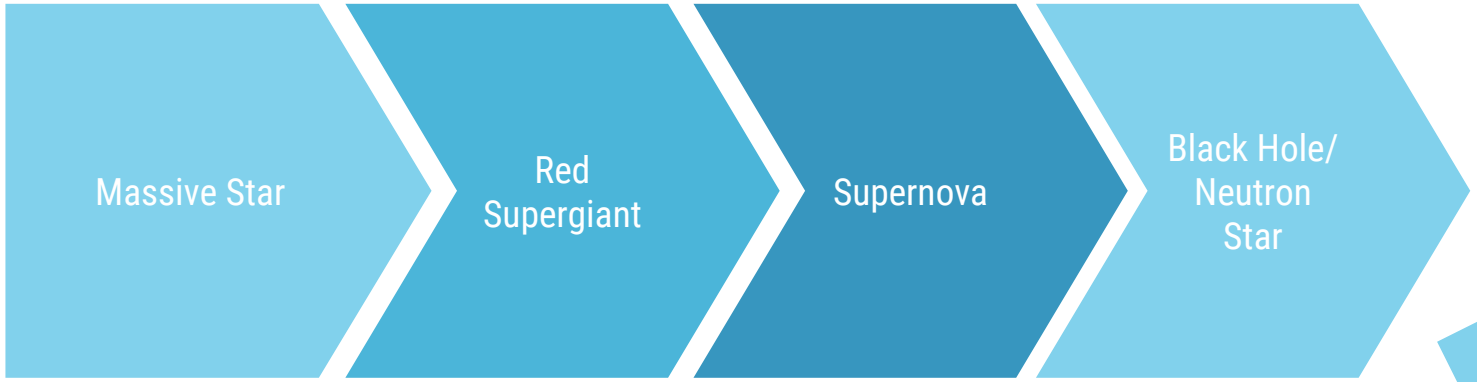
Riddle 4

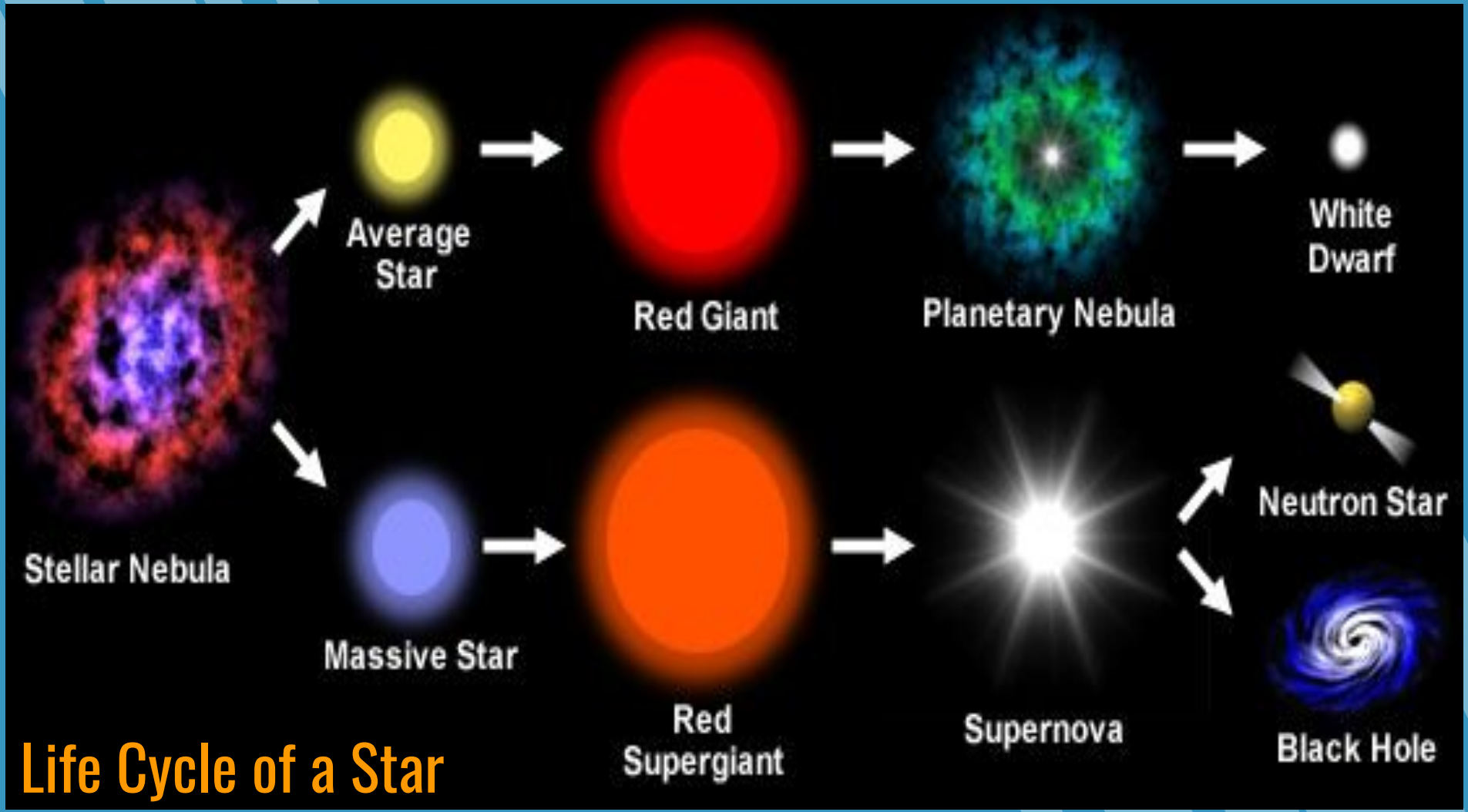
Need: Supernova, black hole/neutron star, massive star, red super giant

Director- stellar nebula

1. The supernova is not on an end.
2. The black hole/neutron star is as far from the massive star as possible.
3. Either the black hole/neutron star or the supernova are last.
4. The red super giant is closest to the massive star.

Answer for Riddle 4




Average Star
Red Giant
Planetary Nebula
White Dwarf
Stellar Nebula
Massive Star
Red Supergiant
Supernova
Neutron Star
Black Hole
Life Cycle of a Star

https://www.youtube.com/watch?v=L9PrMA5IJt0

Stellar Nebula

Emission Nebula

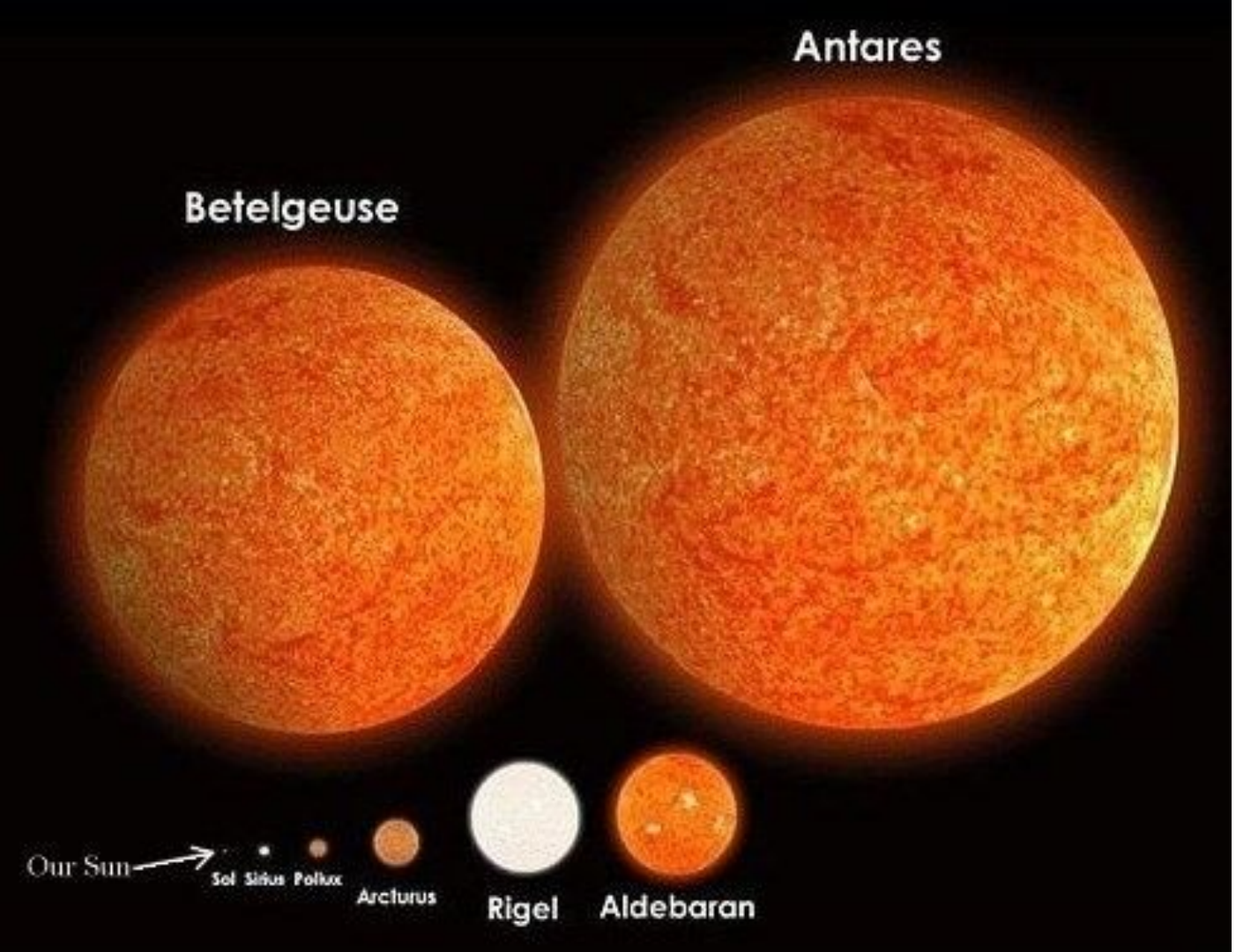
- Orion Nebula

Reflection Nebula

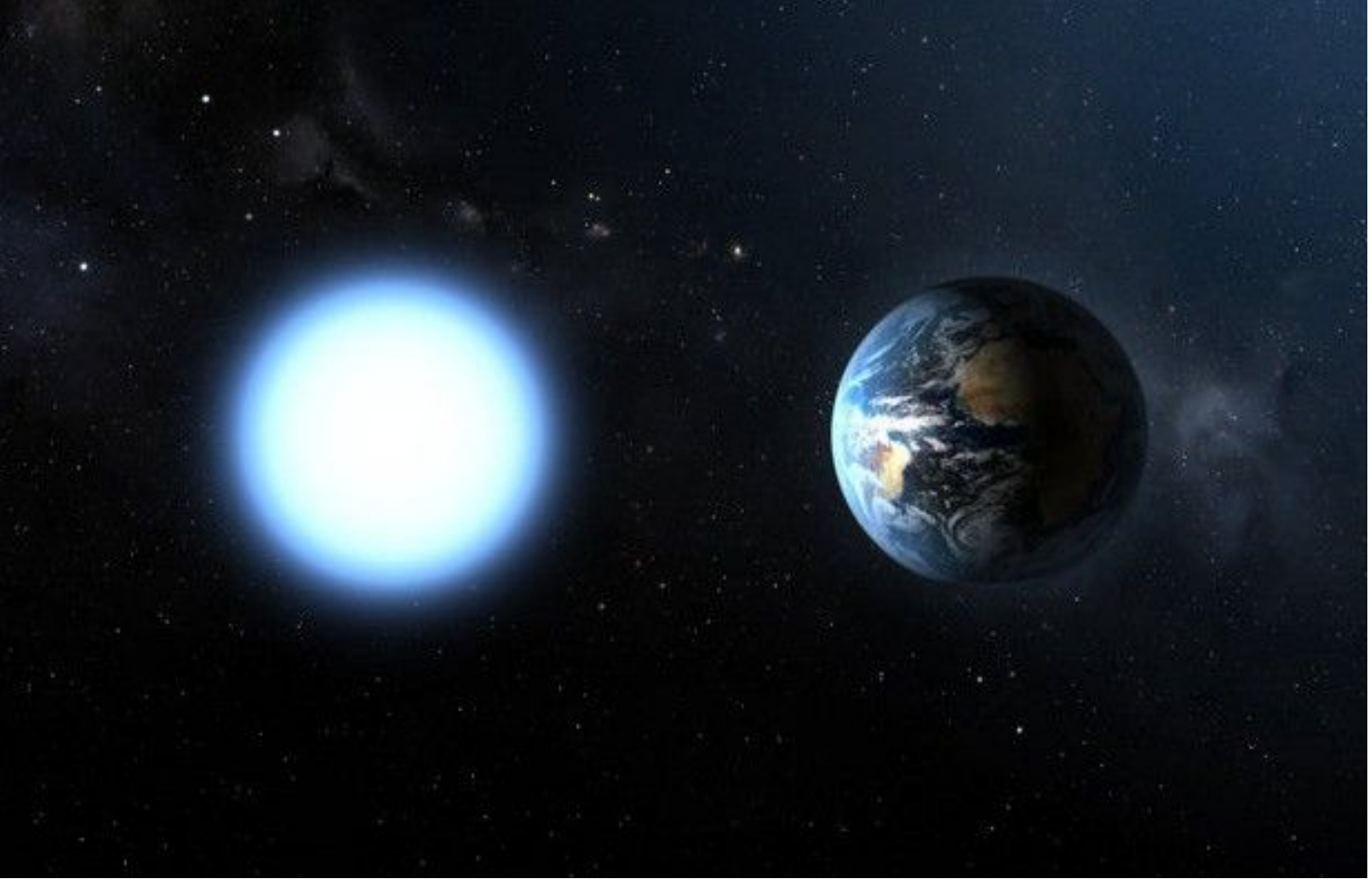
- nebula surrounding the Pleiades Cluster

Dark Nebula

- Horsehead Nebula in Orion

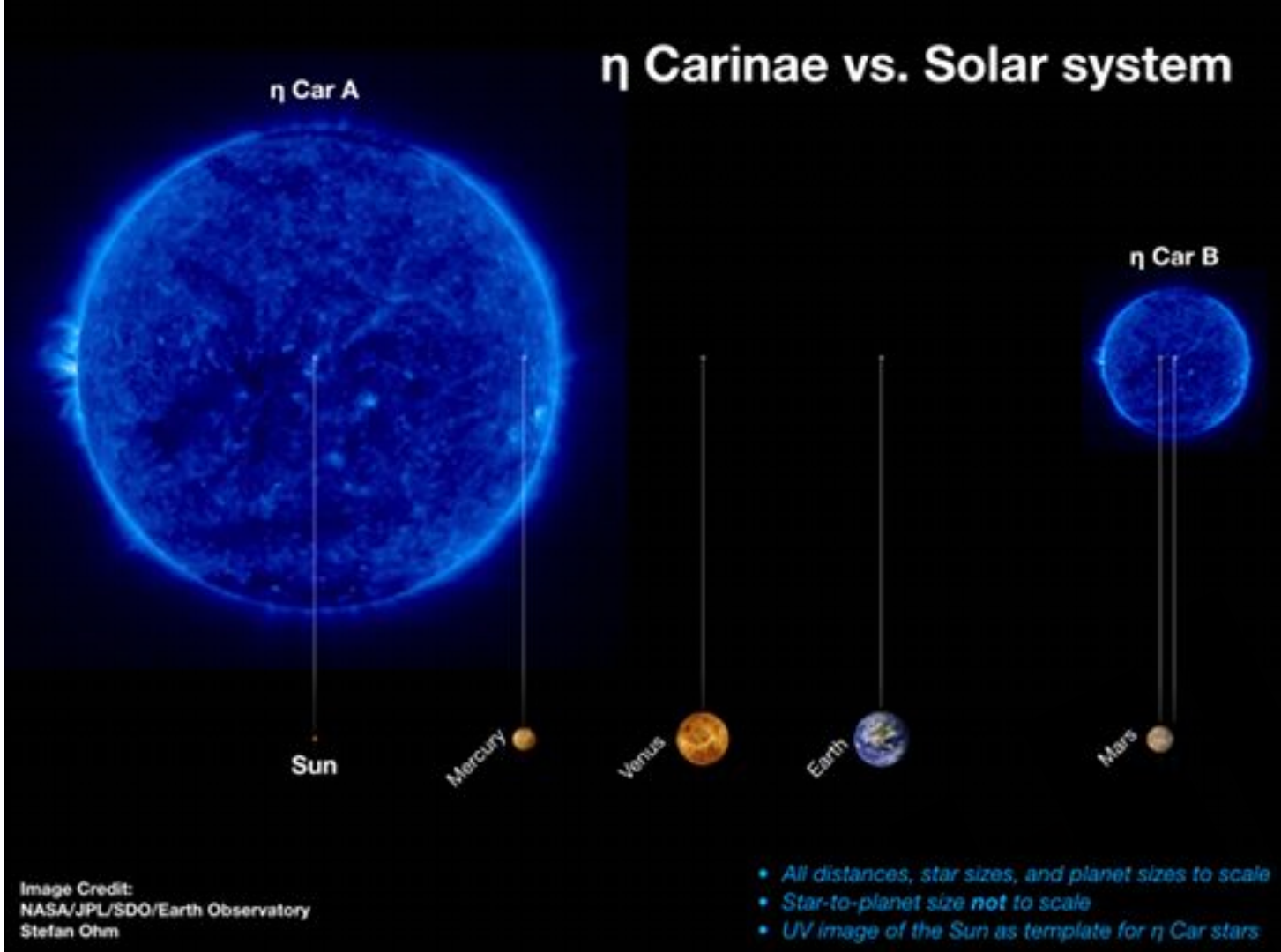

Antares
Betelgeuse
Our Sun
Sol
Sirius
Pollux
Arcturus
Rigel
Aldebaran

Red Giants

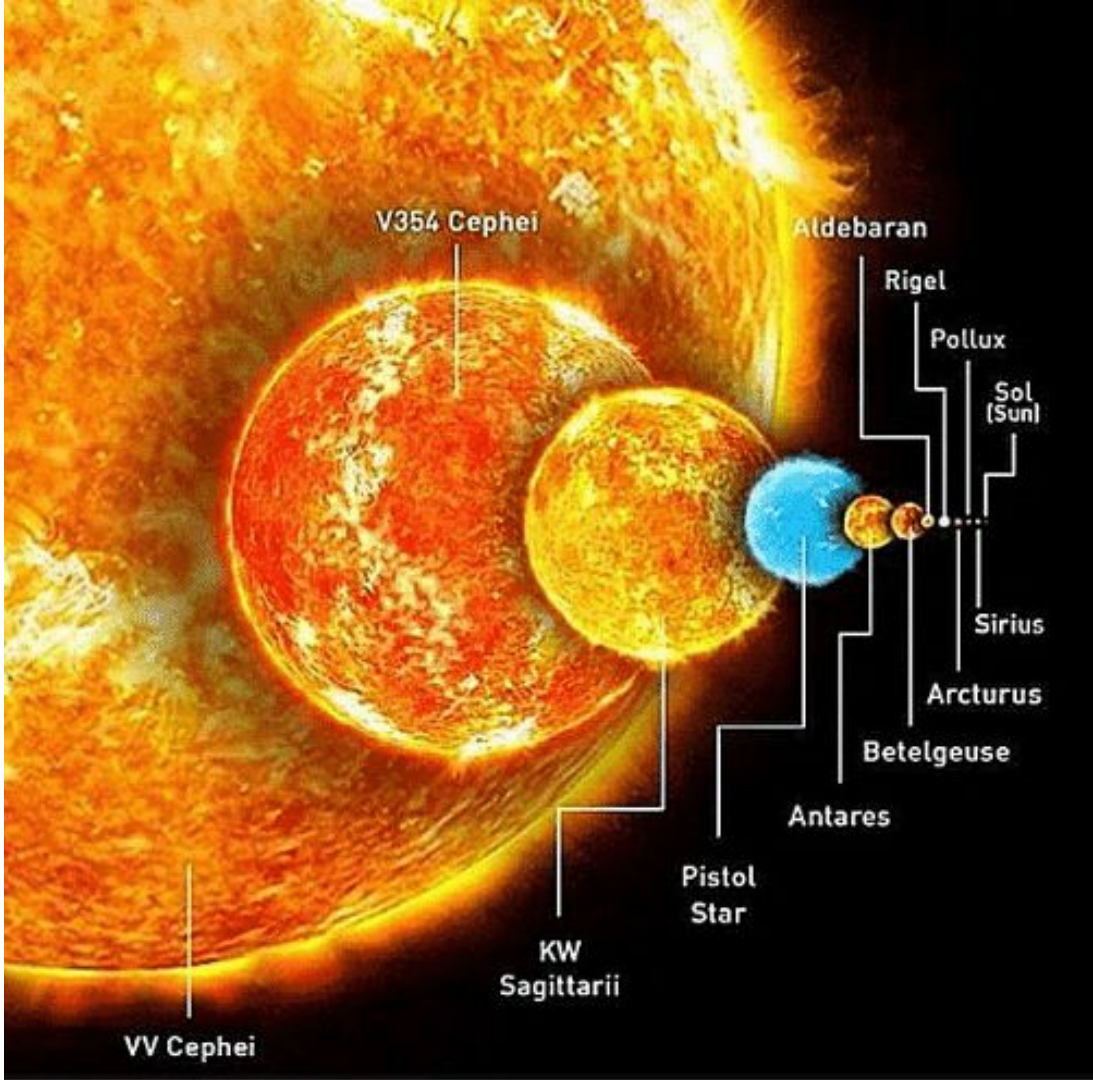


White Dwarf vs. size of Earth

Eta Carinae

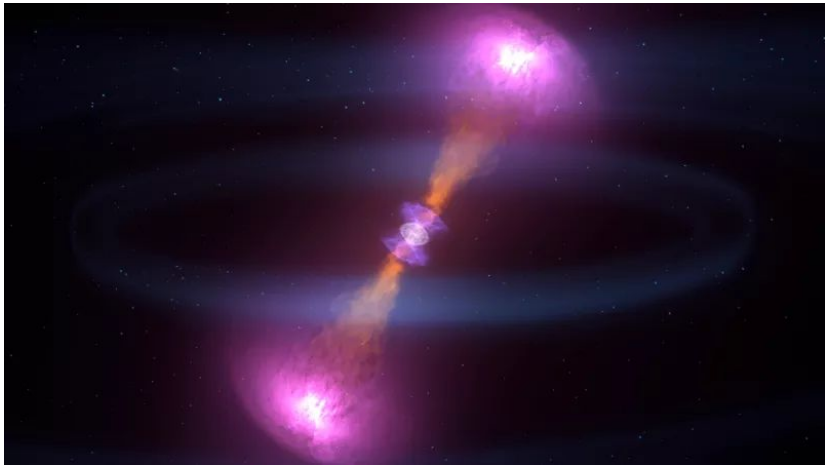

η Carinae vs. Solar system
η Car A
η Car B
Sun
Mercury
Venus
Earth
Mars
Image Credit:
NASA/JPL/SDO/Earth Observatory
Stefan Ohm
All distances, star sizes, and planet sizes to scale
Star-to-planet size not to scale
UV image of the Sun as template for η Car stars

Red Supergiants



Supernova

Black Hole & Neutron Star

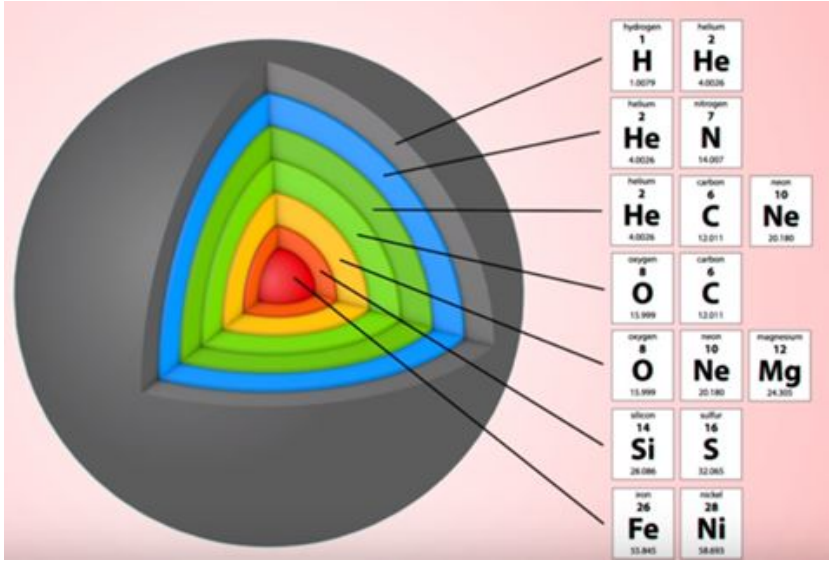


NUCLEAR FUSION

https://www.youtube.com/watch?v=aPYirMuvlKk

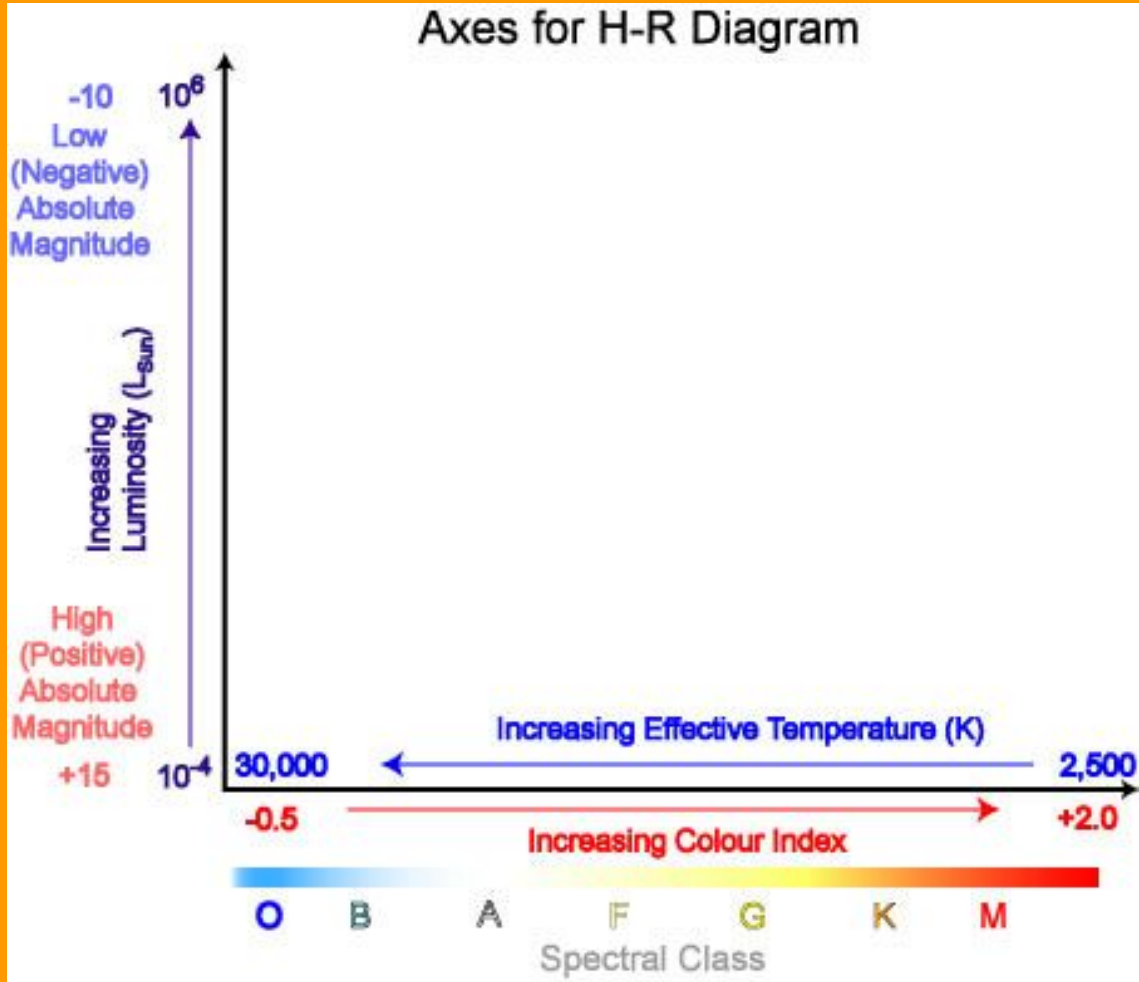
Star 20x the Sun

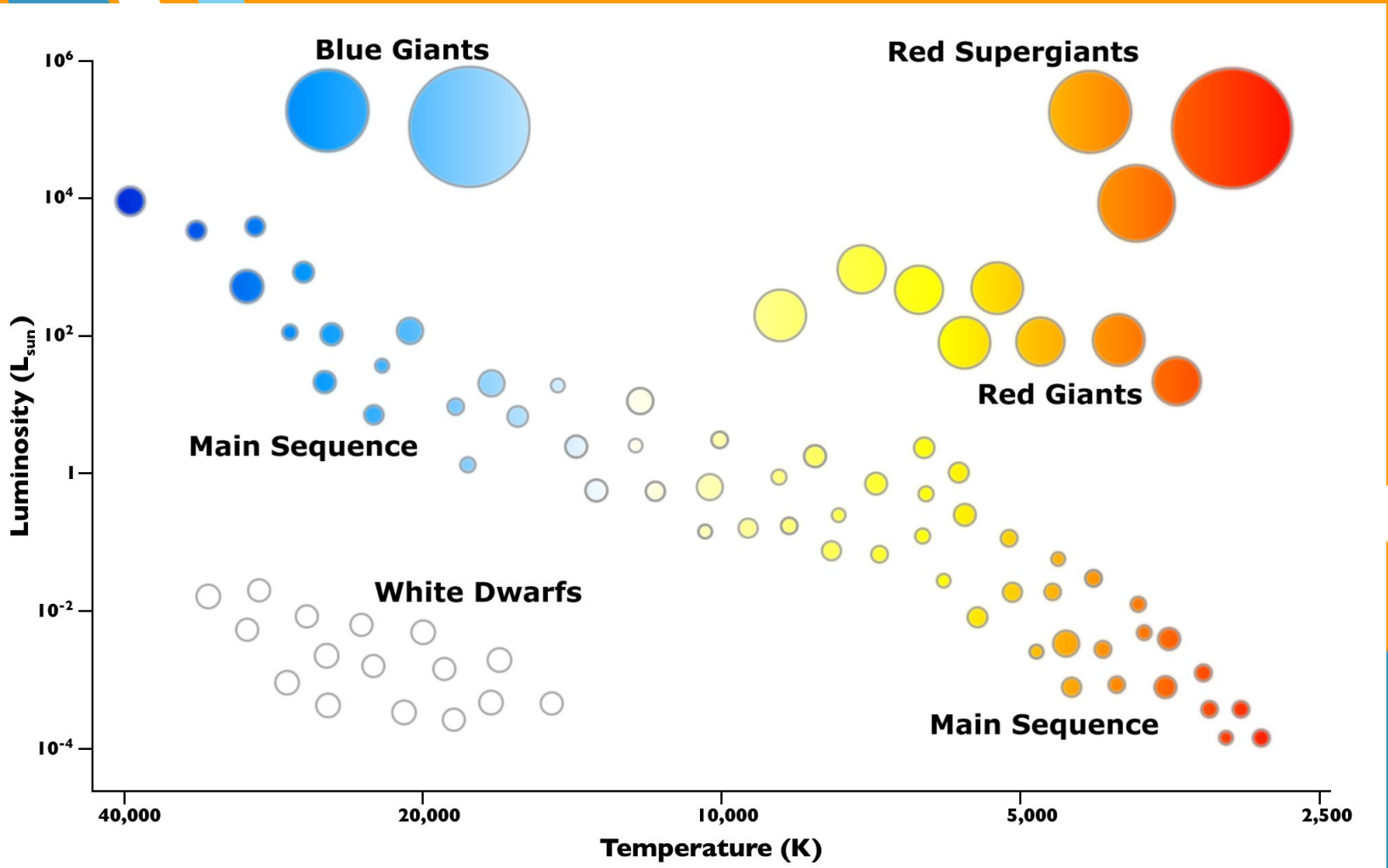
He	C	Ne	O	Si
1,000,000 yrs.	1,000 yrs.	1 year	Several months	1 Day



Hertzsprung-Russell Diagram

What does it tell us?




Blue Giants
Red Supergiants
Red Giants
Main Sequence
White Dwarfs
Main Sequence
Luminosity (L_{sun})
10^6
10^4
10^2
1
10^{-2}
10^{-4}
40,000
20,000
10,000
5,000
2,500
Temperature (K)

Create your own HR Diagram ~ 15 minutes

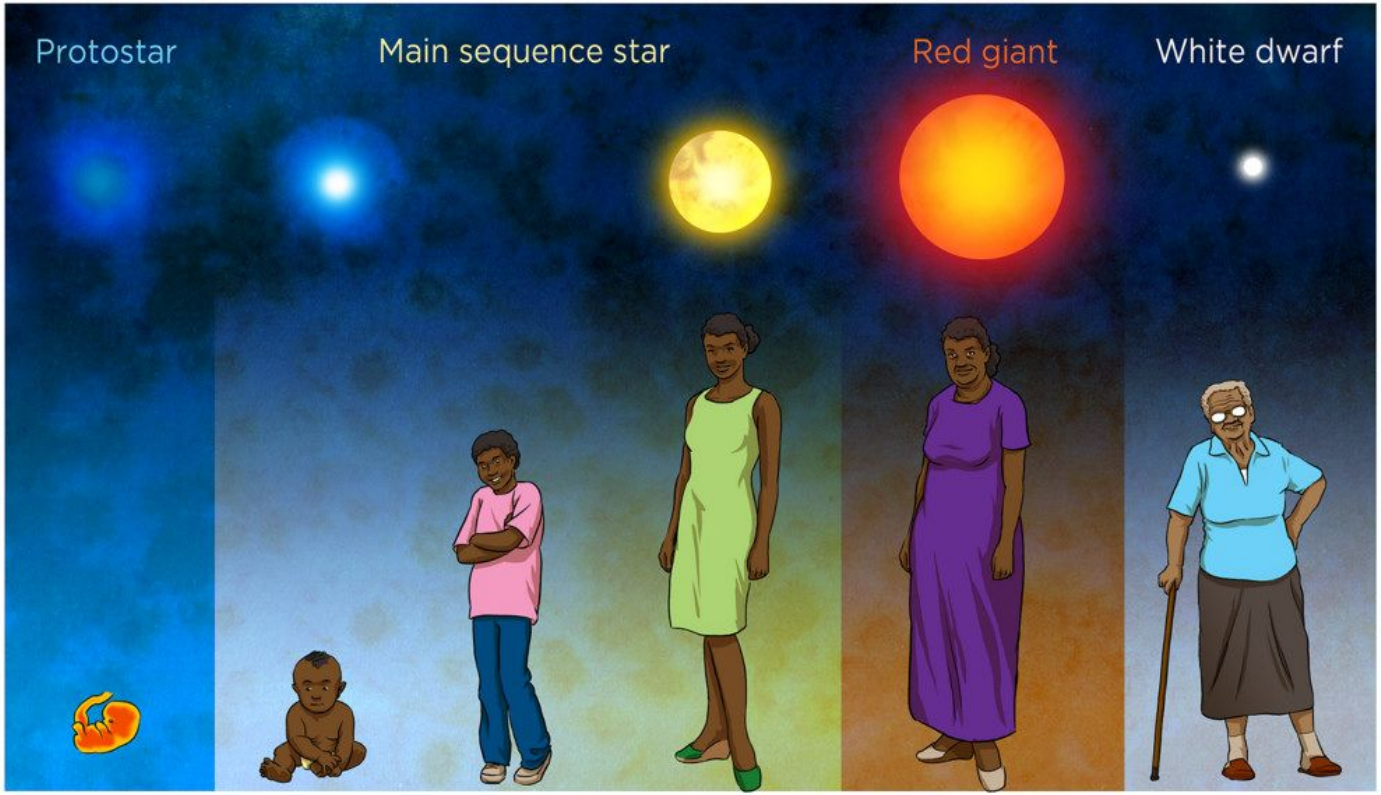
You will be given approximately 100 stars. Each “star” contains important features such as:

- Star name
- Temperature
- Brightness

You will plot these stars in your chart in order to create a model of the HR diagram. Each person in your team should plot 25 stars.

Become an All-Star!

1. Teacher will assign one star to each student.
2. Each student will color and decorate a ½ styrofoam ball according to its characteristics and stage of life cycle.
3. When decoration is complete, glue styrofoam star on class HR Diagram on butcher paper.

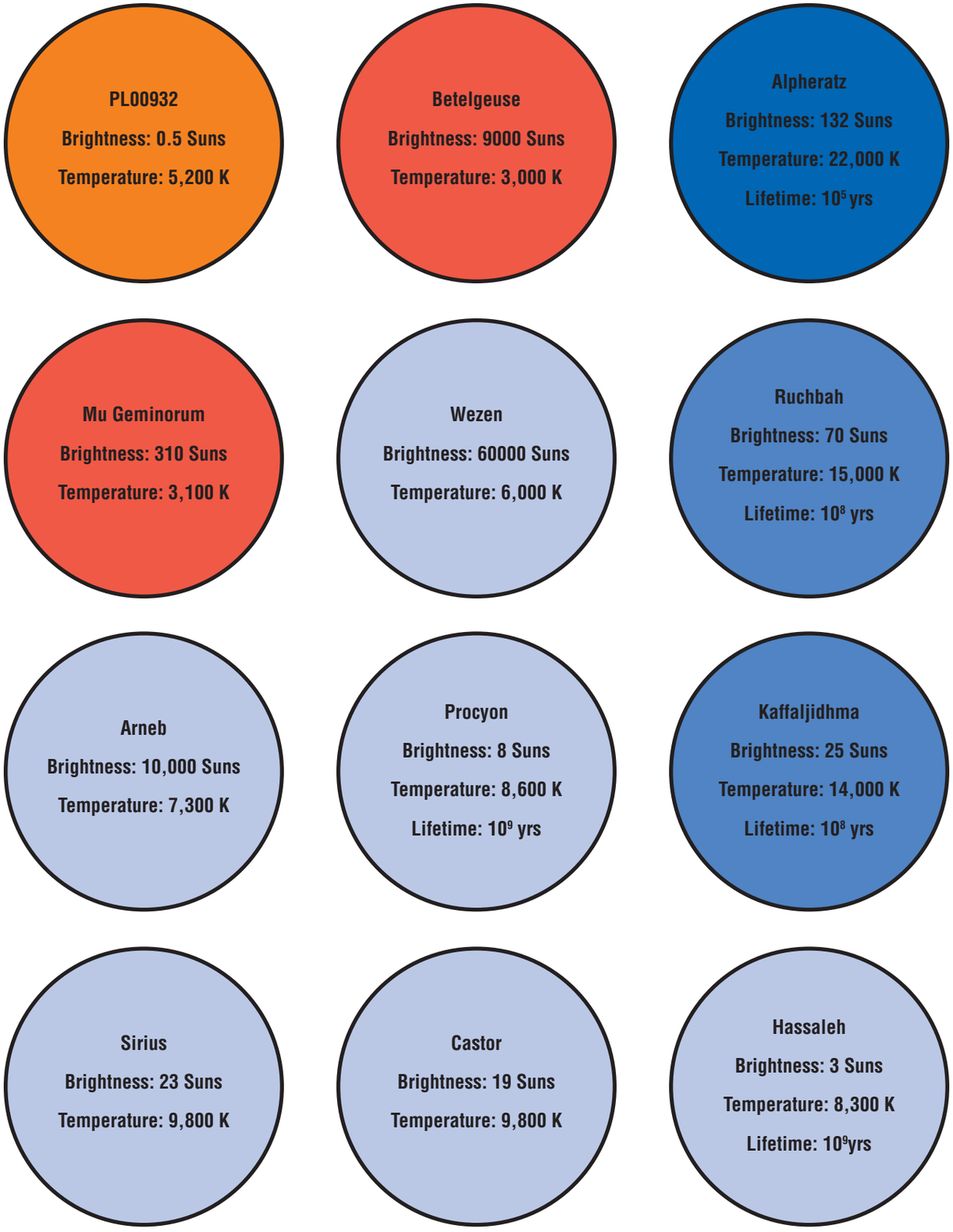

Protostar
Main sequence star
Red giant
White dwarf
foetus
infancy through adulthood
middle age
old age -death

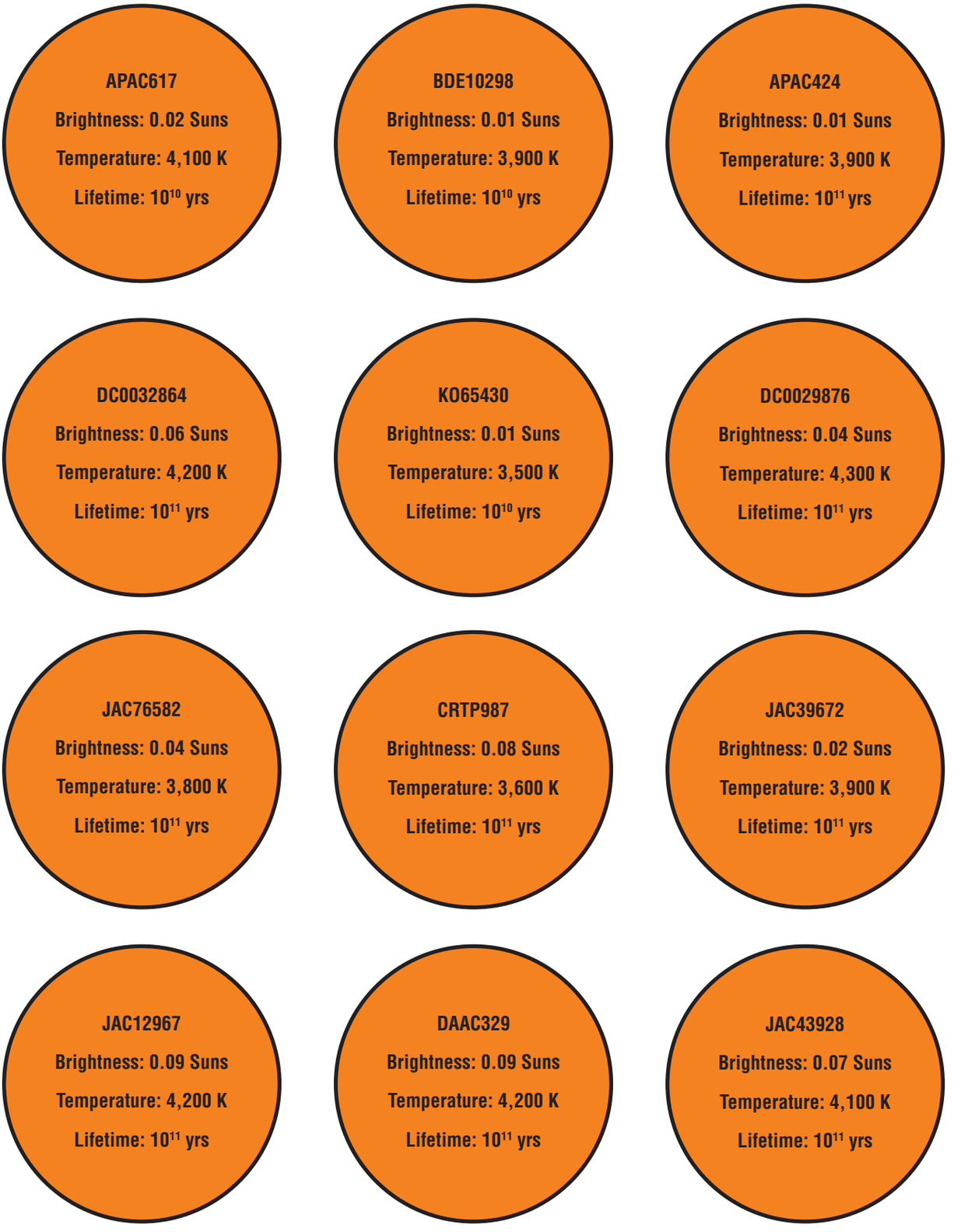
Nuclear Fusion Activity

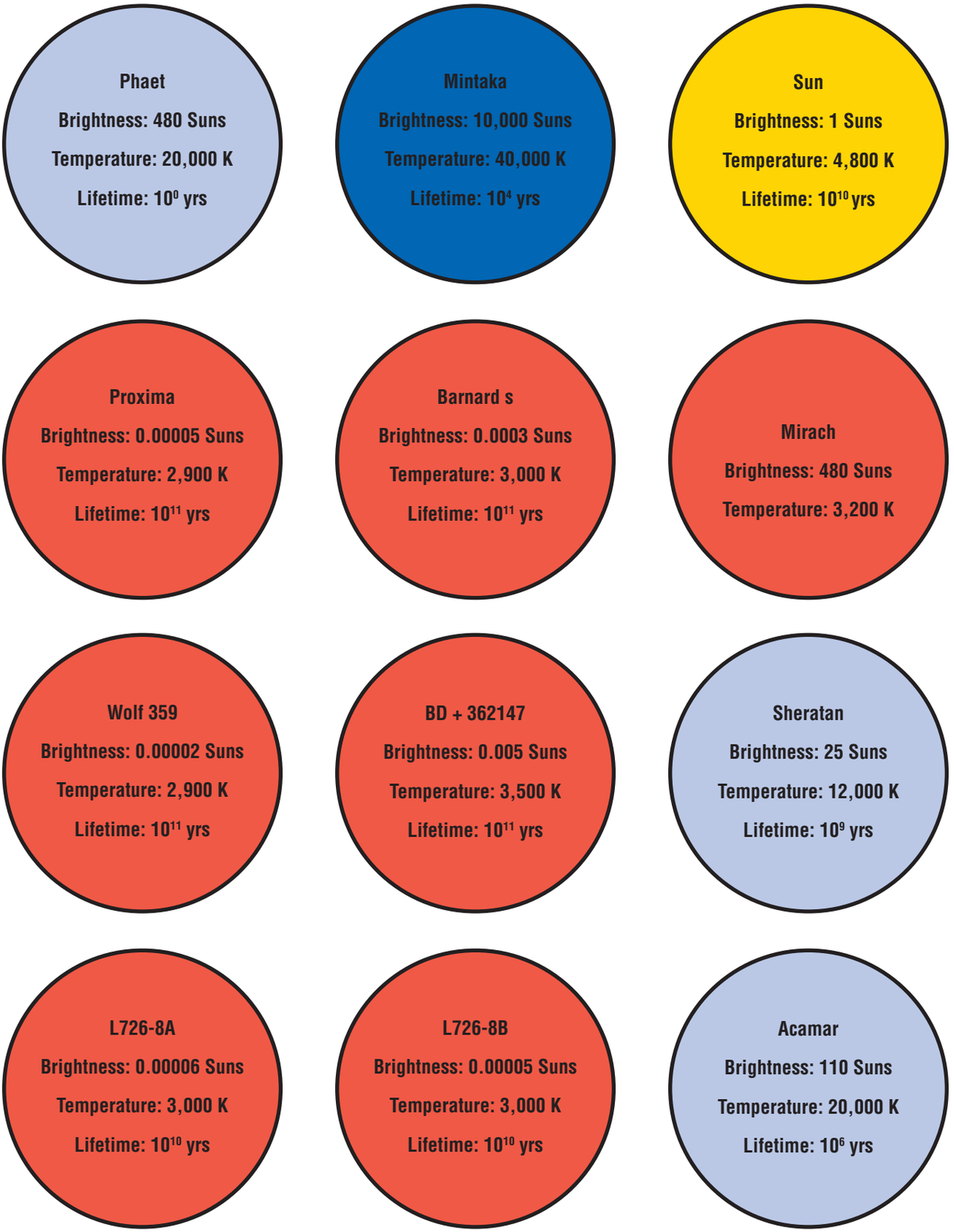
1. Grab a sponge, your sponge represents a proton.
2. Soak your sponge in water.
3. Listen for the element called out and get in a group with the same number of people as protons in that element.
4. When teacher says “nuclear fusion”; splash your sponge with other protons to make make the element through nuclear fusion. Splashed water represents light energy.

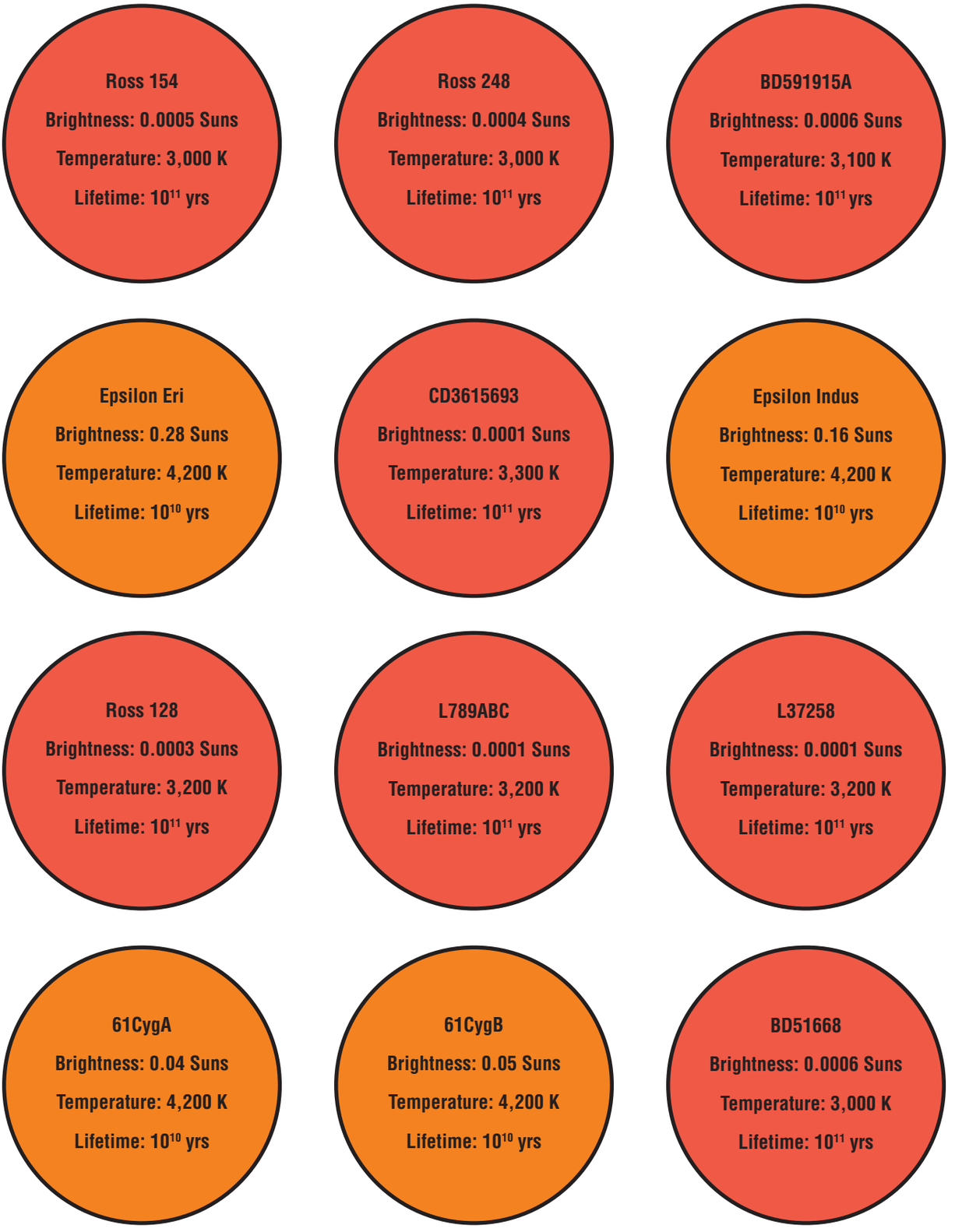
Ex.) Boron is called out, boron has 6 protons, 6 people will splash their sponges together to create Boron

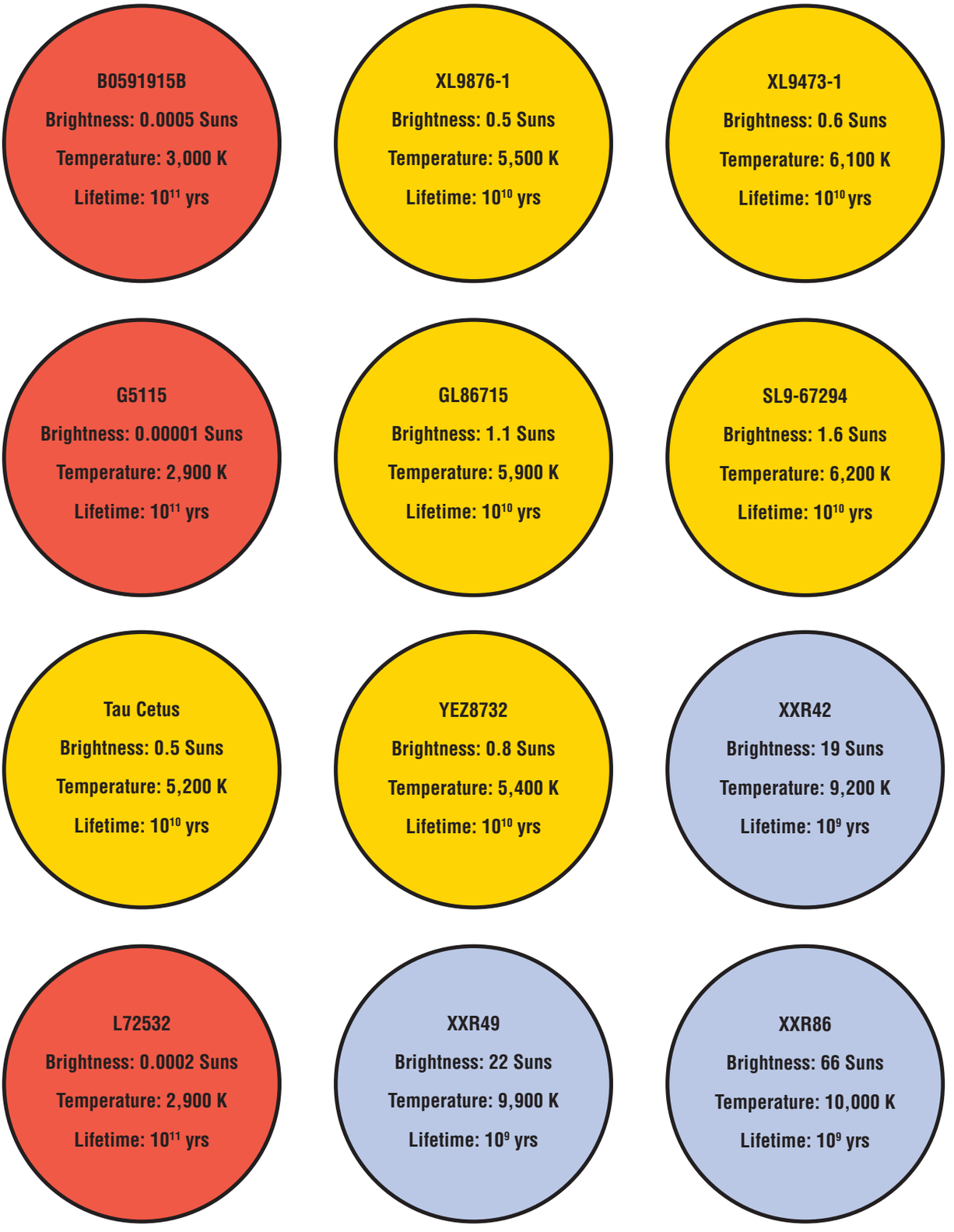
Star Circles

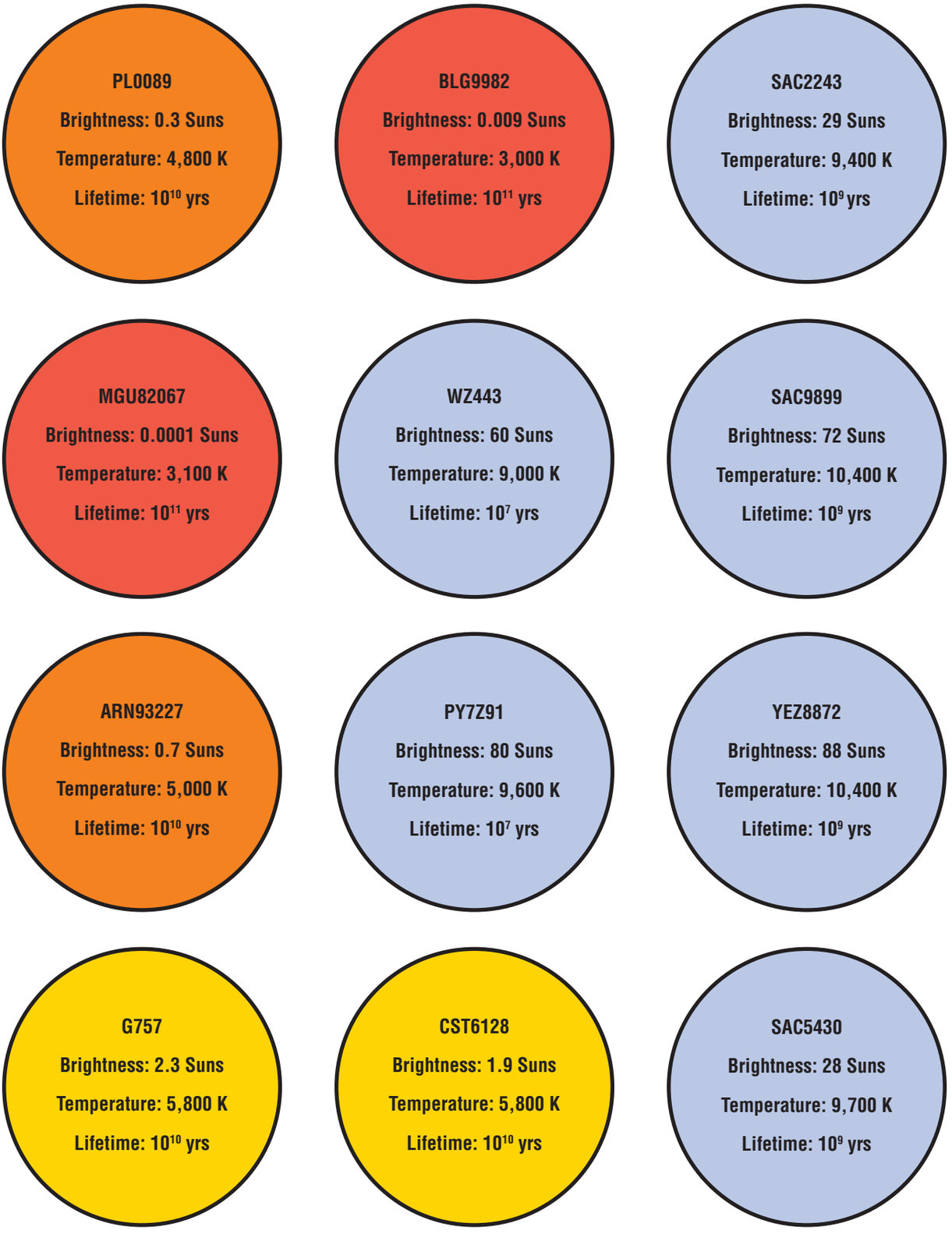


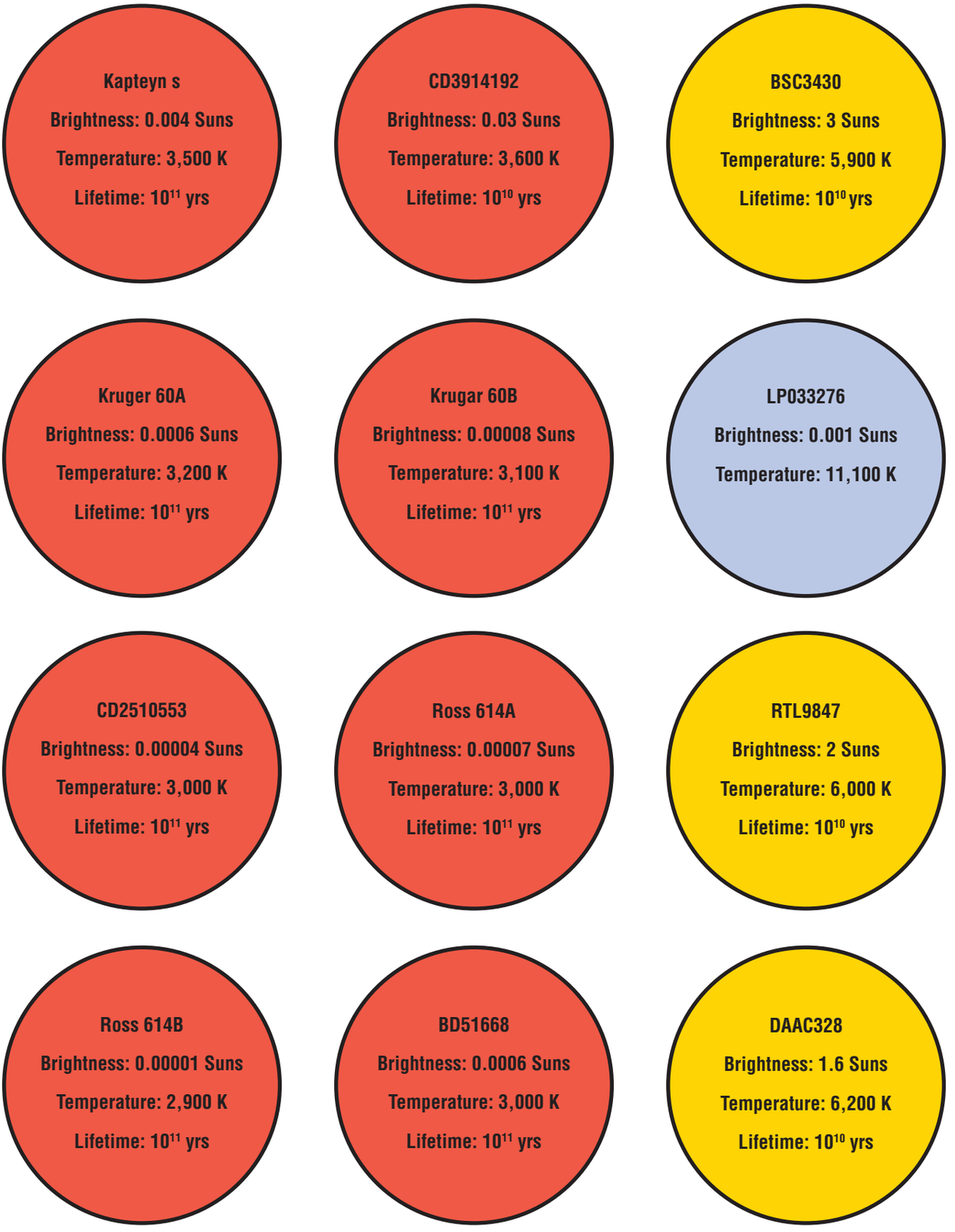






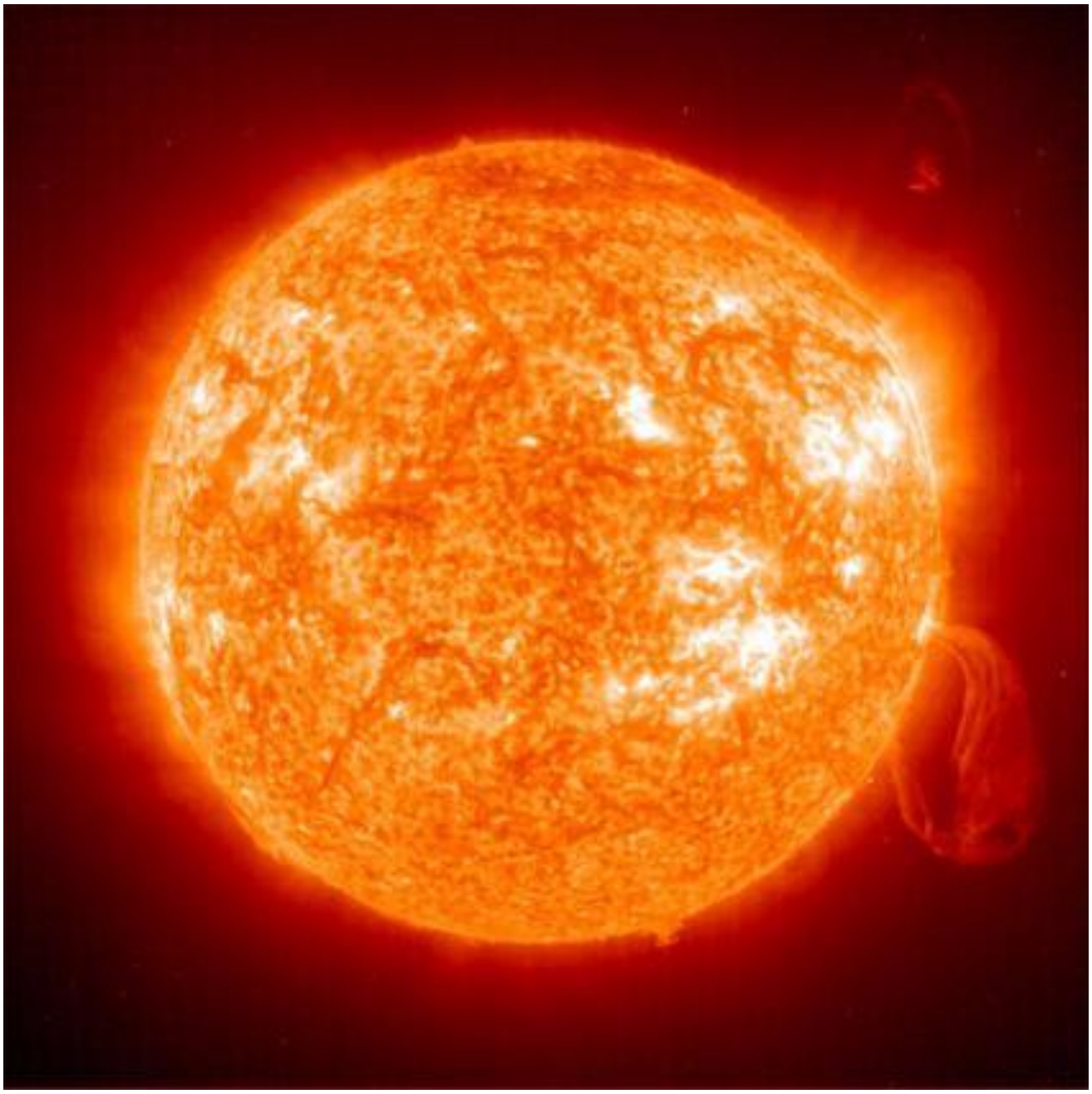






Average Star

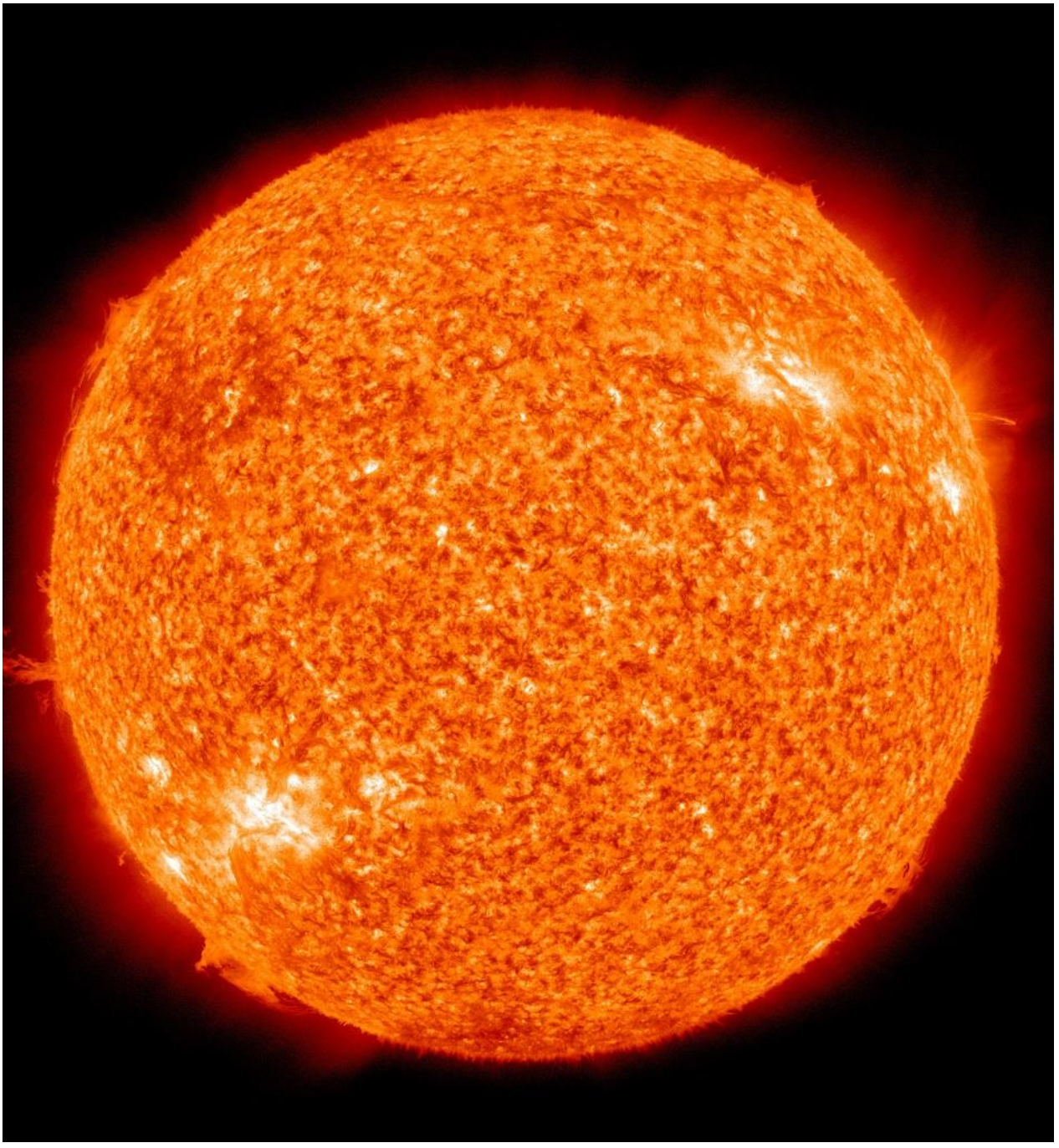
Red Giant



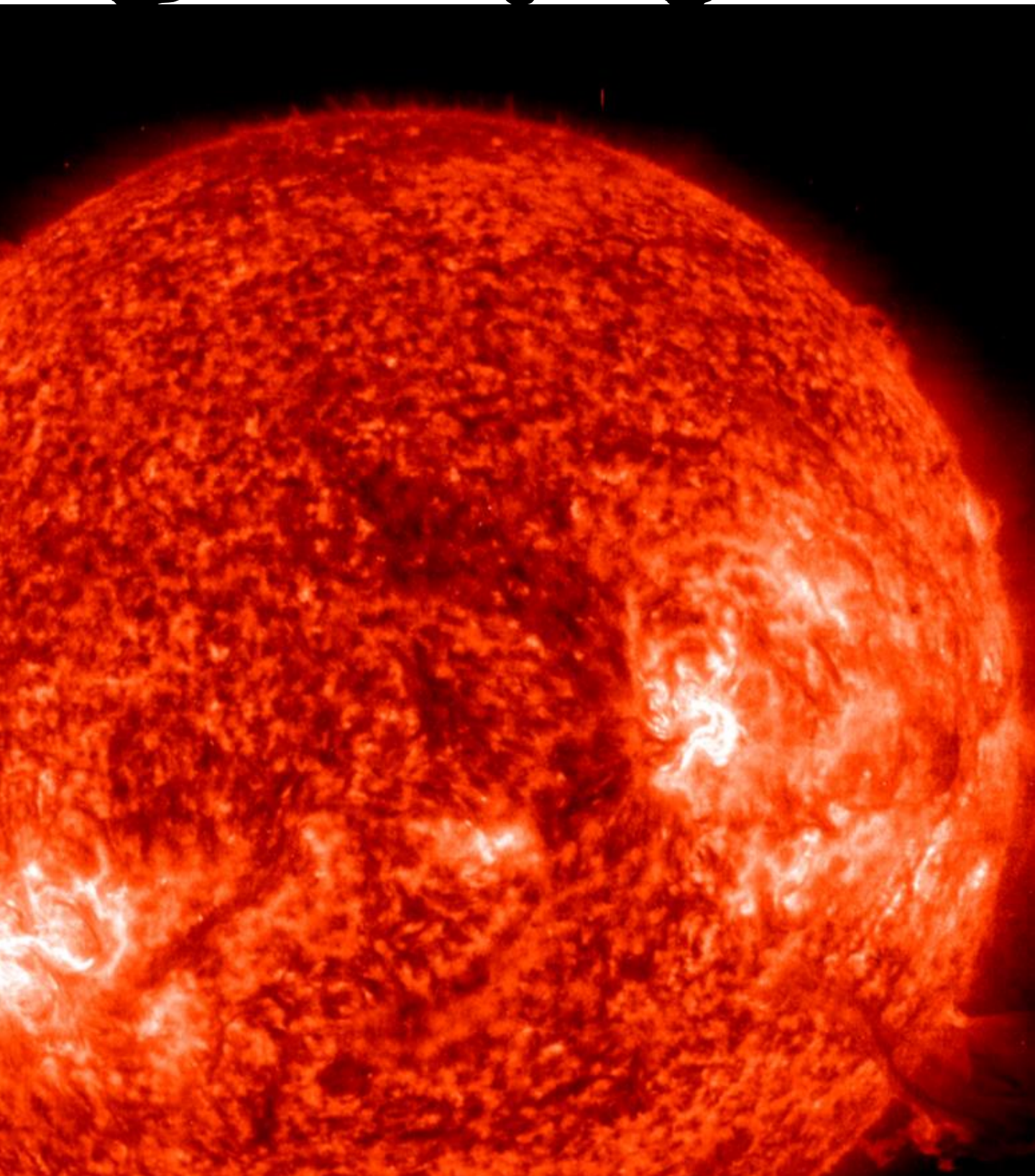
Planetary Nebula

White Dwarf

Massive Star

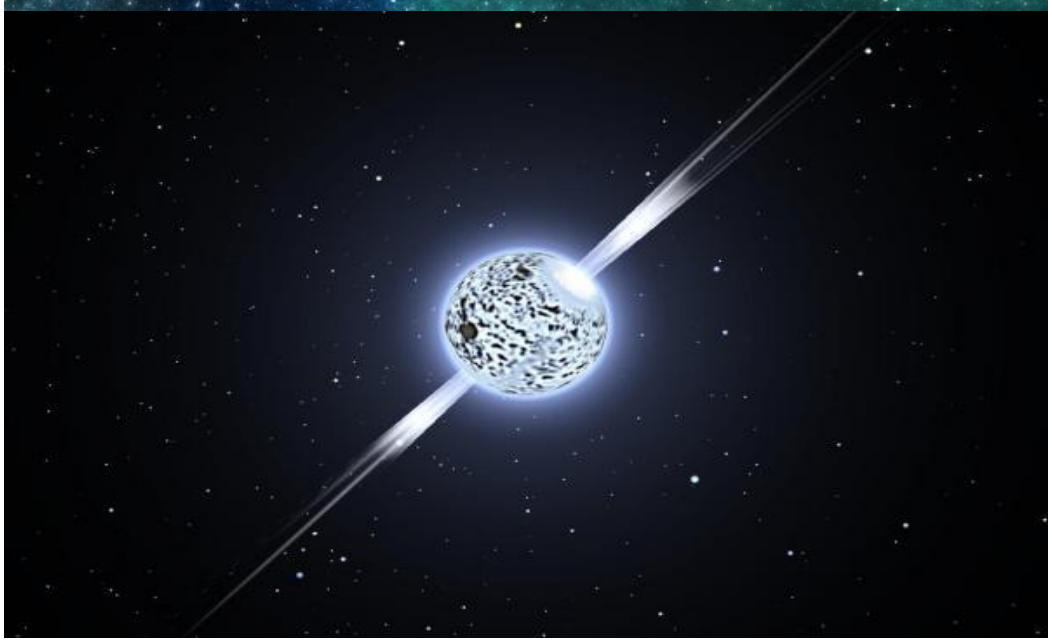


Red Supergiant

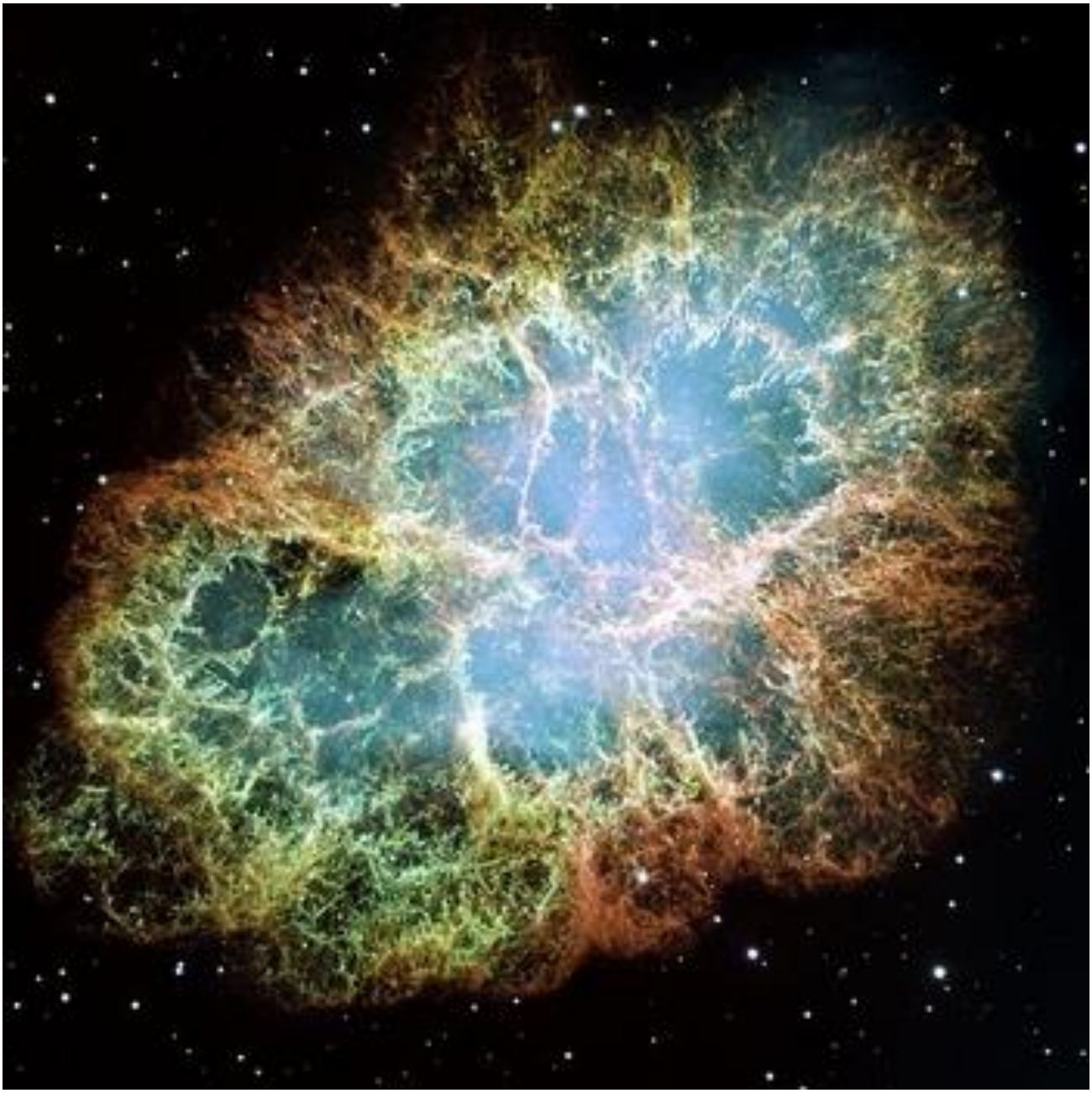


Supernova

Black hole/ Neutron Star



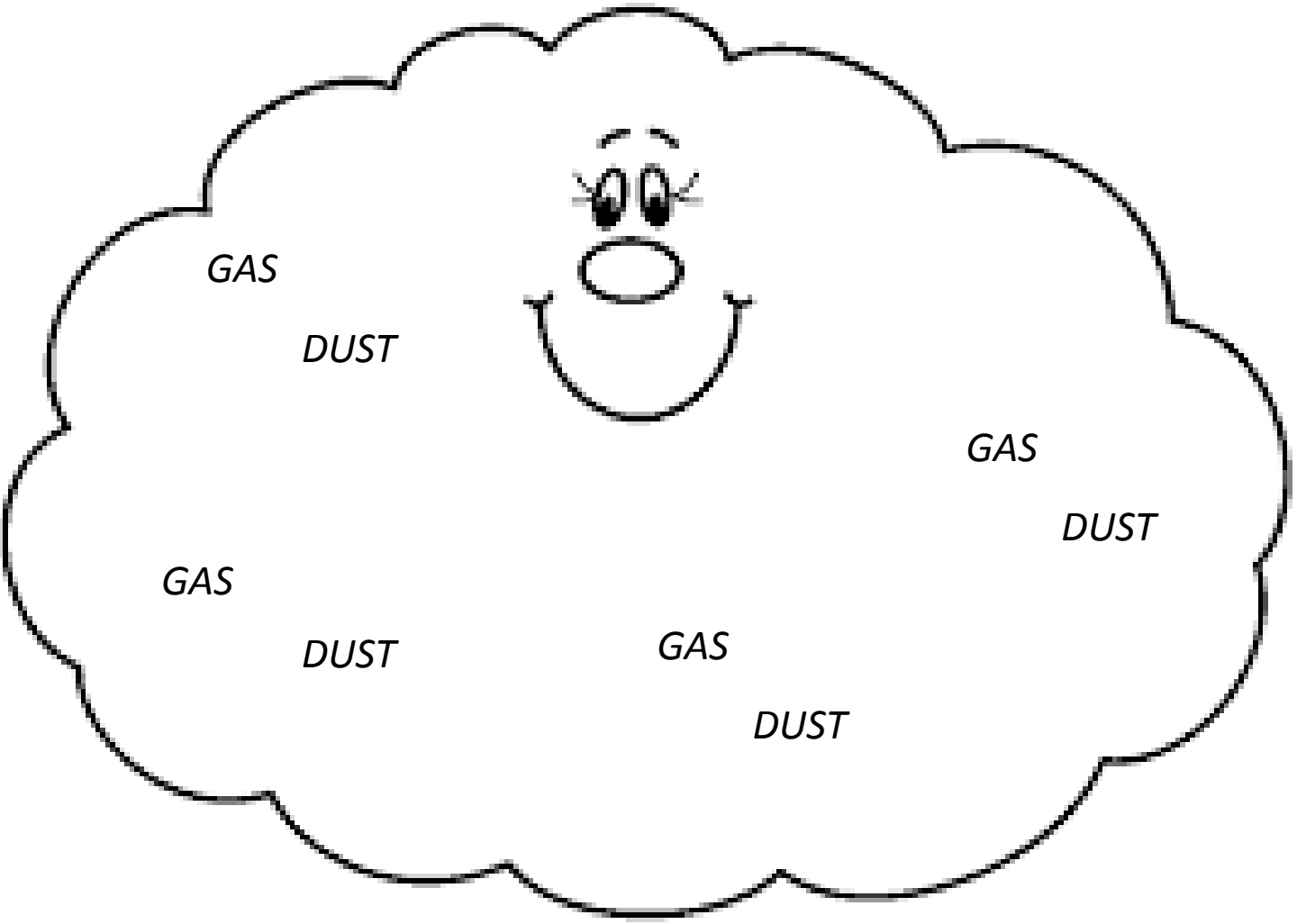
Stellar Nebula



Average Star

Red Giant

Planetary Nebula



White Dwarf

Massive Star

Red Supergiant


SUPERNOVA

Black Hole / Neutron Star

Stellar Nebula

Instructional Lesson Plan

Content Area(s)/Course: Chemistry	Lesson Topic: Making Olympic Medals
Teacher: Yuliana Cardoza and Marcela Diaz	

TEKS objective:
CH 10. H: Understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions, single replacement.

Student Outcome(s): Students will understand oxidation-reduction reactions.

Materials

- Copper pennies, very clean and shiny, 3
- Sodium chloride, NaCl, 2.5–3 g
- Vinegar, 15 mL
- Zinc, granular, Zn, 1 g
- Zinc chloride solution, ZnCl2, 1 M, 25 mL
- Water, distilled or deionized
- Balance, 0.1-g precision
- Beakers, 100-mL, 2
- Graduated cylinder, 50-mL
- Hot plate
- Tongs
- Towel or paper towel
- Goggles
- Gloves
- Apron
- Foldable

Instructional Delivery - Activities

Periodic Table Bingo Duration: 20 min

Play Bingo using the periodic table. The level of the question can be adjusted to the students knowledge. (Some of the clues were used and on harder ones we used the atomic number or atomic mass)
https://www.michigan.gov/documents/explorelabscience/Periodic_Table_Bingo_403152_7.pdf

Video and Foldable for introduction Duration: 15 min

Pass the foldable out and instruct students to cut out foldable in between lines. (Picture below) Have students watch the video and pause for definition of single displacement. Finish with the video and define alloy. If necessary, explain the single displacement in the video. Students can also come up with their own.
https://www.youtube.com/watch?v=NVbYPryN4PQ

Move on to the lab. The lab can be carried out step by step, or you can have students move at their own pace.

NOTE: Typed procedure is also attached. Important to stop for discussion after penny turns silver. This is to show the single displacement that occurred.

Preparation Duration: 10 min

1. Weigh out and place 2.5–3.0 g of sodium chloride and 15 mL of vinegar in a clean, 100-mL beaker.
2. Clean two pennies by placing them in the sodium chloride/vinegar solution until they are shiny.
3. Remove the pennies using tongs and rinse thoroughly with water. Dry completely with a towel.

Note: Do not handle the clean pennies with your hands. The oils from your skin may interfere with the zinc-plating reaction.

Procedure Duration: 20 min

1. In a clean 100-mL beaker, mix together 1.0 g of granular zinc and 20 mL of 1 M zinc chloride solution. Note: Chemical splash goggles must be worn.
2. Place the beaker with the ZnCl2 and zinc on a hot plate set to a medium heat setting.
3. Carefully and gently heat the mixture until the solution boils.
4. Using tongs, immerse two pennies in the mixture until they appear “silver.”

SINGLE DISPLACEMENT: $Cu+ZnCl2 \rightarrow CuCl2+Zn$

5. Use tongs to remove the pennies. Caution: The pennies will be very hot. Carefully dip the pennies into a beaker of distilled water. Shine the pennies with a towel. Set one treated penny aside to be used for comparisons.
6. Using tongs, place the other treated penny on the hot plate until the penny turns to a golden color. Using a heat resistant glove or tongs, flip the penny every 30 seconds to avoid burning.

Zinc + Copper + Heat yields the alloy

If necessary show this video: https://www.youtube.com/watch?v=UqVP3WdOqUk&t=1s

7. Use tongs to remove the penny from the hot plate and immediately dip the penny into a fresh beaker of distilled water. The penny will be extremely hot and should be handled with tongs until it has cooled for several minutes. Students will enjoy showing their friends their “silver” and “gold” pennies.

https://www.flinnsci.com/api/library/Download/674479ccda964683ac6201381ffbdb89

Clean Up Duration: 10 min

calculate the density of each metal Duration: 15 min

Students will calculate the density of each of their pennies. They will use the volume of .35. Students will then look up the density of Copper, Silver & Gold to determine if their pennies are real gold.

Total Duration Aprox. - 90 min

Conclusions

Results

Mass for:

Copper Penny	Silver Penny	Gold Penny

Equation #1

Equation #2

	Density	My Penny
Cu		
Ag		
Au		

I learned…

_____

_____

_____

_____

_____

_____

Density of My Copper Penny

Density of My Silver Penny

Density of My Gold Penny

Observation

What do you observe about the picture? Explain.

Alloy -

Question:

Is the gold penny real gold?

My Olympic Gold Medals

Single Displacement -

Hypothesis

If pennies are made of copper, then _____

_____

_____

_____

Experimental Observations

#1

#2

MAKING OLYMPIC MEDALS

BINGO TIME!!

VIDEO

https://www.youtube.com/watch?v=NVbYPryN4PQ

FOLDABLE TIME!!

PREPARATION

1. Weigh out and place 2.5–3.0 g of sodium chloride and 15 mL of vinegar in a clean, 100-mL beaker.
2. Clean two pennies by placing them in the sodium chloride/vinegar solution until they are shiny.
3. Remove the pennies using tongs and rinse thoroughly with water. Dry completely with a towel. Note: Do not handle the clean pennies with your hands. The oils from your skin may interfere with the zinc-plating reaction.

EXPERIMENT

1. In a clean 100-mL beaker, mix together 1.0 g of granular zinc and 20 mL of 1 M zinc chloride solution. Note: Chemical splash goggles must be worn.
2. Place the beaker with the ZnCl2 and zinc on a hot plate set to a medium heat setting.
3. Carefully and gently heat the mixture until the solution boils.
4. Using tongs, immerse two pennies in the mixture until they appear "silver."
5. Use tongs to remove the pennies. Caution: The pennies will be very hot. Carefully dip the pennies into a beaker of distilled water. Shine the pennies with a towel. Set one treated penny aside to be used for comparisons.
6. Using tongs, place the other treated penny on the hot plate until the penny turns to a golden color. Using a heat resistant glove or tongs, flip the penny every 30 seconds to avoid burning.
7. Use tongs to remove the penny from the hot plate and immediately dip the penny into a fresh beaker of distilled water. The penny will be extremely hot and should be handled with tongs until it has cooled for several minutes. Students will enjoy showing their friends their "silver" and "gold" pennies.

CLEAN UP

CALCULATE DENSITY

- $d = \frac{m}{v}$

Instructional Lesson Plan

Content Area(s)/Course:	Lesson Topic: Catapult
Teacher: Karen Olivas	Date: Canutillo STEM Games 2018

TEKS objective:

(2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to:

(F) demonstrate the use of course apparatus, equipment, techniques, and procedures, including … stopwatches…protractors…metric rulers…meter sticks…

(J) organize and evaluate data and make inferences from data, including the use of tables, charts, and graphs;

(4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to:

(B) describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration;

Student Outcome(s):

We will design a catapult to describe how forces affect the motion of a projectile, figure out the optimum angle for launching a projectile, and distinguish between accuracy and precision.

Materials

- Popsicle Sticks
- Paper Clips
- Rubber Bands
- Bottle Cap/Small Cup
- Tape
- Spoons
- Straws
- Glue gun Sticks
- Marshmallows
- Sponges
- Gummy Bears
- Cotton Balls
- Projector
- Laptop/Computer
- Tablet/Phone
- Catapult Design Worksheet
- Poster Board (to make target)
- Markers (to make target)
- Cone
- Duct Tape
- Black Permanent Marker

Instructional Delivery - Activities

1. Catapult 1 min video (1 minute)
2. Short intro about the physics of catapults (15 min)
3. Build catapult with the materials provided
    - Research & draw catapult design (10 minutes)
    - Complete budget sheet to buy materials (10 min)
    - Build the catapult (60 min)
    - Test catapult using projectiles, modify catapult as needed (45 min)
        - Fill in the tables
        - measure the distance traveled of the projectiles with a ruler/meter stick
        - Time your projectile launch w/your phone
    - Paint or add more details to your catapult if you have extra time
4. Battle (30 min)
5. Conclusion & questions (10 min)

Activity 1

- Video- https://youtu.be/0MHJvsXHLy0
- Only show the 1st minute

Activity 2

- Discuss Potential Energy and Kinetic Energy
- Discuss Velocity
- Discuss the different types of catapult there are and that they will be building a mangonel that day

Activity 3

- Complete Catapult Design Worksheet

Activity 4

- Battle

Total Duration Aprox. 180 minutes

Catapult Design

Problem: As a Greek God you must attack the enemies' temples to defend your home. You and your team of Greek Gods and Goddesses will design a machine called a catapult that will launch projectiles at temples. To reach the other temples, your catapult must be able to launch projectiles accurately.

Constraints:

The only building materials available to you are listed below:

Building Materials:
Popsicle Sticks
Paper Clips
Rubber Bands
Bottle Cap/Small Cup
Tape
Spoons
Straws
Glue gun Sticks (max 4)

You can test your catapult with four different projectiles, but when it's time to launch your projectile you will choose *only one* projectile your team thinks it's best to launch at the target temples.

Projectiles			
Marshmallow	Sponge	Gummy Bear	Cotton Ball

Team Roles

Project engineer

God/Goddess Name: _____

The project engineer is the project leader. This person is in charge of final decisions. S/he listens to all of the engineers and helps to decide the best idea. S/he makes sure the catapult gets built on schedule.

Design engineer

God/Goddess Name: _____

The design engineer plans how the catapult will work and look. This person is in charge of picking materials and deciding how the catapult should be built. S/he works with the budget office (when picking materials) and construction engineer (when deciding how to build the catapult).

Construction engineer:

God/Goddess Name: _____

The construction engineer builds the catapult. This person gets the plans about how to build the catapult from the design engineer. If the catapult design must be fixed, s/he talks to the budget office about getting more or different materials.

Budget officer:

God/Goddess Name: _____

The budget office makes sure that the project spends the least amount of money possible. This person helps the design engineer pick materials. S/he is in charge of filling out the budget worksheet, doing the calculations, and keeping track of how much money has been spent. You cannot go over budget!!

Imagine & Design – Section 1

(Design Engineer, Project Engineer)

1. **Imagine & Design:** Brainstorm several ideas you have for how to use the above materials in your catapult. Draw out your group's best catapult design. Be sure to label where you will use all of the different materials (Popsicle sticks, tape, plastic spoon, etc.).

Budget – Section 2

(Budget Officer, Project Engineer)

2. Your group has been given a budget of $1,000. Keep a record of the materials that you purchase. Record the amount of each material that you buy in the "quantity" column. To find the total cost for that material, multiply the quantity by the unit cost. To find the total cost of the model catapult, tally the total costs of each building material. Make sure to write in pencil, because you may need to buy more materials as you build!

Building Material	Quantity (how many?)	Unit Cost (price for 1)	Cost (quantity x unit cost)
Popsicle Sticks		$30	
Paper Clips		$20	
Rubber Bands		$25	
Bottle Cap/Small Cup		$55	
Tape (1 foot of tape)		$50	
Spoons		$45	
Straws		$35	
Wooden Dowels		$50	
Drill Hole		$10	
			Total Cost: _____

Build- Section 3

(Construction Engineer will be doing most of the building, but the rest of the team will be helping, guiding, and making modifications as needed)

3. Build the catapult. The god/goddess must get the plans about how to build the catapult from the design engineer, build the catapult, and discuss any modifications that need to be made.

Testing your catapult- Section 4

4. Each person will be in charge of launching a projectile at a different launch angle.

Marshmallow

God/Goddess Name: _____

Sponge

God/Goddess Name: _____

Gummy Bear

God/Goddess Name: _____

Cotton Ball

God/Goddess Name: _____

**********	Angle	Projectile	Distance (m)	Time (s)	Velocity (m/s)
Trial 1	15°	Marshmallow			
Trial 2	15°	Sponge			
Trial 3	15°	Gummy Bear			
Trial 4	15°	Cotton Ball			

	Angle	Projectile	Distance (m)	Time (s)	Velocity (m/s)
Trial 1	30°	Marshmallow			
Trial 2	30°	Sponge			
Trial 3	30°	Gummy Bear			
Trial 4	30°	Cotton Ball			

**********	Angle	Projectile	Distance (m)	Time (s)	Velocity (m/s)
Trial 1	45°	Marshmallow			
Trial 2	45°	Sponge			
Trial 3	45°	Gummy Bear			
Trial 4	45°	Cotton Ball			

	Angle	Projectile	Distance (m)	Time (s)	Velocity (m/s)
Trial 1	60°	Marshmallow			
Trial 2	60°	Sponge			
Trial 3	60°	Gummy Bear			
Trial 4	60°	Cotton Ball			

**********	Angle	Projectile	Distance (m)	Time (s)	Velocity (m/s)
Trial 1	75°	Marshmallow			
Trial 2	75°	Sponge			
Trial 3	75°	Gummy Bear			
Trial 4	75°	Cotton Ball			

What projectile will you be using to defend your temple? _____

Did you observe any trends at the various angles you launched your projectile? Write down your observations.

Section 5

5. BATTLE!!!!

Clash of the Greek Gods

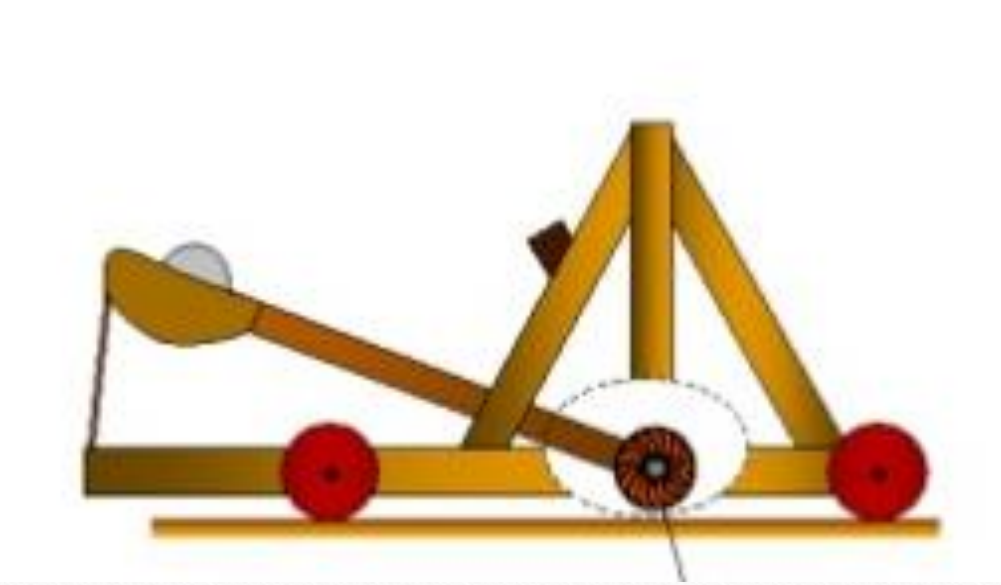
1. Catapult 1 min video (1 minute)
2. Short intro about the physics of catapults (5 min)
3. Build catapult with the materials provided
    - Research & draw catapult design (10 minutes)
    - Complete budget sheet to buy materials (10 min)
    - Build the catapult (50 min)
    - Test catapult using projectiles, modify catapult as needed (40 min)
        - Fill in the tables
        - measure the distance traveled of the projectiles with a ruler/meter stick
        - Time your projectile launch w/your phone
    - Paint or add more details to your catapult if you have extra time
4. Battle (30 min)
5. Conclusion & questions (5 min)

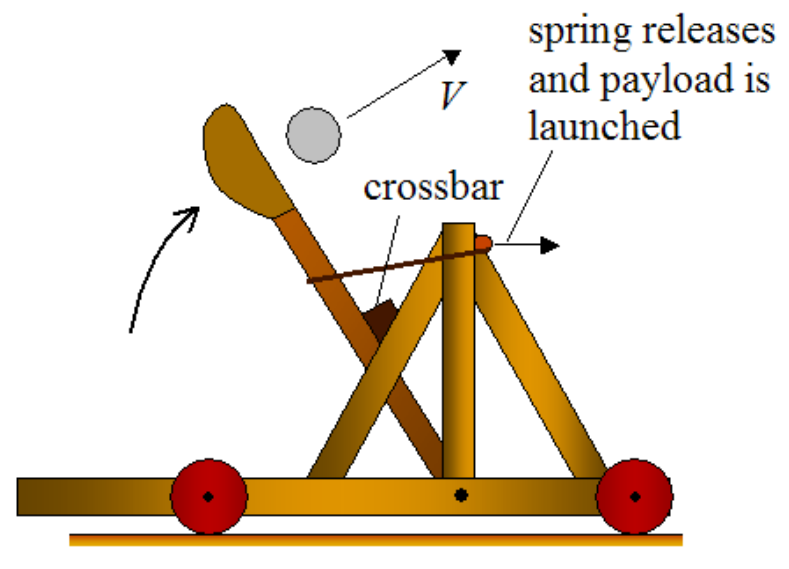
Catapult Video

- https://youtu.be/0MHJvsXHLy0
- (watch just the 1st minute)

Physics of a Catapult

- Potential Energy (PE): energy that is stored in an object due to its position relative to some zero position
- Kinetic Energy (KE): energy that it possesses due to its motion





Velocity

- Velocity is a physical vector quantity; both magnitude and direction are needed to define it.

$$v = \frac{d}{t}$$

v = speed
d = distance travelled
t = time taken

Different Types of Catapults

- Trebuchet

- Ballista

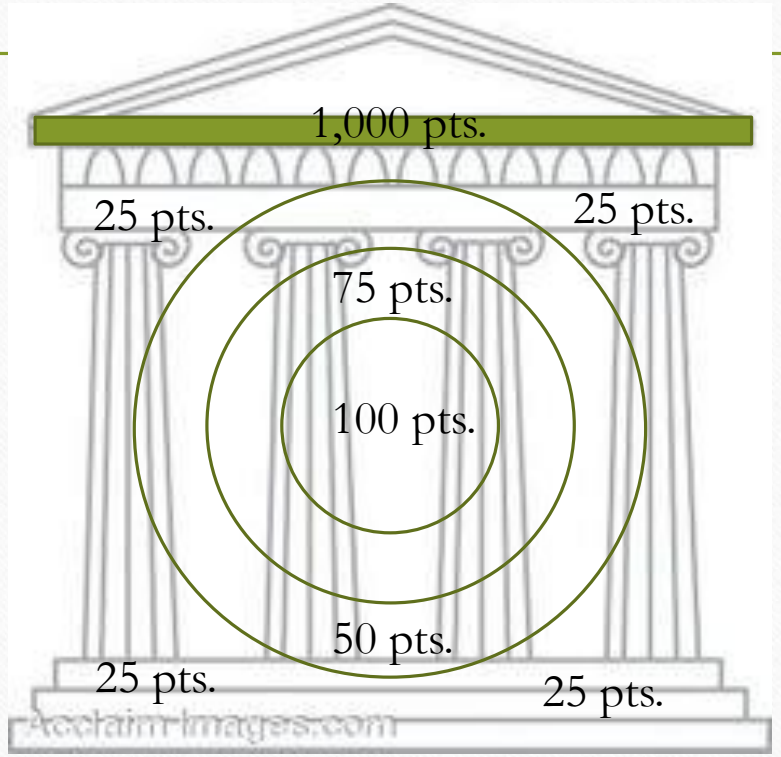
- Mangonel

Mangonel

Battle Instructions

1. Students will work in their teams
2. Students must choose their desired projectile and must have graphs completed in order to participate in the battle
3. Targets will be set up at different areas and students will have to launch from different distances that the teacher sets (ex. Temple 1 – 0.5 meters away, Temple 2 – 1.0 meter away, Temple 3 – 1.5 meter away, etc.)
4. The students in each group must take turns in launching and hitting the target, once they launch the projectile w/ the catapult, students must go to the back of the line of their team to wait for their turn again
5. Teacher will be keeping track of the teams score based on what their projectile hits on the Target Temples

Battle (Target Temple)



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- https://www.sciencebuddies.org/blog/simple-catapult-science?from=Blog
- https://www.teachengineering.org/lessons/view/cub_catapult_lesson01
- https://physlets.org/tracker/ --Link to download tracker
- https://youtu.be/-ViH3GE5l9Y

8:45-10:00 Quidditch

- 8:45-8:55 Prezi/Rules
- 8:55-9:00 Walk to designated place (gym)
- 9:00-10:00 Quidditch game
    - Set up crew will leave at 9:40

10:00-10:05 Walk to next area
10:05-10:10 Instructions for obstacle course
10:10-10:15 Setting groups up in order and course
10:15-11:20 Obstacle course
11:20-11:25 Finish/Instructions for lunch
11:25-11:30 Walk to lunch

Quidditch

Francia— Player
Yuli— Player
Marcela— Player
Rebecca—Time keeper
Dani— Player/Setup
Chadema— Player/Setup
Ale— Referee/Break down
Troy— Snitch
Marco— Lunch
Cesar— Snitch
Karen— Referee/Break down
Xena— Lunch
Dani— Lunch
Dafnie— Player/Setup

Obstacle Course

Francia— Obstacle course #4
Yuli— Obstacle course #1
Marcela— Obstacle course #2
Rebecca— Time keeper
Dani— Obstacle course #3/Break down
Chadema— Referee/Break down
Ale— Obstacle course #4
Troy— Obstacle course #1/Break down
Marco— Lunch
Cesar— Obstacle course #2
Karen— Obstacle course #3
Xena— Lunch
Dani— Lunch
Dafnie— Referee

TIME LINE FOR FIELD TRIP #1

06/28/18

8:30-9:00am arrive at school (A GRANOLA BAR AND WATER ARE PROVIDED)

9:00am leave campus

9:30am arrive downtown

9:30-9:40am planning

9:40-11:30:am scavenger hunt

11:30-11:45 meet @Art Museum

11:45am leave downtown

12:00-1:30pm Peter Piper Pizza

1:30pm leave Peter Piper Pizza

1:45 arrive EPISD

2:00 – 3:00pm Planetarium

3:10pm leave Planetarium

3:40pm arrive campus

31° 45’ 30’’ N 106° 29’ 24’’ W	Y	1
31° 45’ 36’’ N 106° 29’ 18’’ W	P	2
31° 45’ 31’’ N 106° 29’ 22’ W	D	3
31° 45’ 31’’ N 106° 29’ 31’’ W	A	4
31° 45’ 35’’ N 106° 29’ 19’’ W	U	5
31° 45’ 33’’ N 106° 29’ 18’’ W	F	6
31° 45’ 31’’ N 106° 29’ 20’’ W	T	7
31° 45’ 34’’ N 106° 29’ 19’’ W	R	8
31° 45’ 35’’ N 106° 29’ 30’’ W	E	9
31° 45’ 37’’ N 106° 29’ 32’’ W	O	10

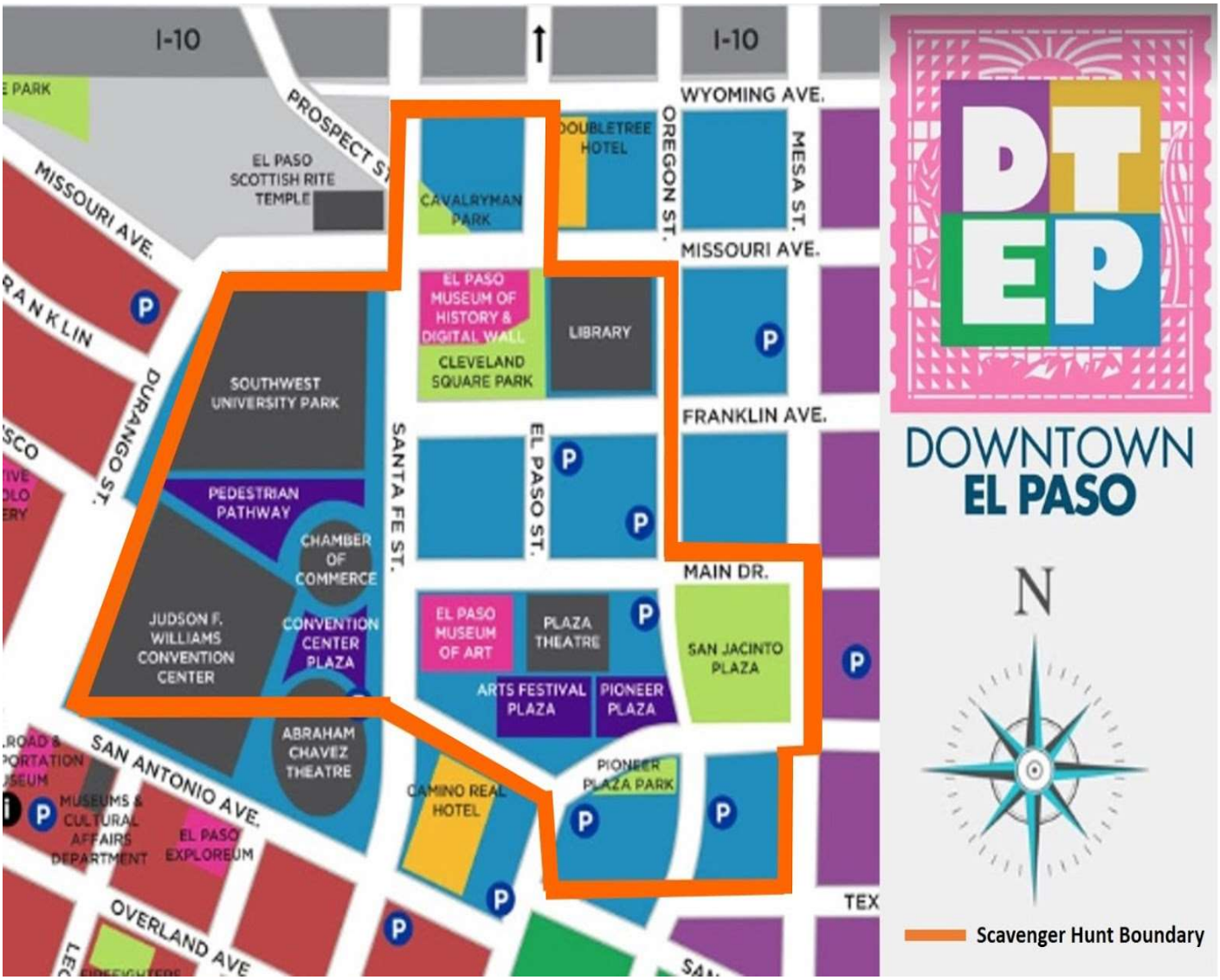
“I 6 1 10 5 6 4 I L 7 10 2 8 9 2 4 8 9 , 1 10 5 ‘ 8 9 2 8 9 2 4 8 9 3 7 10 6 4 I L.”

“I__ __ __ __ __ __ I L __ __ __ __ __ __ __ __ __ , __ __ __ ‘ __ __
__ __ __ __ __ __ __ __ __ __ __ __ I L.”

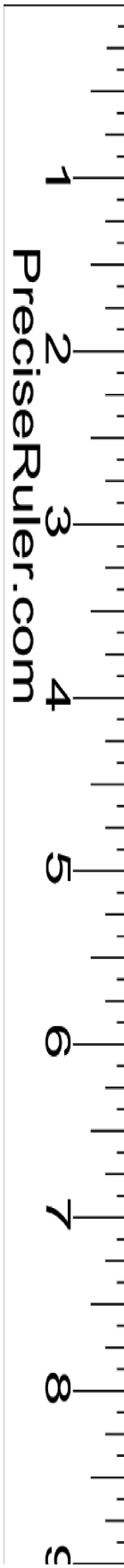
“If you fail to prepare, you’re prepared to fail” - Mark Spitz

Coordinate Point	Clue	Question	Answer:
31° 45’ 35’’ N 106° 29’ 19’’ W	See you later… or in a while...	What is the name of the artist?	Luis A. Jimenez Jr.
31° 45’ 36’’ N 106° 29’ 18’’ W	The two presidents sat down at the table to discuss their main diplomacy over coffee.	What two presidents were they?	President Taft & President Diaz
31° 45’ 34’’ N 106° 29’ 19’’ W	Tick tock, watch the clock, catch a snack before you get eaten by the croc.	What year was it built?	1911
31° 45’ 33’’ N 106° 29’ 18’’ W	Follow the Oregon Trail across the Mill. The peak of a wave is called a Kress.	What is the color of the center of the five flowers?	Yellow
31° 45’ 31’’ N 106° 29’ 20’’ W	I don’t move, I don’t blink. I was a pioneer and founded the pass to the North.	What is my name and what direction am I facing?	Fray Garcia De San Francisco 215° Southwest
31° 45’ 31’’ N 106° 29’ 22’’ W	Welcome back my friends to the show that never ends. We’re so glad you could attend. Buy your ticket before they end.	How many seats are in the center aisle of row X? How many squares does the marquee ceiling have?	20 36
31° 45’ 30’’ N 106° 29’ 24’’ W	My vertices are well grounded to the floor and I’m art, so what more?	What is the name of the artist?	Oswaldo Sagastegui
31° 45’ 35’’ N 106° 29’ 30’’ W	Use technology to go back in time; capture the moment, it don’t cost a dime.	Take a picture and email it to: ycardoza2@miners.utep.edu	

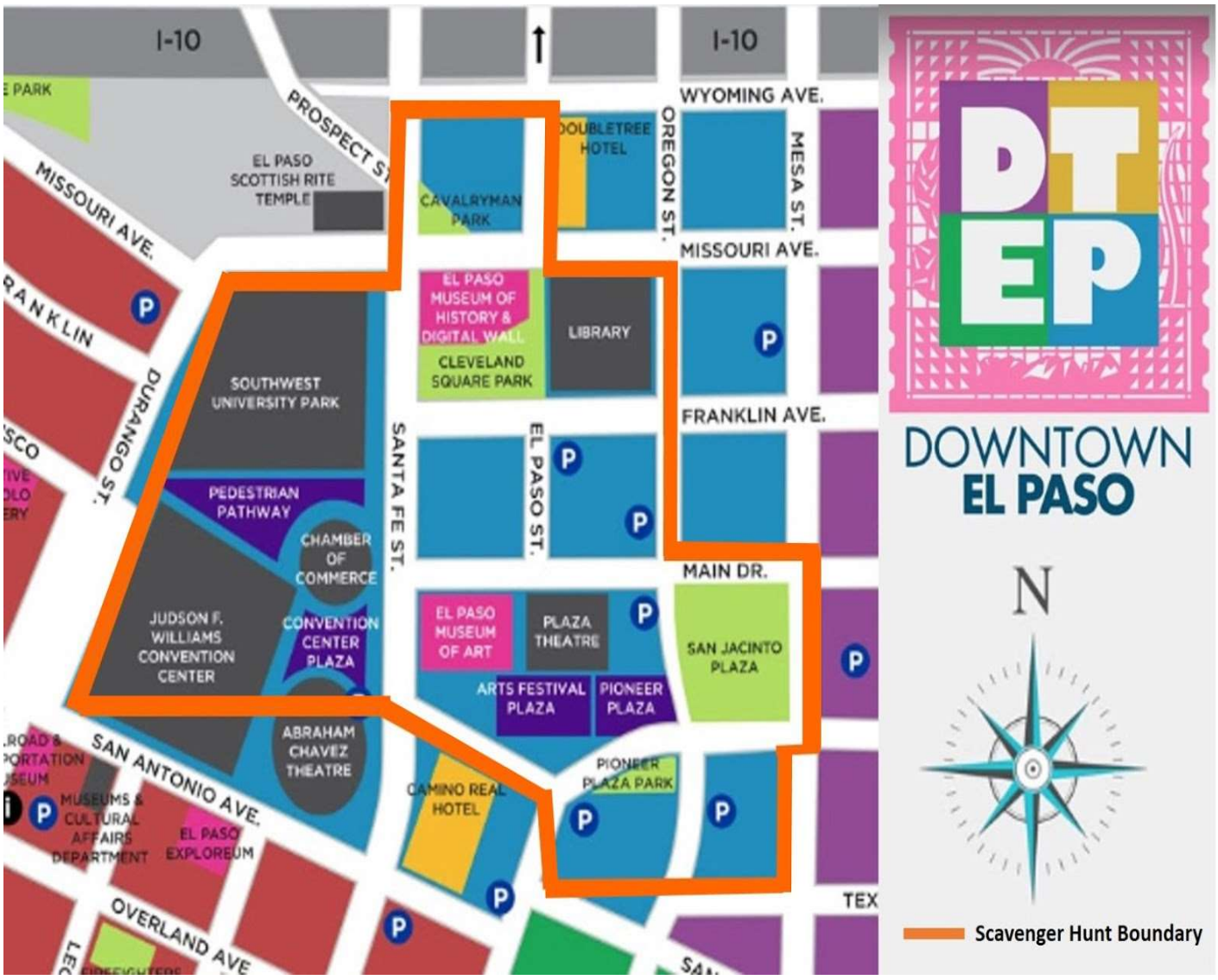
31° 45’ 31” N 106° 29’ 31” W	Find the location	What color is the circle that has a radius of about 6in?	Red
31° 45’ 37” N 106° 29’ 32” W	I would land caddy corner if a home run was hit over center field.	What technology is used for renewable energy at this site?	Solar panels



Coordinate Point	Clue	Question	Answer:
	See you later… or in a while...	What is the name of the artist?	
	The two presidents sat down at the *table* to discuss their *main* diplomacy over *coffee.*	What two presidents were they?	
	Tick tock, watch the clock, catch a snack before you get eaten by the croc.	What year was it built?	
31° 45’ 33’’ N 106° 29’ 18’’ W	Follow the Oregon Trail across the Mill. The peak of a wave is called a Kress.	What is the color of the center of the five flowers?	
	I don’t move, I don’t blink. I was a pioneer and founded the pass to the North.	What is my name and what direction am I facing?	
	Welcome back my friends to the show that never ends. We’re so glad you could attend. Buy your ticket before they end.	How many seats are in the center aisle of row X? How many squares does the marquee ceiling have?	
	My vertices are well grounded to the floor and I’m art, so what more?	What is the name of the artist?	
	Use technology to go back in time; capture the moment, it don’t cost a dime.	What two team members of the 1966 UTEP Basketball Team that won the NCAA Tournament are in the front row of this picture?	



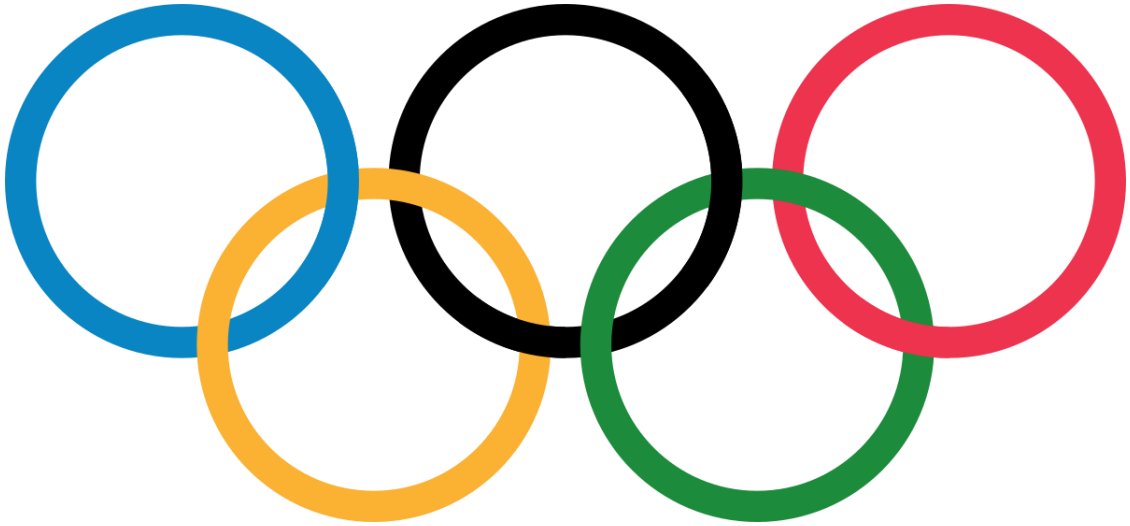
31° 45’ 31” N 106° 29’ 31” W	Find the location	What color is the circle that has a radius of about 6in?	
	I would land caddy corner if a home run was hit over center field.	What technology is used for renewable energy at this site?	



Mentors arrive at this time.	2:15-2:30
	2:30-2:45
Students Arrive to School	2:45-3:00
	3:00-3:15
	3:15-3:30
	3:30-4:00
	4:00-4:15
	4:15-4:30
	4:30-4:45
	4:45-5:00
Arrive	5:00-5:15
Set up/ instruction	5:15-5:30
	5:30-5:45
Play on dunes	5:45-6:00
	6:00-6:15
	6:15-6:30
	6:30-6:45
Dinner	6:45-7:00
	7:00-7:15
Star party?	7:15-7:30
	7:30-7:45
	7:45-8:00
Awards	8:00-8:15
	8:15-8:30
Pack and leave	8:30-8:45
	8:45-9:00

CERTIFICATE OF OLYMPIC ACHIEVEMENT

CANUTILLO STEM GAMES



AWARDED TO

_____

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