Unit 5 Physics
Electromagnetic Radiation
...

Monday, April 17

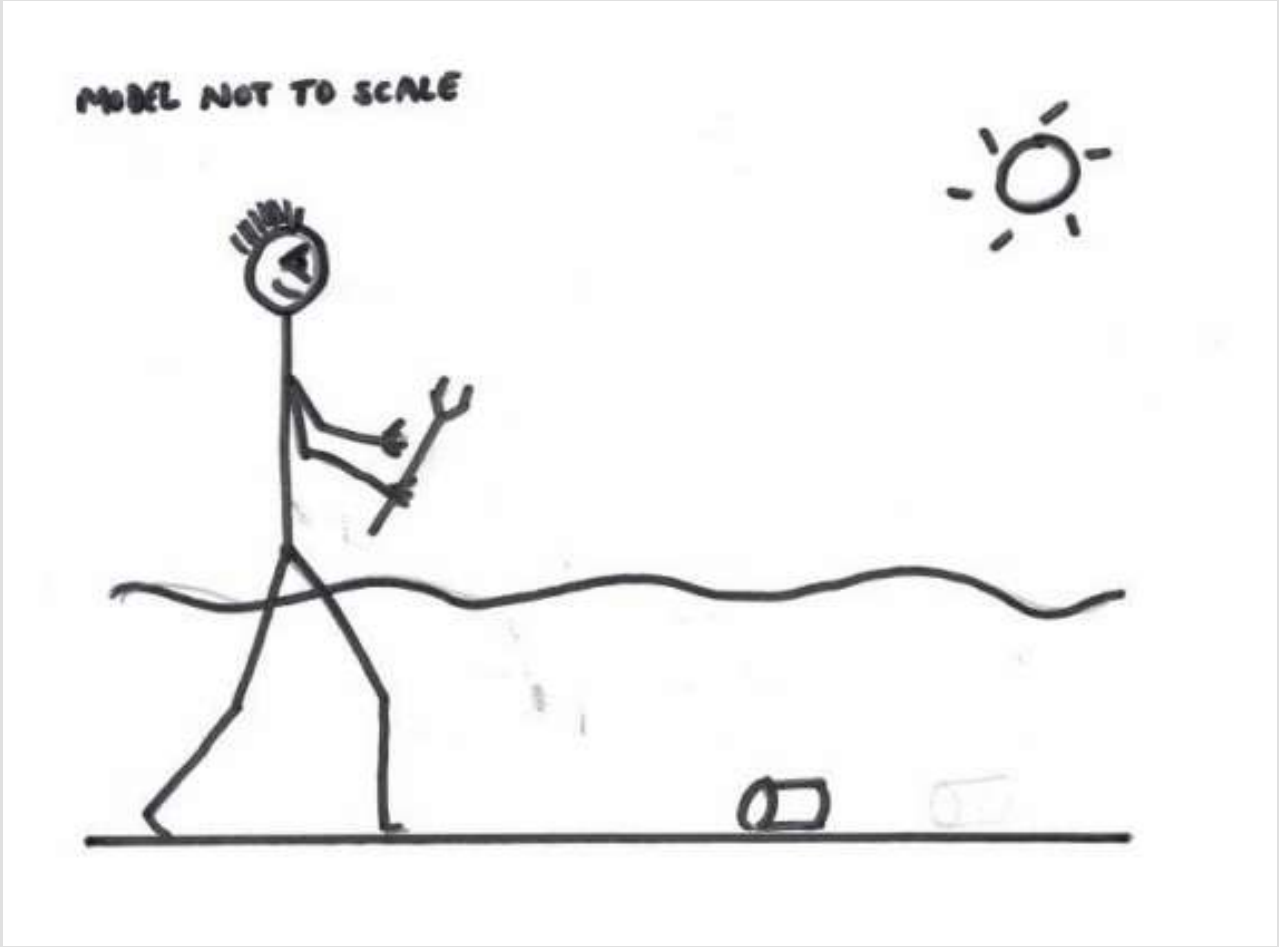
Warm Up: Model what you see in this picture.

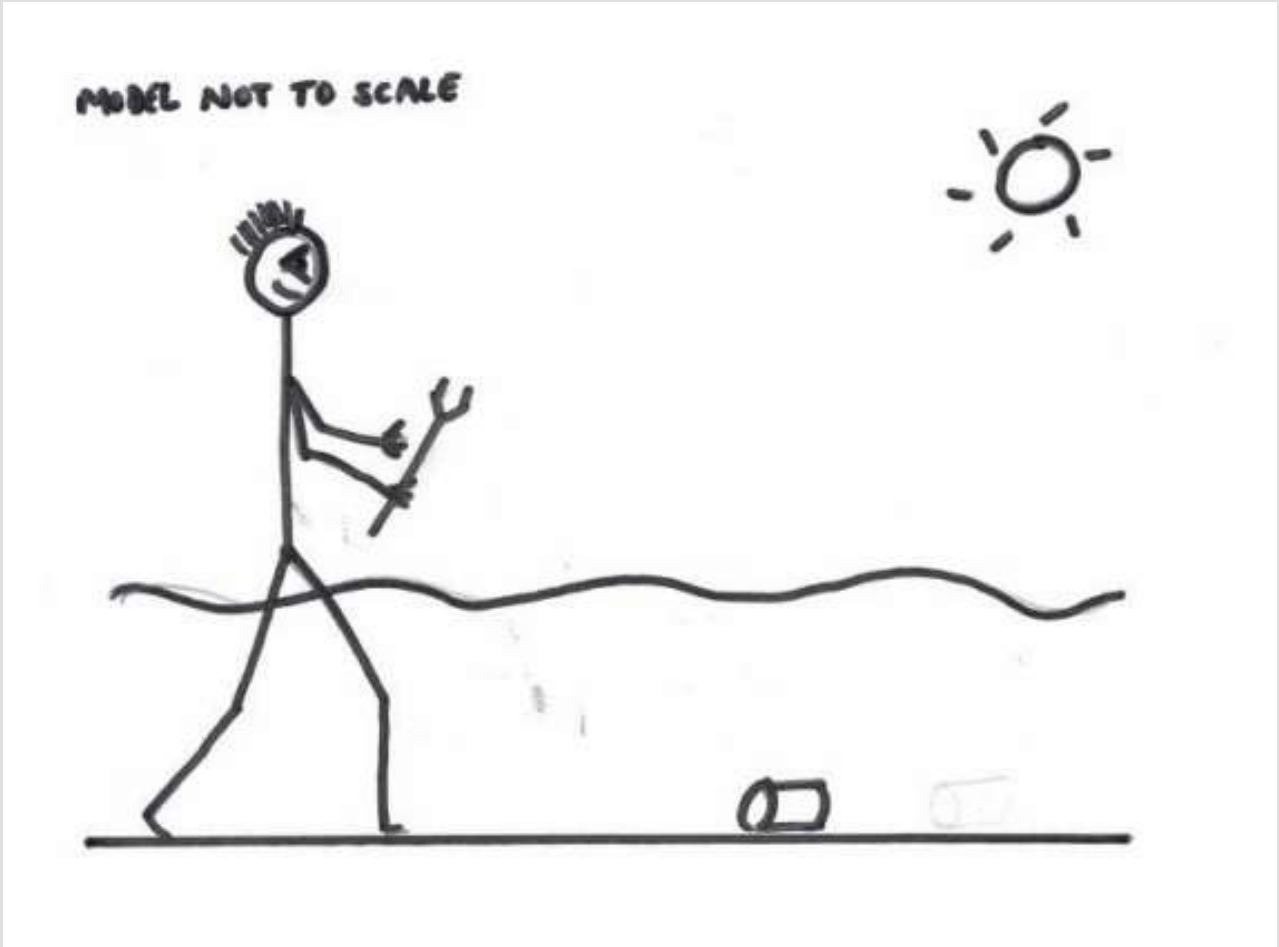
Agenda

- ~~New Seats~~
- Warm Up Model
- Unit 5 Phenomenon and Modeling

Warm Up: Model what you see in this picture.

You are part of a team of students cleaning up a local waterway. You are wading through thigh deep water looking for trash to clean up with your claw. How do you know where to aim your claw to pick up the trash?


MODEL NOT TO SCALE



How do you know where to aim your claw to pick up the trash?

Tuesday, April 18

Warm Up

Model this image!

Agenda

- Warm Up
- Review Modeling
- Phenomenon from yesterday
- PhET Color Vision
- Make Up Presentations

Modeling

Rubric Criteria	4	3	2	1	0
Details	Communicates all unobservable connections in detail through the model. Input/output is fully shown with no irrelevant details.	Communicates all unobservable connections in detail through the model however assumptions must be made by the reader. Input/output is fully shown with no irrelevant details.	Partially communicates the unobservable connections with limited detail through their model. Input/output is attempted.	Attempts to communicate the unobservable through their model. But produces fragmented and disorganized ideas. .	Does not communicate anything unobservable. No relevant details to show the science behind the phenomenon.
Scientific Accuracy	The model accurately combines all necessary concepts to apply them to a new scenario.	The model is an accurate and complete representation of necessary concepts.	The model has small misconceptions in representation of most of the necessary concepts.	The model has significant inaccuracies or is missing necessary concepts.	The model is not an accurate representation because no scientific concepts are expressed.

Grade Check In

1. Fill in your scores for each assignment (older assignments are at the top, more recent assignments at the bottom.
2. Look at the trend, from top to bottom, of each column to figure out your overall score.
3. Use the information on the back to determine your current letter grade.
4. Answer the questions.
5. Take the completed form home for a caregiver to sign.
6. Show me the signed form.

Wednesday, April 19

Warm Up

What is a model supposed to show?

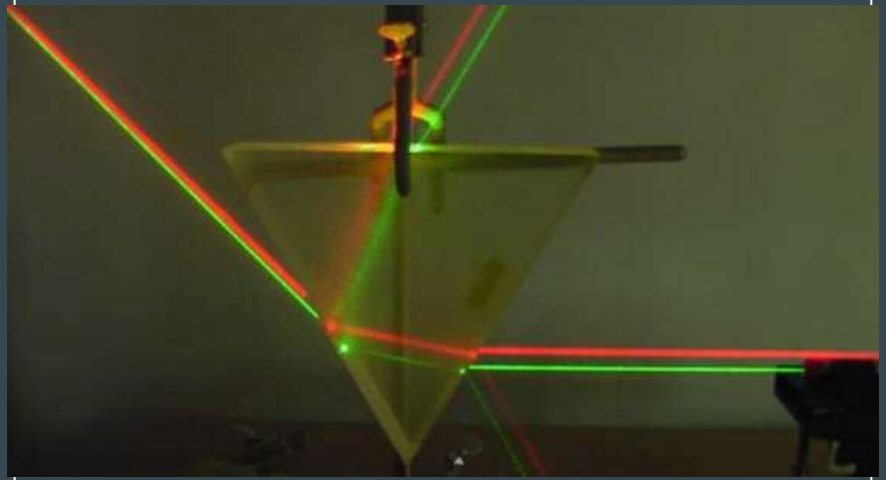
Agenda

- Warm Up
- PhET Color Vision
- Make Up Presentations

Thursday, April 20

Warm Up

What is happening in this picture?



Agenda

- Warm Up
- Grade Check In
- Make up presentations
- PhET Color Vision
- Start Demos?

Overall Grade in each standard:
Overall Grade:
Grade Goal:
Have you turned in your report? Presentation? Need to fix anything?

Grade	Combination:	Examples (not exhaustive)
A	3's and one or more 4's	3, 3, 4 or 3, 4, 4 or 4, 4, 4
B+	All 3's	3, 3, 3
C+	One or more 2's (no 1's)	2, 4, 4 or 2, 2, 2 or 2, 2, 4 etc.
D+	One 1	1, 2, 2 or 1, 2, 3 etc.
E	Two or more 1's or one 0	1, 1, 4 or 1, 1, 1, etc. 1, 2, 0

Friday, April 21

Warm Up

Open up PhET Color Vision for a class discussion!

Agenda

- Warm Up
- Review PhET Color Vision
- Light Interaction Investigations

Monday, April 24

Warm Up

- When creating a data table, what are some components that you need?
- How do you take observations in a lab setting?

Agenda

- Warm Up
- Laser Light Demo
- Finish Up Light Exploration
- Class Conclusions
- Reflection Mini Lab

Light Interactions Exploration

Types of Light: Primary Colors, White Light, UV and Laser

Materials

- Flat, Concave, Convex Mirrors
- Flat, Concave, Convex Lenses
- Polarized Lenses
- Color Lenses
- Prisms

Question- How does the different mediums affect the different types of light?

You need to create a data table that is organized where you can draw and describe what you notice within the interactions for each medium and types of light.

Tuesday, April 25

Warm Up

Take out your data table for the Light Exploration. Make sure your data table is sufficient!

Agenda

- Class Conclusions
- Reflection Mini Lab

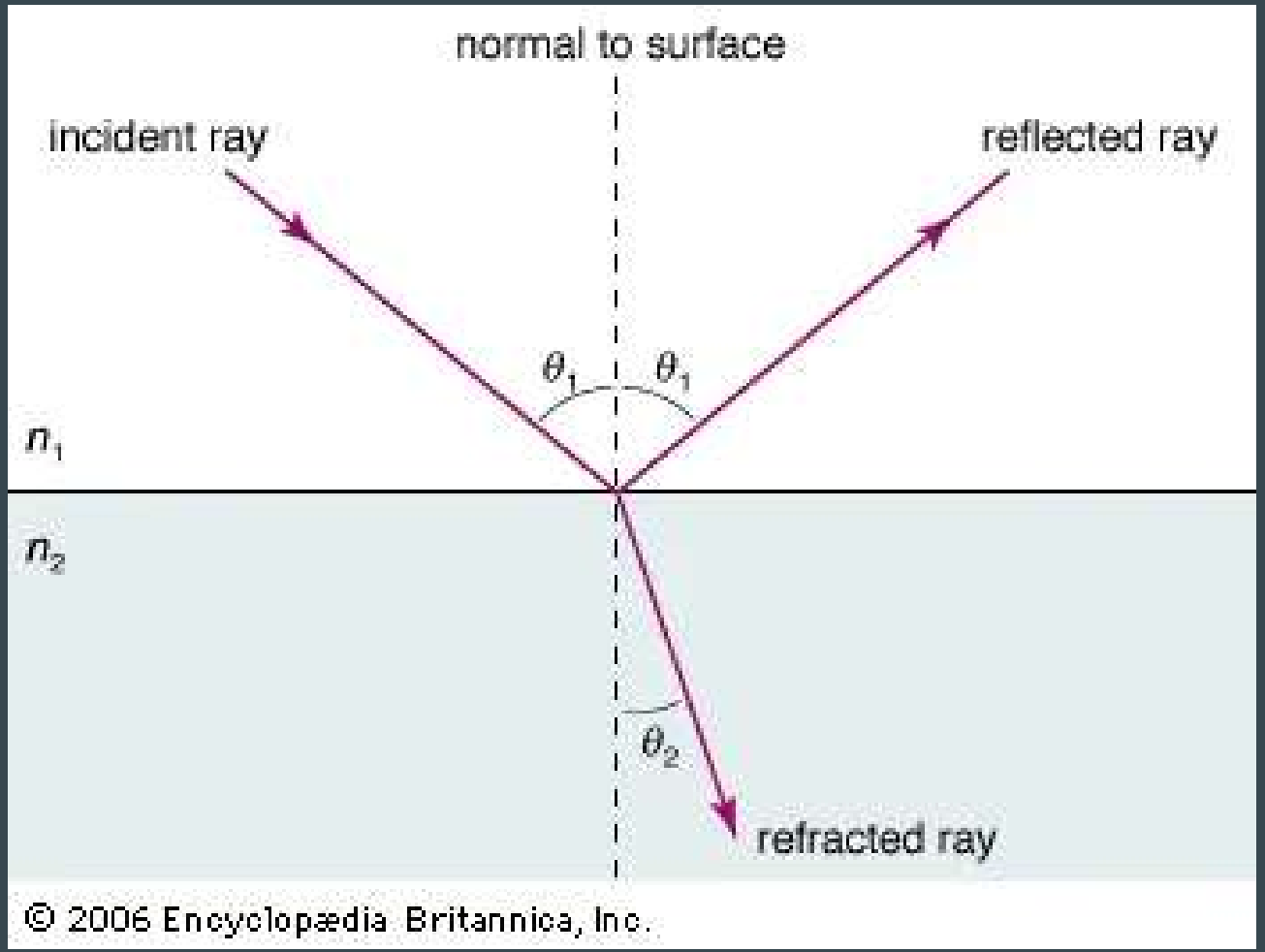
Class Conclusions- What are overall 2-3 observations?

Mirrors

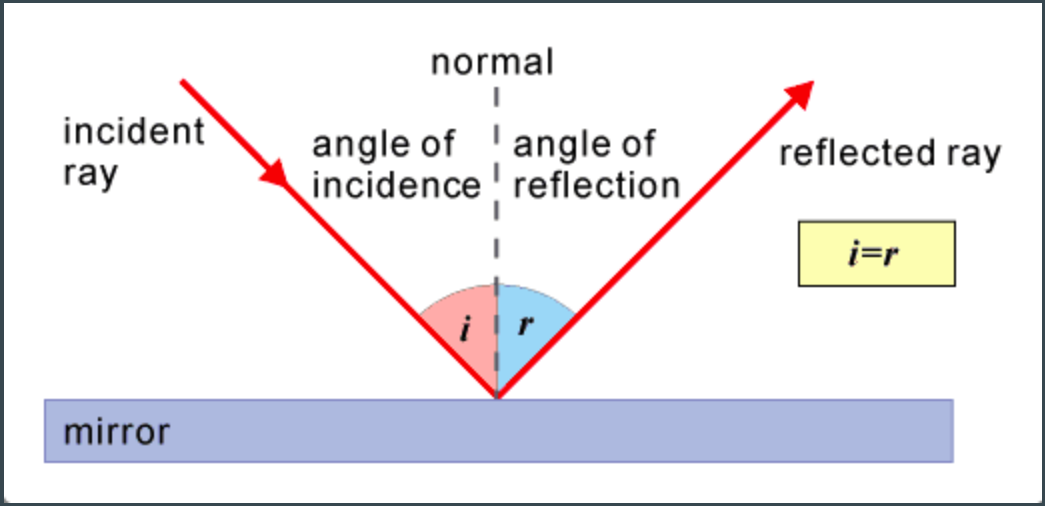
Lenses

Color Filters

Prisms


normal to surface
incident ray
reflected ray
θ_1
θ_1
n_1
n_2
θ_2
refracted ray
© 2006 Encyclopædia Britannica, Inc.

Law of Reflection



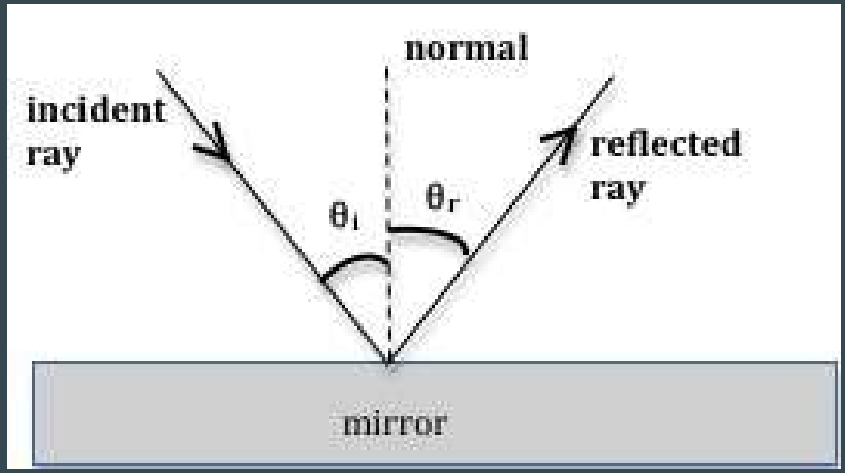
Law of Reflection Mini Lab

How can you prove the law of reflection in a lab setting?

You will have a mirror, laser, protractor and white paper.

You need to test at least 10 angles for the experimental reflected ray and theoretical (expected) reflection ray.

- Independent, dependent and control variables
- Procedure
- Data Table
- What would you graph?
- How would you use the percent error formula?



$$\% \text{ error} = \left| \frac{\#\text{experimental} - \#\text{actual}}{\#\text{actual}} \right| \times 100$$

Wednesday, April 26

Warm Up

Suppose you shine a laser light at 60 degrees and it reflects off at 58 degrees. What is the degree of the expected reflected ray? What is the percent error in your experiment?

$$\% \text{ error} = \left| \frac{\#\text{experimental} - \#\text{actual}}{\#\text{actual}} \right| \times 100$$

Agenda

- Reflection Mini Lab Finish

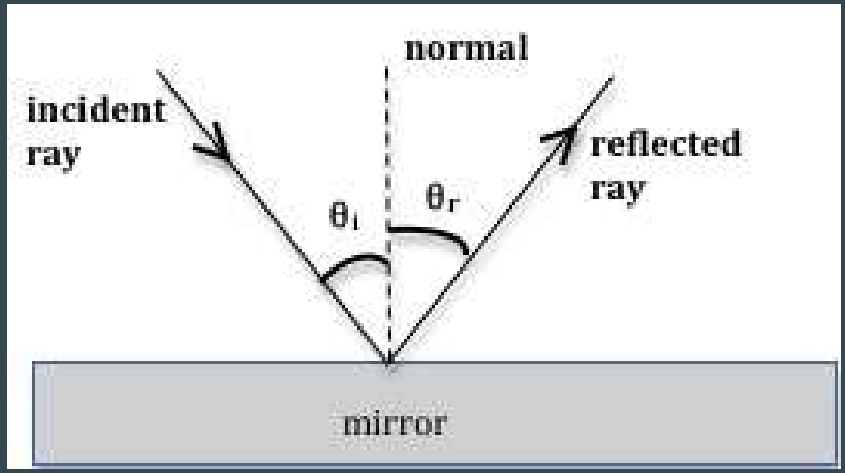
Refraction Lab starts tomorrow!

Law of Reflection Mini Lab

Final Lab Write Up IN YOUR NOTEBOOK

How can you prove the law of reflection in a lab setting?

- Independent, dependent and control variables
- Procedure and set up (updated based on experience)
- Data Table
- Graph (think about what could answer the question)
- Percent error for each angle
- Conclusion
- 5 sources of error and how they could have been prevented



$$\% \text{ error} = \left| \frac{\#\text{experimental} - \#\text{actual}}{\#\text{actual}} \right| \times 100$$

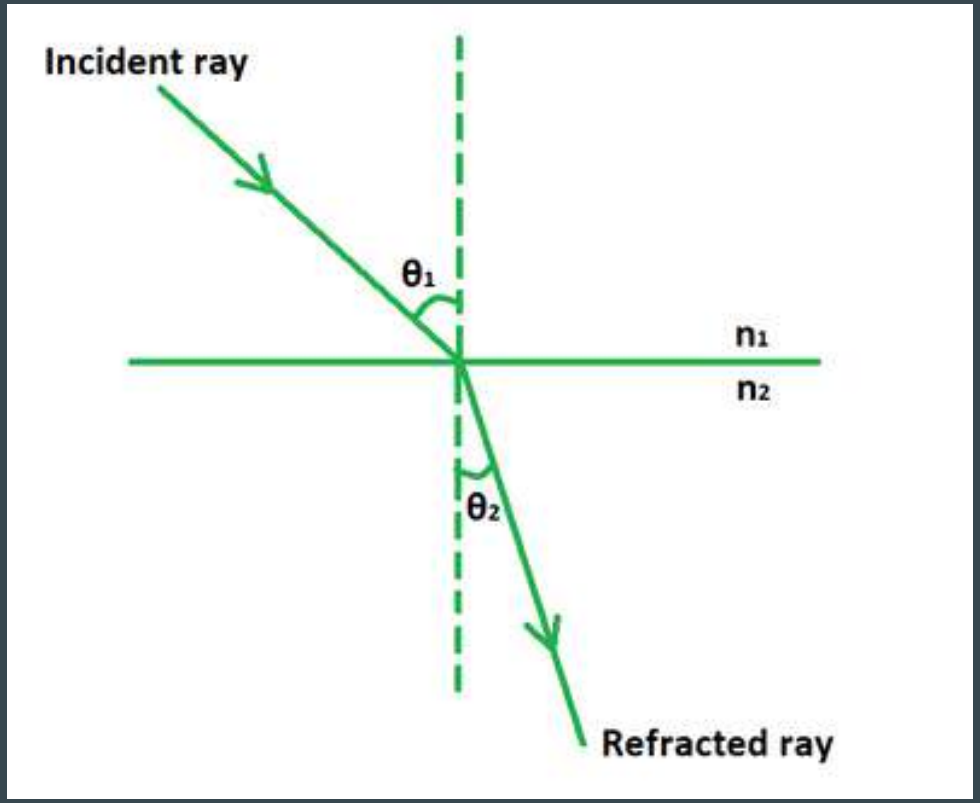
Thursday, April 27

Warm Up

Describe and model what is happening in this gif.

Agenda

- The Refraction of Jello Lab


Incident ray
θ1
n1
n2
θ2
Refracted ray

Formula

$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$

n_1 = incident index

n_2 = refracted index

θ_1 = incident angle

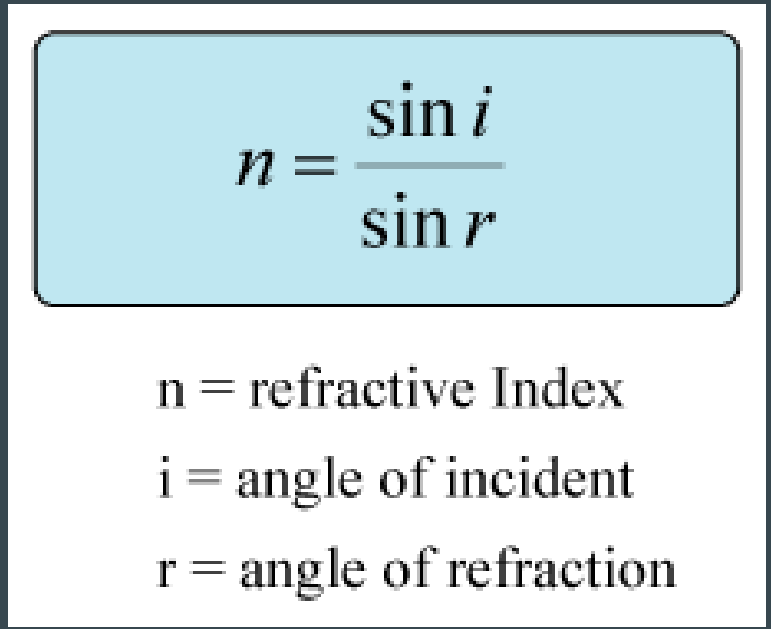
θ_2 = refracted angle

Equation when air is the first medium (n = 1)

Practice 1: A light is shown through an unknown substance. The angle of incidence is 60 degrees and the angle of refraction is 50 degrees. What is the refraction index?

Practice 2 (Stretch Problem):

Water has a refractive index of 1.33. You shine a light at an angle of 60 degrees. What is the expected angle of refraction?

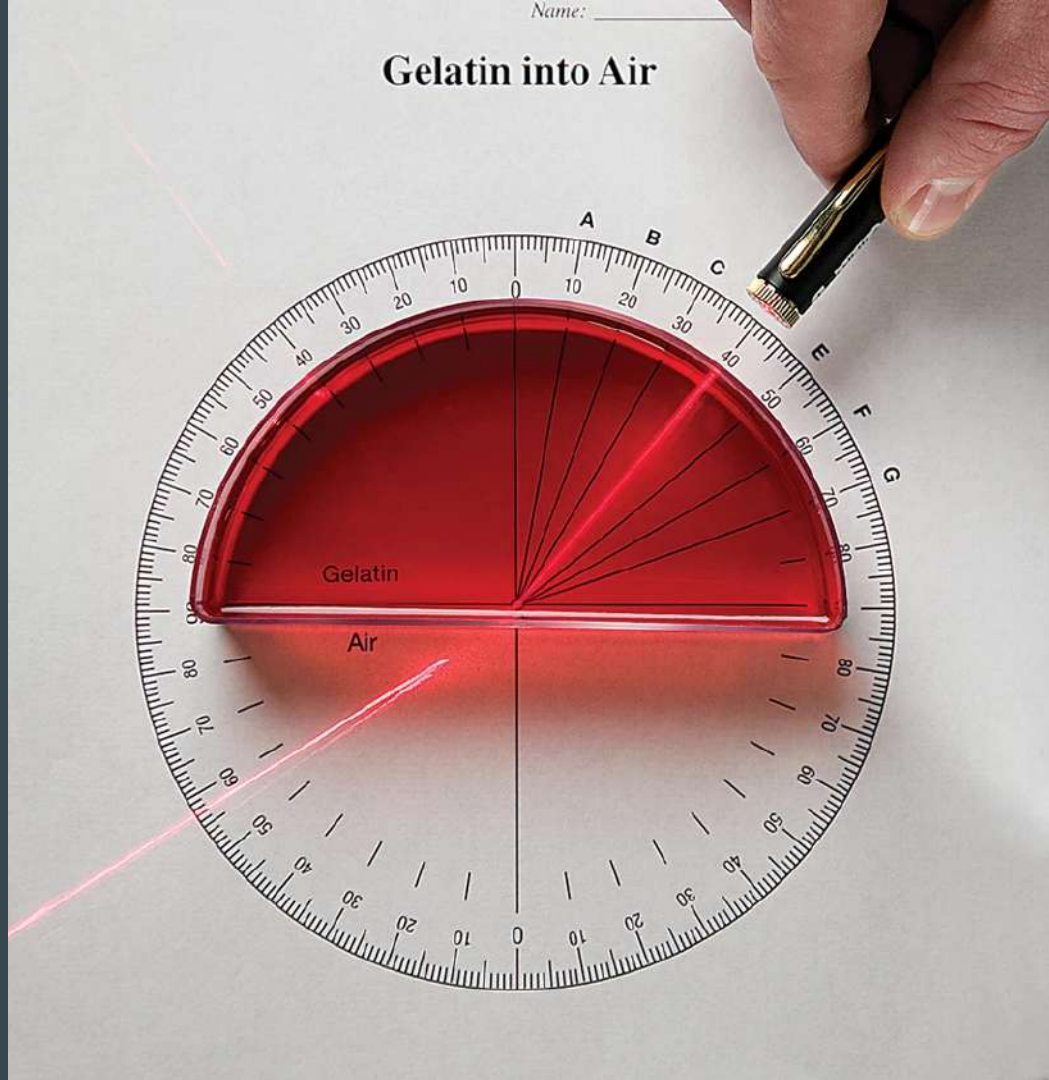


Law of Refraction Lab

Can you prove the refraction index of jello?

We are taking data today! If you do not take your data today, the next day you can take it is Tuesday (I will be out Friday and MSTEP is Monday).

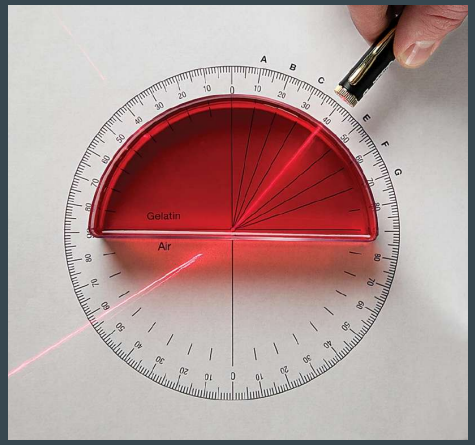
You need to take data for 6-10 angles (angle of incidence and angle of refraction).



Monday, May 1

Law of Refraction Lab Report

- Independent, dependent and control variables
- Procedure and set up (updated based on experience)
- Data Table
- Graph (think about what could answer the question)
- Percent error fo122098r each angle
- Conclusion
- 5 sources of error and how they could have been prevented



$$n = \frac{\sin i}{\sin r}$$

n = refractive Index

i = angle of incident

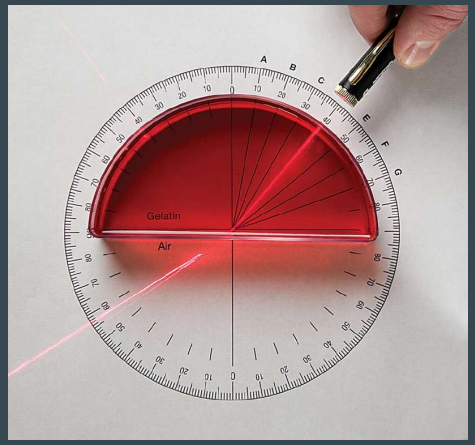
r = angle of refraction

$$\% \text{ error} = \left| \frac{\#\text{experimental} - \#\text{actual}}{\#\text{actual}} \right| \times 100$$

Wednesday, May 3

Law of Refraction Lab Report

- Independent, dependent and control variables
- Procedure and set up (updated based on experience)
- Data Table
- Graph (think about what could answer the question)
- Percent error for between your refractive index and gelatin's
- Conclusion
- 5 sources of error and how they could have been prevented



$$n = \frac{\sin i}{\sin r}$$

n = refractive Index

i = angle of incident

r = angle of refraction

$$\%\ \text{error} = \left| \frac{\#\,\text{experimental} - \#\,\text{actual}}{\#\,\text{actual}} \right| \times 100$$

Peer is THURSDAY! Labs are now due Thursday.

Thursday, May 4

Warm Up

Open up your lab report on Google Classroom (or your notebook if you wrote it by hand).

Agenda

- Peer Edit Refraction Lab
- Turn in Refraction Lab by the end of the hour.

Monday, May 8

Warm Up

What do you think of when you hear the word “wave”? Draw and describe what you think of.

Agenda

- Revise Models
- Wave Investigation (Case of the Unknown Wave)
- Wave Vocabulary

Grade check in’s this week- I will be grading lab reports this week!

Tuesday, May 9

Warm Up

New seats!

Agenda

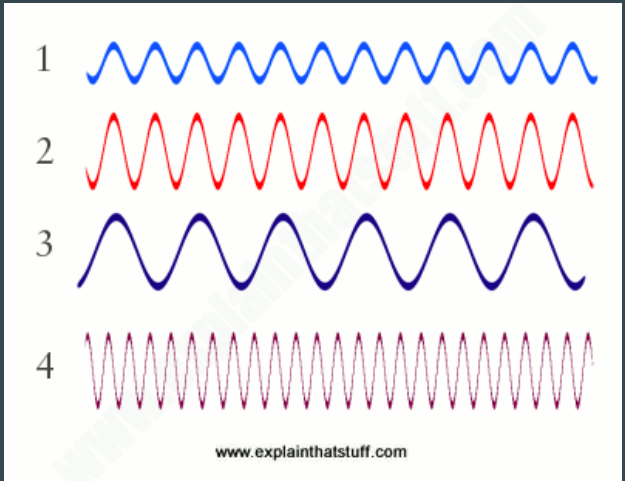
- Wave Investigation (Case of the Unknown Wave)
- Waves on a String

Grade check in's this week- I will be grading lab reports this week!

Wednesday, May 10

Warm Up

What are similarities and differences between these waves? List all!

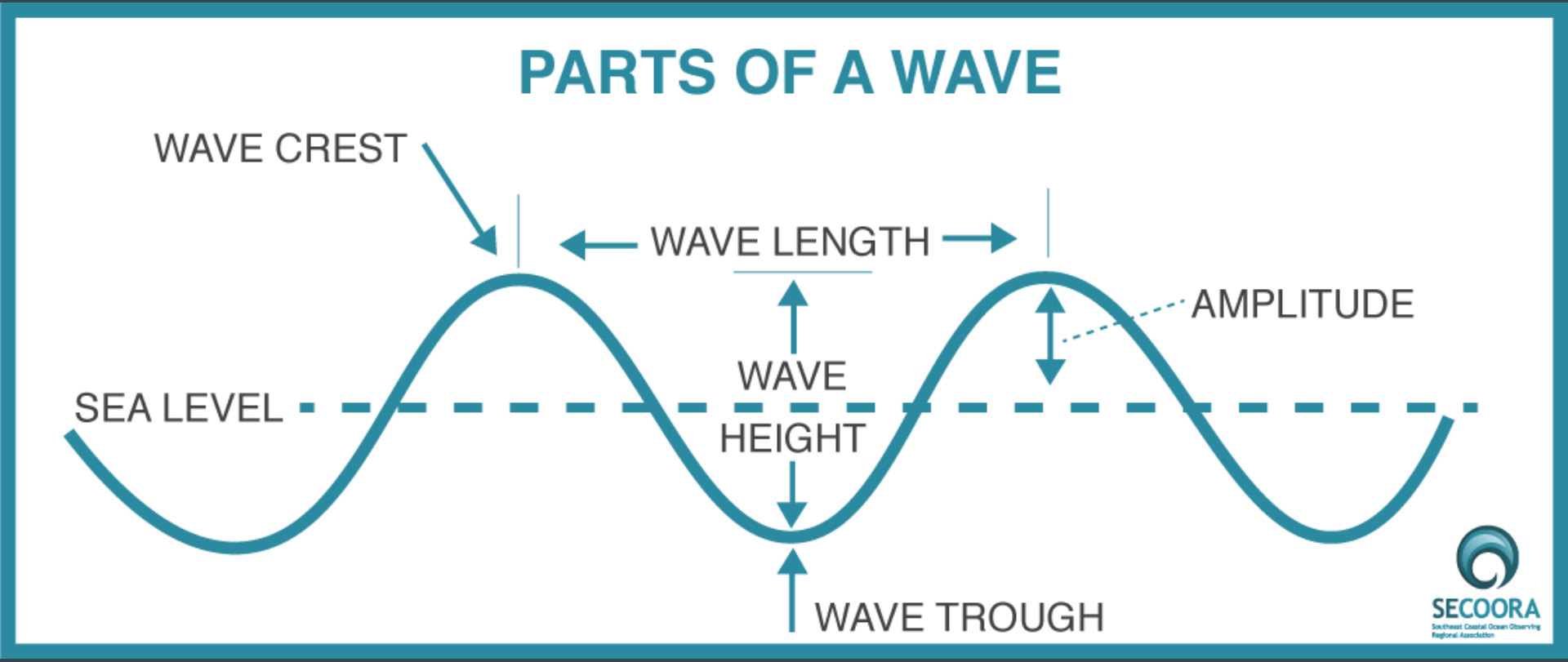


Agenda

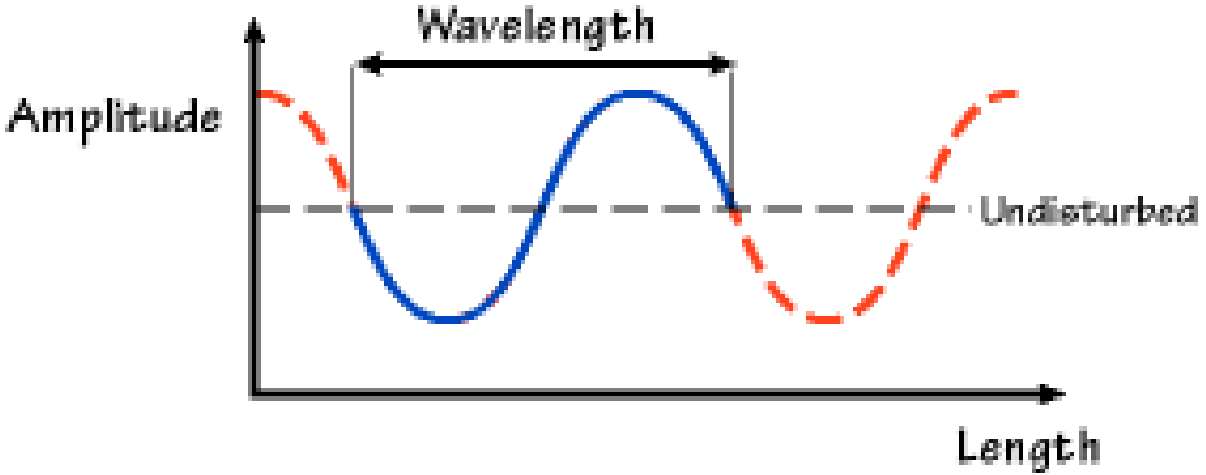
- Wave Investigation Wrap Up
- Parts of a Wave
- Practice

Grade check in's this week- I will be grading lab reports today/tomorrow.

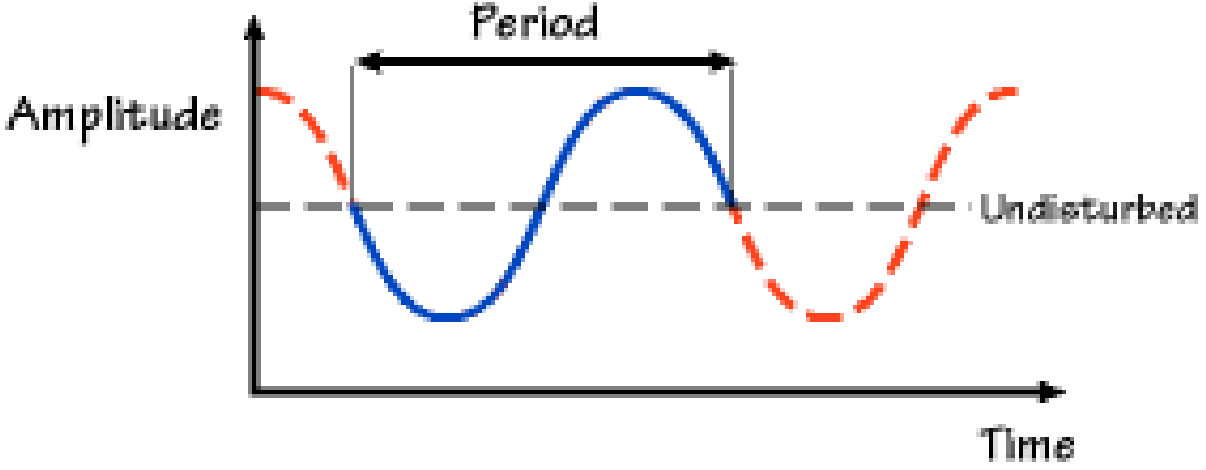
Check in question FRIDAY (mathematical thinking)- parts of a wave.


PARTS OF A WAVE
WAVE CREST
WAVE LENGTH
AMPLITUDE
WAVE
HEIGHT
SEA LEVEL
WAVE TROUGH
SECOORA
Southeast Coastal Ocean Observing
Regional Association

"Snapshot" at a single time



History at a single location

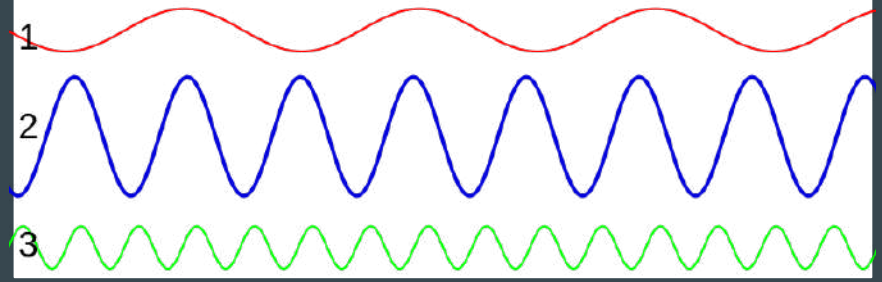


Thursday, May 11

Warm Up

Rank the waves from longest to shortest wavelength and tallest to shortest amplitude.

Which wave has more frequent waves?

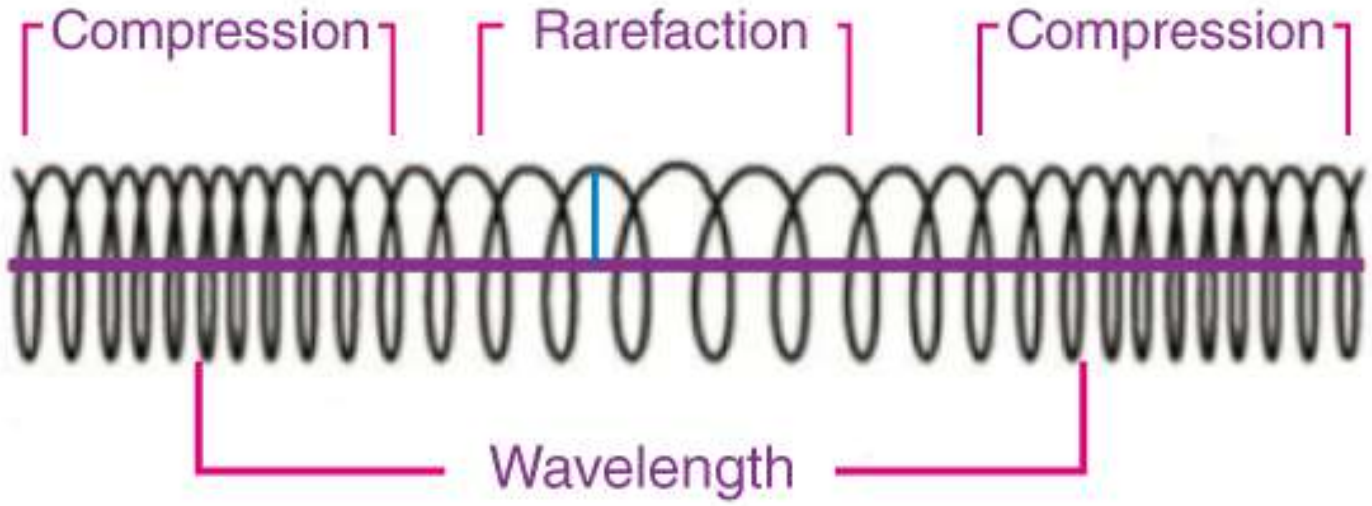


Agenda

- Wave Investigation- The Answer!
- Parts of a Wave

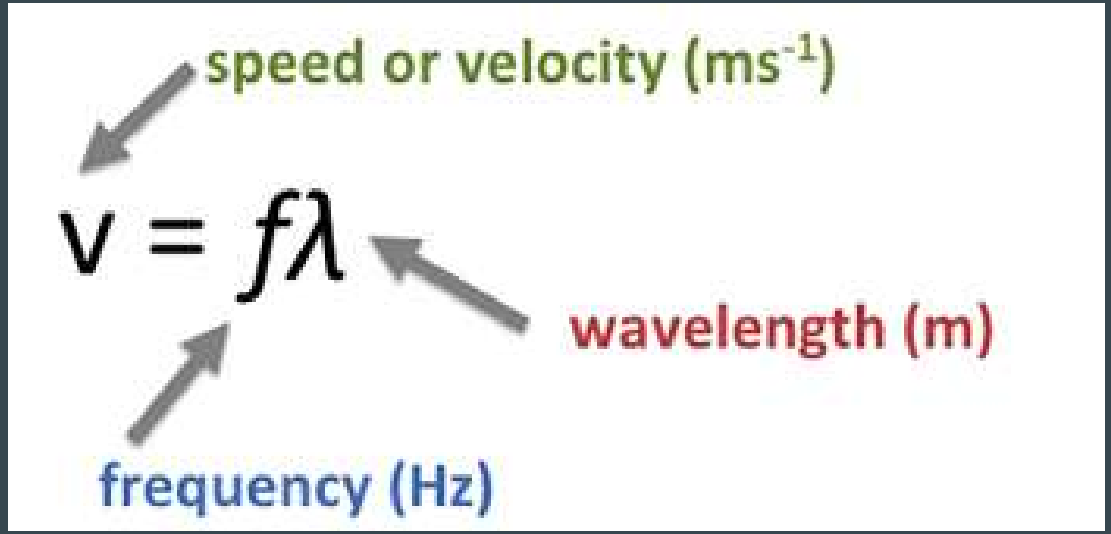
Grade check in's Friday and Monday- I will be grading lab reports today/tomorrow.

Check in question Monday (mathematical thinking)- parts of a wave.


Compression
Rarefaction
Compression
Wavelength

F = 1/T

T = Period (time)

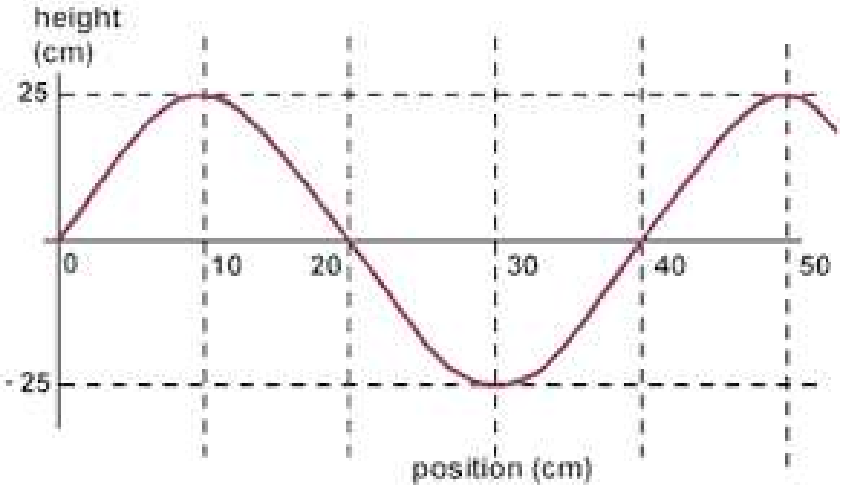


Wave Worksheet- Finish front and back

Friday, May 12

Warm Up

Determine the wavelength, amplitude and number of cycles. If it takes 10 seconds to create the wave below. Determine the wave speed.



Agenda

- Slinky Wave Investigation
- Waves Extra Practice

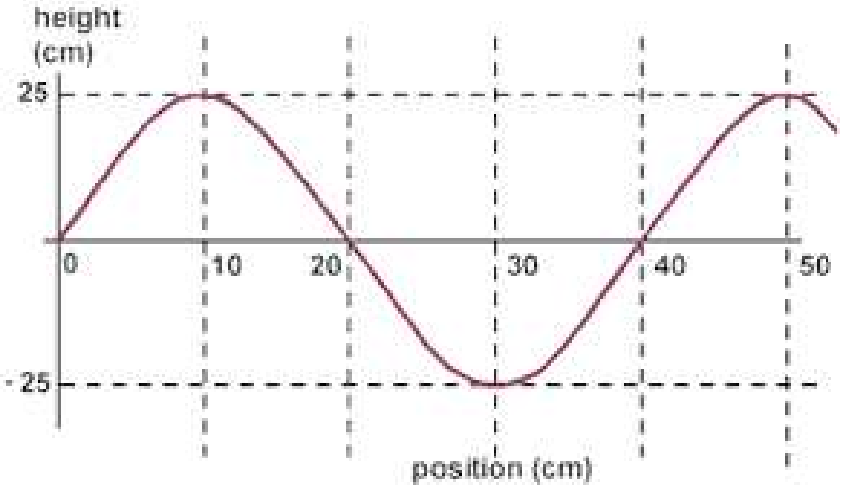
Grade Check In's Friday and Monday

Check in question Monday (mathematical thinking)- parts of a wave.

Friday, May 12

Warm Up

Determine the wavelength, amplitude and number of cycles. If it takes 10 seconds to create the wave below. Determine the wave speed.



Agenda

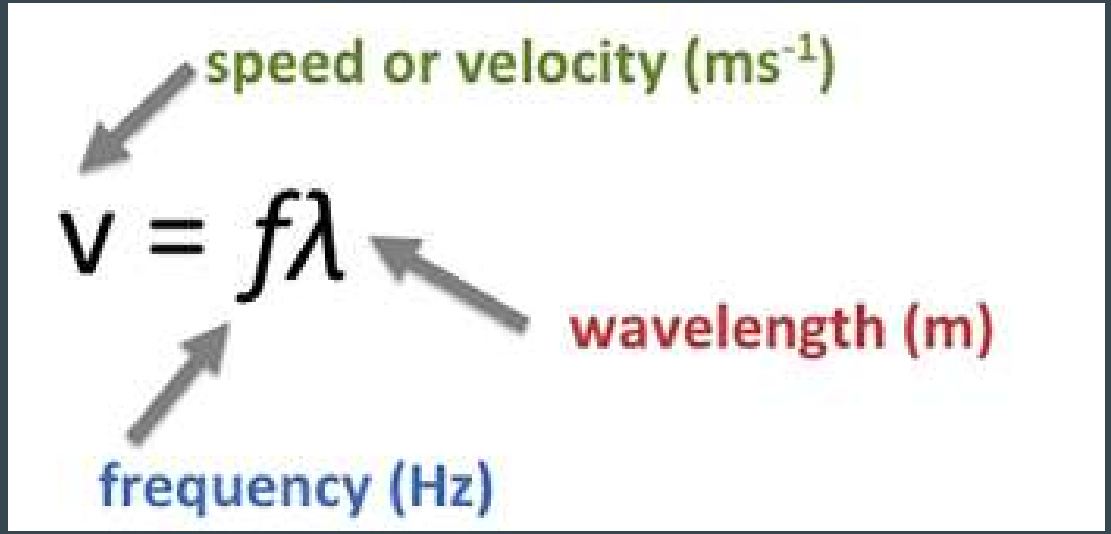
- Slinky Wave Investigation

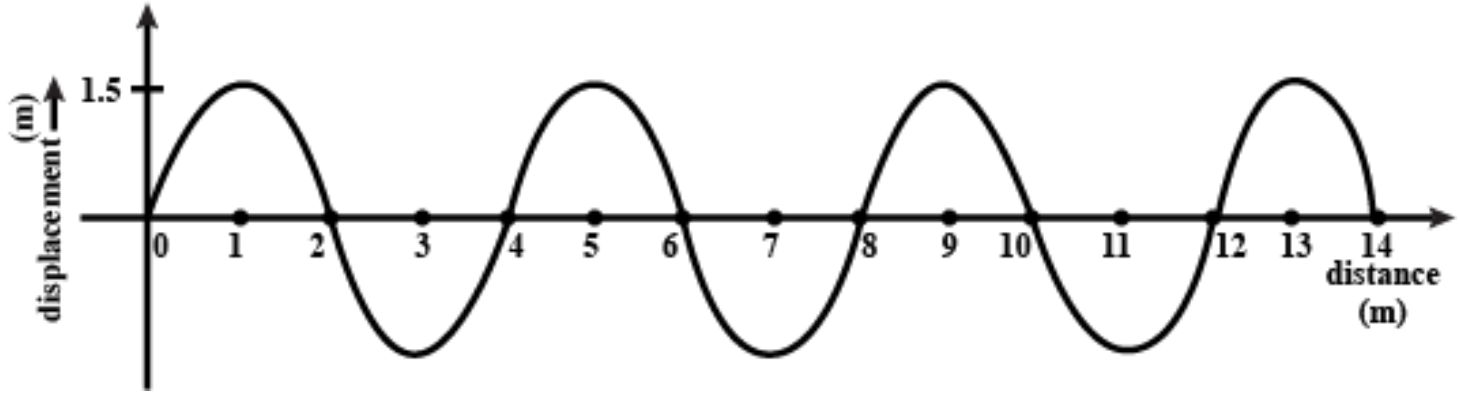
Grade Check In's on Monday

Check in question Monday (mathematical thinking)- parts of a wave.

F = 1/T

T = Period (time)




displacement (m)
1.5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
distance (m)

Slinky Fun

- With your partner-
  - You will get a slinky! You will create a standing wave (one side is fixed and the waves travel down)
  - You must create 3 different situations and record...
    - Amplitude
    - Total distance traveled
    - Time to reach the other side
    - Number of waves in a cycle
    - Frequency

Slinky Waves

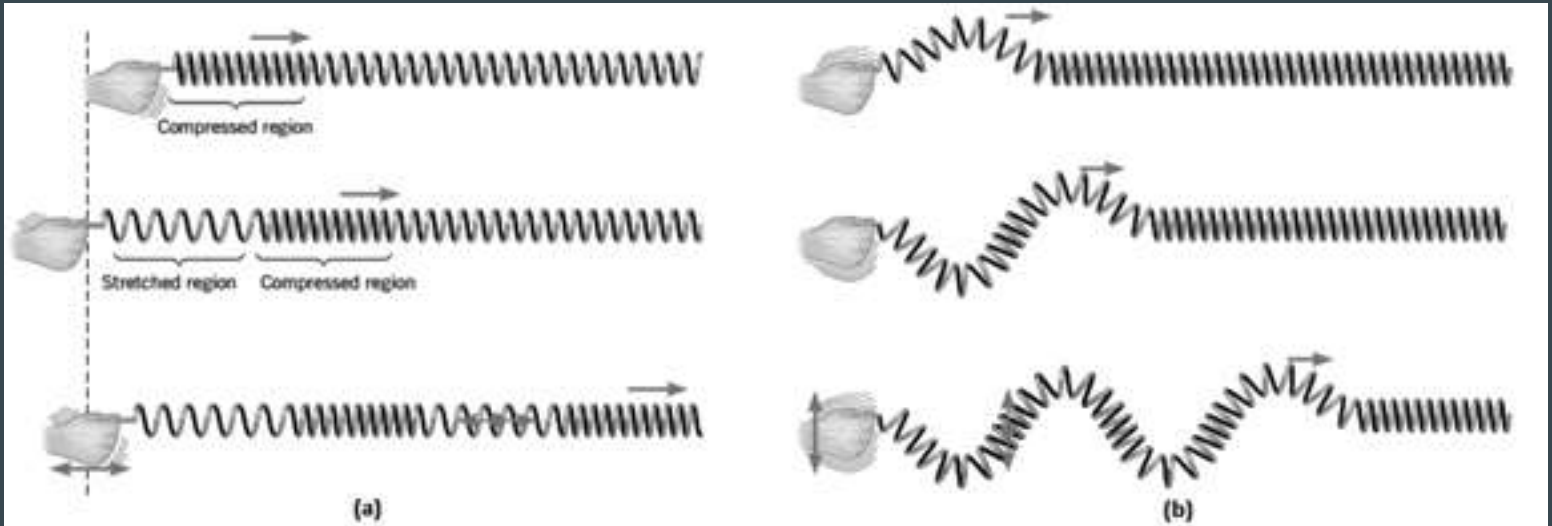
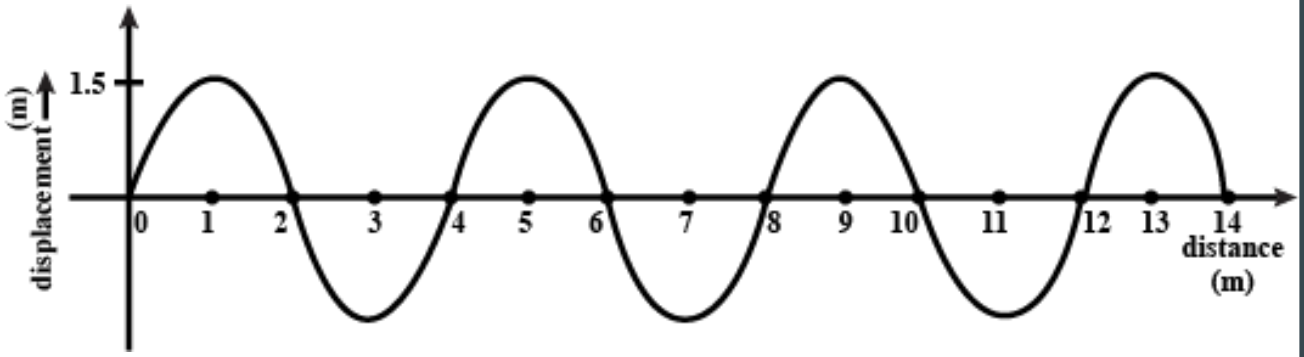


Figure 4. *Propagation in longitudinal and transverse waves generated using a Slinky®*
(a) longitudinal, (b) transverse (Cutnell & Johnston, 2012)

Monday, May 15

Warm Up

Determine the wavelength, amplitude and number of cycles. If it takes 5 seconds to create the wave below. Determine the wave speed.



Agenda

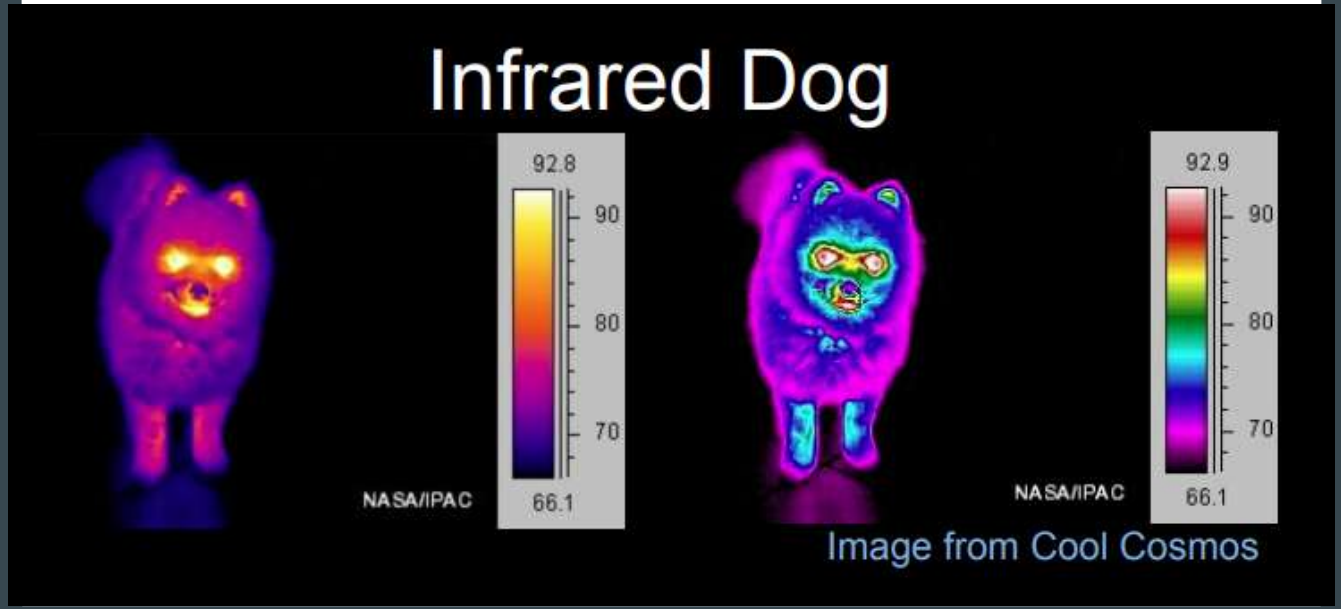
- Warm Up
- Open Note Check in Question
- Grade Check In's
- Page 1-2 of Multiwavelength Astronomy

Grade	Combination:	Examples (not exhaustive)
A	3’s and one or more 4’s	3, 3, 4 or 3, 4, 4 or 4, 4, 4
B+	All 3’s	3, 3, 3
C+	One or more 2’s (no 1’s)	2, 4, 4 or 2, 2, 2 or 2, 2, 4 etc.
D+	One 1	1, 2, 2 or 1, 2, 3 etc.
E	Two or more 1’s or one 0	1, 1, 4 or 1, 1, 1, etc. 1, 2, 0

Tuesday, May 16

Warm Up

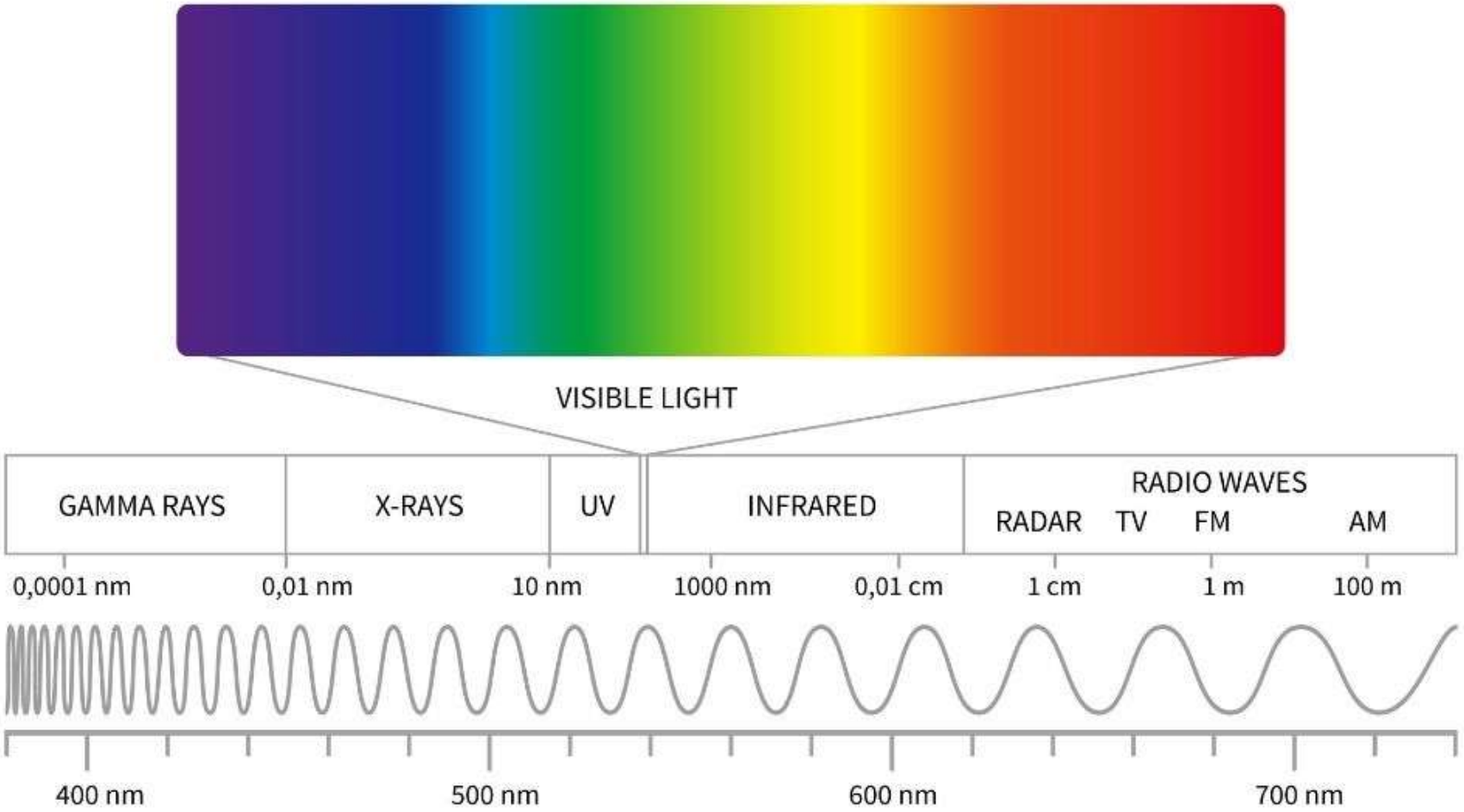
Take out Multiwavelength Packet and turn to Page 2. Make sure you have read Page 1 and completed Page 2.

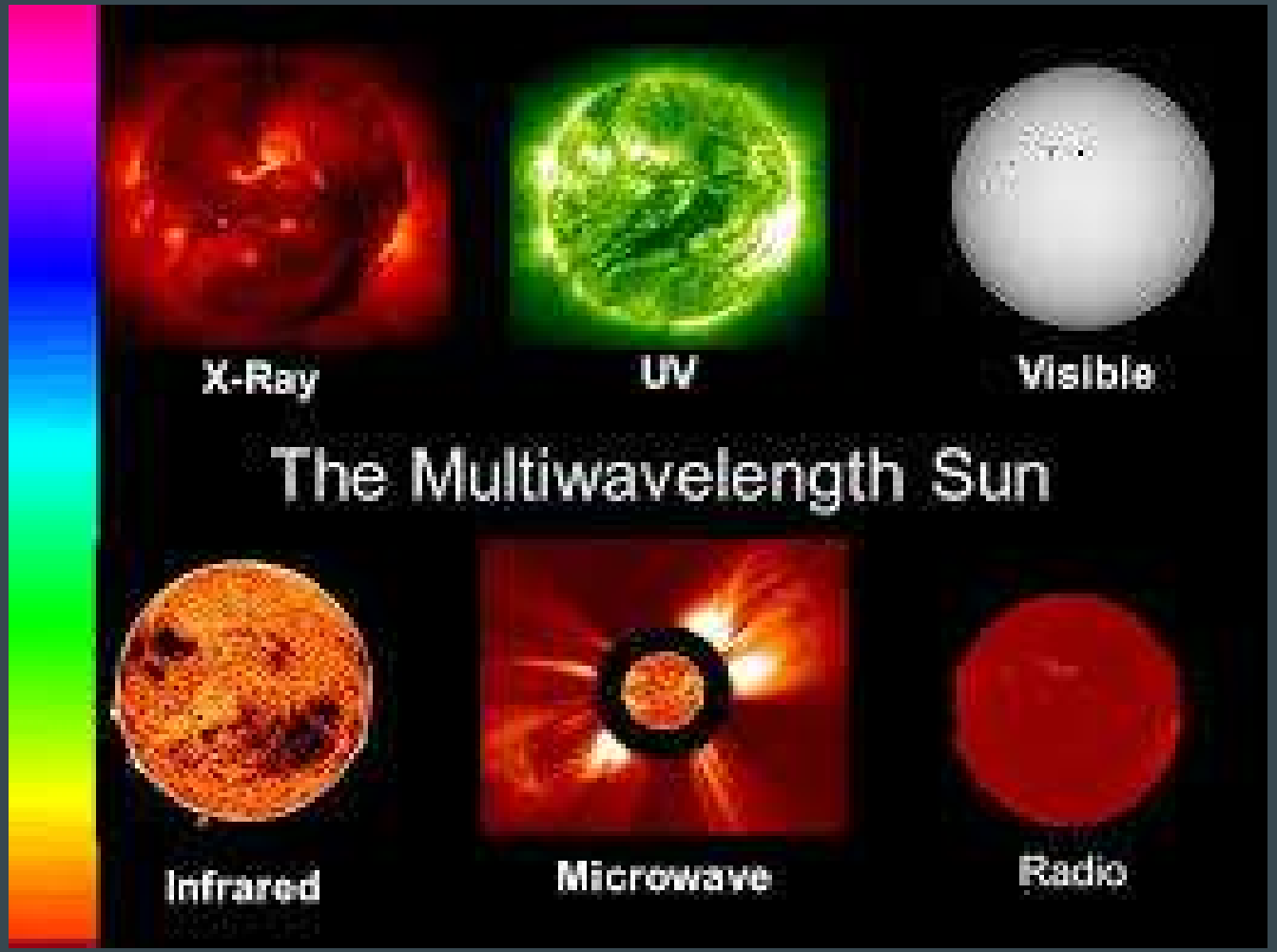


Agenda

- Review Page 1-2 of Multiwavelength
- False Color Imaging with a partner compare and contrast
- Grade Check In's (if needed)

VISIBLE SPECTRUM



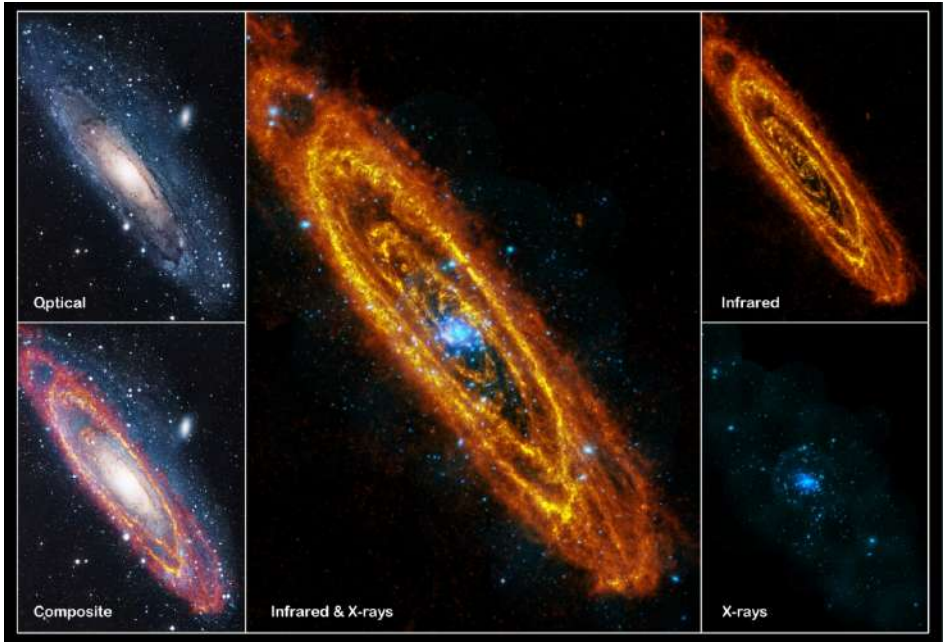

X-Ray
UV
Visible
The Multiwavelength Sun
Infrared
Microwave
Radio


HUBBLE
JAMES WEBB

Wednesday, May 17

Warm Up

Take out your galaxy pixel coloring assignment. Finish now if you need to!



Agenda

- Review and compare galaxy pixel coloring
- Pages 3-5 in Packet
- Start Galaxy Matching

Thursday, May 18

Warm Up

Open up your packet to Page 5 and use the chart to help you...

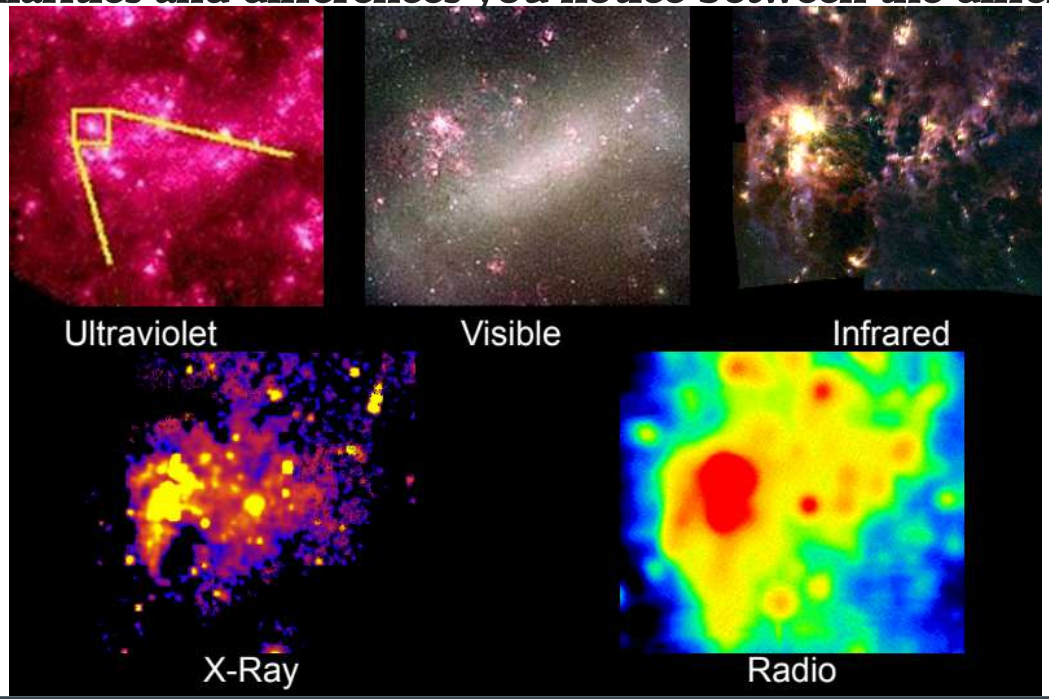
1. If you look at a galaxy with visible light, what do you expect will be in the galaxy?
2. You notice in a galaxy there is the most radiation in the X-ray wavelength, what are two different objects you expect to be in that galaxy based on this data?
3. You are an astronomer searching for quasars. What type of radiation should you be detecting in?
4. To detect the cosmic background, what type of radiation should you be detecting in?

Agenda

- Warm Up
- Review page 5 in Packet
- Galaxy Matching Activity (In Class Observation of Communication and Data)

Friday, May 19

This is the Large Magellanic Cloud. What are some similarities and differences you notice between the different



Agenda

- Galaxy Matching Activity (In Class Observation of Communication and Data)
- Is Light a Particle or Wave?

Monday, May 22

For each part of the EM Spectrum, write down how we use it in our everyday life...

- Gamma Rays
- X-Rays
- Ultraviolet
- Visible
- Infrared
- Microwave
- Radio

Agenda

- Warm Up
- Is Light a Particle or Wave?
- EM Spectrum Collage Project

Tuesday, May 23

- What do you notice about this diagram?
- What similarities do you notice about how light travels from our experiments?

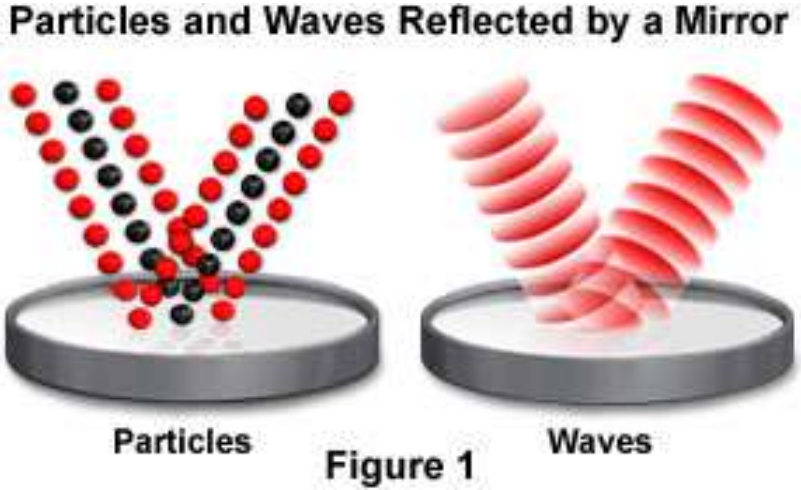
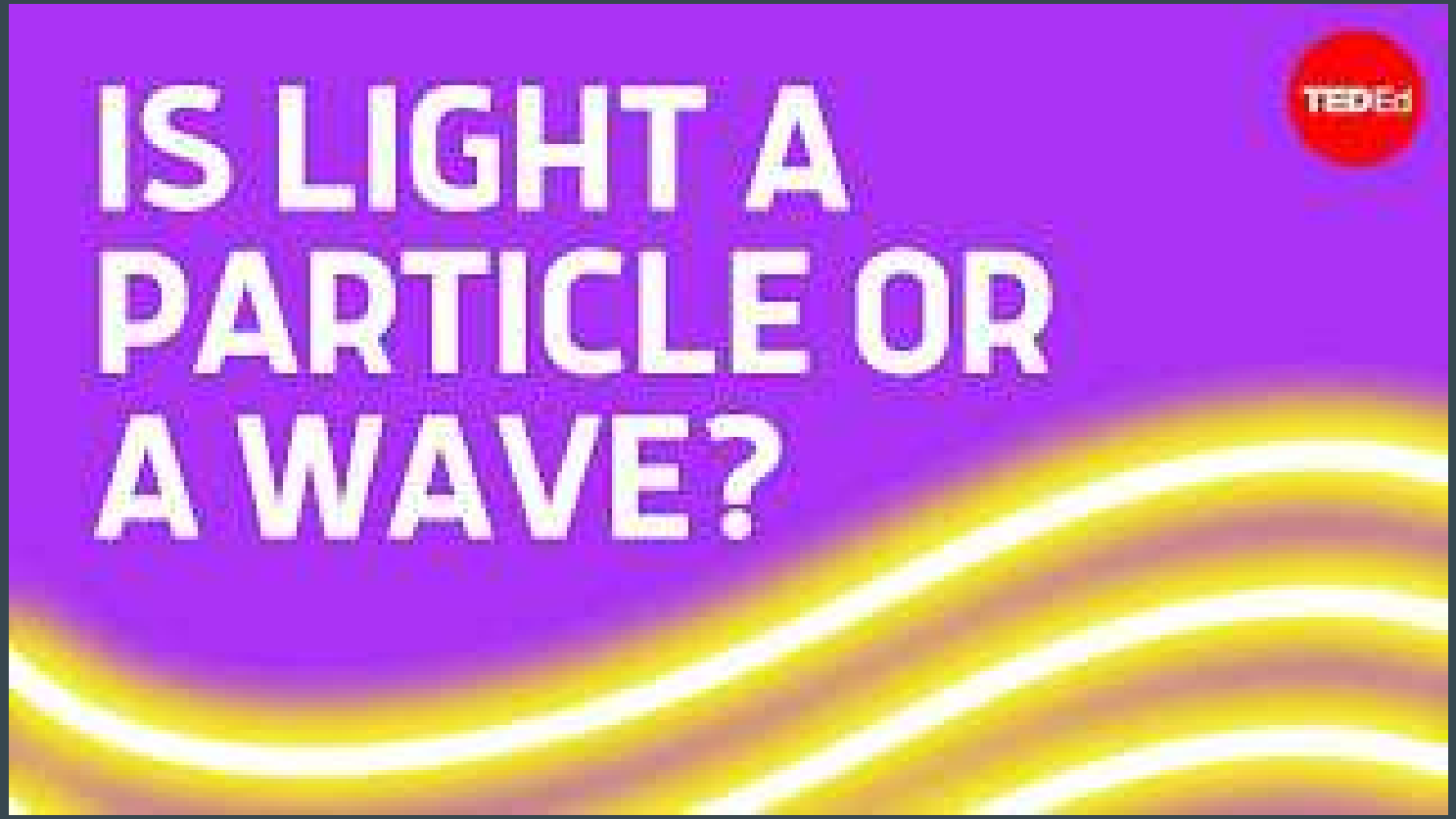


Figure 1

Agenda

- Warm Up
- Is Light a Particle or Wave?
- EM Spectrum Collage Project


IS LIGHT A
PARTICLE OR
A WAVE?
TED-Ed

EM Spectrum Collage Project

Work Days

- Tuesday, May 23
- Wednesday, May 24
- Thursday, May 25

Presentation to Teacher (when you are done with your collage)

- Thursday, May 25
- Tuesday, May 30
- Wednesday, May 31 (make up only)

Wednesday, May 24

Goal Today:

- Complete your initial research
- Complete **one page collage.**

Teacher Presentations

- One on one with me
- Tell me about your part of the EM Spectrum and I'll ask you questions too!

Agenda

- EM Spectrum Collage Project
  - Research
  - Create Collage
- Teacher Presentations Tuesday 5/30 and Wednesday 5/31

Tuesday, May 30

- Take out your EM Spectrum Collage on your computer

Agenda

- Teacher Presentations Tuesday 5/30 and Wednesday 5/31
- Top 5 in the Universe

Grades finalized by June 2nd.

Rubric Criteria	4	3	2	1	0
Communication of Content	Utilizes concise content-specific language to clearly articulate viewpoints and provides justifications or connections beyond the class.	Uses concise content-specific language to clearly articulate viewpoints and justify them.	Uses some content specific language to articulate a viewpoint or the idea is not completely clear to the audience.	Attempts to communicate ideas but does not use content-specific language or connections are not valid.	No attempt to communicate ideas
Visuals	Original and relevant visuals are utilized and explained by the student and relate directly to the viewpoint presented. Students make the visuals the focal point to the communication.	Relevant visuals are utilized and explained by the student and relate directly to the viewpoint presented.	Relevant visuals are explained but add limited value to the viewpoint presented.	Relevant visuals are used but are not referenced or explained.	Visuals that are present are not relevant to the presentation of ideas or not present.
Science Dialogue	Engage in dialogue adding their own related information, thoughts, and questions to move the conversation forward.	Engages in dialogue by adding their own information and thoughts that are related and moves the conversation forward.	Engages in some dialogue by adding their own information and thoughts that are partially related to the current conversation.	Engages in limited dialogue by expressing agreement or disagreement with ideas shared by others.	Does not engage in dialogue with others.

Wednesday, May 31

- Take out your EM Spectrum Collage on your computer (if you haven't presented)
- Open up Top 5 in the Universe from Google Classroom (due tomorrow)

Agenda

- Teacher Presentations for EM Spectrum Collage
- Top 5 in the Universe

Grades finalized by June 5th.

Thursday, June 1

- Take out your EM Spectrum Collage on your computer (if you haven't presented)
- Open up Top 5 in the Universe from Google Classroom (due end of class today)

Agenda

- Teacher Presentations for EM Spectrum Collage
- Top 5 in the Universe

Grades finalized by June 5th.

Friday, June 2

- Open up Top 5 in the Universe from Google Classroom
- Make sure you have completed it and have explanations!

Agenda

- Top 5 in the Universe Class Conclusions

Grades finalized by June 5th- final grade meetings on Monday and Tuesday

Overall Top 5 (Past)

Look at your categories of top 5 for Past (Space, Earth, Life, Humanity) and from those lists choose your overall Top 5 and rank in order of importance and why.

Monday, June 5

- Open up Top 5 in the Universe from Google Classroom

Agenda

- Top 5 in the Universe Class Conclusions
- Grade Reflection
- Grade Meetings Today and Tomorrow

Overall Grade in each standard:
Overall Grade for S2:
Do you think these scores and grade reflect your work in this class this semester?
What is something that you did well in this class? Still need improvement in?

Grade	Combination:	Examples (not exhaustive)
A	3's and one or more 4's	3, 3, 4 or 3, 4, 4 or 4, 4, 4
B+	All 3's	3, 3, 3
C+	One or more 2's (no 1's)	2, 4, 4 or 2, 2, 2 or 2, 2, 4 etc.
D+	One 1	1, 2, 2 or 1, 2, 3 etc.
E	Two or more 1's or one 0	1, 1, 4 or 1, 1, 1, etc. 1, 2, 0

Tuesday, June 6

- Open up your notebook.
- No tech today! (make sure you turn in your Chromebook in English class today)

Agenda

- Grade Meetings
- Cosmos: Standing Up in the Milky Way

Cosmos: Standing up in the Milky Way

Something I learned (take notes along the way)

Something I am wondering about (as you watch and at the end)