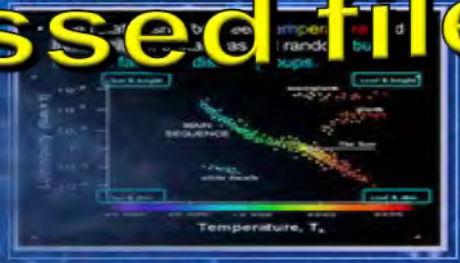
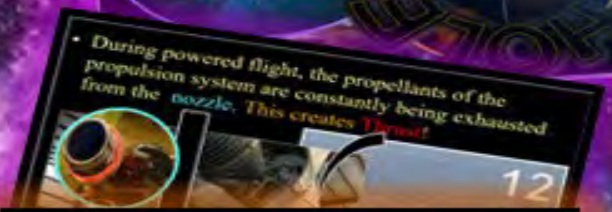
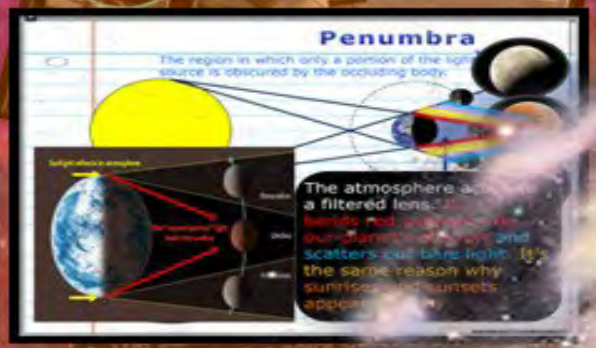
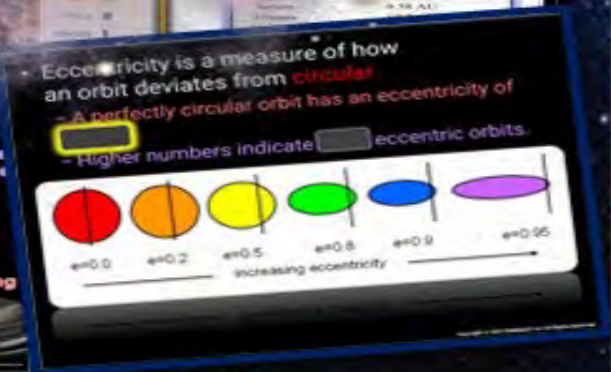
Astronomy Mega Bundle

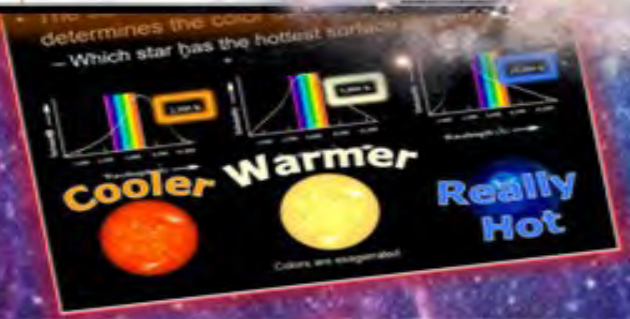
Preview is a compressed file





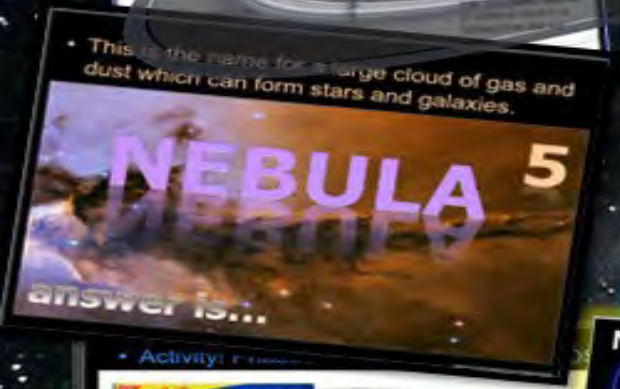


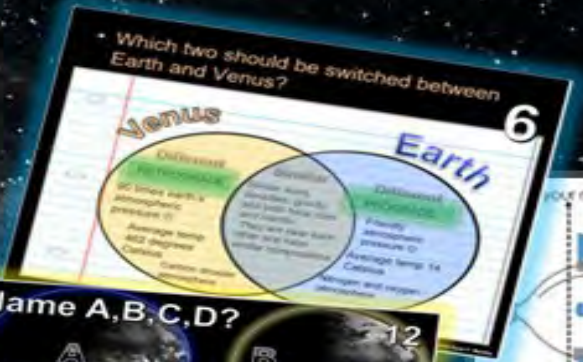




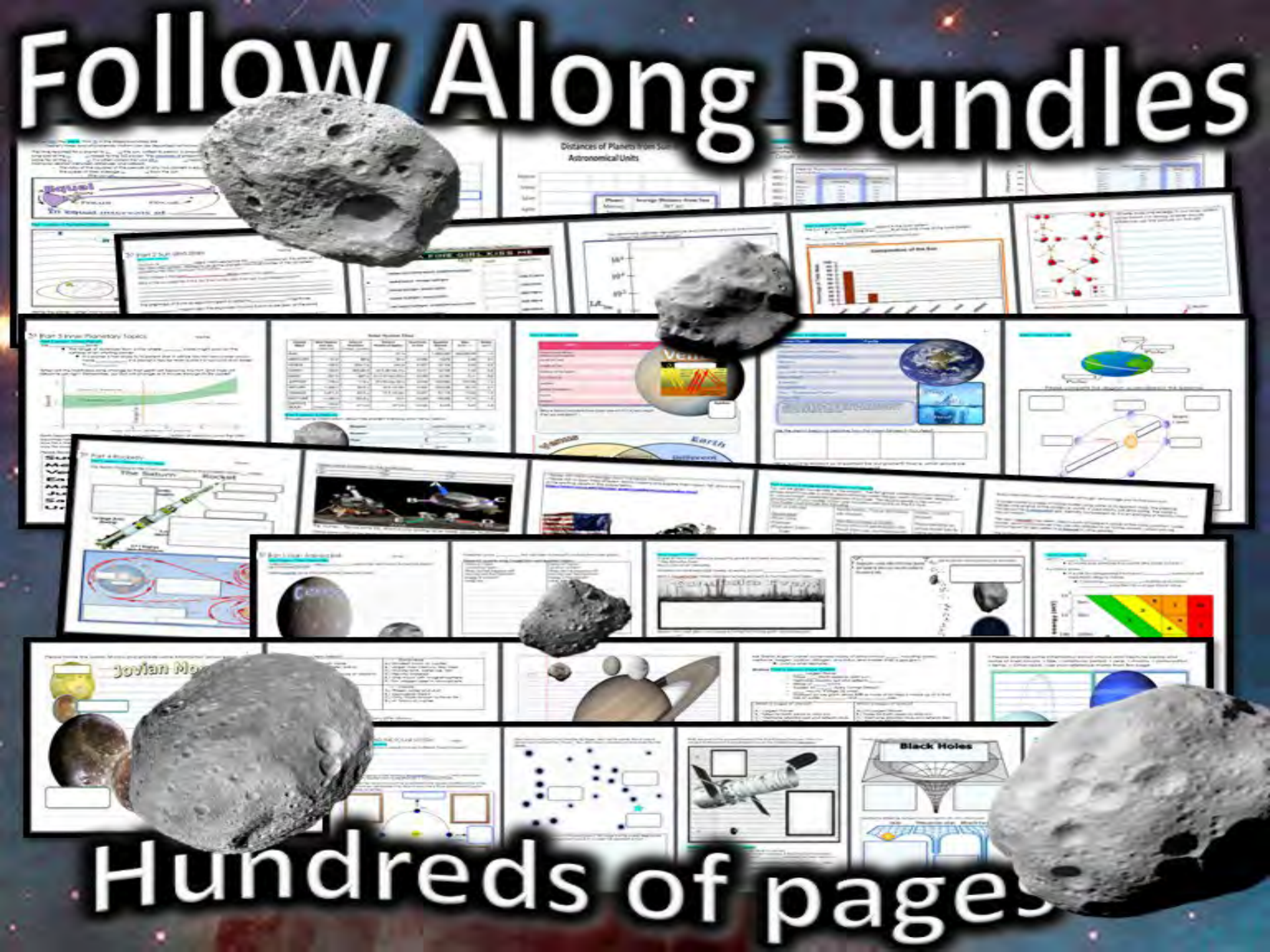
7 Units

INTERACTIVE SLIDESHOWS



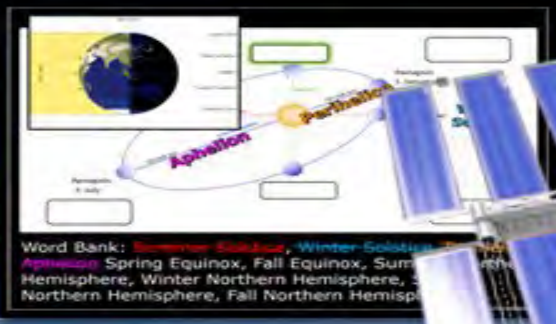


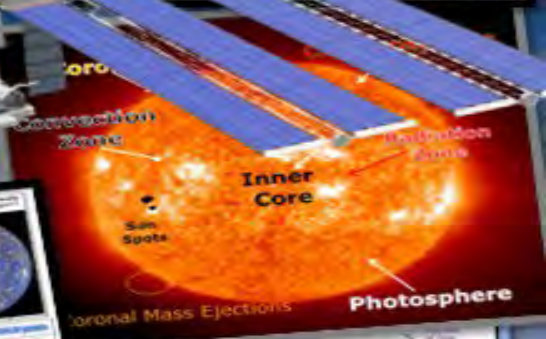
Follow Along Bundles



Hundreds of pages

Activities, Projects, Assessments, All Built-in



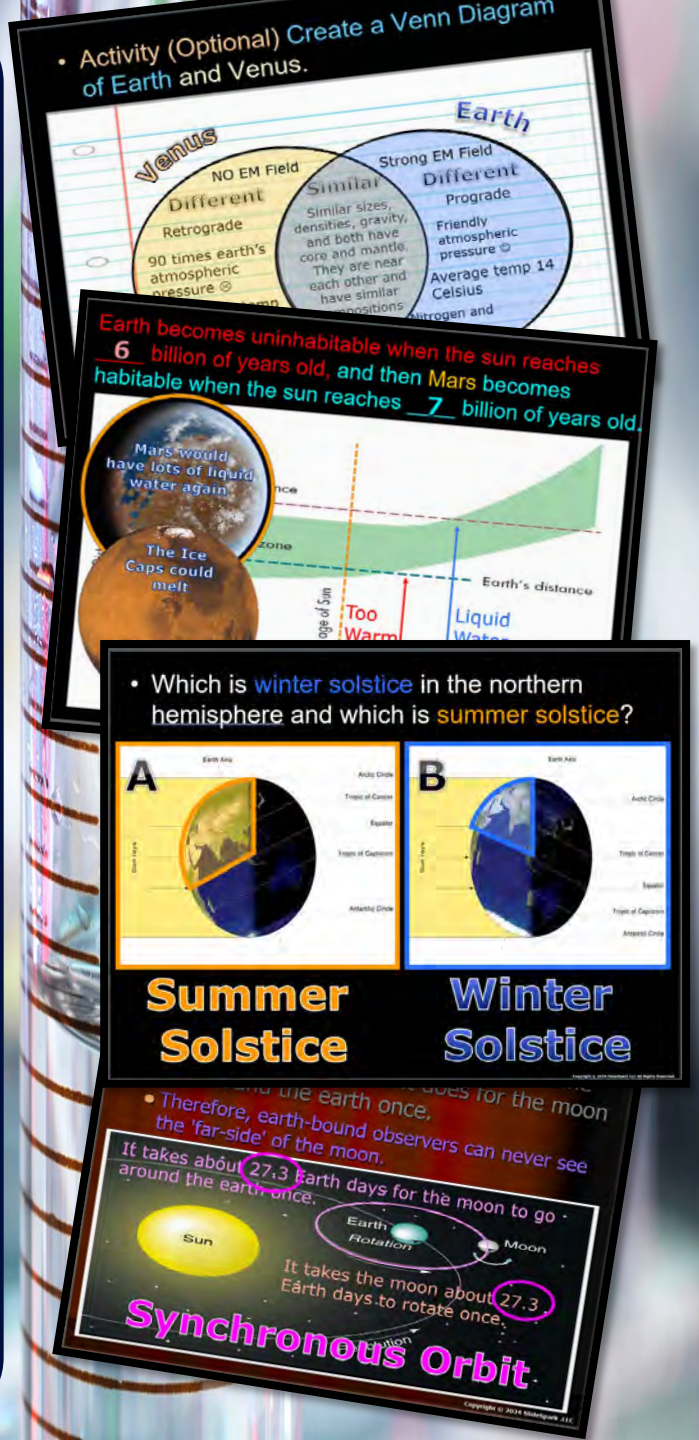


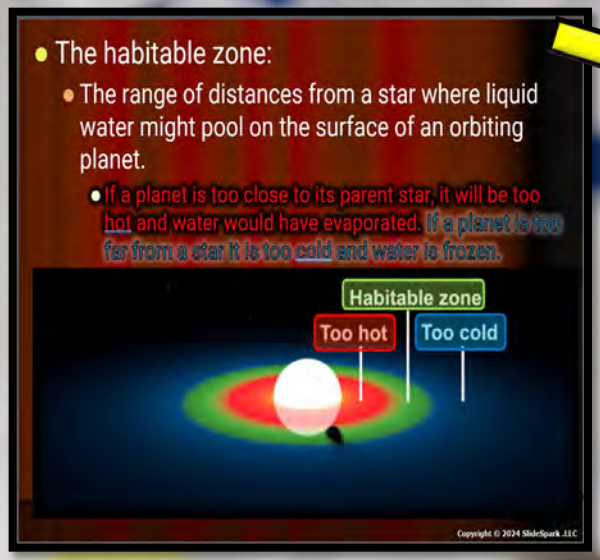
SlideSpark Science

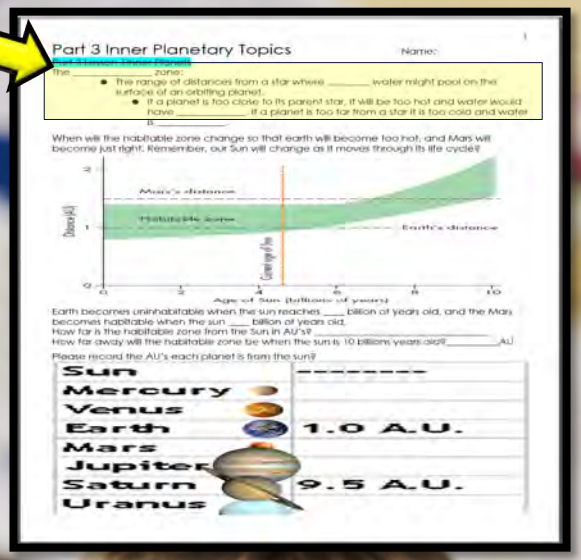
MIDDLE-LEVEL EDUCATIONAL RESOURCES

Interactive slideshows provide the roadmap for an amazing learning experience for students in grades 5-9. A Detailed set of work bundles chronologically follow the digital learning, providing a clear and intuitive roadmap to understanding. As the teacher or student advances through a slideshow, exciting hands-on activities, fantastic visuals, fill-in notes, review opportunities, video links, assessments, and much more are strategically placed throughout. Interactive learning unfolds step by step and supported by the work bundle to reach all types of learners. Everything you need to run to an amazing learning experience is provided in this one-of-a-kind science curriculum.

Each unit in the curriculum is designed to help teachers deliver the best possible learning experience for their students. Our interactive science slideshows are filled with questions and answers, important fill-in notes, hands-on activities, projects, games, built-in quizzes, and end of the unit assessment pieces. Students follow along with a work bundle that documents the entire learning experience for a fantastic review and assessment piece.

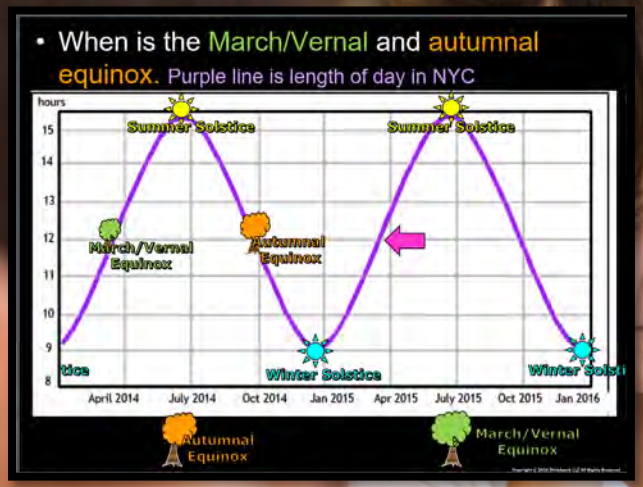


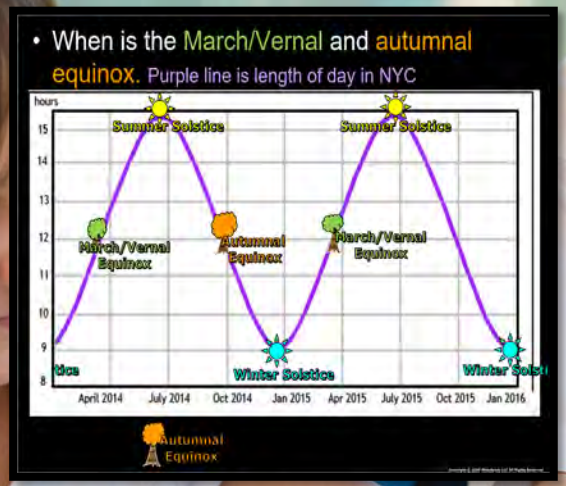


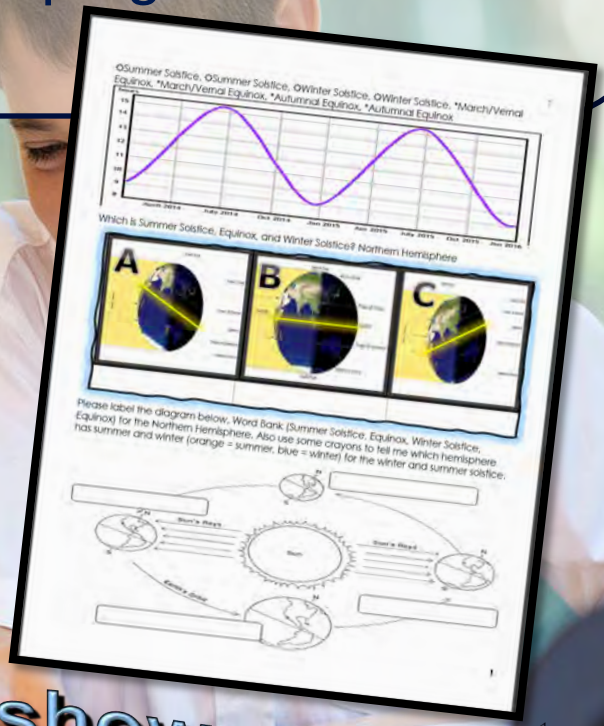


Red Slide Notes: Help students record important information in a fun and easy-to-understand way. Designed red-colored slides contain a few pieces of crucial information that students must record into their work bundle to complete the notes. Students will use these important notes throughout the work bundle.

The set-up of the slideshows are designed to make learning fun and interactive for students. With a mix of questions and answers, teachers can use these slides to get their students thinking and actively participating in their education. Plus, the answers are always revealed on the next slide, providing students with immediate feedback and helping teachers assess their understanding.







Next Slide

Slideshow supports Work Bundle

Lesson Planning

Daily lessons space exciting hands-on activities, red slide notes, video and academic links, projects, simulations, readings, built-in quizzes, and review opportunities throughout the slideshows. A typical day may have many different learning styles being targeted. Daily lesson planning becomes advancing through the slideshow roadmap the night before. Each lesson is roughly 50 minutes, but sometimes things can speed up or slow down. The best strategy is just to go at your classes own pace. The work bundle chronologically follows the interactive slideshow and you can always spend extra time assessing the quality of the writing within. If you don't quite finish a lesson, you can always pick it up the next day where you left off. The only real trick in timing is not starting a larger activity if you don't have the available time to complete. The slideshows have been designed to be a low stress, go at your classes own pace experience. Most activities are designed to be cost effective, using general materials that can be gathered from your local stores.

Example Part 3 Inner Planets

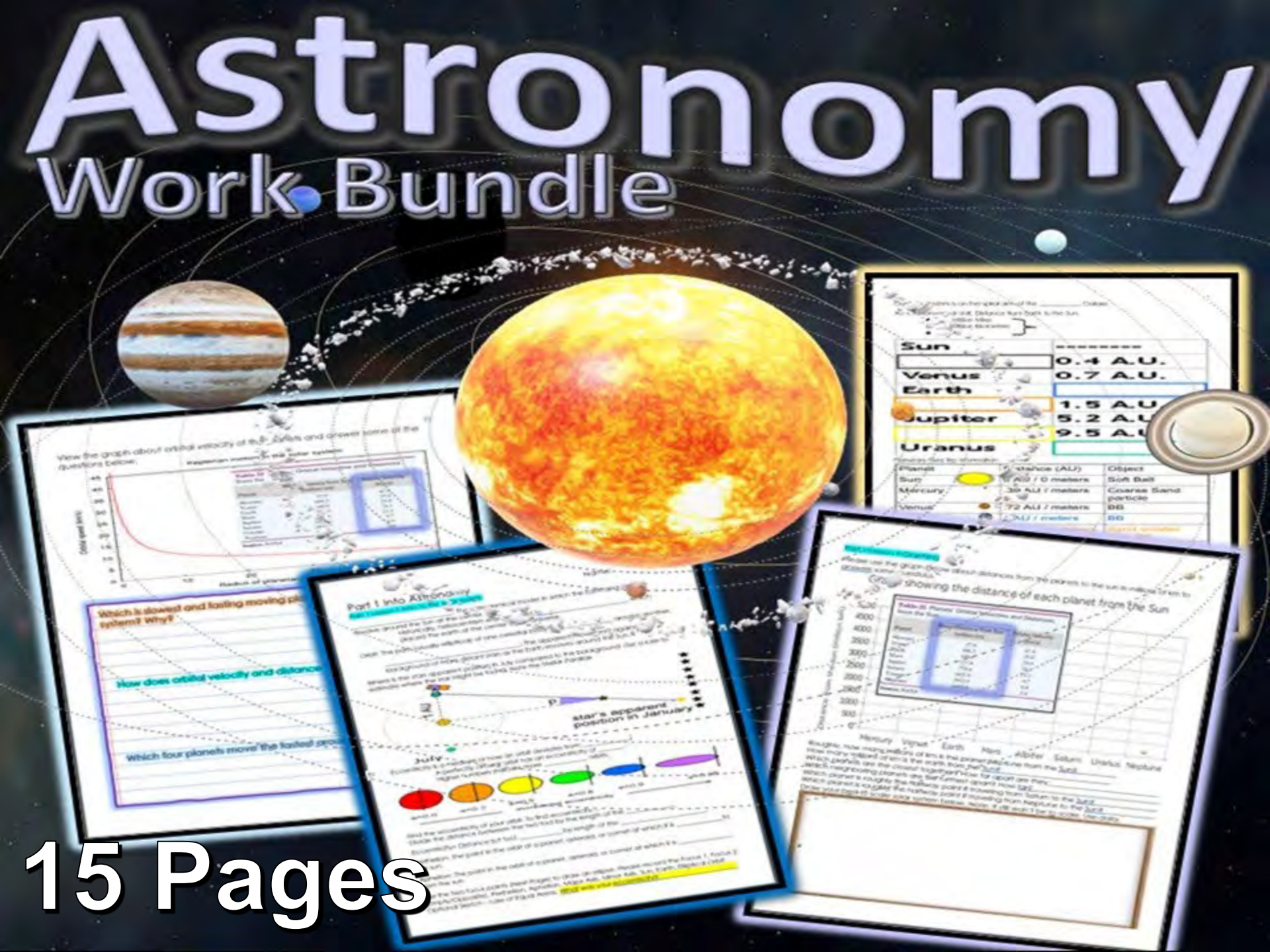
One clear, organized bundle guides students through notes, review, and assessments with ease.

Follow Along Work Bundle

Each science unit comes with several work bundles. The bundles should be printed before the unit begins and distributed to the students on the first day of the unit. The work bundles will be due shortly after the completion of the unit. The work bundle will become a resource for the review games, crossword puzzles, and will be collected for assessment. The work bundle follows the entire learning experience and will be used every day. They are chronological to the lessons and provide places to record fill-in notes, answer questions, collect data, graph and much more. An answer version is provided that can that be distributed to your support professionals. A digital version of the work bundle and some writable .pdf versions are provided if you want to go paperless. These work bundles are perfect for students looking for an easy and organized way to track their progress and stay on top of their studies.

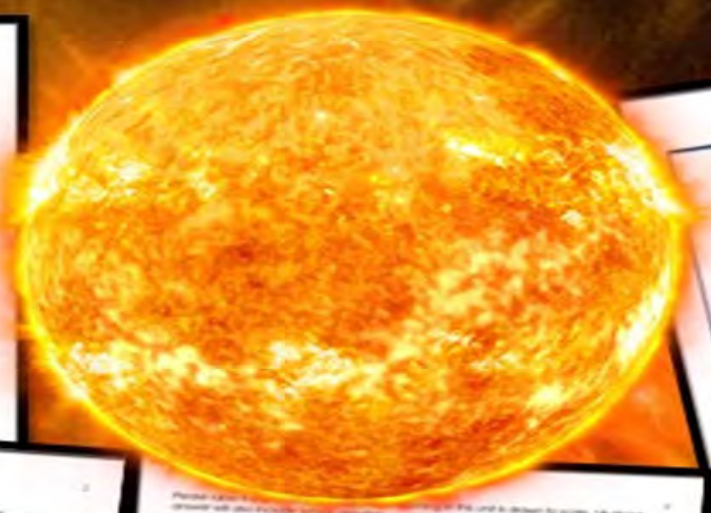
Astronomy

Work Bundle



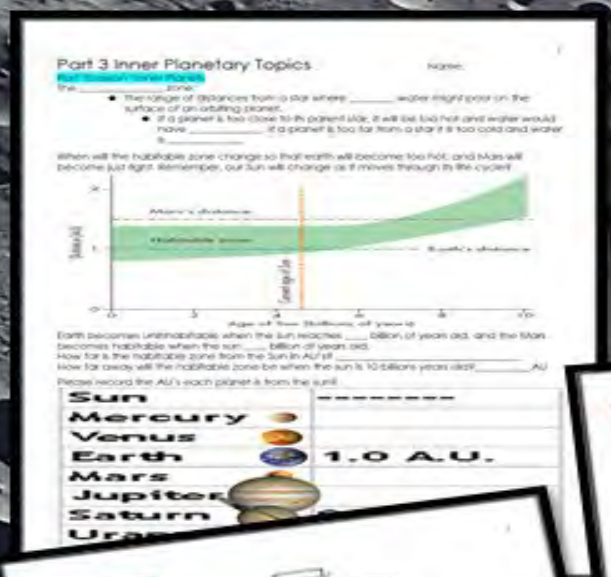
15 Pages

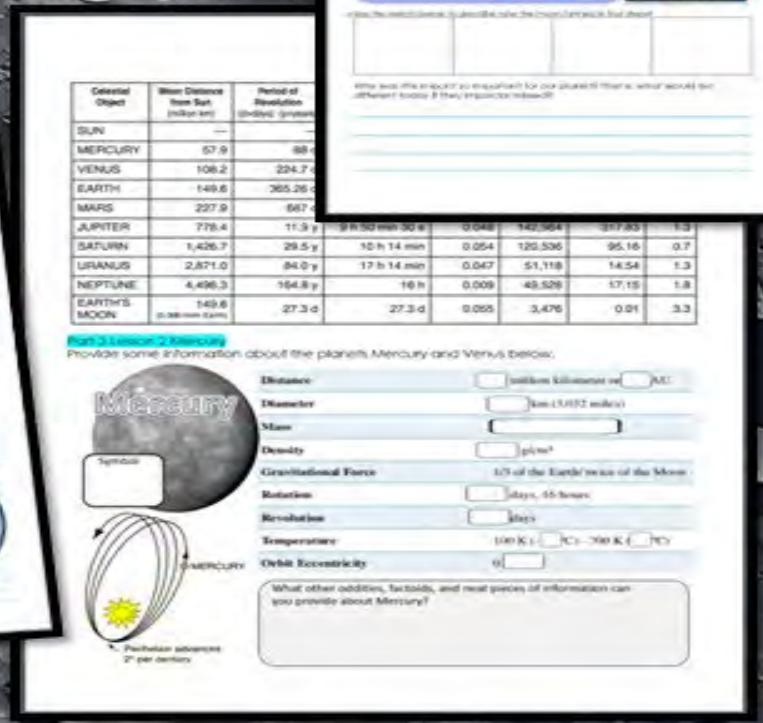
Sun and Stars

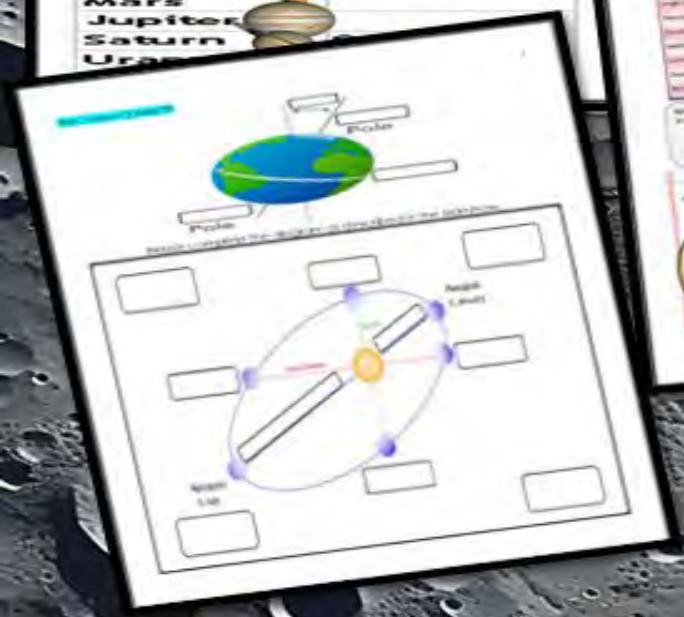


18 Pages

Inner Planetary Topics Work Bundle



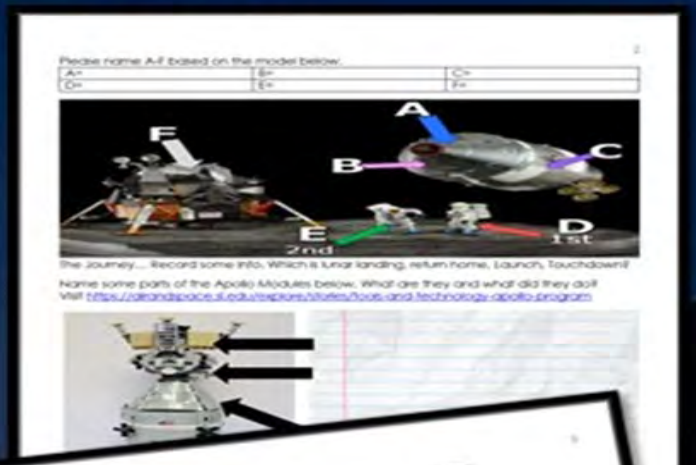


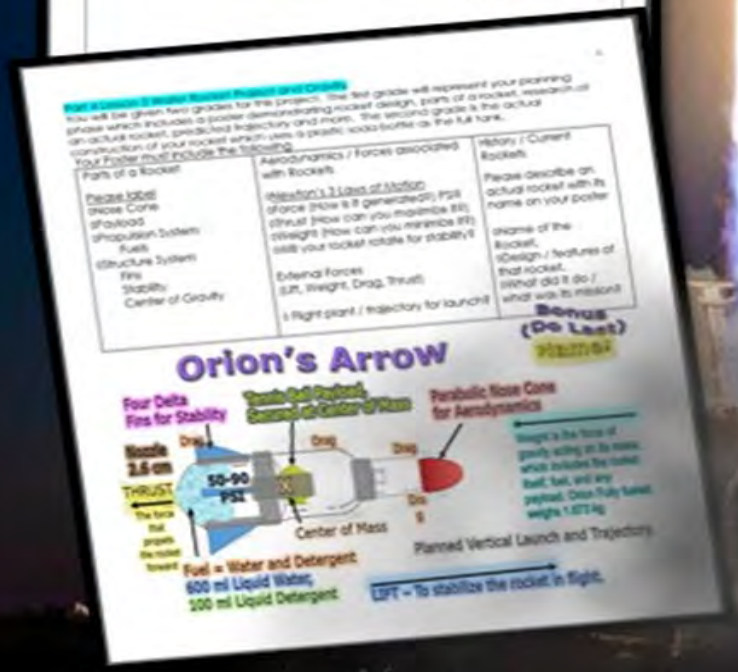


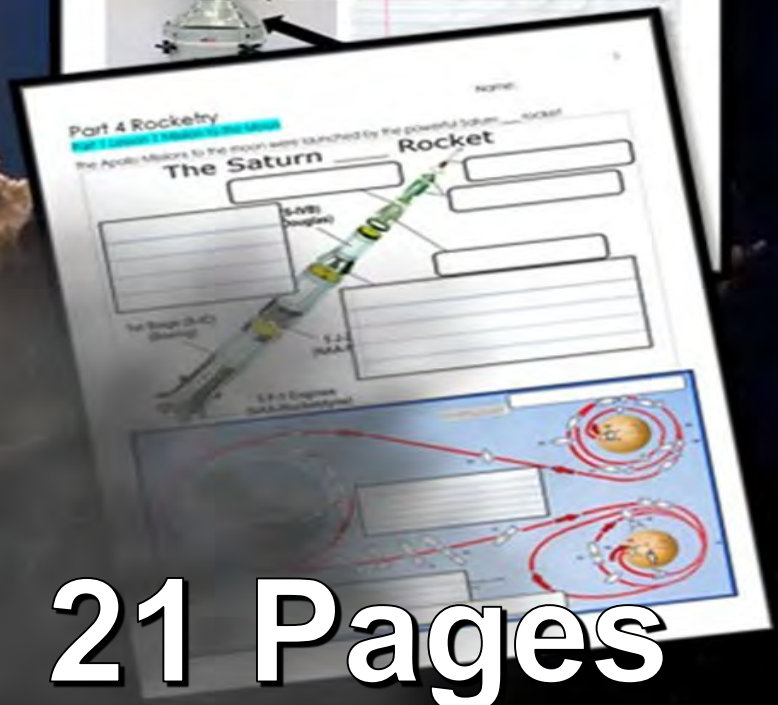
17 Pages

ROCKETRY

Work Bundle



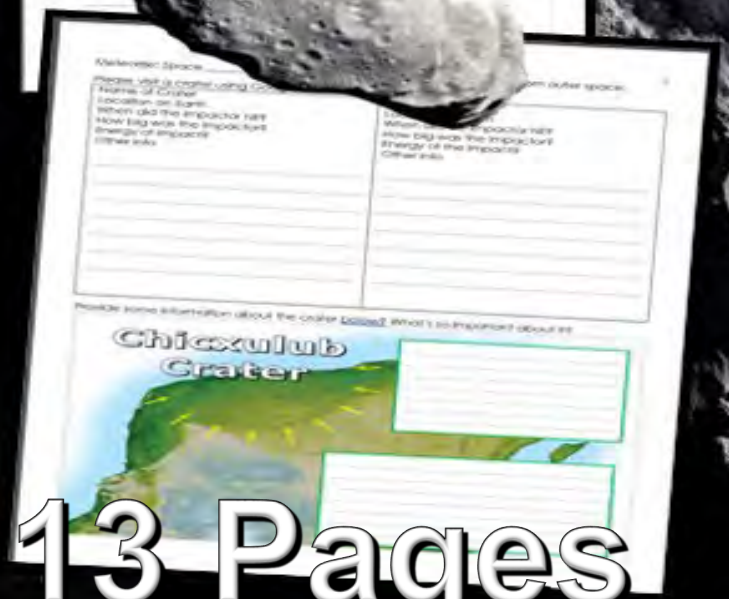




21 Pages

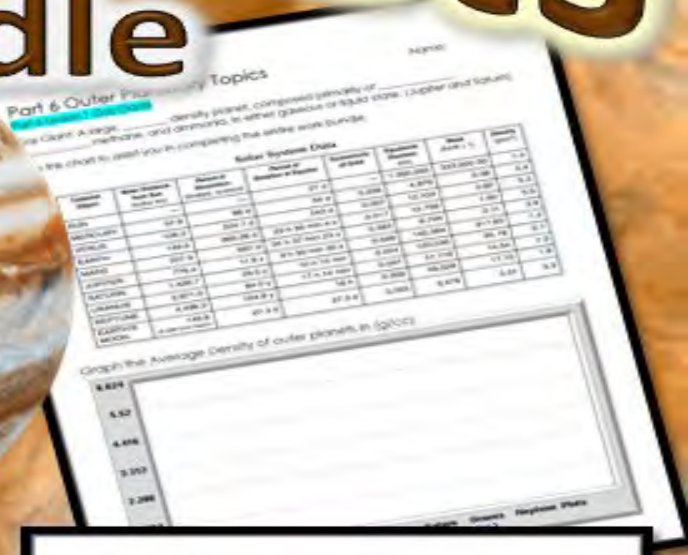
Asteroids, Meteors, Meteorites, NEO's

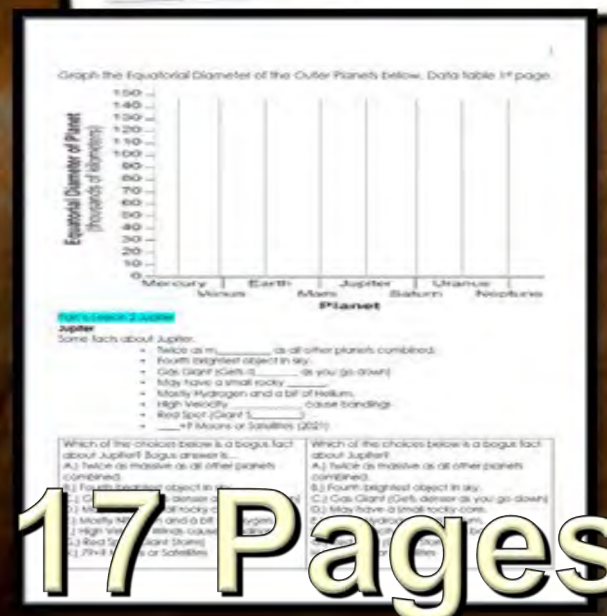
Work Bundle

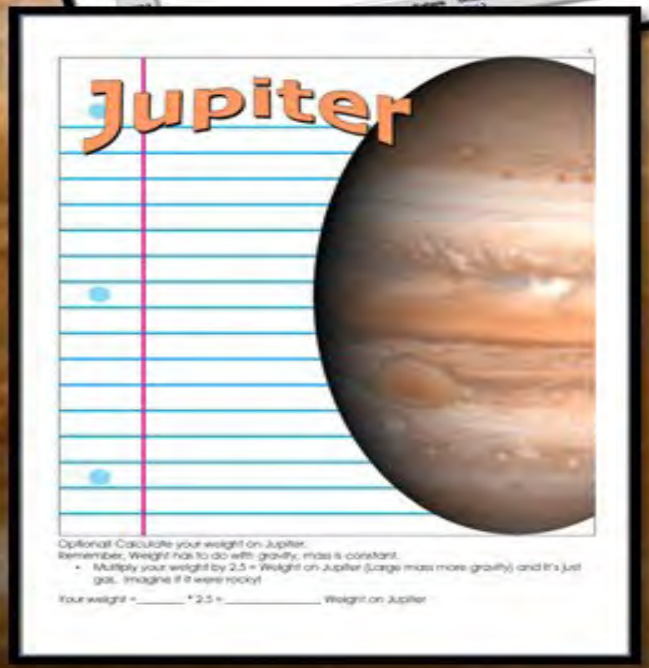


13 Pages

Outer Planets
Work Bundle



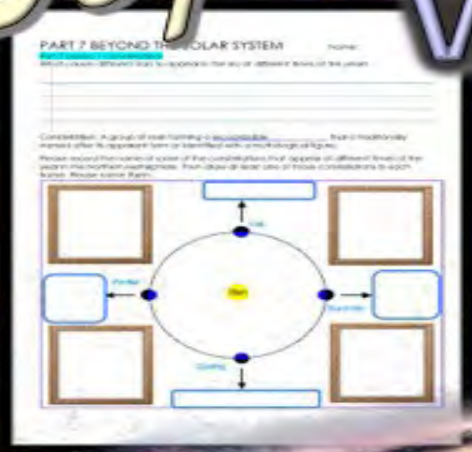


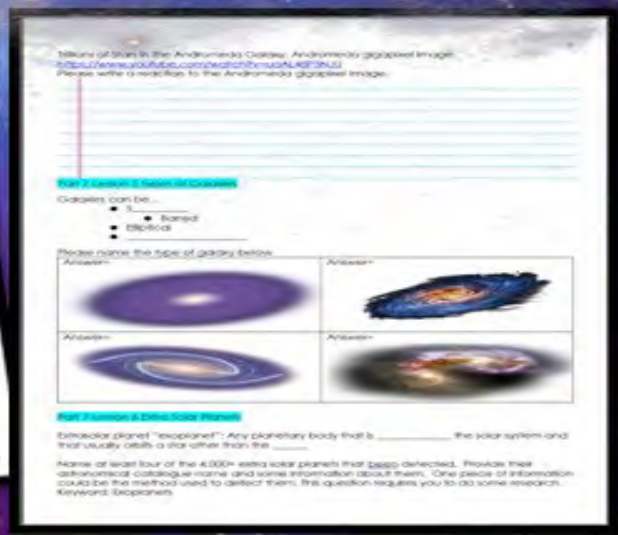


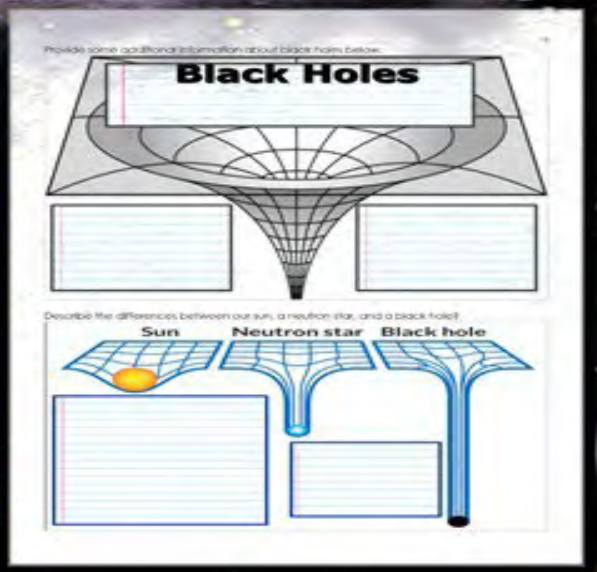
17 Pages

Beyond the Solar System

Work Bundle



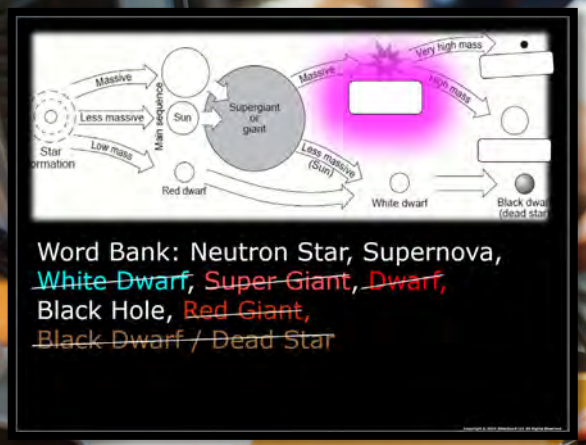


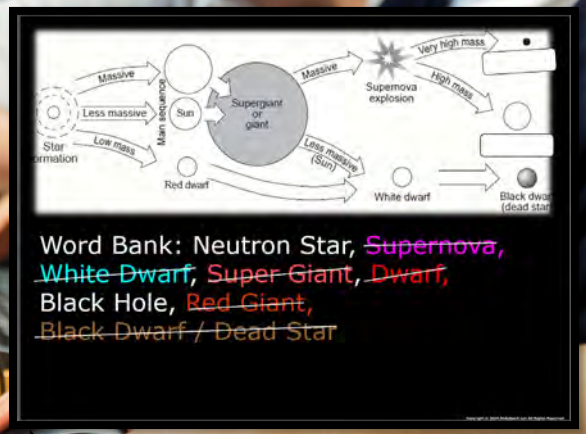


15 Pages

Built-in Questions and Assessments

Many slides will have relevant terms covered with a box. When advancing through the slideshow an outline around the box will glow with a bright color. The next slide will make the box disappear. These slides allow the teacher to call upon students or table groups / check for understanding before advancing. The team at SlideSpark has found that using this technique helps to keep the students focused. Constantly recalling and reviewing information learned is necessary when moving through a large unit. The slideshows don't just give everything away for free. Students should be able to demonstrate knowledge before moving on. Some slides have full questions instead of just covered terms. In these slides, the teacher should encourage small group work. The teacher can then call upon one or two groups to share before advancing the slide. The next slide will always reveal the correct answer.



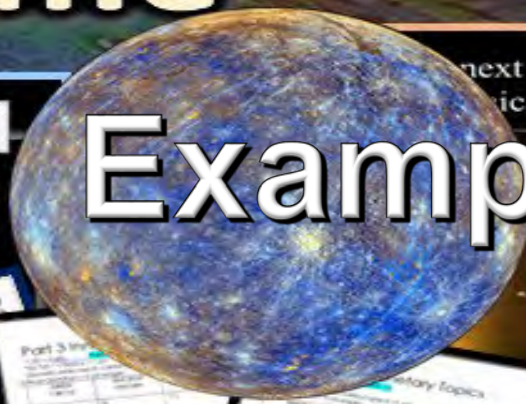


Review Game / Assessments

Each of the 11 Units concludes with a review quiz. Answers are provided in slideshow form so students can self assess. A blank template sheet is provided in the work bundle. Students can benefit from working together in small table groups with quiet communication. You can decide if you want to allow the use of work bundles or not. These are a nice review opportunity and get the students looking through their work bundles for the answers.

Inner Planetary Topics

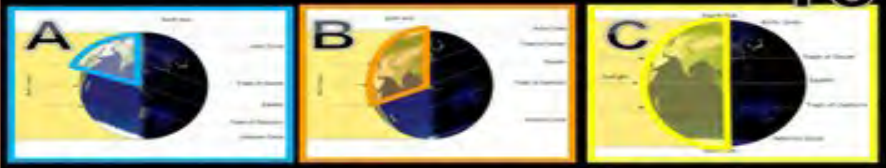
Quiz Game



Example Part 3

- Which is, equinox, winter solstice, and summer solstice in the northern hemisphere?

10



Winter Solstice | Summer Solstice | Equinox

Which is winter in the Northern Hemisphere?

9

Summer Southern Hemisphere

Equator gets even sunlight all year round

- Which is not true of the planet Earth

7

A.) Only planet known to support life.

B.) Complex system of land, water, and air.

C.) Largest of the inner planets.

D.) Most dense planet in the solar system

E.) Oceans (liquid water) can exist.

F.) Atmosphere, 78% Nitrogen and 21% oxygen, shields from radiation and keeps the planet's temperature just right.

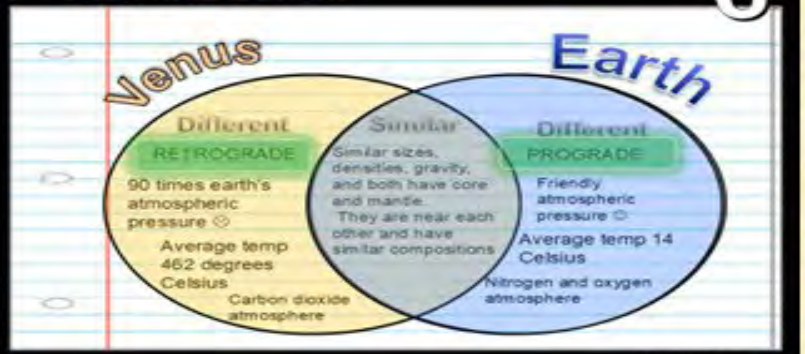
5.51 g/cm³

- W… …ears ago t… …e axial tilt, and i…

8

- Which two should be switched between Earth and Venus?

6



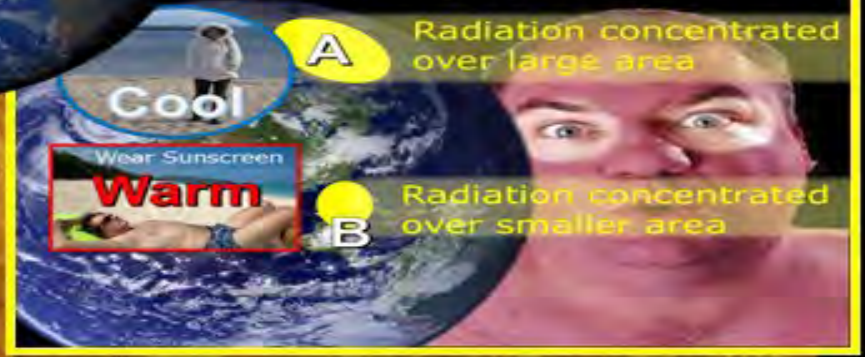
Name A and B?
Which one causes the larger tides?

15

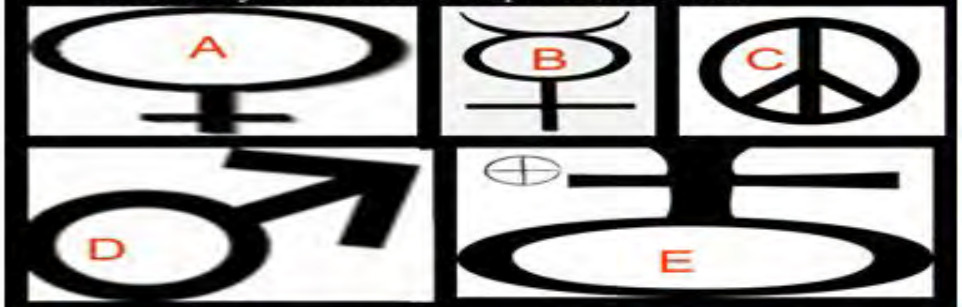
- Earth has a strong electromagne
protects the earth from charged par
– It also creates the Aurora borealis (Nor

a of the planet has hot weather year
d which is cooler year round?

11



- Which symbol below represents Mars?



Name A,B,C,D?

12

- What are the names of these two moons on Mars?

- What is the name of this giant canyon on Mars that dwarfs the Grand Canyon?

Valles Marineris

18

What's the name of these extinct volcanos on Mars.

17

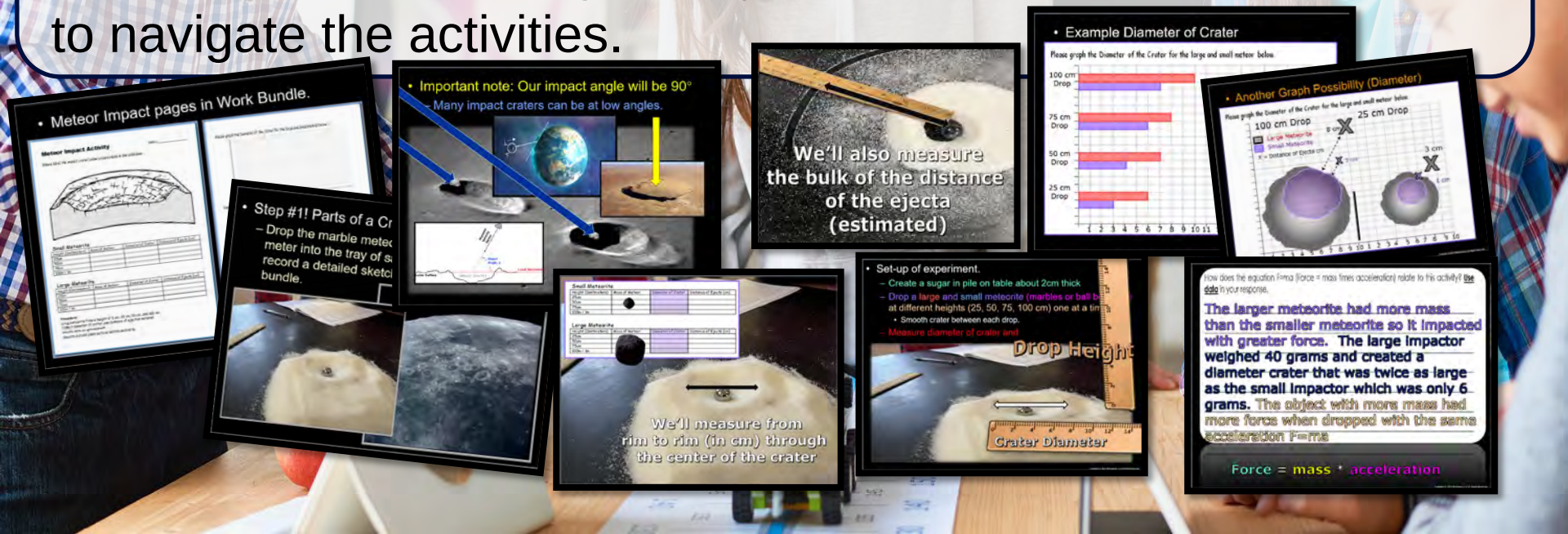
e the Lander and Rovers below? 19

- The photograph below provides some evidence that this use to cover the Martian surface?

16

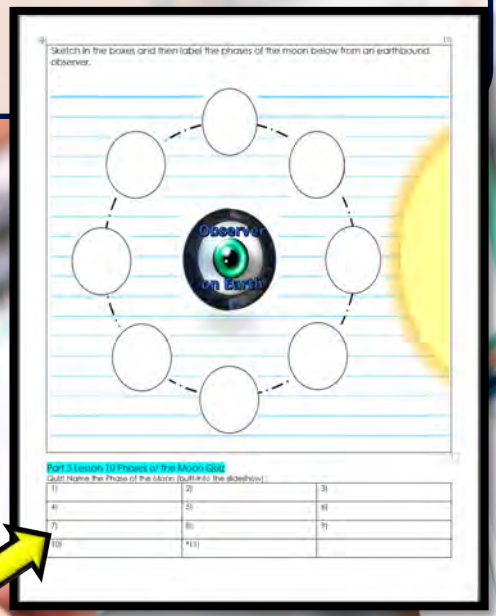
Activities

Our science activities are designed to help students explore and understand complex scientific concepts in an engaging and interactive way. Each science unit includes several hands-on activities that encourage students to collect data and think critically about the world around them. Our easy-to-follow slideshow provides detailed visuals, simple materials, and clear directions, making it easy for both students and teachers to navigate the activities.



Built-in Assessment

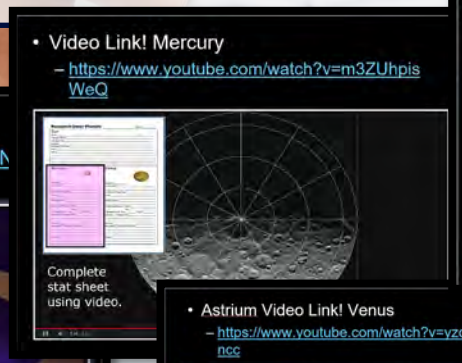
This unit contains built-in assessments that students answer in their work bundle. With the question revealed before the answer, the teacher can easily call on individual students or table groups to respond. These provide an effective and efficient way for teachers to assess student learning.

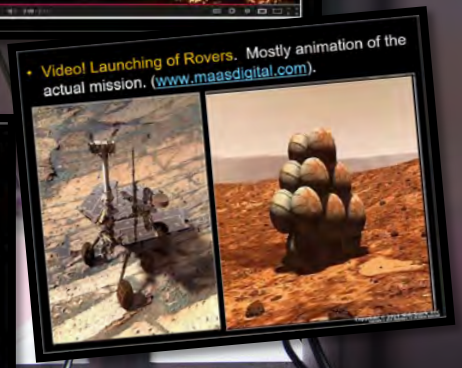


Quiz in Work Bundle

Built-in Video Links

Our science education program is designed with the modern, multimedia learner in mind, and our video links are a perfect complement to our educational materials. These short clips are embedded into the slideshow at just the right places for a fantastic review. Whether you're studying biology, chemistry or physics, our video links are an excellent way to reinforce your learning.





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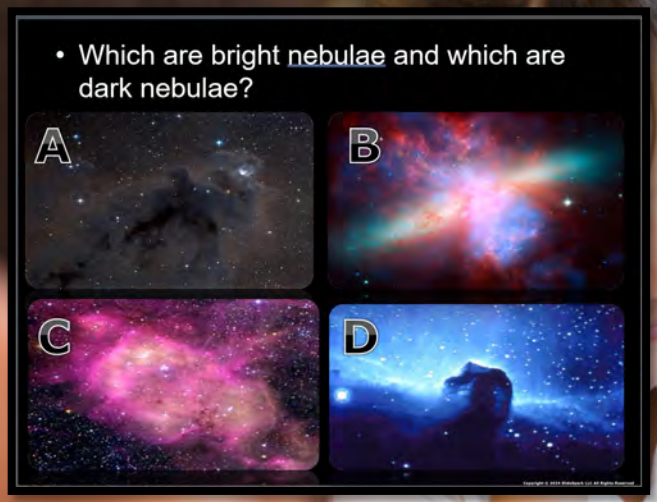
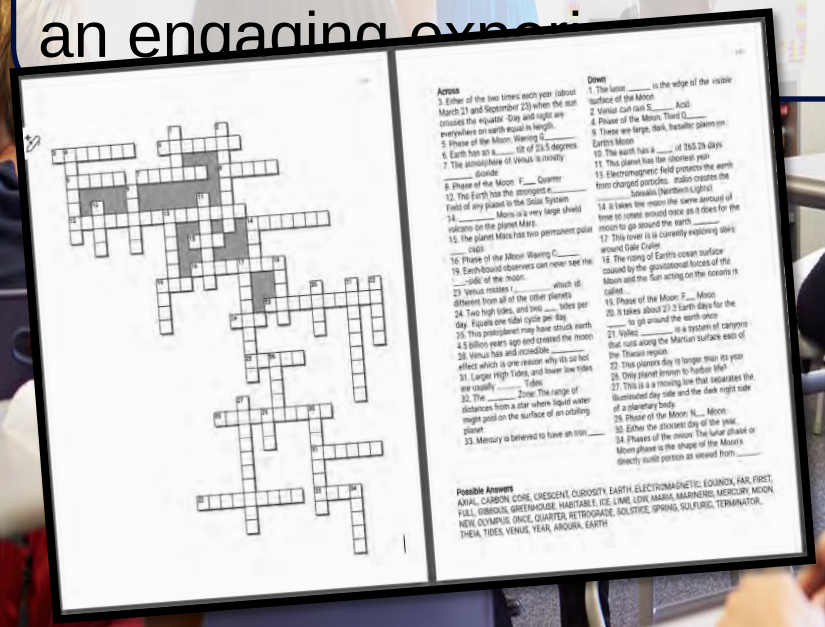


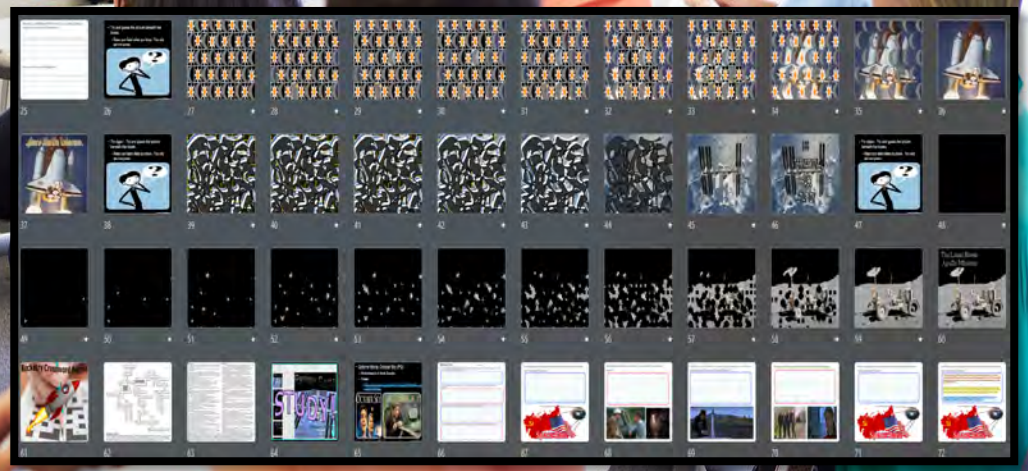
Next Slide

Slideshow supports Work Bundle

Games and Review

Games are a fantastic way for students to learn scientific concepts while having fun. We incorporate a variety of games into our curriculum, including interactive quizzes and puzzles that challenge students to think critically about the material. Our Hidden Box Games are a particularly popular feature, which conclude each unit by revealing a picture related to the topic. Students try to guess what the picture might be, making learning an engaging experi





The Owl - Each Part of the slideshow has a small clipart Owl hiding somewhere in a slide. The owl is incredibly small and blended into just the right slide. If a student spots the “Owl” they can raise their hand high into the air. When you call upon the student they can say “Owl" and be the student who spotted the Owl. Each PowerPoint Review game also has an owl hiding in it worth one point. Remind the students that they secretly write the word "owl" rather than yell it out during the review games. The Owl search is not included in every lesson. A slide at the beginning of the lesson will alert the students that today is an “Owl’ day. Everything arrives editable so delete if you wish. You will find that some students will become the expert owl hunters in the group.

Google Classroom Compatible

Our digital learning programs are designed for students to learn science in a flexible and engaging environment. Our Google Classroom-compatible units provide a seamless learning experience whether your students are in the classroom or learning from home. Our step-by-step slideshows and student work bundles ensure that students can complete their work independently. The PowerPoint Slideshows and step-by-step work bundles can easily be loaded to your Google Drive and posted in your Google Classroom. These are great for daily lessons, students who need additional time, and for a student who was absent and looking to catch up in their work bundle.

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Part 1 Lesson 1 Introduction ...
Google Slides

Part 1 Lesson 5 Review Game
Google Slides

Part 1 Lesson 2 Planetary M...
Google Slides

Part 1 Lesson 4 Graphing Wr...
Google Slides

Part 1 Lesson 3 Distances S...
Google Slides

Part 2 Lesson 5 Life Cycle o...

Google Slides

Part 2 Lesson 2 HR Diagram

Google Slides

Part 2 Lesson 1 The Sun

Google Slides

Part 2 Lesson 9 Solar Lunar ...

Google Slides

Part 2 Lesson 10 Review Ga...

Google Slides

Part 2 Lesson 7 Optional Su...

Google Slides

Part 2 Lesson 3 Inside the S...

Google Slides

Part 2 Lesson 4 Solar Flares

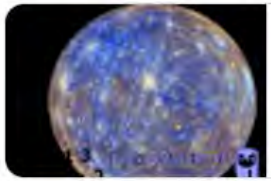
Google Slides

Part 2 Lesson 6 Solar Syste...

Google Slides

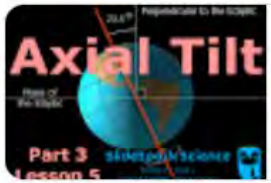
Part 2 Lesson 8 Shadows Su...

Google Slides



Part 3 Lesson 2 Mercury
Google Slides

Part 3 Lesson 9 Phases of M...
Google Slides



Part 3 Lesson 5 Axial Tilt
Google Slides

Part 3 Lesson 3 Venus
Google Slides

Part 3 Lesson 7 EM Field
Google Slides

Part 3 Lesson 4 Earth and M...
Google Slides

Part 3 Lesson 8 Phases of M...
Google Slides

Part 3 Lesson 10 Phases Quiz
Google Slides

Part 3 Lesson 1 Inner Planets
Google Slides

Part 3 Lesson 6 Solstice Equ...
Google Slides

Part 3 Lesson 11 Tides
Google Slides

Part 3 Lesson 12 Mars 1
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Part 3 Lesson 13 Mars 2
Google Slides

Part 2 Lesson 10 Review Ga...
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Part 4 Lesson 4 Space Shutt...

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Part 4 Lesson 1 Mission to t...

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Part 4 Lesson 3 Gravity Roc...

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Part 4 Lesson 2 Water Rock...

Google Slides

Part 4 Lesson 7 3rd Law of ...

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Part 4 Lesson 6 2nd Law of ...

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Part 4 Lesson 9 Review Game

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Part 4 Lesson 5 Newtons 1st...

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Part 4 Lesson 8 Rocketry Wr...

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Part 5 Lesson 3 NEOs
Google Slides

Part 5 Lesson 6 Review Game
Google Slides

Part 5 Lesson 5 Research an...
Google Slides

Part 5 Lesson 2 Tunguska Ev...
Google Slides

Part 5 Lesson 4 Impact Lab
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Part 6 Lesson 3 Jovian Moons
Google Slides

Part 6 Lesson 1 Gas Giants
Google Slides

Part 6 Lesson 5 Ice Giants
Google Slides

Part 6 Lesson 4 Saturn
Google Slides

Part 6 Lesson 7 Review Game
Google Slides

Part 6 Lesson 6 Outer Solar ...
Google Slides

Part 6 Lesson 2 Jupiter
Google Slides

Part 6 Lesson 7 Review Game
Google Slides

Part 7 Lesson 4 Pulsar Neut...

Google Slides

Part 7 Lesson 8 Review Game

Google Slides

Part 7 Lesson 7 Big Bang

Google Slides

Part 7 Lesson 3 Spacetime

Google Slides

Part 7 Lesson 5 Galaxies

Google Slides

Part 7 Lesson 2 Speed of Li...

Google Slides

Part 7 Lesson 6 Exoplanets

Google Slides

Astronomy Unit

Astronomy Unit

60 Lessons (6^{th} -8^{th} Medium Difficulty) Part 1 is 6 Lessons and 18 Page Work Bundle, Part 2 is 10 Lessons and 19 Page Work Bundle, Part 3 is 14 Lessons and 19 Page Work Bundle, Part 4 is 9 Lessons and 20 Page Work Bundle, Part 5 is 6 Lessons and 13 Page Work Bundle, Part 6 is 8 Lessons and 17 Page Work Bundle, Part 7 is 9 Lessons and 19 Page Work Bundle

Part 1: Astronomy Unit : Introduction to Astronomy, Copernicus, Heliocentrism, Galileo, Kepler's Laws of Planetary Motion, Ellipse, Perihelion, Aphelion, Orbits, Orbital Velocities, Eccentricity, Calculating Eccentricity, Astronomical Units, Distances in the Solar System, Graphing Planetary Data, Order of the Planets, Box Game Review, Crossword Puzzle, End Unit Assessment with Answer Version so Students can Self-Assess.

Part 2: Astronomy Unit: The Sun, Absolute Magnitude, Apparent Magnitude, Parsec, Stellar Classification / Spectra, Hertzsprung Russell Diagram, Composition of the Sun, Nuclear Synthesis, Layers of the Sun, Solar Flares, Coronal Mass Ejections, Carrington Event, Life Cycle of a Star, Blackhole, Neutron Star, Solar System Formation, Shadows, Sun Dials, Eratosthenes, Graphing Shadow length, Solar Eclipse, Lunar Eclipse, Path of Totality, Box Game Review, Crossword Puzzle, End Unit Assessment with Answer Version so Students can Self-Assess

Part 3: Astronomy Unit: The Habitable Zone, Important data about Mercury, Venus, Earth, Venn Diagram of Earth and Venus, Moon Formation Theories, Earth's Axial Tilt, Seasons on Earth, Equinox, Solstice, Earth's EM Field, Aurora borealis, Synchronous Orbit of the moon, Features of the moon, Phases of the Moon (with OREOS), Tides, Neap Tide, Spring Tide, Tidal Cycle, Reading a Tide Chart, Mars, Features on Mars, Moons of Mars, Rover Exploration, Missions Past and Future, End Unit Assessment with Answer Version so Students can Self-Assess

Part 4: Astronomy Unit: Rocketry, Apollo Missions, Parts of the Saturn V Rocket, Apollo Modules, Parts of a Rocket, Water Bottle Rockets, Newton's Laws, Lift, Drag, Thrust, Weight, Law of Gravitation, Einstein and Gravity, Spacetime, Space Shuttle Program, International Space Station, Future in Space, Box Game Review, Crossword Puzzle, End Unit Assessment with Answer Version so Students can Self-Assess

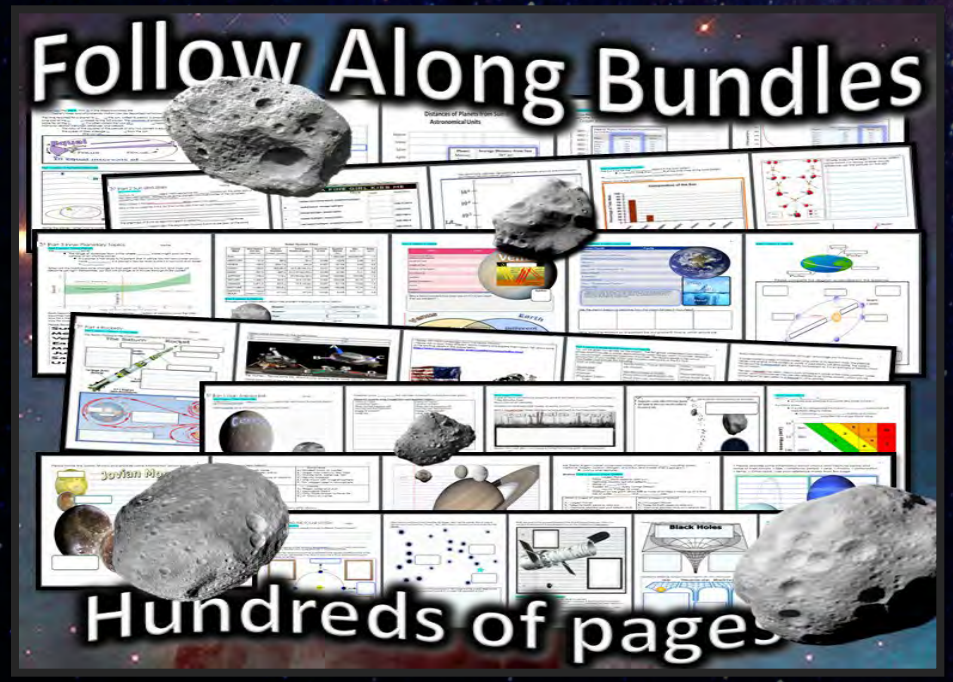
Part 5: Astronomy Unit : Main Asteroid Belt, protoplanet Ceres, Vesta, Meteors, Meteorites, Asteroids, Bolides, Chicxulub Crater, Tunguska Event, Chelyabinsk meteor, Craters, Parts of a Crater, Crater Impact Activity, NEO's, Torino Scale, Box Game Review, Crossword Puzzle, End Unit Assessment with Answer Version so Students can Self-Assess

Part 6 Astronomy Unit: The Outer Planets, Gas Giants, Ice Giants, Density of Outer Planets, Jupiter, Red Spot, Composition of Outer Planets, Jovian Moons, Saturn and its Moons, Uranus and its Moons, Neptune and its Moons, The Kuiper Belt, Demotion of Pluto, Oort Cloud, Comets, Box Game Review, Crossword Puzzle, End Unit Assessment with Answer Version so Students can Self-Assess

Part 7: Astronomy Unit: Constellations, Hubble Space Telescope, Spitzer Space Telescope, Speed of Light, Nebulas, Types of Nebulas, Galaxy, Type of Galaxies, Gravity, The Special Theory of Relativity , Blackholes, Neutron Stars, Spacetime, Pulsars, Quasars, Exoplanets, Hubble Deep Field, Beyond the Solar System, Black holes, Exoplanets, The Big Bang, Evidence for the Big Bang, Box Game Review, Crossword Puzzle, End Unit Assessment with Answer Version so Students can Self-Assess


Astronomy
Mega Bundle
Neutron Star
The Habitable Zone
Penumbra
Cooler
Warmer
Really Hot
7 Units


INTERACTIVE
SLIDESHOWS
Barred
Irregular
Elliptical
Neutron Star
NEBULA
Venus
Earth
Olympus Mons
Name A,B,C,D?
Equinox March 20th
Equinox September 20th
Secure with Duct Tape

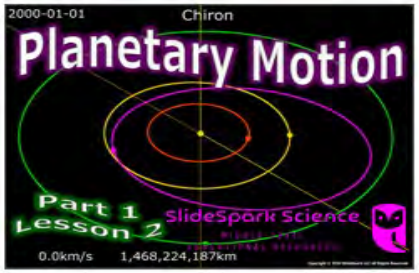

Follow Along Bundles
Hundreds of pages


Activities, Projects,
Assessments, All Built-in
Our Sun
The size and color tell us where the star is in its life cycle.
Johannes Kepler
Galileo Galilei
Nicholaus Copernicus
Eccentricity
Cooler
Warmer
Really Hot

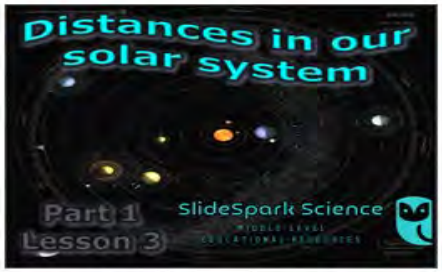
Introduction to Astronomy, Copernicus, Heliocentrism, Galileo, Kepler's Laws of Planetary Motion, Ellipse, Perihelion, Aphelion, Orbits, Orbital Velocities, Eccentricity, Calculating Eccentricity, Astronomical Units, Distances in the Solar System, Graphing Planetary Data, Order of the Planets, Box Game Review, Crossword Puzzle, End Unit Assessment with Answer Version so Students can Self-Assess

Part 1: Astronomy Unit

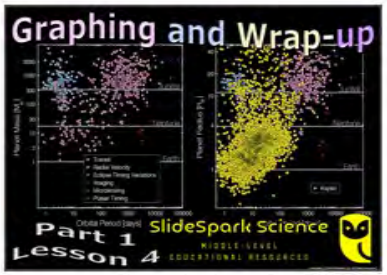
Part 1 Lesson 1 Introduction Kepler



Part 1 Lesson 2 Planetary Motion



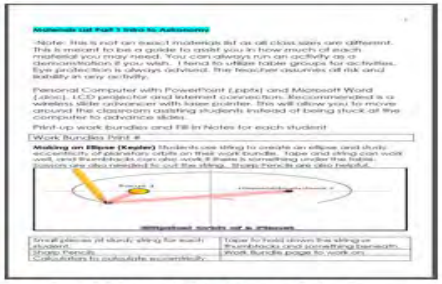
Part 1 Lesson 3 Distances Solar System

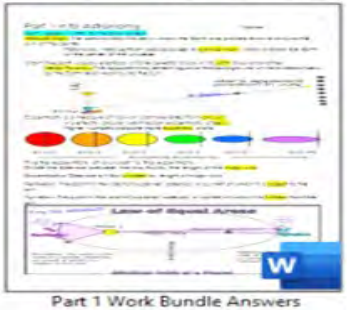


Part 1 Lesson 4 Graphing Wrap Up

Part 1 Lesson 5 Review Game

Part 1 Lesson 6 Review Game Answers


Part 1 Materials List Intro to Solar System


Part 1 Work Bundle Answers


Part 1 Work Bundle Digital


Part 1 Work Bundle Print


Part 1 Work Bundle Writable pdf

Planetary Motion Unit

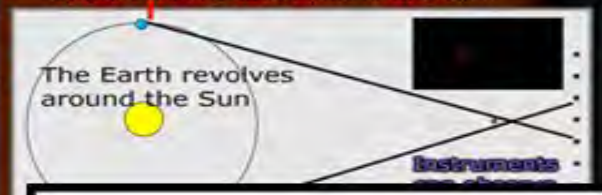
- The terms below are a measurement of how an orbit deviates from circular.
  - A perfectly circular orbit has an eccentricity of zero.
  - Higher numbers indicate more eccentric orbits.

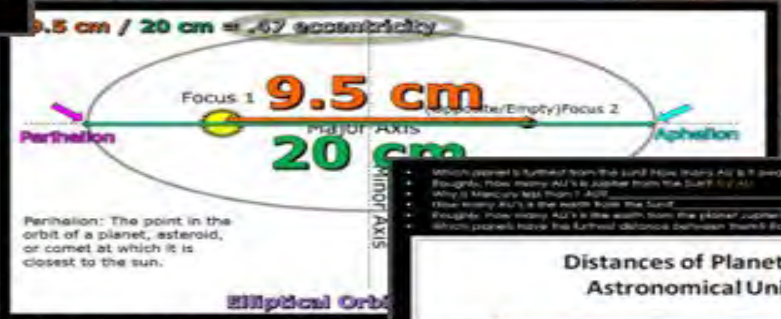
10

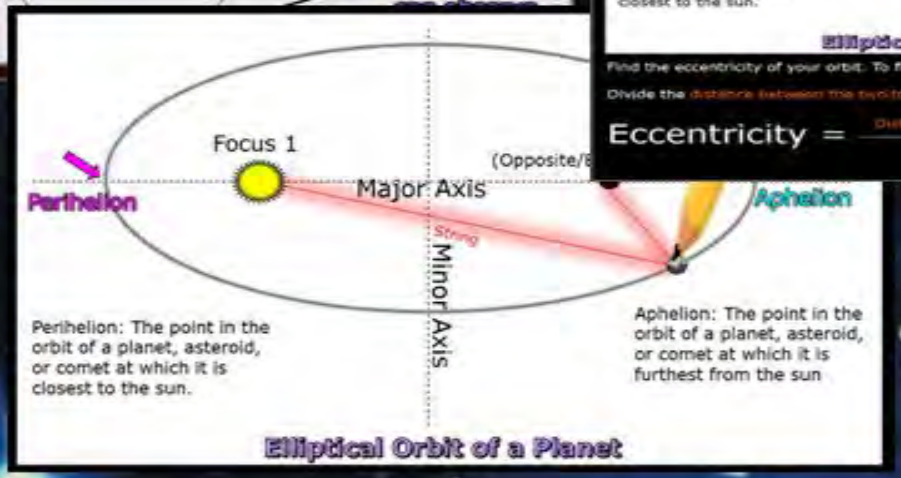
- Kepler's three laws of planetary motion can be described as follows
  - An imaginary line drawn from the center of the sun to the center of the planet will sweep out equal areas in equal intervals of time.
    - (The Law of Equal Areas)

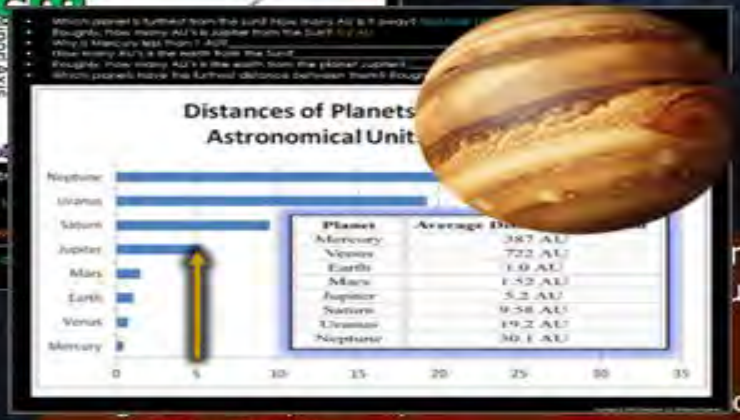
- Galileo Galilei (1564 -1642)
  - Italian physicist, mathematician, astronomer, and philosopher.
  - Played a major role in the Scientific Revolution.
  - His achievements include improvements to the telescope, astronomical observations, and support for Copernicanism.

against the background of more distant stars as the Earth revolves around the Sun.

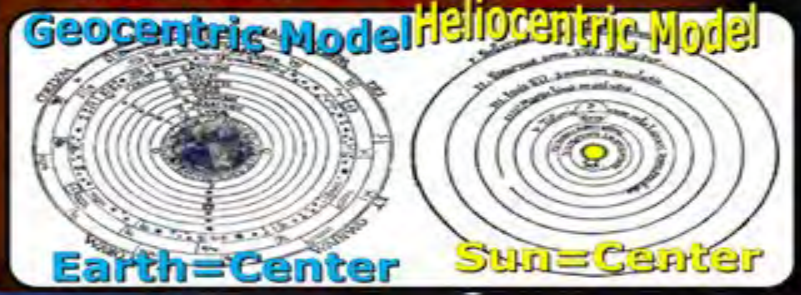






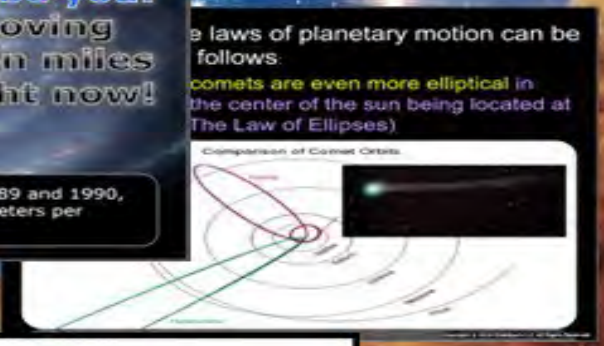


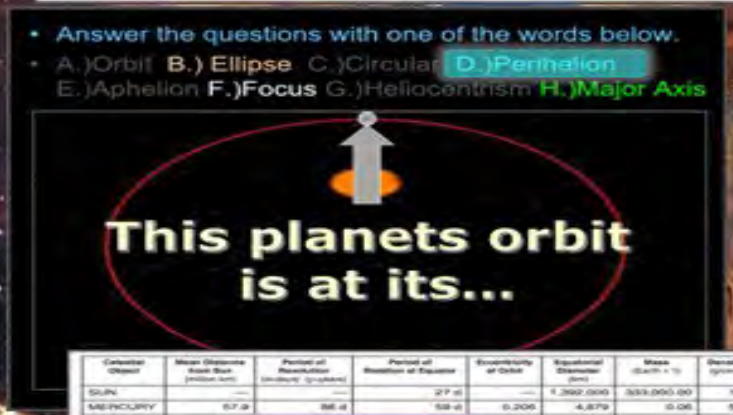
of the universe.

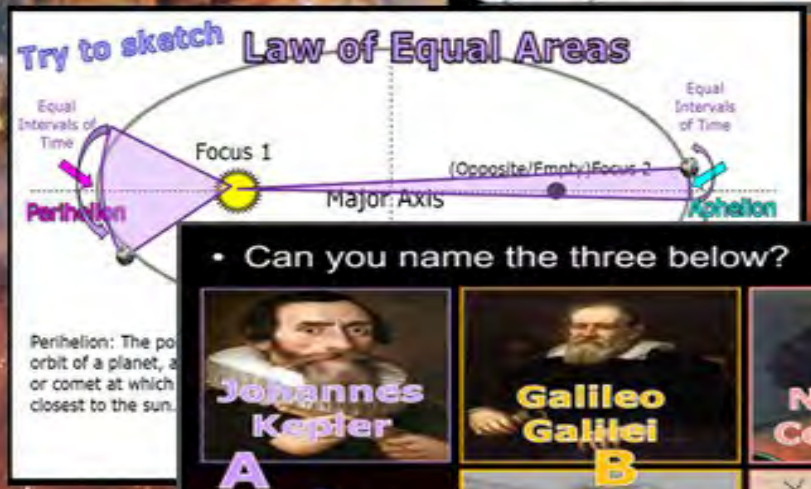


6 Lessons

Interactive Slideshows







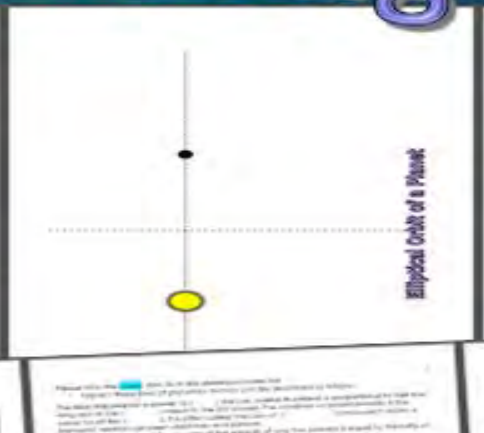
Celestial Object	Mean Distance from Sun (million km)	Period of Revolution (Orbital) (y=years)	Period of Rotation at Equator	Eccentricity of Orbit	Equatorial Diameter (km)	Mass (Earth = 1)	Density (g/cm³)
SUN	—	—	27 d	—	1,392,000	333,000.00	1.4
MERCURY	57.9	88 d	59 d	0.206	4,879	0.06	5.4
VENUS	108.2	224.7 d	243 d	0.007	12,104	0.82	5.2
EARTH	149.6	365.26 d	23 h 56 min 4 s	0.017	12,756	1.00	5.5
MARS	227.9	687 d	24 h 37 min 23 s	0.093	6,794	0.11	3.9
JUPITER	778.4	11.9 y	9 h 50 min 30 s	0.048	142,984	317.83	1.3
SATURN	1,426.7	29.5 y	10 h 14 min	0.054	120,536	95.16	0.7
URANUS	2,871.0	84.0 y	17 h 14 min	0.047	51,118	14.54	1.3
NEPTUNE	4,498.3	164.8 y	16 h	0.009	49,528	17.15	1.8
EARTH'S MOON	149.6 (0.386 from Earth)	27.3 d	27.3 d	0.055	3,476	0.01	3.3

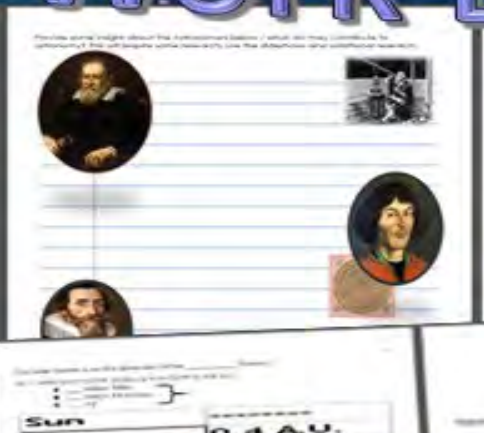
1 day on Venus = 243 Earth days
1year on Venus = 225 Earth days

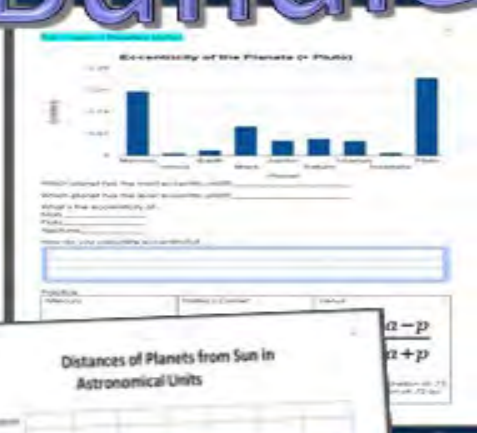
Which planets day is longer than its year?
Which planets have roughly the same lengths of their day?

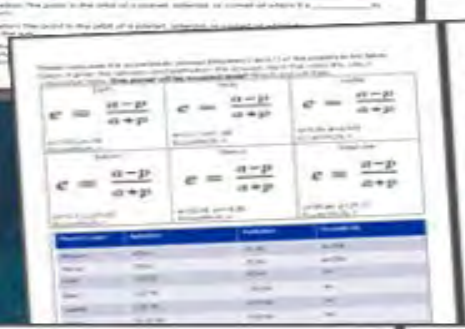
Neptune 164.8 years
Jupiter 9h 50 min
27 days
Mercury .2
Venus and Earth
317.83
Mercury by 1403 km
Earth 5.5 g/cm3
Saturn .7g/cm3
Venus

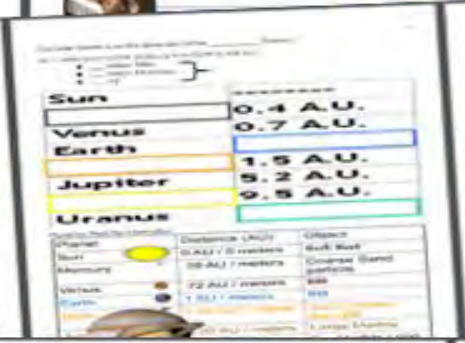
Follow Along Work Bundle

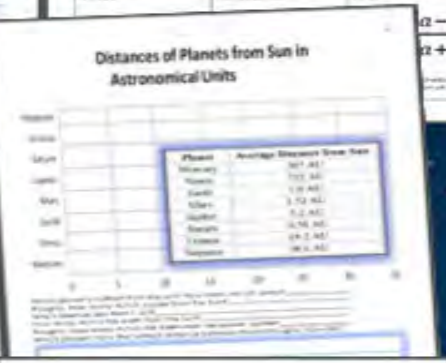


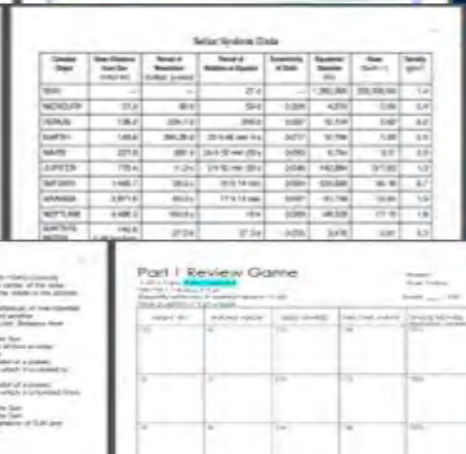


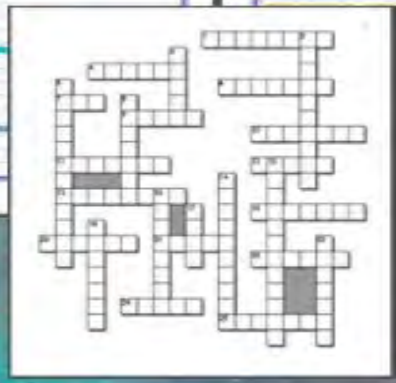






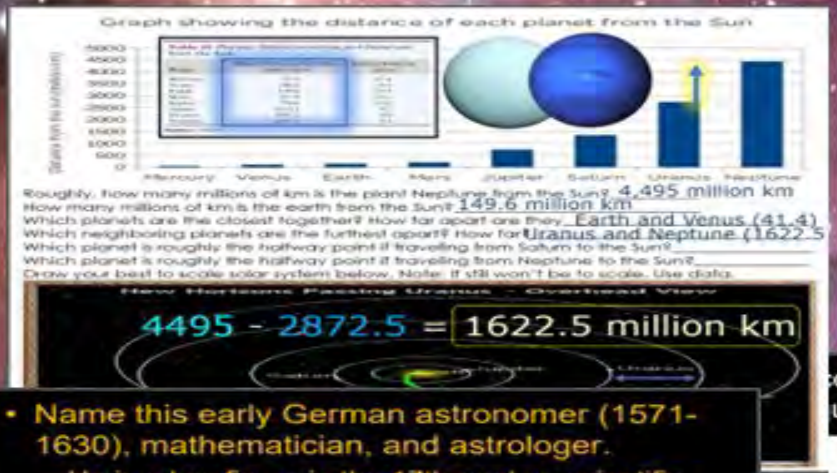


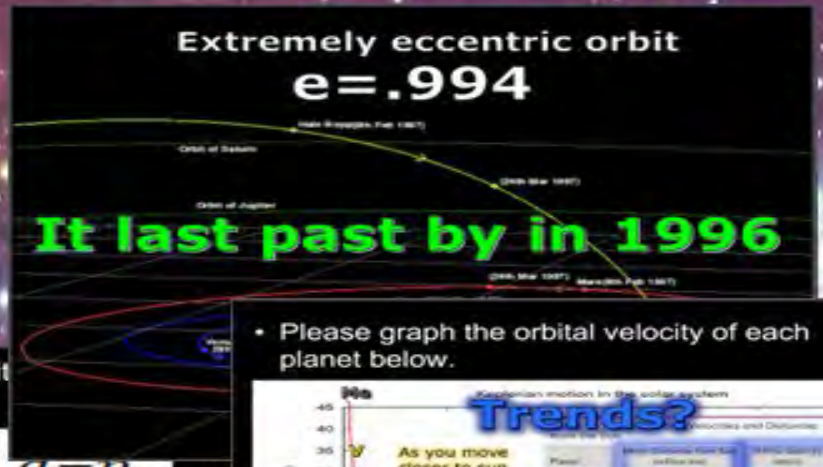




15 Pages

Notes, Activities, Keys, Assessments, Games, and more all built-in





- Name this early German astronomer (1571-1630), mathematician, and astrologer.
  - He is a key figure in the 17th-century scientific revolution
  - Best known for his laws of planetary motion.

6

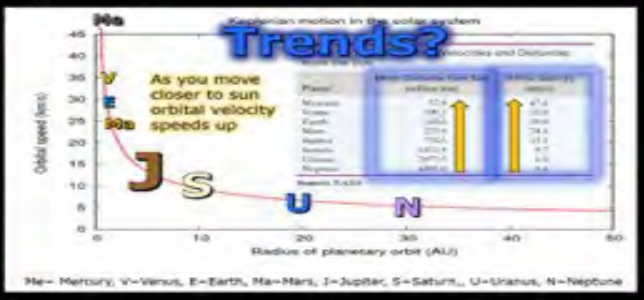
$$e = \frac{a-p}{a+p}$$

.78 au

Mercury has an aphelion of .31 au. .16 / .78 = .20

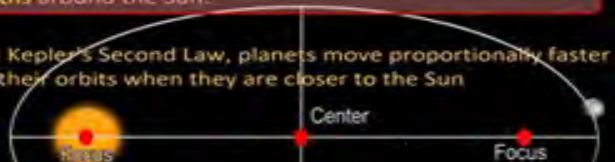
What's the eccentricity of Merc
(note: it will always be between 0 and 1)

- Please graph the orbital velocity of each planet below.



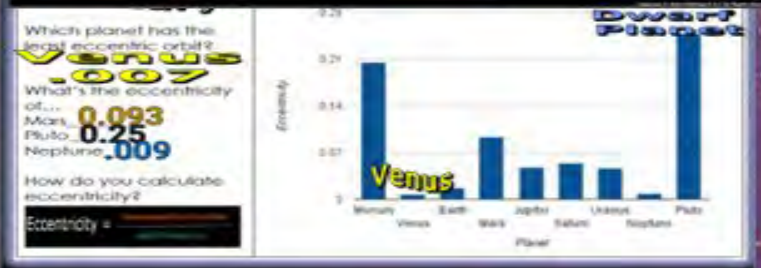
Kepler used simple mathematics to formulate three laws of planetary motion.

A.) Kepler's First Law stated that planets move in elliptical paths around the Sun.



B.) Kepler's Second Law, planets move proportionally faster in their orbits when they are closer to the Sun

C.) Kepler's Third Law explained the relationship between the distance of a planet from the Sun and the amount of time it took to orbit the Sun. Together these laws of celestial mechanics revolutionized astronomy.



Eccentricity = Distance between the two Focus Points / Length of the major axis

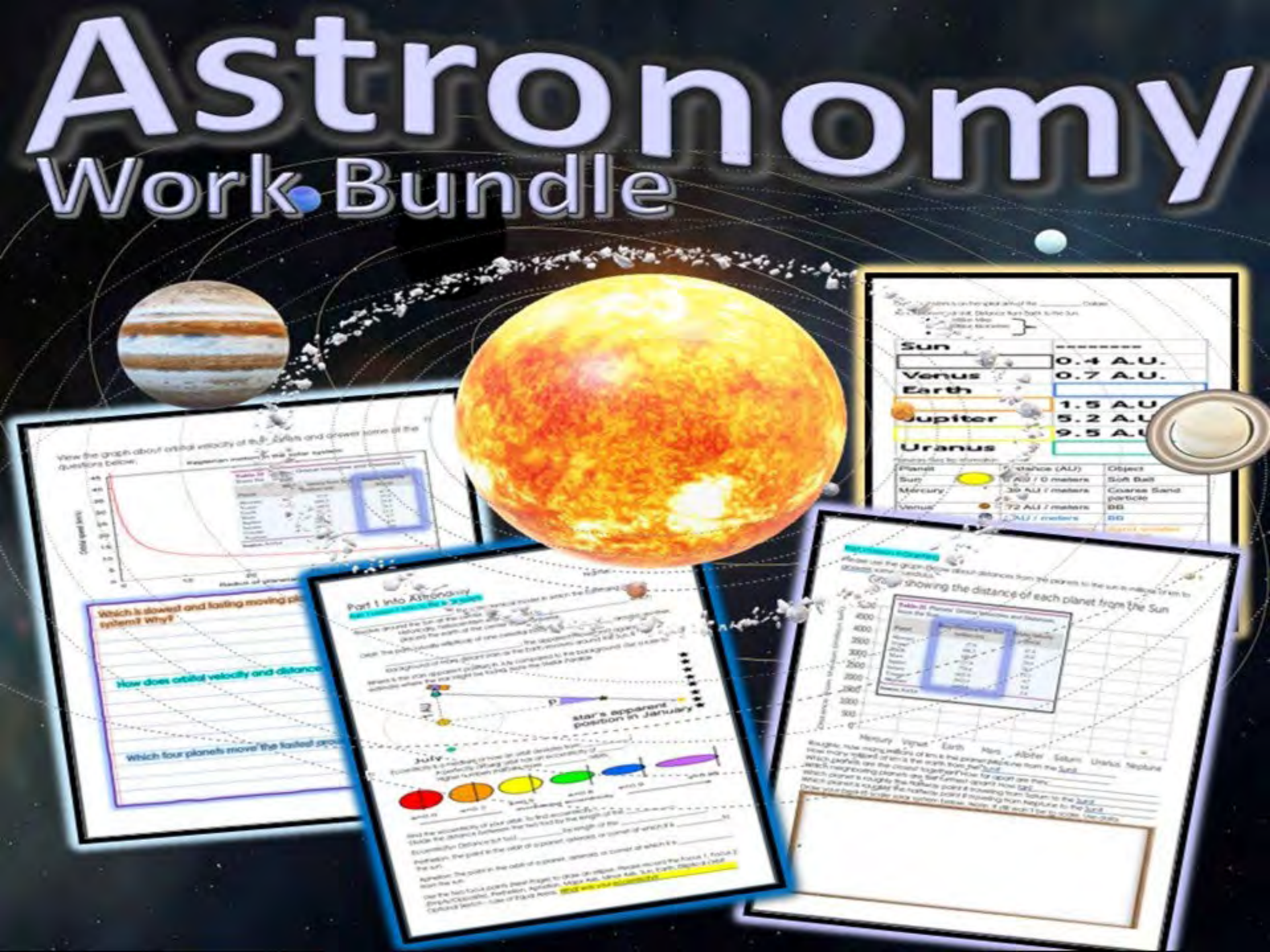
Planet	Aphelion
Mercury	.47
Venus	.73
Earth	1.02
Mars	1.67
Jupiter	5.46
Saturn	10.12
Uranus	20.08
Neptune	30.44

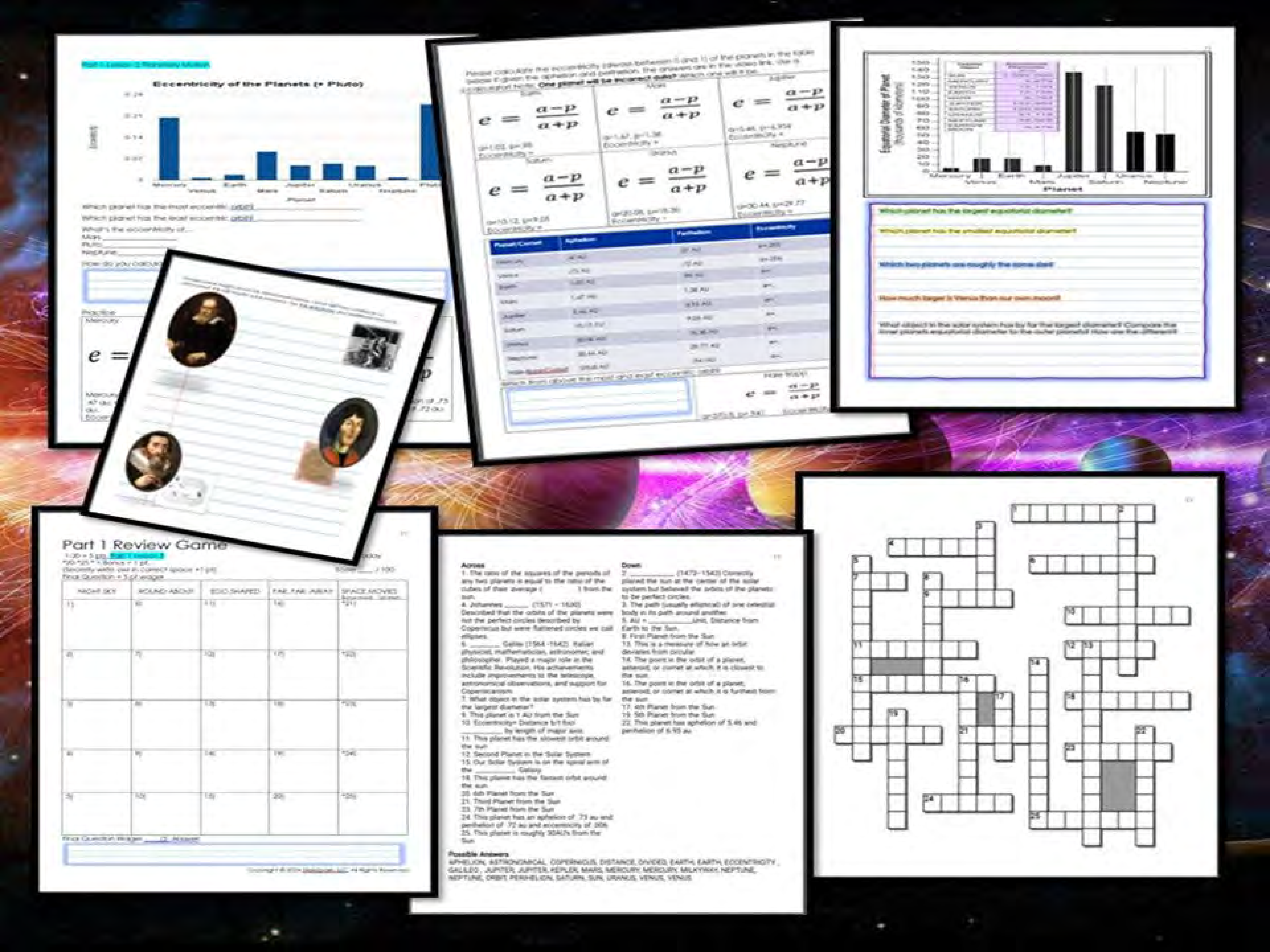
$$e = \frac{a-p}{a+p}$$

Aphelion: The point in the orbit of a planet, asteroid, or comet at which it is furthest from the sun

Perihelion: The point in the orbit of a planet, asteroid, or comet at which it is closest to the sun.

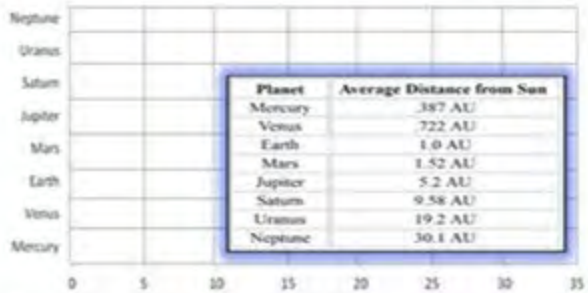
Astronomy Work Bundle





Eccentricity of the Planets (+ Pluto)
Part 1 Review Game
NIGHT SKY
ROUND ABOUT
EGG SHAPED
FAR, FAR AWAY
SPACE MOVIES
Across
Down
Possible Answers
APHELION, ASTRONOMICAL, COPERNICUS, DISTANCE, DIVIDED, EARTH, EARTH, ECCENTRICITY, GALILEO, JUPITER, JUPITER, KEPLER, MARS, MERCURY, MERCURY, MILKYWAY, NEPTUNE, NEPTUNE, ORBIT, PERIHELION, SATURN, SUN, URANUS, VENUS, VENUS

Distances of Planets from Sun in Astronomical Units



Planet	Average Distance from Sun
Mercury	.387 AU
Venus	.722 AU
Earth	1.0 AU
Mars	1.52 AU
Jupiter	5.2 AU
Saturn	9.58 AU
Uranus	19.2 AU
Neptune	30.1 AU

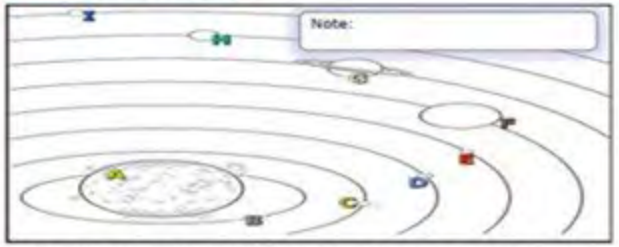
Which planet is furthest from the sun? How many AU is it away?
Roughly, how many AU's is Jupiter from the Sun?
Why is Mercury less than 1 AU?
How many AU's is the earth from the Sun?
Roughly, how many AU's is the earth from the planet Jupiter?
Which planets have the furthest distance between them? Roughly, how far?

Solar System Data

Celestial Object	Mean Distance from Sun (million km)	Period of Revolution (d=days) (y=years)	Period of Rotation at Equator	Eccentricity of Orbit	Equatorial Diameter (km)	Mass (Earth = 1)	Density (g/cm³)
SUN	—	—	27 d	—	1,392,000	333,000.00	1.4
MERCURY	57.9	88 d	59 d	0.206	4,879	0.06	5.4
VENUS	108.2	224.7 d	243 d	0.007	12,104	0.82	5.2
EARTH	149.6	365.26 d	23 h 56 min 4 s	0.017	12,756	1.00	5.5
MARS	227.9	687 d	24 h 37 min 23 s	0.093	6,794	0.11	3.9
JUPITER	778.4	11.9 y	9 h 50 min 30 s	0.048	142,984	317.83	1.3
SATURN	1,426.7	29.5 y	10 h 14 min	0.054	120,536	95.16	0.7
URANUS	2,871.0	84.0 y	17 h 14 min	0.047	51,118	14.54	1.3
NEPTUNE	4,498.3	164.8 y	16 h	0.009	49,528	17.15	1.8
EARTH'S MOON	149.6 (0.386 from Earth)	27.3 d	27.3 d	0.055	3,476	0.01	3.3

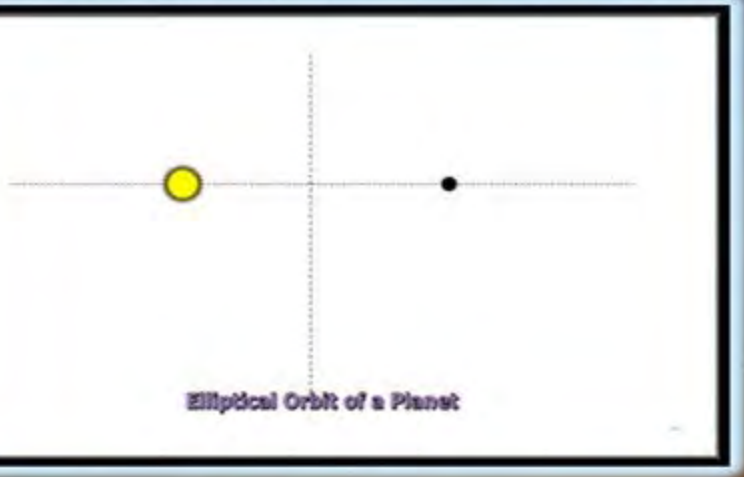
Which planet has longest period of revolution? How many earth years is one of its years?
Which planet has the shortest day? (Period of rotation):
How long is one day on the Sun?
Which planet has the most eccentric orbit?
Which two planets are roughly the same size? (Equatorial Diameter)
How many earth masses equal the mass of Jupiter?
Which is larger, the moon or Mercury?
Which planet has the highest density (g/cm³)?
Which planet could float in water? (Has a density of less than 1g/cm³)
Which planets day is longer than its year?
Which planets have roughly the same length of their day?

Part 1 Lesson 3 Planetary Distances



Name the planet / other (not to scale) Can you sketch in the Main Asteroid Belt? Feel free to add in more detail as we explore the solar system and learn more.

Please use the data sheet to graph the distances of the planets from the Sun in AU's, and at least one other form of data from the data sheet.



Sun	========
Mercury	0.4 A.U.
Venus	0.7 A.U.
Earth	1.0 A.U.
Mars	1.5 A.U.
Jupiter	5.2 A.U.
Saturn	9.5 A.U.
Uranus	19.2 A.U.

Astronomy

Quiz Game

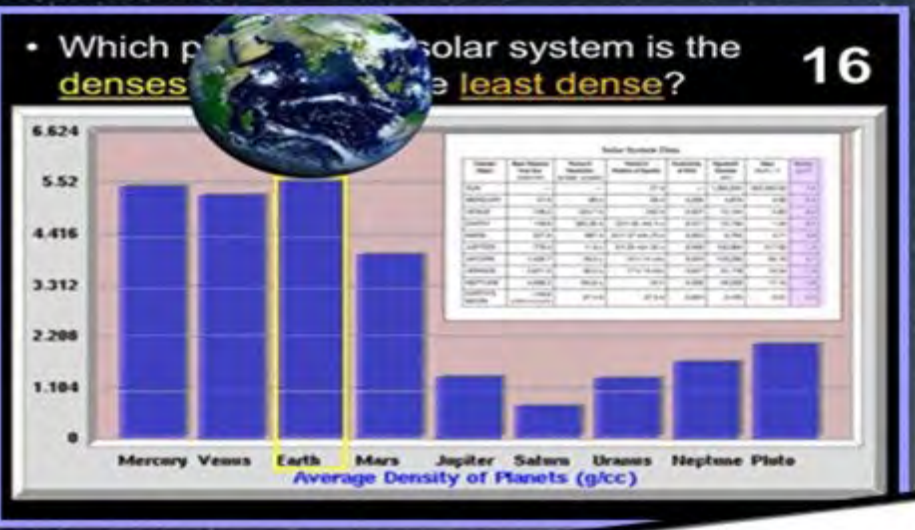
12

- To find eccentricity, you divide the distance between the two focus points by the…

Eccentricity = Distance between the two Focus Points / Length of the major axis

16

- Which p… solar system is the denses… e least dense?



- The terms below are a measurement of how an orbit deviates from circular.
  - A perfectly circular orbit has an eccentricity of zero.
  - Higher numbers indicate more eccentric orbits.

- This is the name for the path (usually… one celestial body in its… revolution ar…

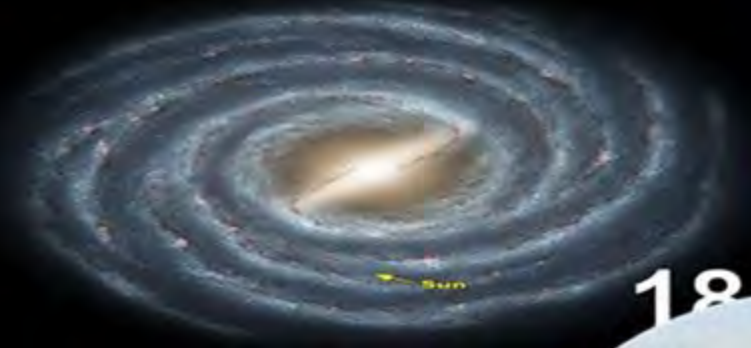
What's the perihelion and aphelion of planet earth?

Aphelion: Furthest from sun
152 million

Perihelion: Closest to the sun
147 million

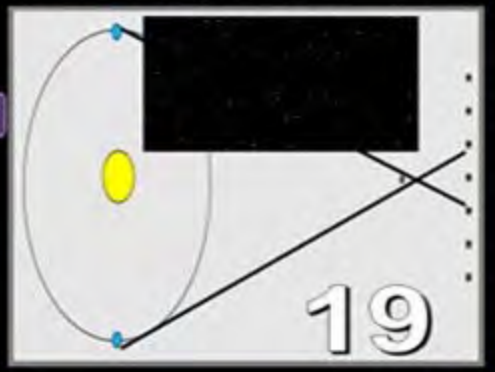
11

- Our solar system (The Sol System) is on the on spiral arm of this galaxy?



18

- This is the name for the apparent movement against the background of more distant stars as the Earth revolves around the Sun.
  - A.) Equinox
  - B.) Aphelion
  - C.) Stellar Parallax
  - D.) Perihelion
  - E.) Harmonic Function



19

- The earth is approximately this far from the sun?
  - 93 Million Miles
  - 150 Million Kilometers
  - 1 AU

Same

Final Question

- This is a unit of measurement, it's the distance from The Sun to Earth.
  It equals= 149,598,000 kilometers

20

- Which is not one of Kepler's three laws of planetary motion?

9

  - A.) The path of the planets about the sun is elliptical in shape, with the center of the sun being located at one focus. (The Law of Ellipses)
  - B.) A planetary body will always have a highly [illegible]cal orbit as it travels around the sun. (The Law Ec[illegible]city)

The planets in our solar systems are only slightly elliptical. Most have eccentricity of less th[illegible] (Mercury has the m[illegible]

- Planetary motion.
  - A line between a planet and the Sun covers equal areas in equal times.

8

- Name this Italian physicist (1564 -1642), mathematician, astronomer, and philosopher.
  - Played a major role in the Scientific Revolution.
  - His achievements include improvements to the telescope, astronomical observations, and support for Copernicanism.

3

Galileo helped improve this device?

- Originally invented by Spectacle makers Hans Lippershey & Zacharias Janssen and Jacob Metius in the Netherlands (1608).

4

the idea of heliocentrism that around a stationary sun.

ecant his beliefs and spent the

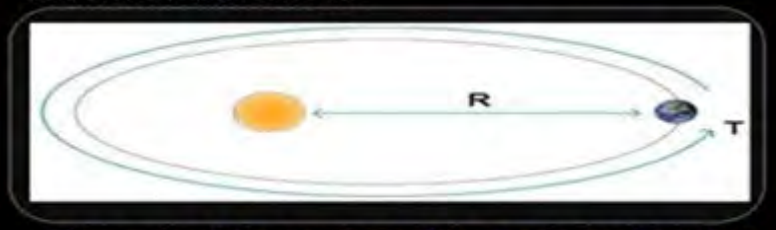
under house arrest.

5

- Planetary motion.
  - Planets move in orbits shaped like an ellipse.
  - A.) Circle
  - B.) Orbit
  - C.) Ellipse
  - D.) Egg
  - E.) Perihelion

7

- Kepler's three laws of planetary motion can be described as follows:



  - The ratio of the squares of the periods of any two planets is equal to the ratio of the cubes of their average distances from the sun.
    - (The Law of Harmonies)

15

- Eccentricity can also be calculated by this equation.

$$e = \frac{a - p}{a + p}$$

$$e = \frac{30.44 - 29.77 \text{ au}}{30.44 + 29.77 \text{ au}} = \frac{.67}{60.21}$$

a= aphelion
b= perihelion

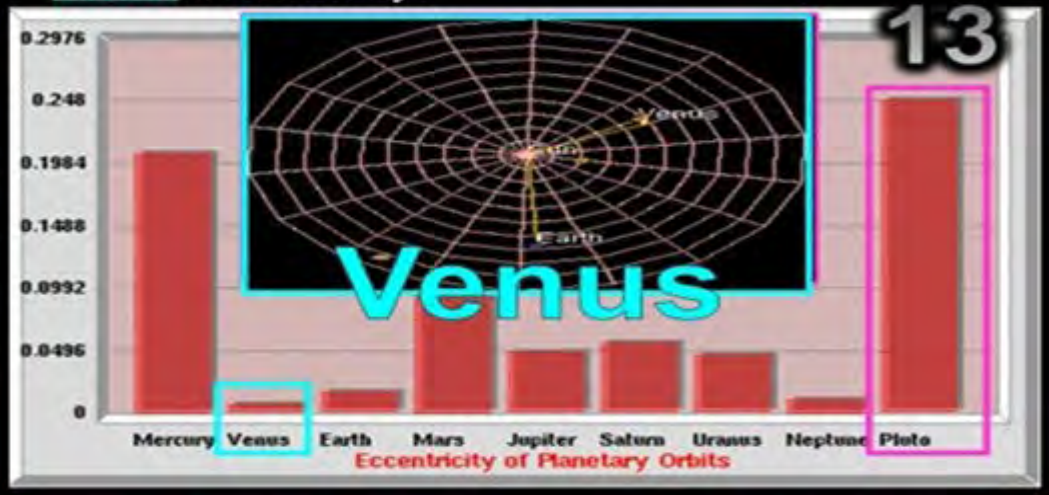
Neptune has an aphelion of 30.44 au, and perihelion of 29.77 au. .67 / 60.21 = .011

What's the eccentricity of Neptune? e=.011
(note: it will always be between 0 and 1)

14

- Which planet / dwarf planet has the highest and lowest eccentricity?

13



Venus

- Which letter below is the correct order of the planets in our solar system from the Sun outward?
  - A.) Mercury, Venus, Mars, Earth, Saturn, Jupiter, Neptune, Uranus
  - B.) Venus, Mercury, Earth, Mars, Saturn, Jupiter, Neptune, Uranus
  - C.) Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune
  - D.) Mars, Mercury, Venus, Earth, Jupiter, Saturn, Uranus, Neptune
  - E.) Mercury, Venus, Earth, Jupiter, Xena, Uranus, Neptune

1

Part 2: The Sun, Absolute Magnitude, Apparent Magnitude, Parsec, Stellar Classification / Spectra, Hertzsprung Russell Diagram, Composition of the Sun, Nuclear Synthesis, Layers of the Sun, Solar Flares, Coronal Mass Ejections, Carrington Event, Life Cycle of a Star, Blackhole, Neutron Star, Solar System Formation, Shadows, Sun Dials, Eratosthenes, Graphing Shadow length, Solar Eclipse, Lunar Eclipse, Path of Totality, Box Game Review, Crossword Puzzle, End Unit Assessment with Answer Version so Students can Self-Assess

Part 2: Astronomy Unit

Part 2 Lesson 1 The Sun

Part 2 Lesson 2 HR Diagram

Part 2 Lesson 3 Inside the Sun

Part 2 Lesson 4 Solar Flares

Part 2 Lesson 5 Life Cycle of Stars

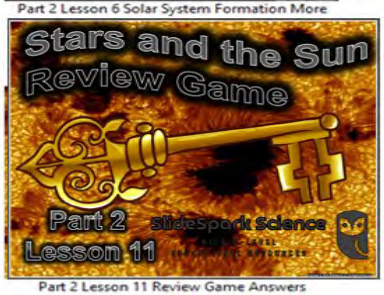
Part 2 Lesson 6 Solar System Formation More

Part 2 Lesson 7 Optional Sun Song

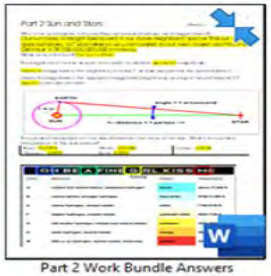
Part 2 Lesson 8 Shadows Sun Dials

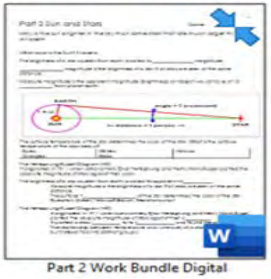
Part 2 Lesson 9 Solar Lunar Eclipse

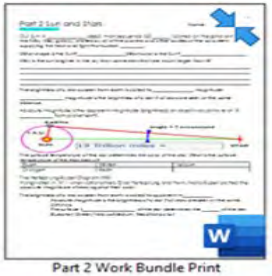
Part 2 Lesson 10 Review Game



Part 2 Lesson 11 Review Game Answers

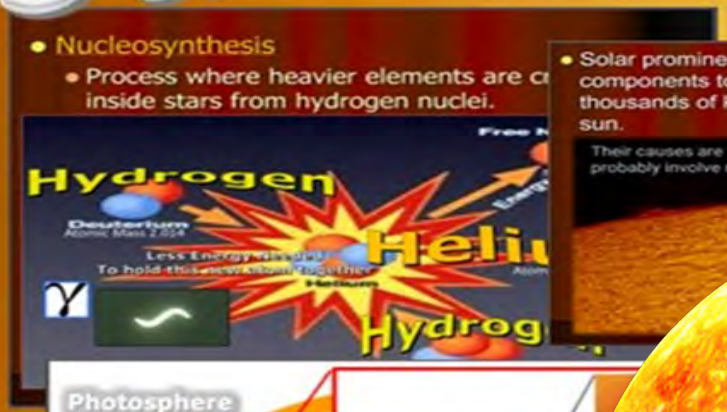

Part 2 Work Bundle Answers

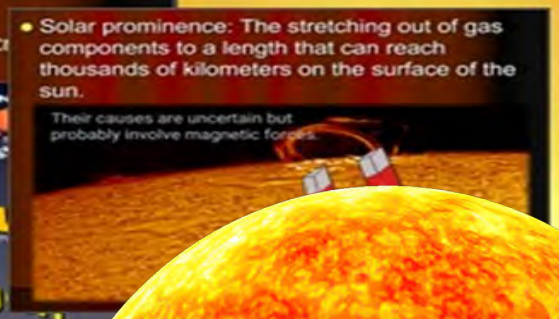

Part 2 Work Bundle Digital

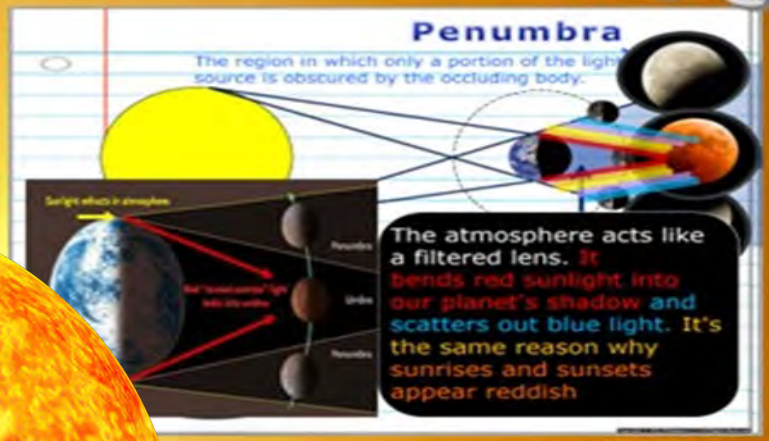

Part 2 Work Bundle Print

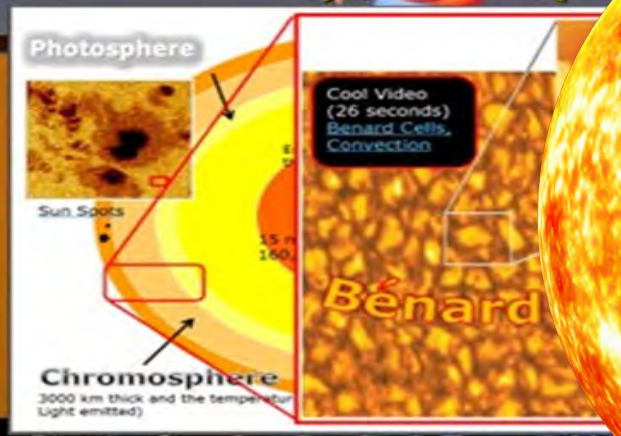

Part 2 Work Bundle Writable pdf

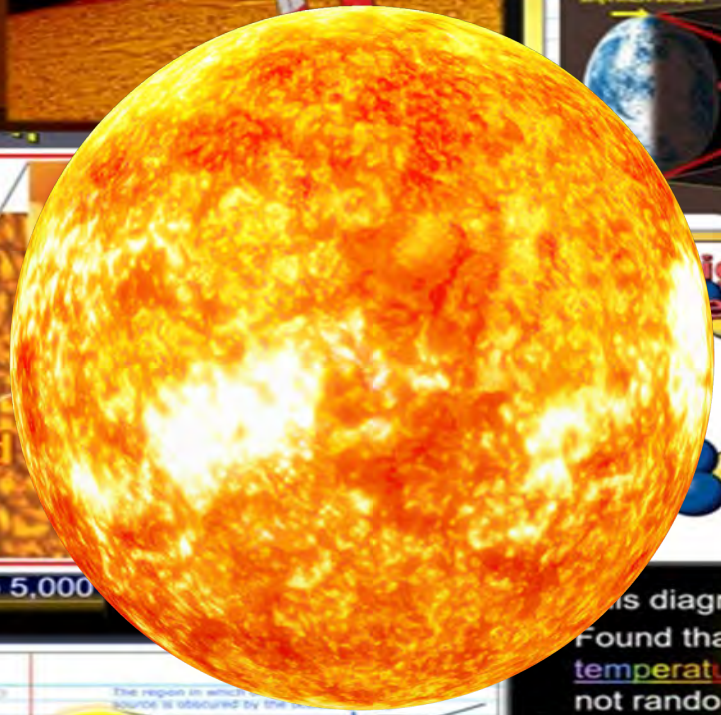
Sun and Stars Unit

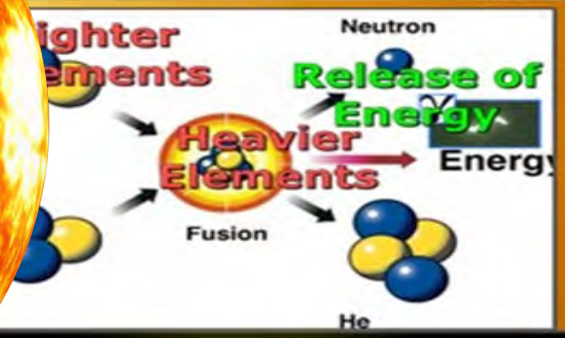


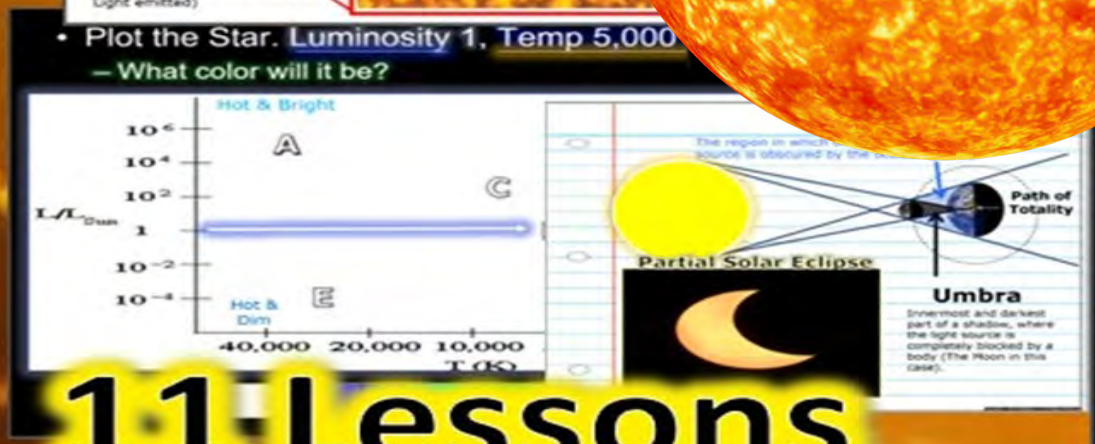


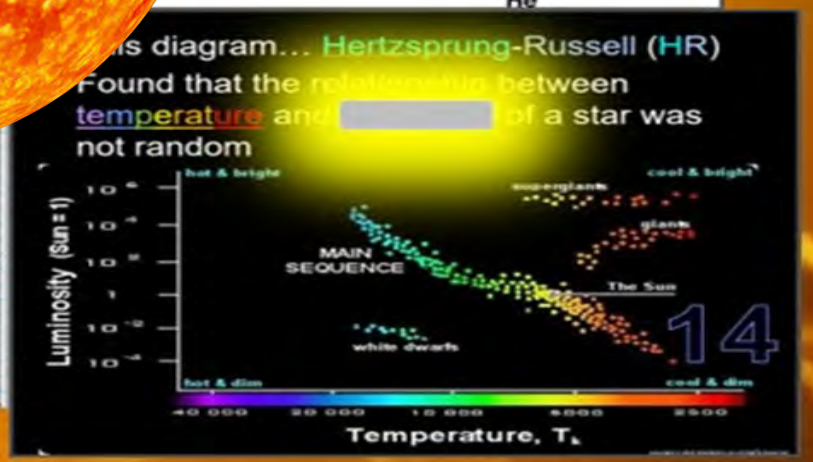






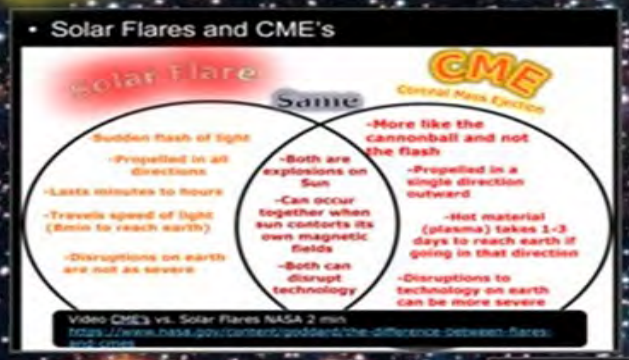


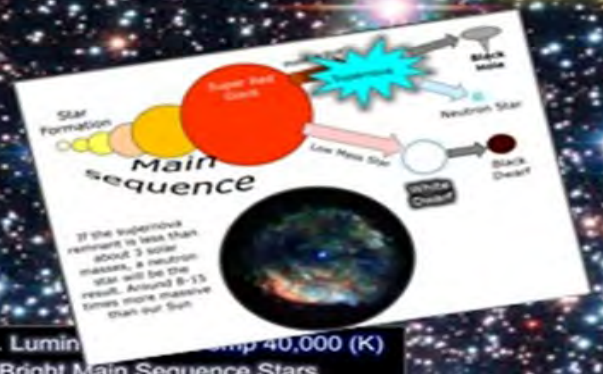


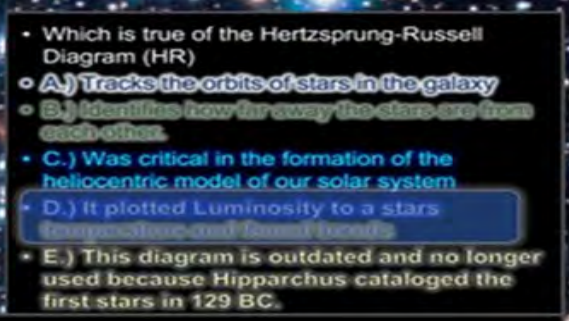


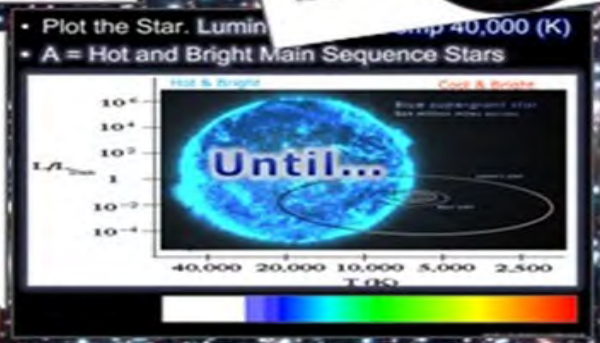
11 Lessons

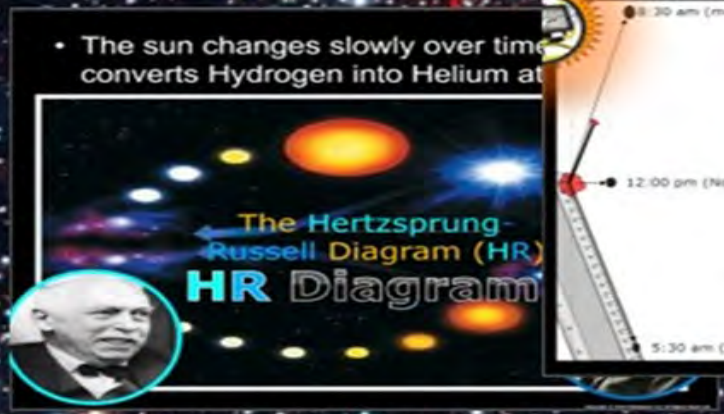
Interactive Slideshows

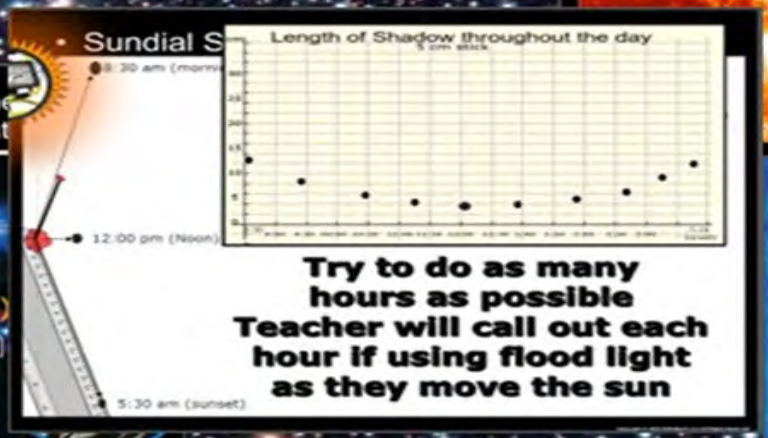




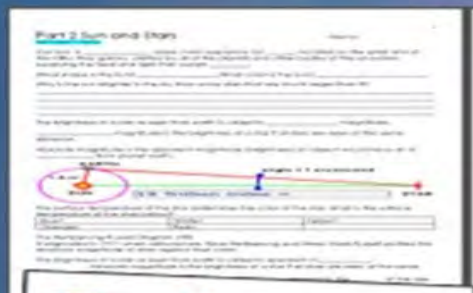


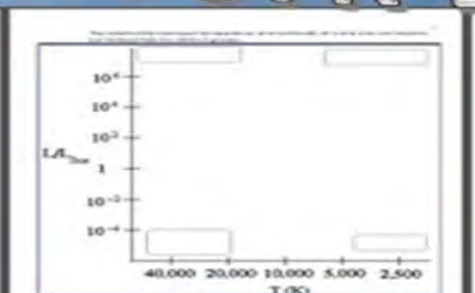


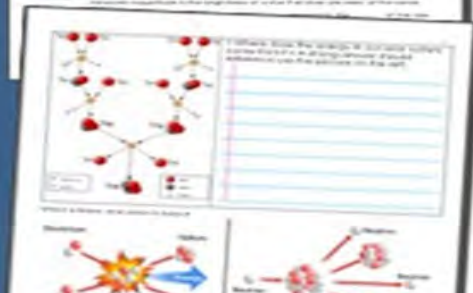


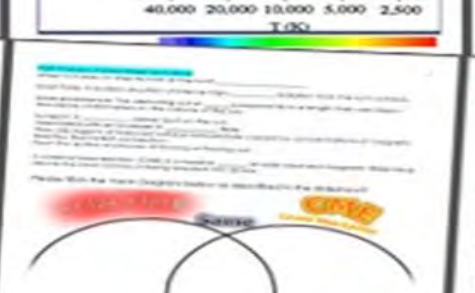


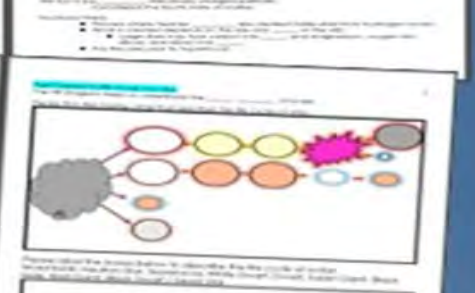
Follow Along Work Bundle

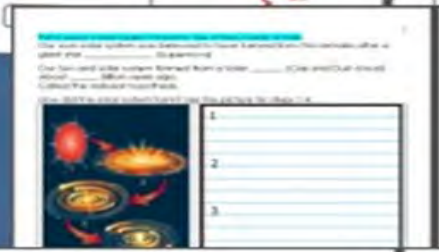


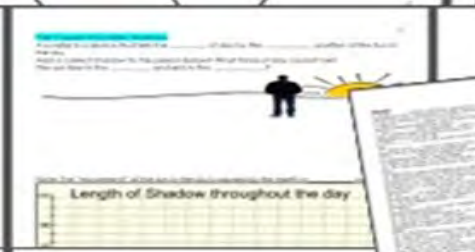


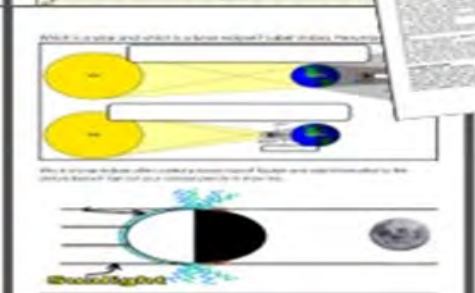






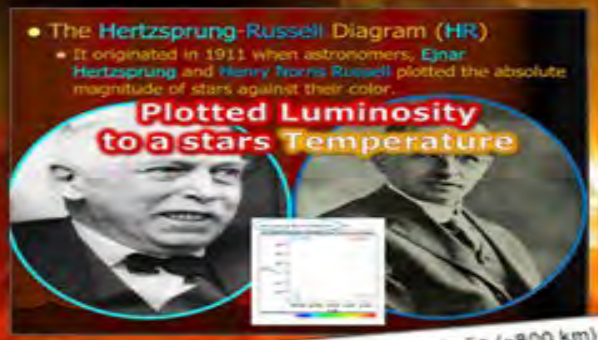


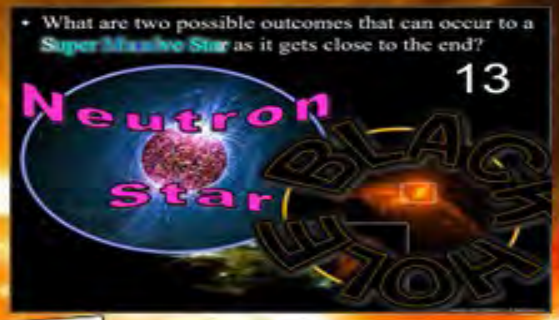


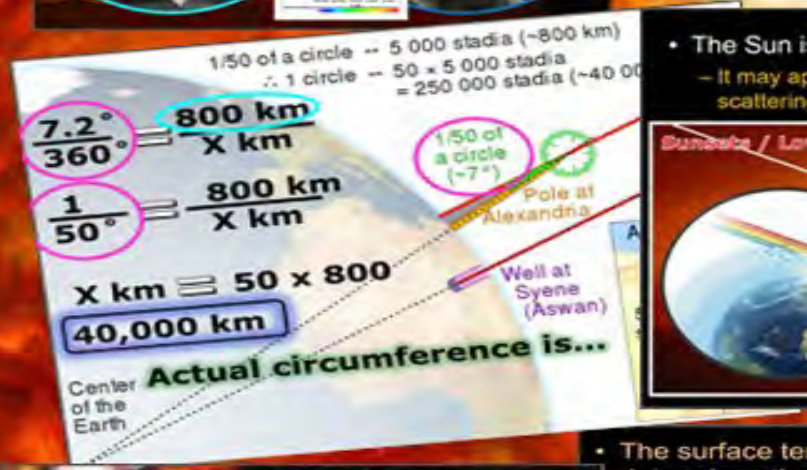


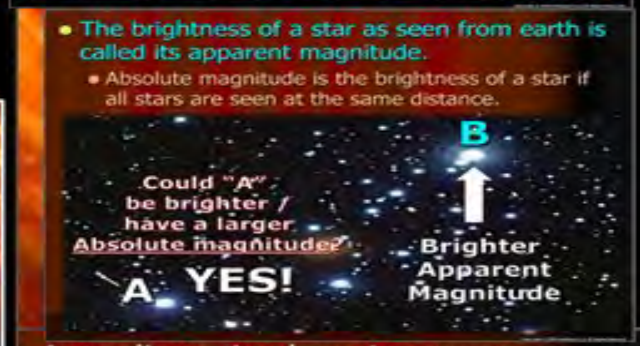
18 Pages

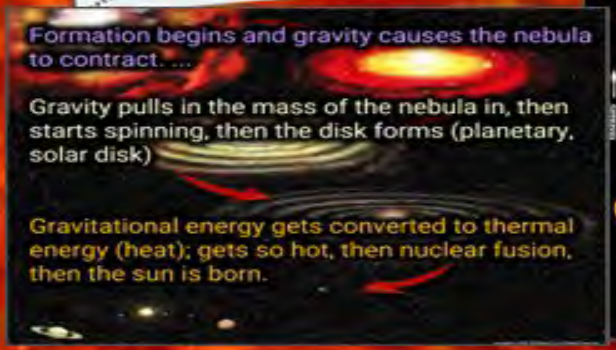
Activities, Notes, Keys, Assessments, and more all built-in

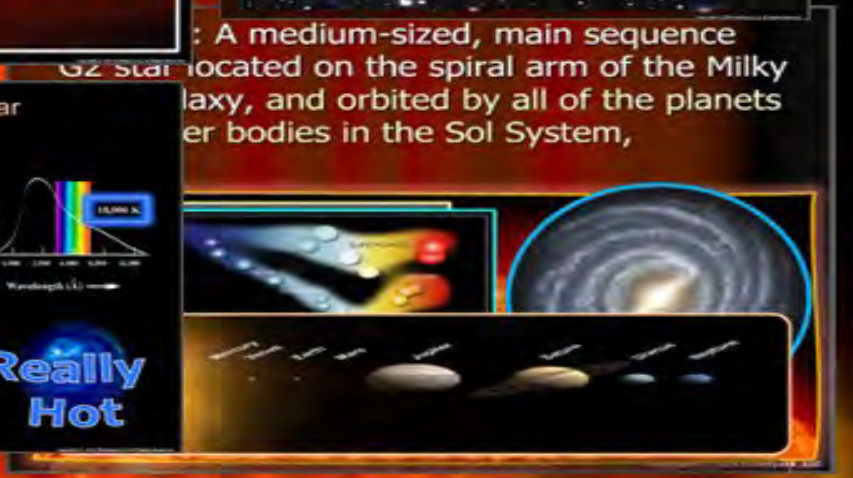




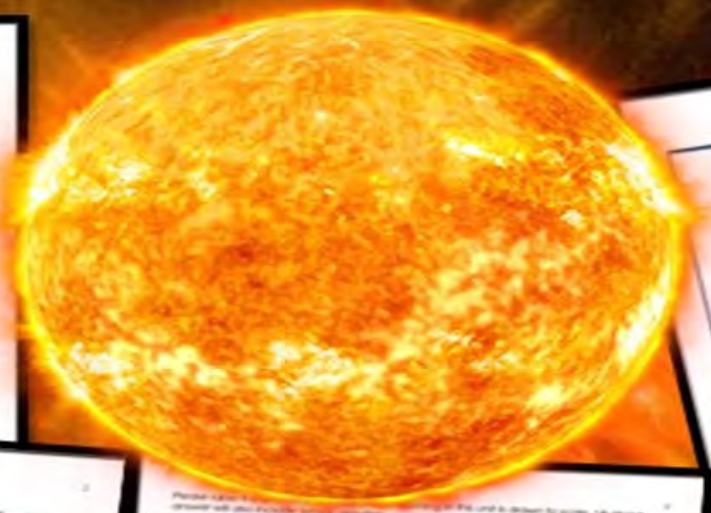




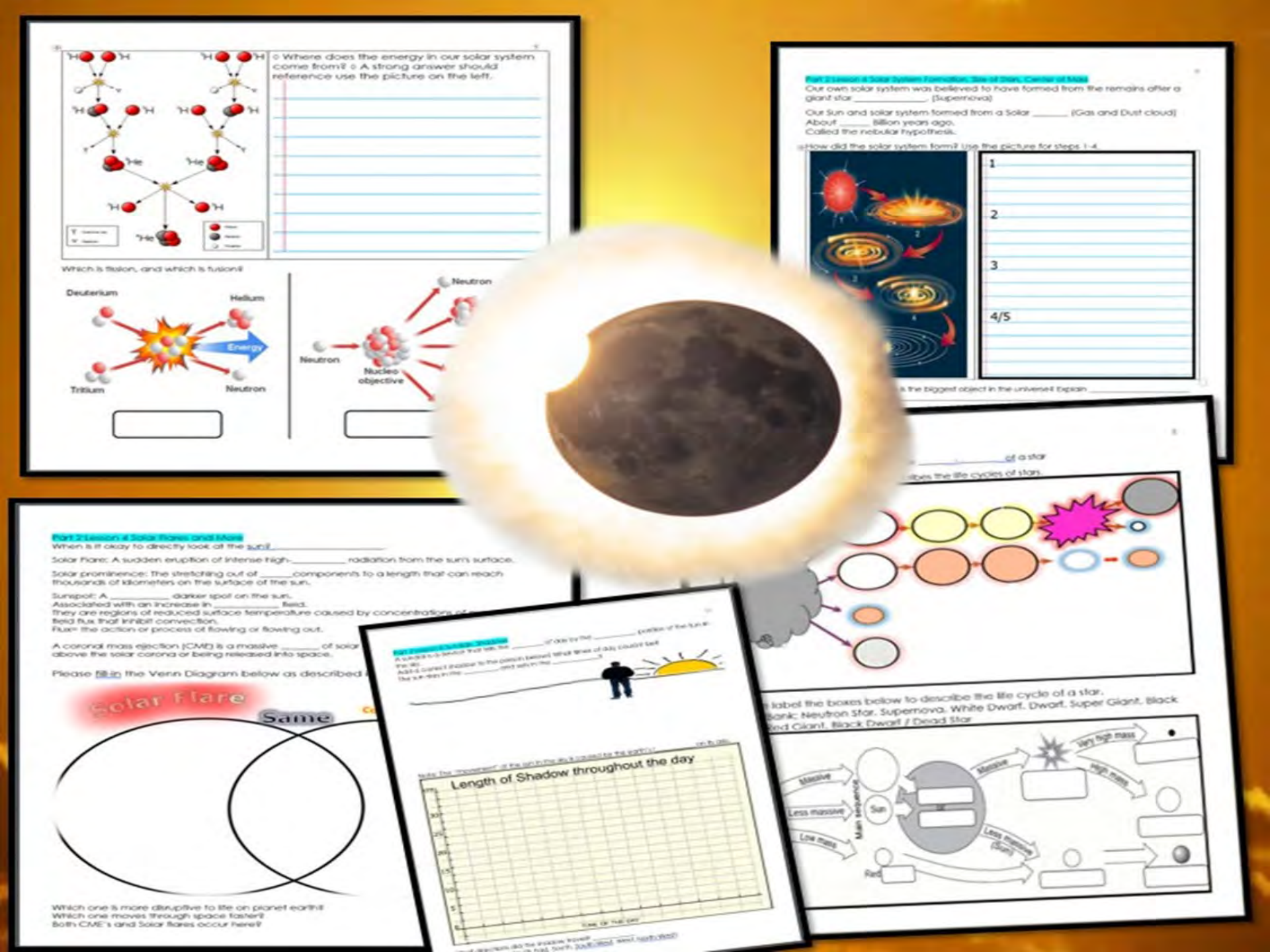




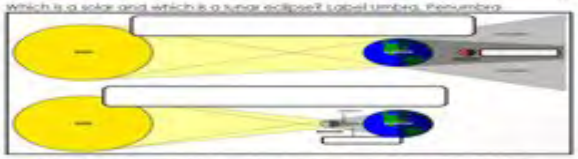
Sun and Stars



18 Pages


Where does the energy in our solar system come from? A strong answer should reference use the picture on the left.
Which is fission, and which is fusion?
Deuterium
Helium
Energy
Tritium
Neutron
Neutron
Nucleo objective
Neutron
Part 2 Lesson 4 Solar System Formation, Size of Stars, Center of Mass
Our own solar system was believed to have formed from the remains after a giant star _____. [Supernova]
Our Sun and solar system formed from a Solar _____ [Gas and Dust cloud]
About _____ Billion years ago.
Called the nebular hypothesis.
How did the solar system form? Use the picture for steps 1-4.
1
2
3
4/5
Part 2 Lesson 4 Solar Flares and More
When is it okay to directly look at the sun?
Solar Flare: A sudden eruption of intense high-_____ radiation from the sun's surface.
Solar prominence: The stretching out of _____components to a length that can reach thousands of kilometers on the surface of the sun.
Sunspot: A _____ darker spot on the sun.
Associated with an increase in _____ field.
They are regions of reduced surface temperature caused by concentrations of
field flux that inhibit convection.
Flux= the action or process of flowing or flowing out.
A coronal mass ejection (CME) is a massive _____ of solar
above the solar corona or being released into space.
Please fill in the Venn Diagram below as described
Solar Flare
Same
Which one is more disruptive to life on planet earth?
Which one moves through space faster?
Both CME's and Solar flares occur here?
Length of Shadow throughout the day
of a star
label the boxes below to describe the life cycle of a star.
Supernova, White Dwarf, Dwarf, Super Giant, Black
Red Giant, Black Dwarf / Dead Star
Massive
Less massive
Low mass
Main sequence
Sun
Red
Very high mass
High mass
Less massive (Star)

Which is a solar and which is a lunar eclipse? Label umbra. Penumbra



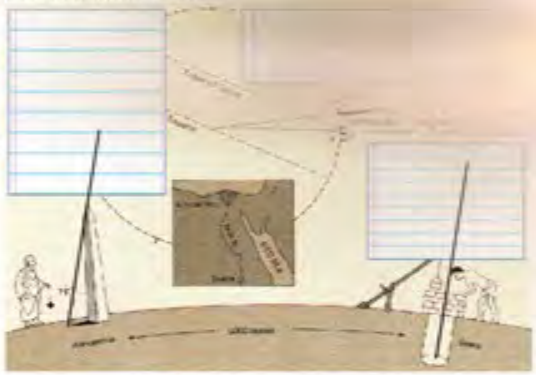
Why is a lunar eclipse often called a blood moon? Explain and add information to the picture below. Get out your colored pencils to show me.

When is the next lunar eclipse and solar eclipse in or near your state? Record the dates and times below. Let's make an effort to check one out sometime.

Is it the sun that moves across the sky or is the earth rotating?

Which way does the sun travel vs. the shadow?

What is so special about Eratosthenes?



Part 2 Rev

1-20 = 5 pts

*20-*25 * = Bonus + 1

(Secretly write owl in

Final Question = 5 pt

STAR LIGHT				
1)	6)			
2)	7)			
3)	8)	13)	18)	*20)
4)	9)	14)	19)	*24)
5)	10)	15)	20)	*25)

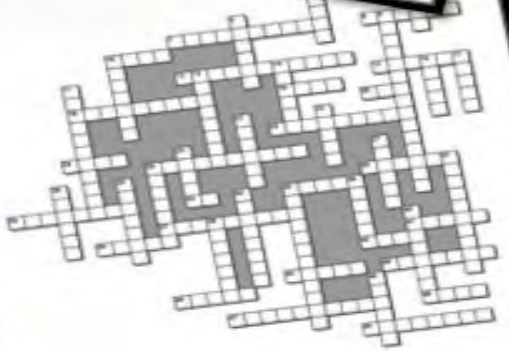
Final Question Wager ___ /5 Answer: _____

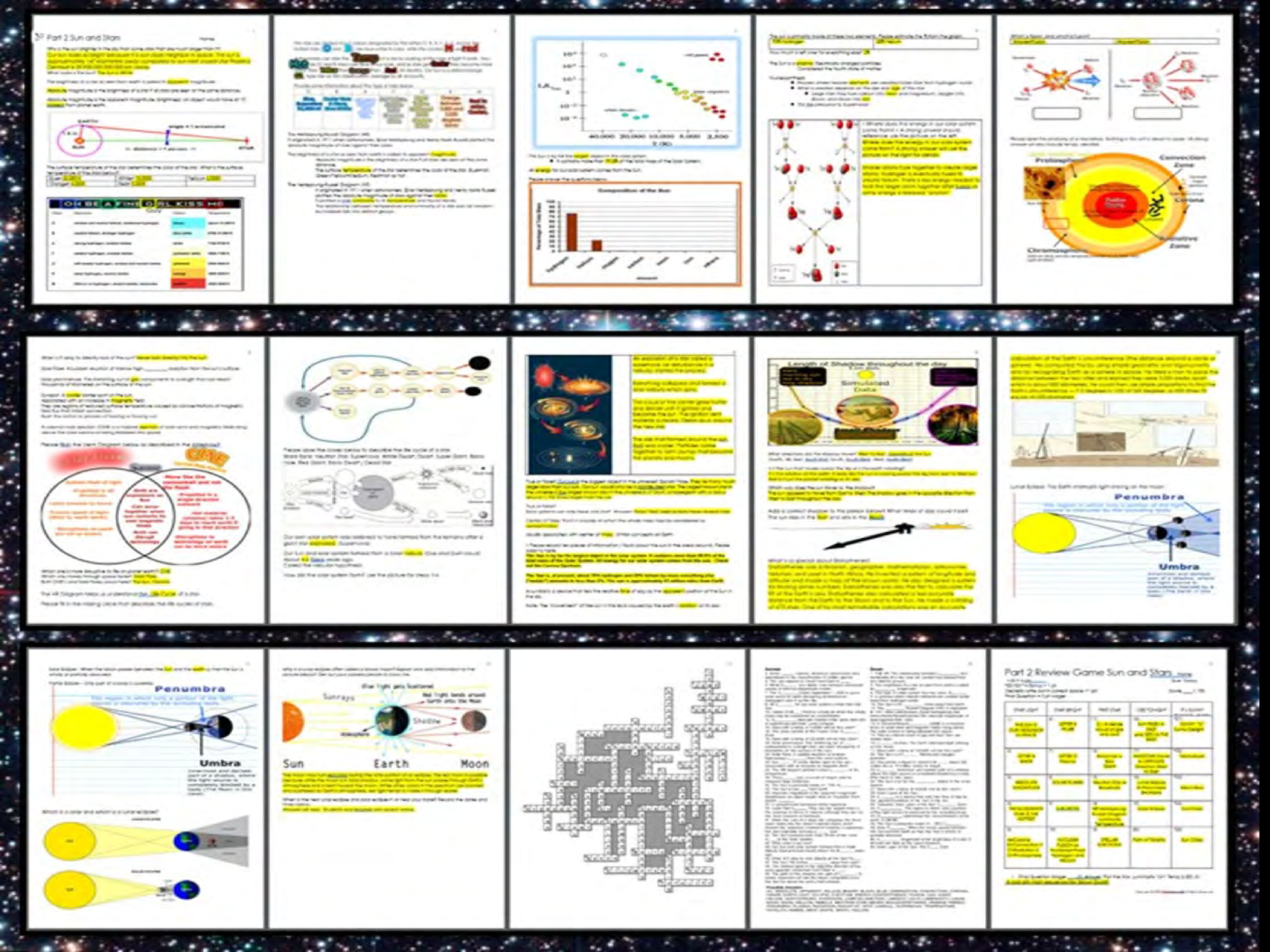
The region in which only a portion of the light source is obscured by the occulting body.

Innermost and darkest part of a shadow; where the light source is completely blocked by a body (The Moon in this case).

The region in which only a portion of the light source is obscured by the occulting body.

Innermost and darkest part of a shadow; where the light source is completely blocked by a body (The Earth in this case).




Part 2 Sun and Stars
Composition of the Sun
Penumbra
Umbra
Sun
Earth
Moon
Length of Shadow throughout the day
Part 2 Review Game Sun and Stars

SUN & STARS

Quiz Game

- The brightness of a star as seen from ear
called its apparent magnitude.
  - Absolute magnitude is the brightness
all stars are seen at the same dista

This star is extremely bright but also FAR AWAY

This sta
It's clos

A

is the Sun?

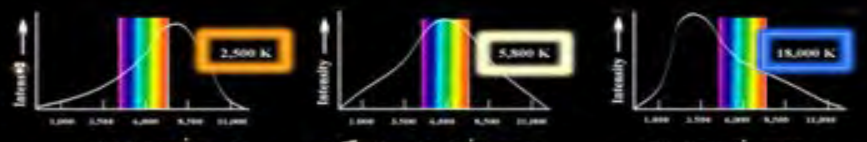
2

B

D

ne answer is...

- The surface temperature of the sta
determines the color of the star.
  - Which star has the hottest surface temperature?



Cooler

Warmer

Really Hot

Colors are exagerrated

- Why is the sun brighter in the sky than some stars that are much larger than it?

1

Our close neighbor

93 million miles

147 million km

Away

Big Difference

Closest star

Proxima Centauri

39,900,000,000,000 km away.

4.24 light-years away

- What is one way a new nebula can form?

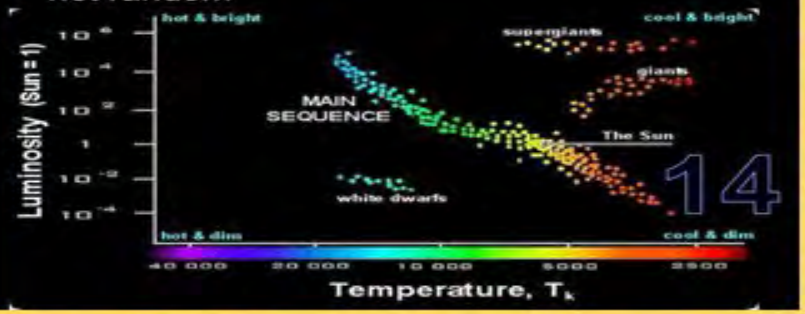
Stellar Ejections

15

Also Supernova

Can aid in Nebula formation (some debate)

- This diagram… Hertzsprung-Russell (HR)
- Found that the relationship between temperature and luminosity of a star was not random



14

- A formation process of a star often begins with a Nebula. A Nebula is a…
  - A.) Largest Object in the Universe
  - B.) A Superheated Blackhole
  - C.) A Supernova
  - D.) A dense cloud of gas and dust
  - E.) Cannot be determined

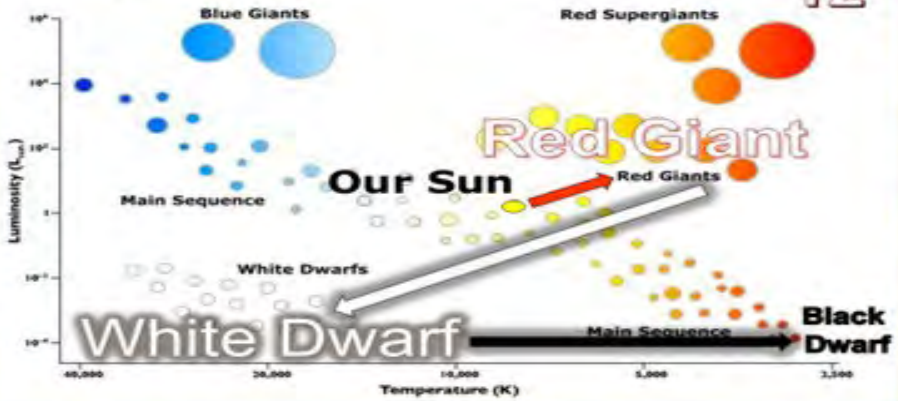
11

- What are two possible outcomes that can occur to a Super Massive Star as it gets close to the end?

13

What is going to happen to our sun? What two types of stars will it turn into?

12



- Name this process? The Sun is primarily composed of these two chemical elements?

HYDROGEN

Deuterium

Free Neutron

HELIUM

10

NUCLEAR FUSION

HYDROGEN

Tritium

- What are the names for these features on the surface of the Sun? Associated with an increase in magnetic field.

Sun Spot

9

- The state of matter that best represents the Sun is a…
  - A.) Gas
  - B.) Solid
  - C.) Liquid
  - D.) Plasma
  - E.) Cannot be determined.

7 answer is…

- The Sun makes up this percent of our solar system by mass?
  - A.) 50%
  - B.) 99.8%
  - C.) 25%
  - D.) 1%
  - E.) Cannot be determined

6

- What are the names of these features circled below?

8

Solar Flares

Also coronal mass ejections

Corona

Chromosphere

Convection Zone

B

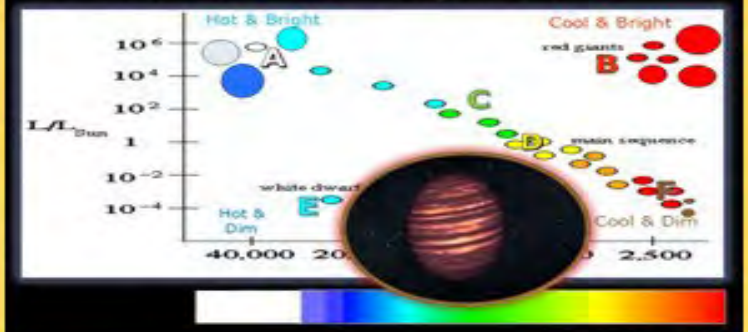
C

Inner Core

D

5

- Plot the Star. Luminosity 10^{-4}, Temp 2,500 (K)
- F = Cool and Dim Main Sequence Stars



- Name this event as seen from planet earth?

19

Solar Eclipse

- The sun rises in the East, and sets in the West. The shadows travel in the opposite direction.
  - When are the shadows the longest and shortest?

17

East
Sunrise
West to East
Noon
(Short Shadows)
West
Sunset

- What is this called? Name A and B?

18

Lunar Eclipse

- What is the name for the shaded region that travels across the surface of the Earth during a solar eclipse?

20

Path of Totality

What causes the apparent movement of the Sun across the sky?

16

Part 3: The Habitable Zone, Important data about Mercury, Venus, Earth, Venn Diagram of Earth and Venus, Moon Formation Theories, Earth's Axial Tilt, Seasons on Earth, Equinox, Solstice, Earth's EM Field, Aurora borealis, Synchronous Orbit of the moon, Features of the moon, Phases of the Moon (with OREOS), Tides, Neap Tide, Spring Tide, Tidal Cycle, Reading a Tide Chart, Mars, Features on Mars, Moons of Mars, Rover Exploration, Missions Past and Future

Part 3: Astronomy Unit

Part 3 Lesson 1 Inner Planets

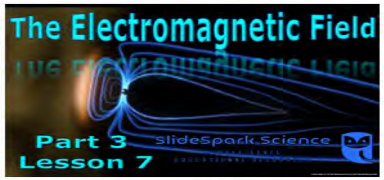
Part 3 Lesson 2 Mercury

Part 3 Lesson 3 Venus

Part 3 Lesson 4 Earth and Moon

Part 3 Lesson 5 Axial Tilt

Part 3 Lesson 6 Solstice Equinox



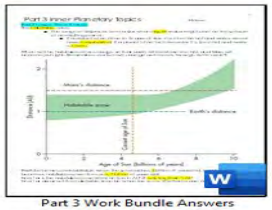
Part 3 Lesson 7 EM Field

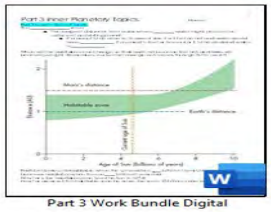
Part 3 Lesson 8 Phases of Moon 1

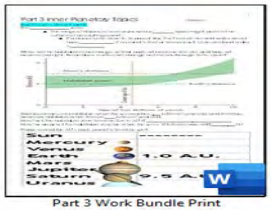
Part 3 Lesson 9 Phases of Moon 2

Part 3 Lesson 10 Phases Quiz

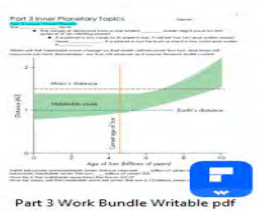

Part 3 Materials List


Part 3 Work Bundle Answers


Part 3 Work Bundle Digital



Part 3 Work Bundle Print


Part 3 Work Bundle Writable pdf

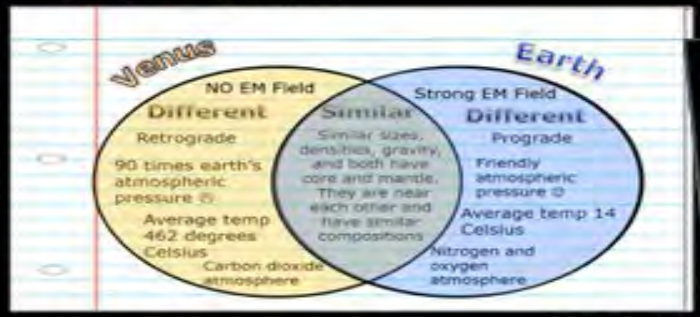
Inner Planetary Topics Unit

Preview is a compressed file

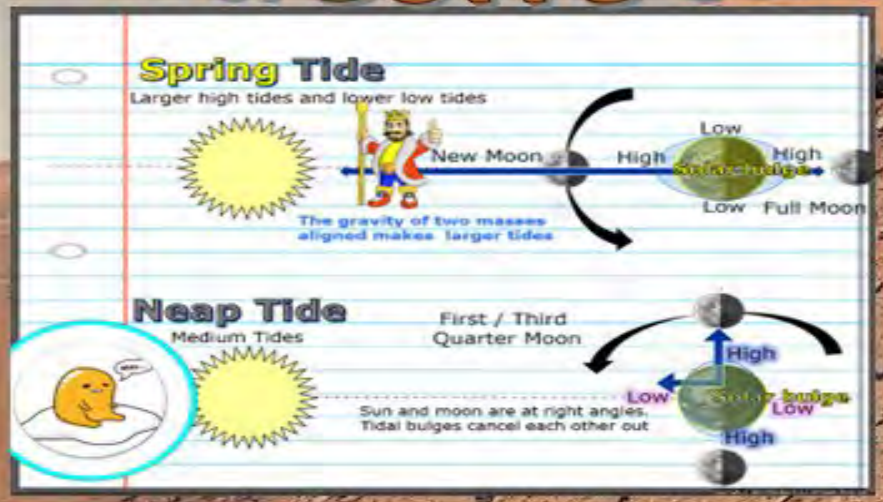
- Earth's axis is currently tilted 23.4 degrees, or about halfway between its extremes.
  - This angle is very slowly decreasing in a cycle that spans about 41,000 years. It was last at its maximum tilt about 10,700 years ago and will reach its minimum tilt about 9,800 years from now.

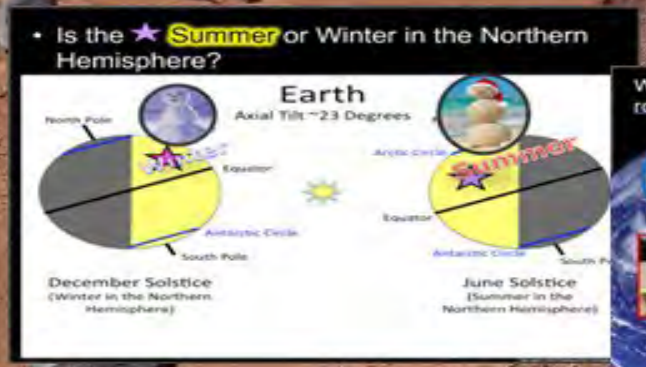
- What planet am I? I am about .7 AU from the sun.

- Activity (Optional) Create a Venn Diagra of Earth and Venus.



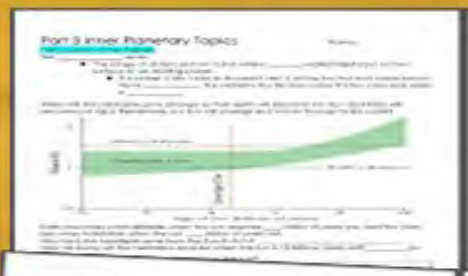
Interactive Slideshows

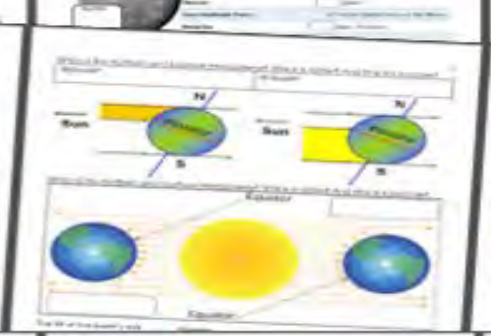


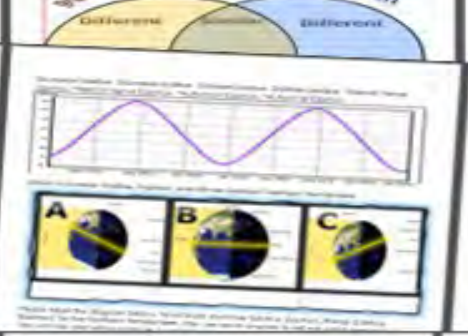


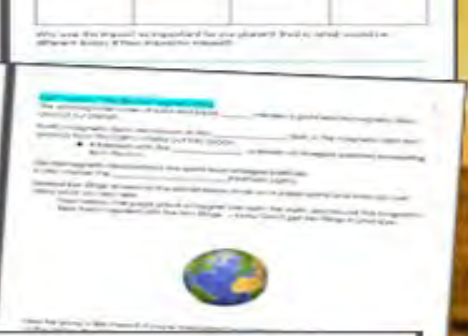
15 Lessons

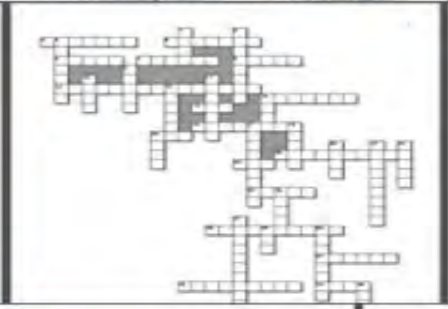
Follow Along Work Bundle

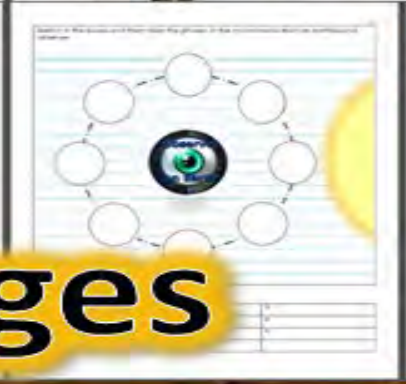


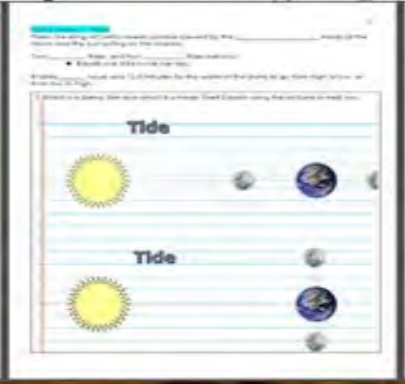






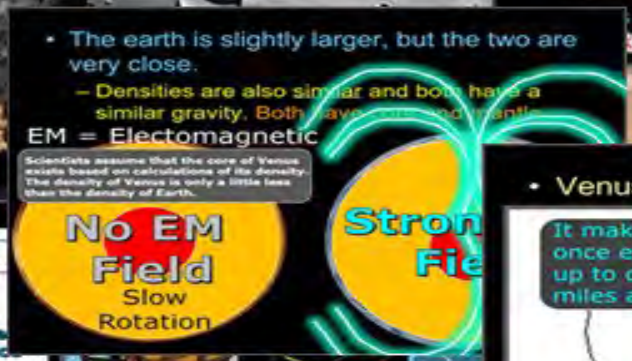


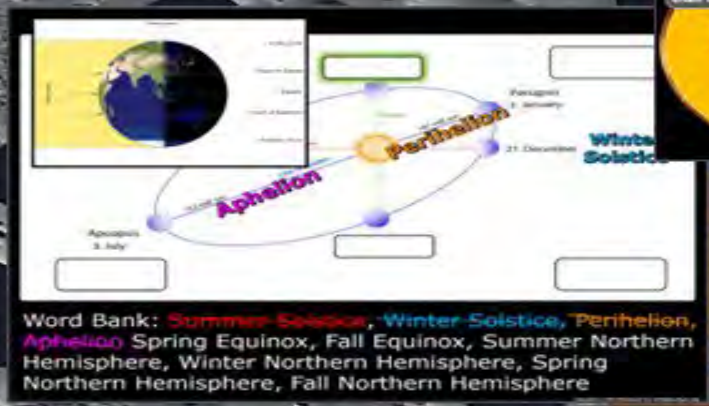


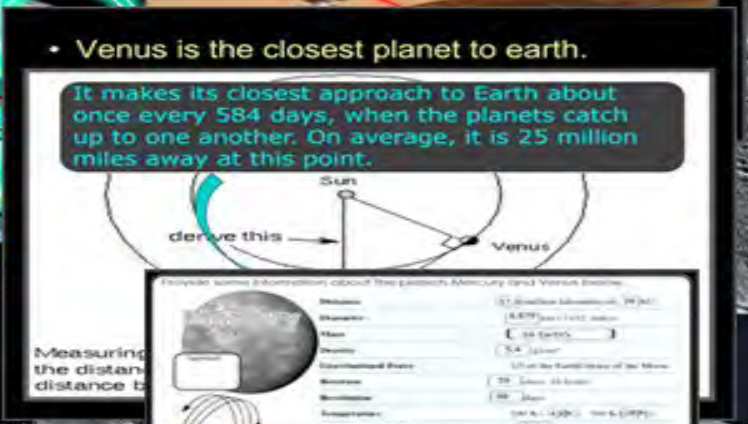


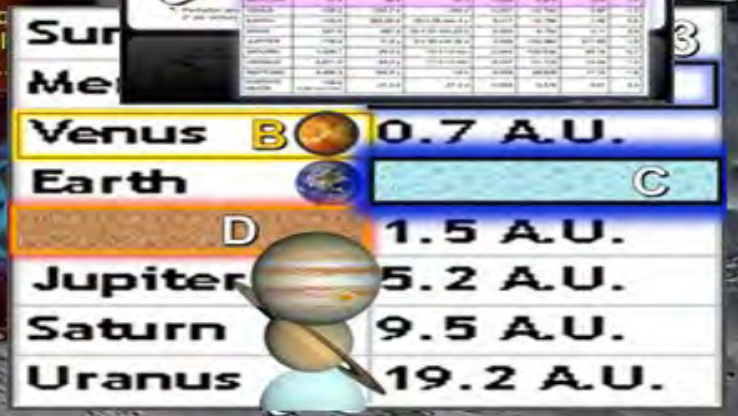
17 Pages

Activities, Notes, Keys, Assessments, and more all built-in

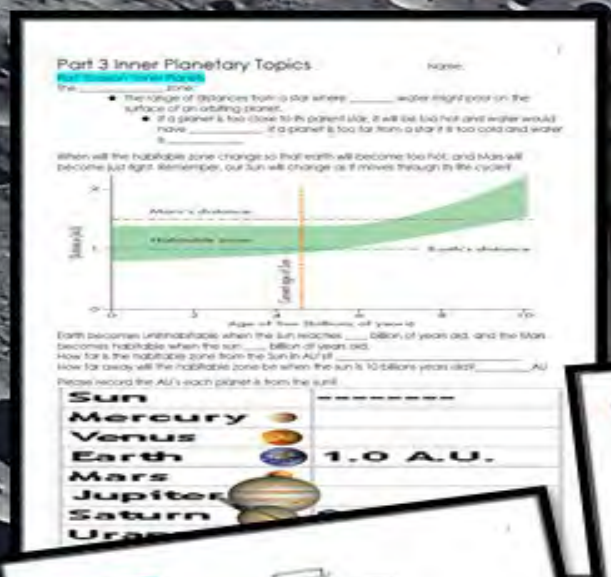


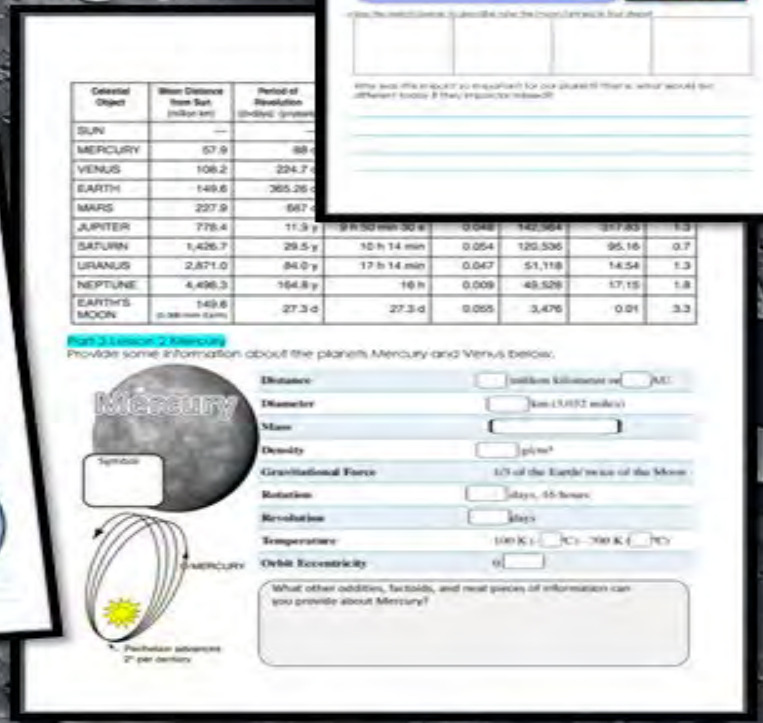


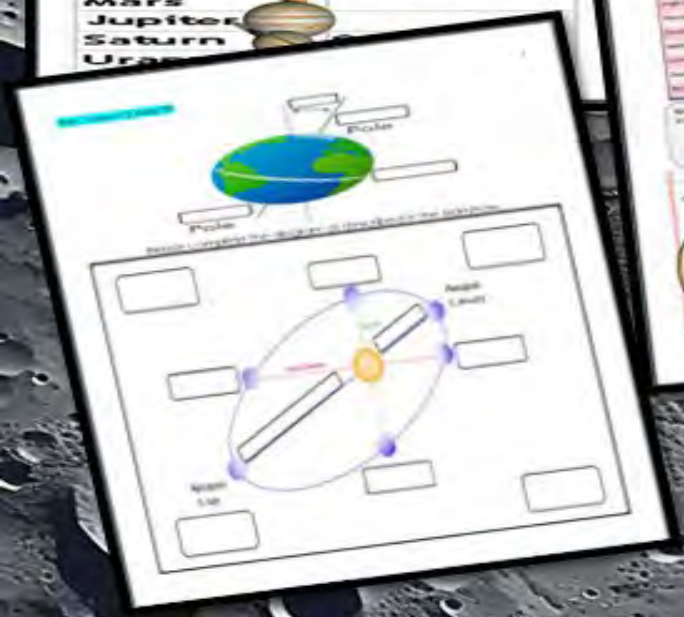




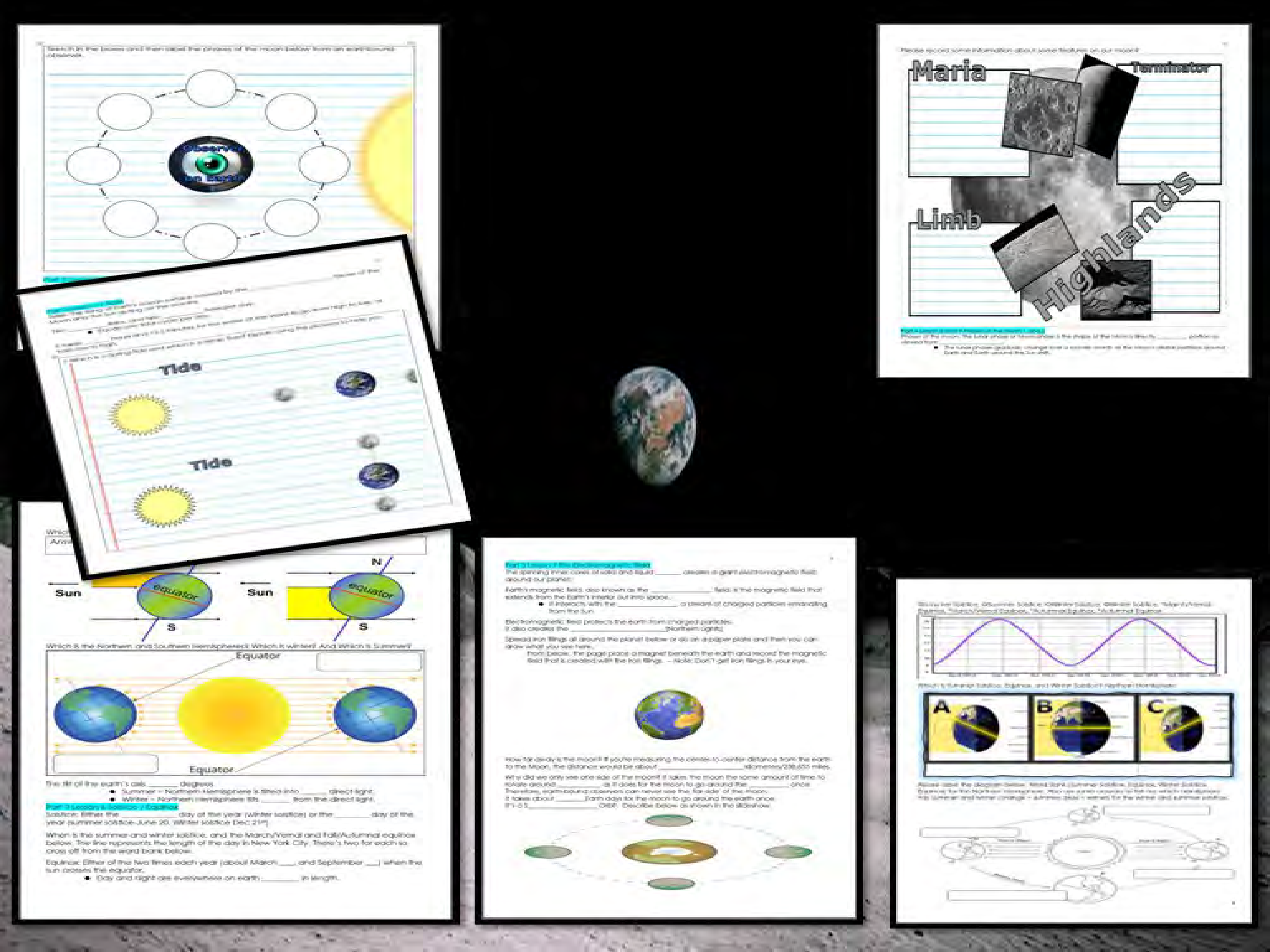
Inner Planetary Topics Work Bundle

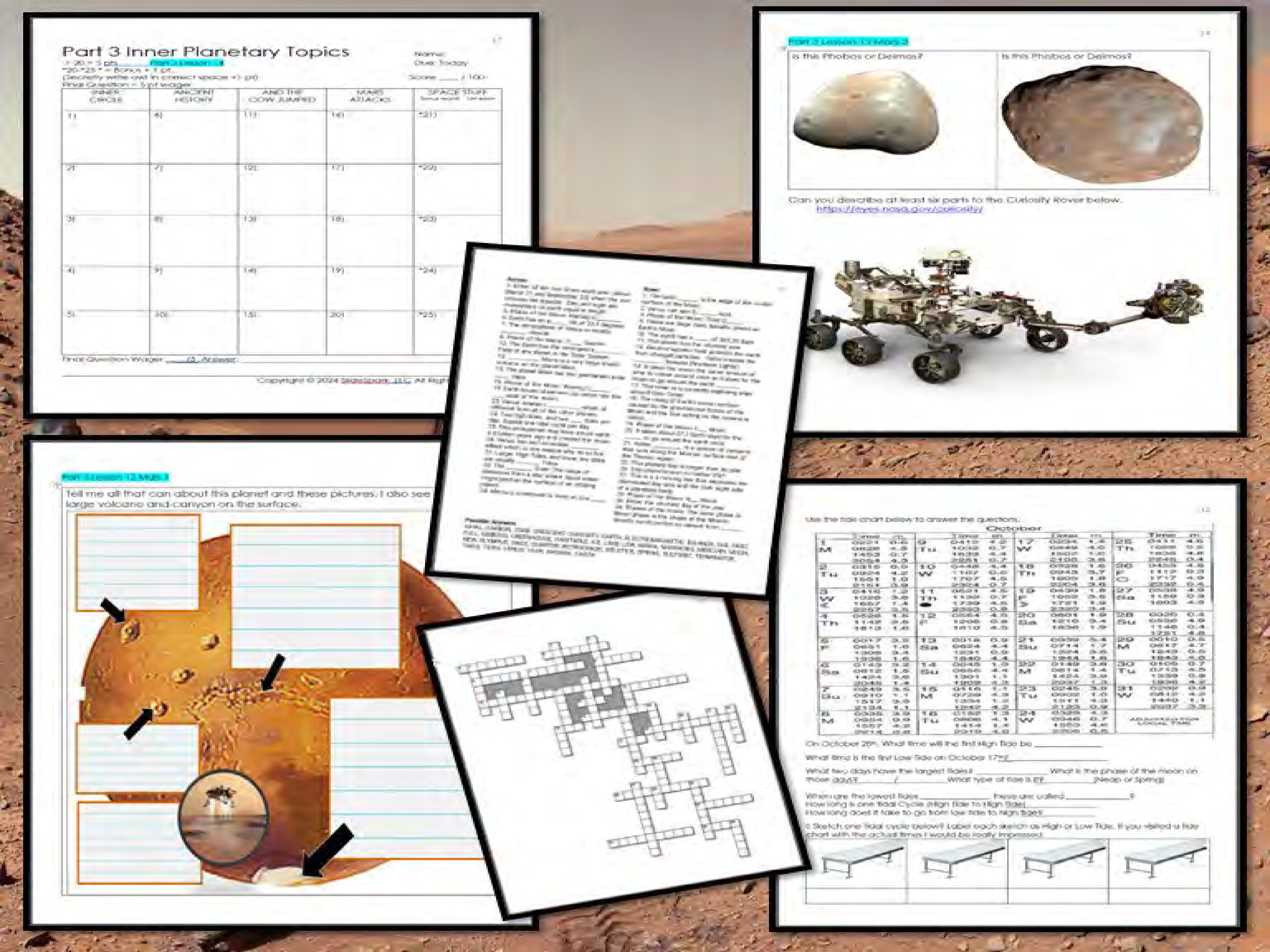




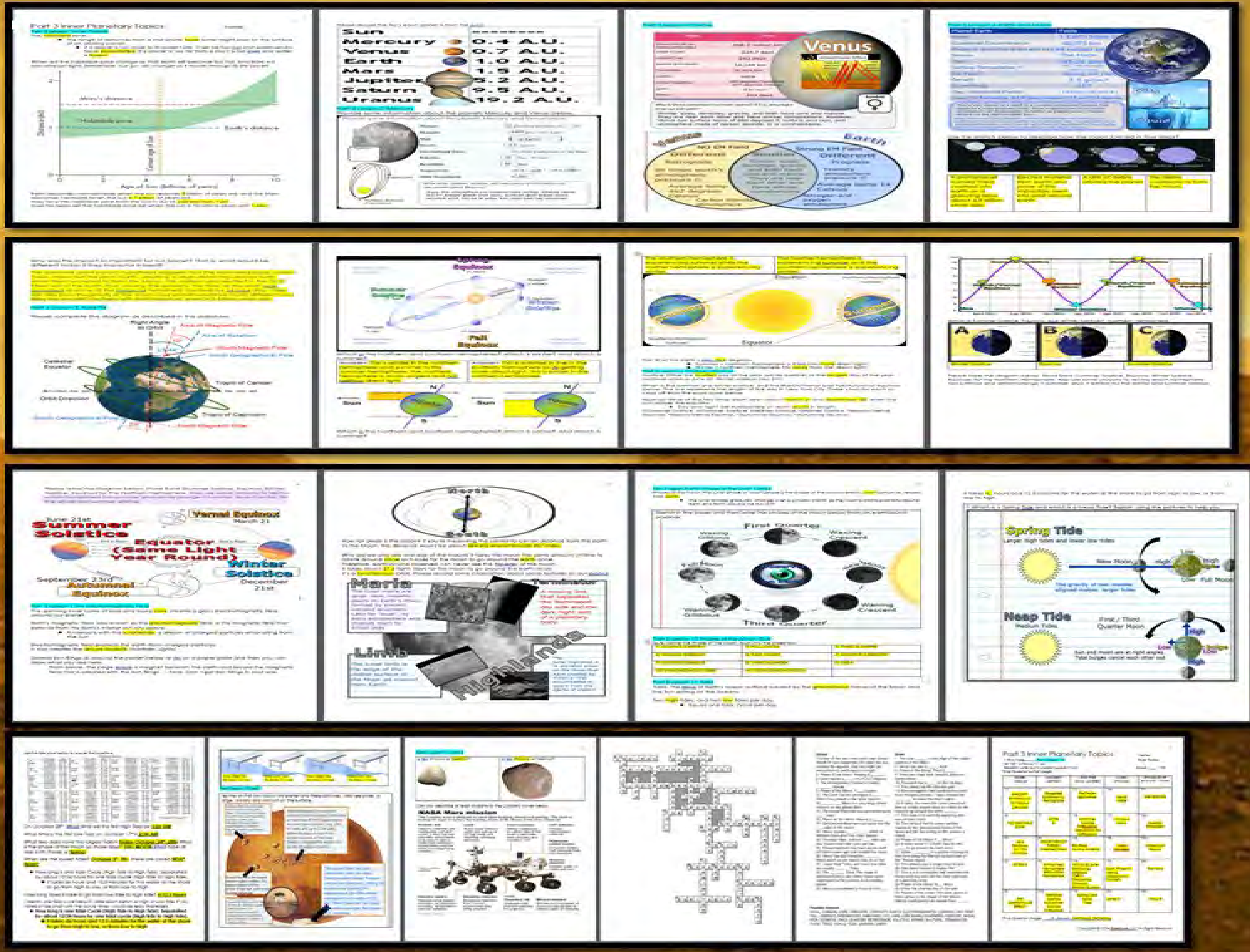


17 Pages


Maria
Terminator
Limb
Highlands
Tide
Tide
N
Sun
equator
S
Sun
equator
S
Equator
Equator
A
B
C

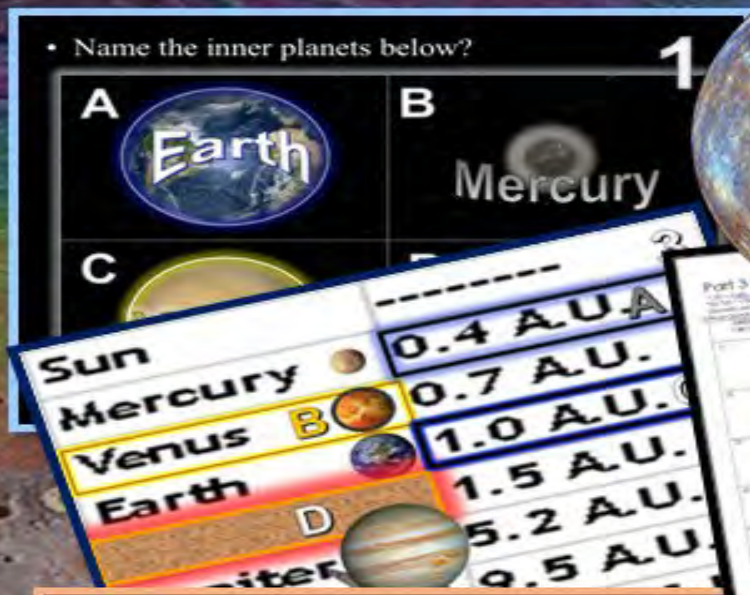


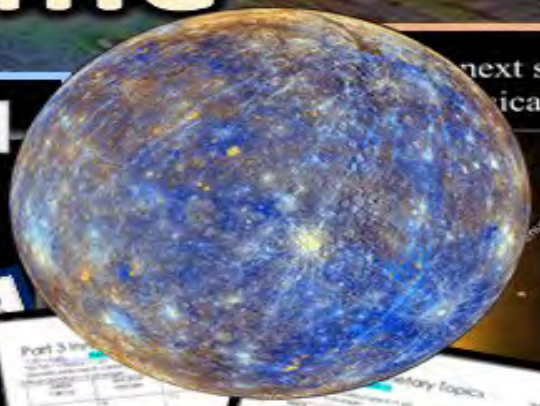
Part 3 Inner Planetary Topics
Name:
Due: Today
INNER CIRCLE
ANCIENT HISTORY
AND THE COW JUMPED
MARS ATTACKS
SPACE STUFF
Part 3 Lesson 13 Mars 2
Is this Phobos or Deimos?
Is this Phobos or Deimos?
Can you describe at least six parts to the Curiosity Rover below.
https://eyes.nasa.gov/curiosity/
Part 3 Lesson 12 Mars 1
Use the tide chart below to answer the questions.
October

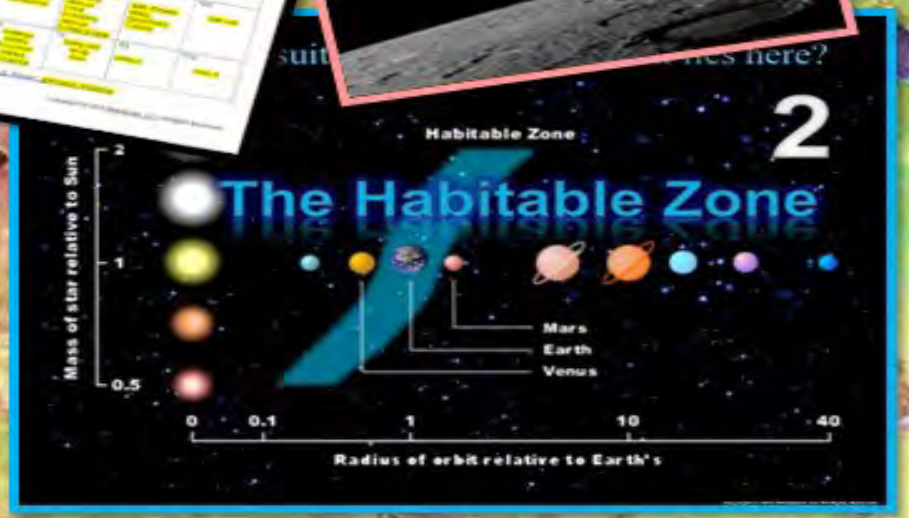

Part 3 Inner Planetary Topics
Sun
Mercury 0.4 A.U.
Venus 0.7 A.U.
Earth 1.0 A.U.
Mars 1.5 A.U.
Jupiter 5.2 A.U.
Saturn 9.5 A.U.
Uranus 19.2 A.U.
Venus
Earth
June 21st
Summer Solstice
Vernal Equinox
March 21
Equator (Same Light Year Round)
Winter Solstice
December 21st
September 23rd
Autumnal Equinox
North
South
Maria
Terminator
Limb
Highlands
First Quarter
Waxing Crescent
Full Moon
New Moon
Waning Gibbous
Waning Crescent
Third Quarter
Spring Tide
Neap Tide
A
B
C
NASA Mars mission
Part 3 Inner Planetary Topics

Inner Planetary Topics

Quiz Game

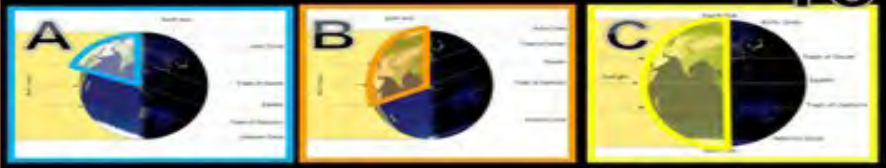






- Which is, equinox, winter solstice, and summer solstice in the northern hemisphere?

10



Winter Solstice | Summer Solstice | Equinox

Which is winter in the Northern Hemisphere?

9

Summer Southern Hemisphere

Equator gets even sunlight all year round

- Which is not true of the planet Earth

7

A.) Only planet known to support life.

B.) Complex system of land, water, and air.

C.) Largest of the inner planets.

D.) Most dense planet in the solar system

E.) Oceans (liquid water) can exist.

F.) Atmosphere, 78% Nitrogen and 21% oxygen, shields from radiation and keeps the planet's temperature just right.

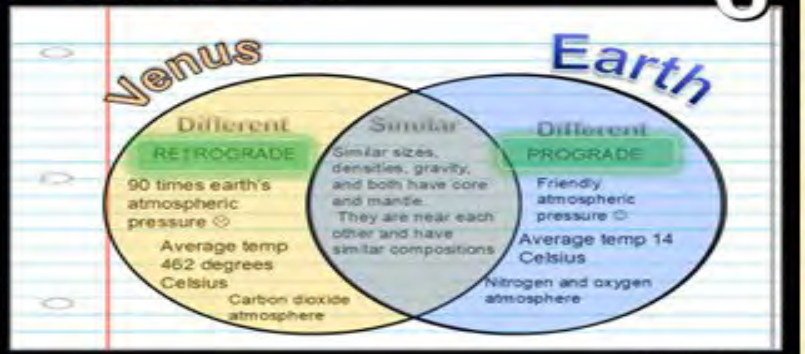
5.51 g/cm³

- W… …ears ago t… …e axial tilt, and i…

8

- Which two should be switched between Earth and Venus?

6



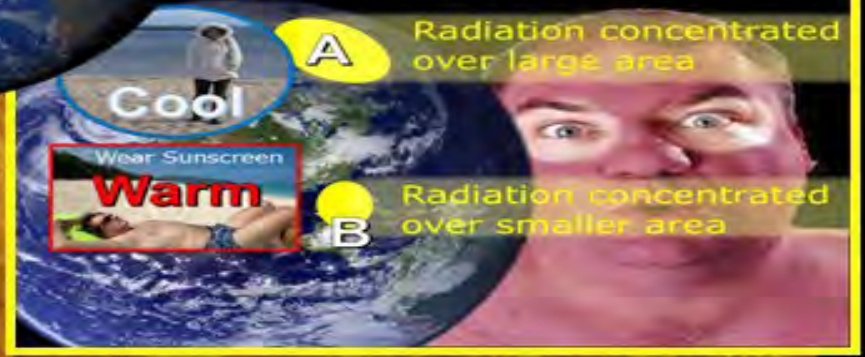
Name A and B?
Which one causes the larger tides?

15

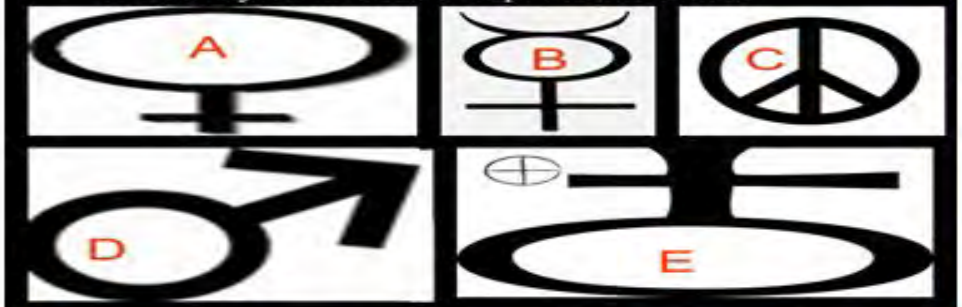
- Earth has a strong electromagne
protects the earth from charged par
– It also creates the Aurora borealis (Nor

a of the planet has hot weather year
d which is cooler year round?

11



- Which symbol below represents Mars?



Name A,B,C,D?

12

- What are the names of these two moons on Mars?

- What is the name of this giant canyon on Mars that dwarfs the Grand Canyon?

Valles Marineris

18

What's the name of these extinct volcanos on Mars.

17

e the Lander and Rovers below? 19

- The photograph below provides some evidence that this use to cover the Martian surface?

16

Astronomy Unit Part 4: Rocketry, Apollo Missions, Parts of the Saturn V Rocket, Apollo Modules, Parts of a Rocket, Water Bottle Rockets, Newton's Laws, Lift, Drag, Thrust, Weight, Law of Gravitation, Einstein and Gravity, Spacetime, Space Shuttle Program, International Space Station, Future in Space

Part 4: Astronomy Unit

Part 4 Lesson 1 Mission to the Moon

Part 4 Lesson 2 Water Rockets Gravity

Part 4 Lesson 3 Gravity Rocket Built Cont

Part 4 Lesson 4 Space Shuttle ISS

Part 4 Lesson 5 Newtons 1st Law

Part 4 Lesson 6 2nd Law of Motion

Part 4 Lesson 7 3rd Law of Motion

Part 4 Lesson 8 Rocketry Wrap Up

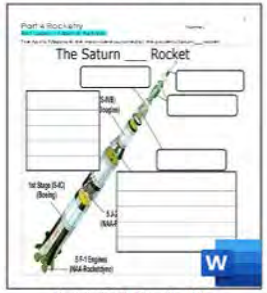
Part 4 Lesson 9 Review Game

Part 4 Lesson 10 Review Game Answers

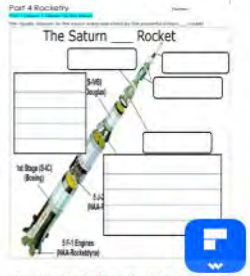

Part 4 Materials List


Part 4 Work Bundle Answers

Part 4 Work Bundle Digital



Part 4 Work Bundle Print



Part 4 Work Bundle Writable pdf

Rocketry Unit

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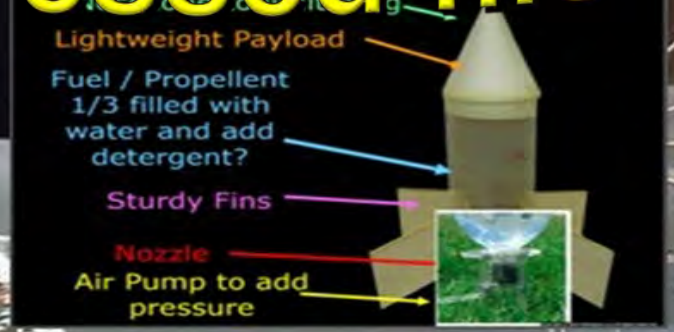
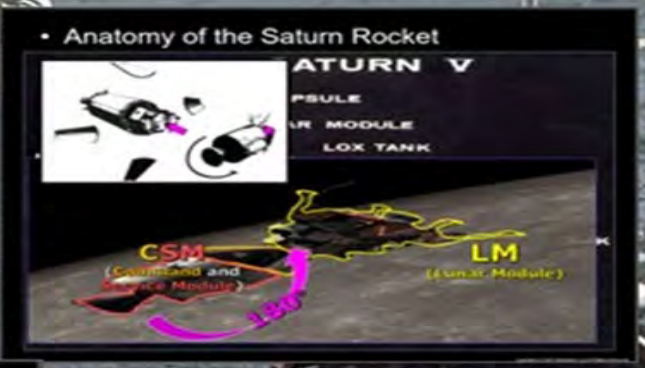
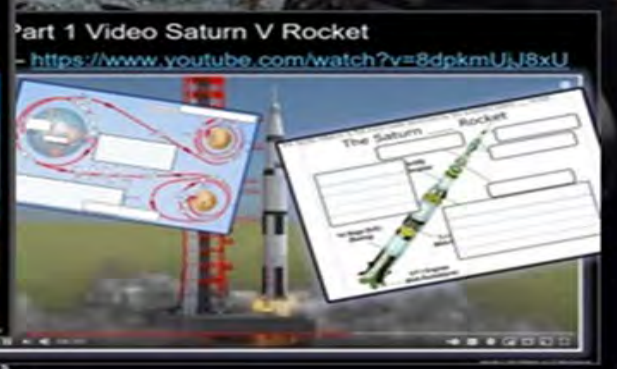
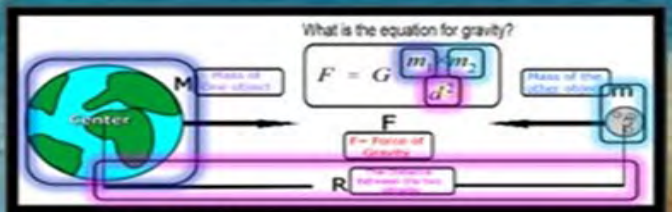






Interactive Slideshows

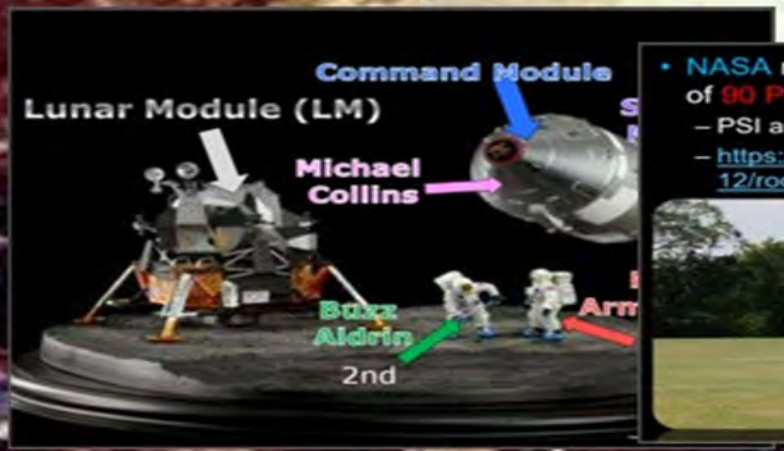


Newton's Law of Gravitation
For two masses displaced a distance apart, the gravitational force of attraction of one mass on the other is directly proportional to the product of the two masses and inversely proportional to the square of the distance between them.

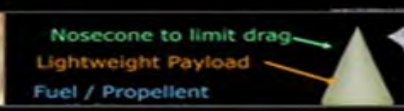
- Lift and Drag – Two aerodynamic forces

- Take a virtual tour of the ISS at…
  - https://esamultimedia.esa.int/multimedia/virtual-tour-iss/

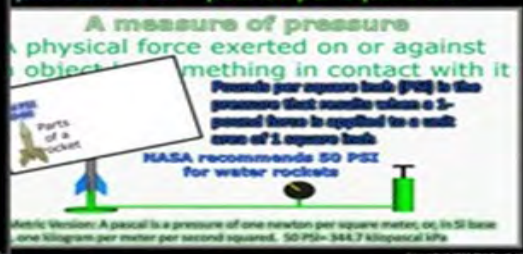
- What is gravity reading link?
  - https://spaceplace.nasa.gov/what-is-gravity/en/



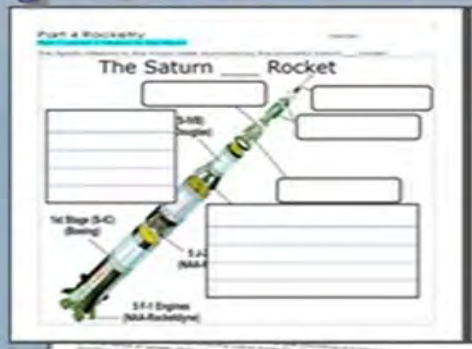
- NASA recommends 50 PSI with a maximum of 90 PSI
  - PSI and other safety information can be found…
  - https://www.grc.nasa.gov/www/k-12/rocket/BottleRocket/safety.htm

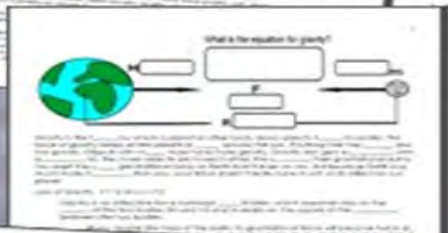


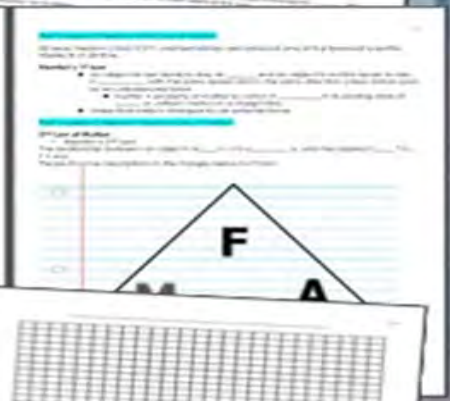
We will be using water rockets and air pressure. PSI = pounds per square inch

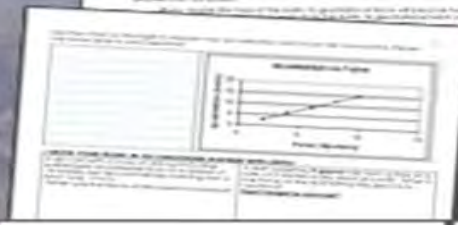


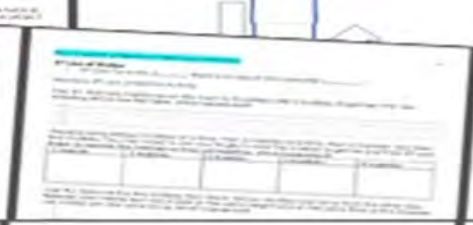
Follow Along Work Bundle





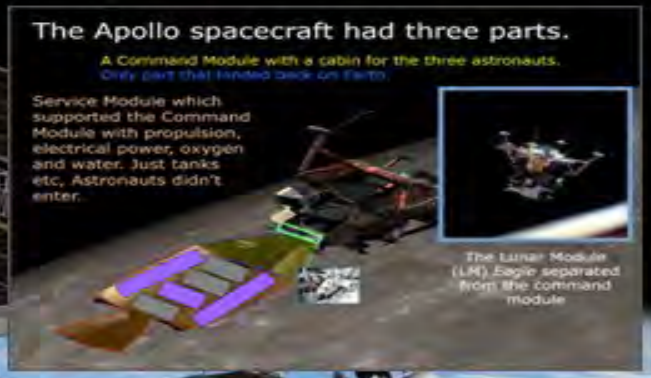






20 Pages

Activities, Notes, Assessments, Keys, And much more all built-in



- Activity! Listening to an historic event that captivated the world. (7:50 minutes in)
  - "The Eagle has landed."
  - http://www.youtube.com/watch?v=5QS3JSRGk3o

- Gravity of the earth keeps the moon from going into deep space… **gravity of the sun keeps the earth in orbit**… and gravity of our galaxy keeps the solar system from heading into deep space.

- Anything that has mass also has gravity. Objects with more mass have 4 gravity. Gravity also gets weaker with 5. So, the closer objects are to each other, the stronger their gravitational pull is

Lunar Module descent Stage: It had a rocket and legs for landing on the moon. It stayed behind when the Ascent Stage blast…

Lunar Module As… astronauts lived… contained a prop… the moon and to…

Command Mod… a mother ship, w… astronauts and t… the Apollo Lunar… brought the astr… landed on the m…

Service Modul… life support sy… electrical powe… main engine /… fuel.

- Law of Gravity $F = G M m / r^2$
  - Gravity is an attractive force between two bodies, which depends only on the mass of the two bodies (M and m) and inversely on the square of the separation between the two bodies.

- Trajectory… e path that a projectile makes th… space under the action of given for…s …ch as thrust, wind, and gravity.

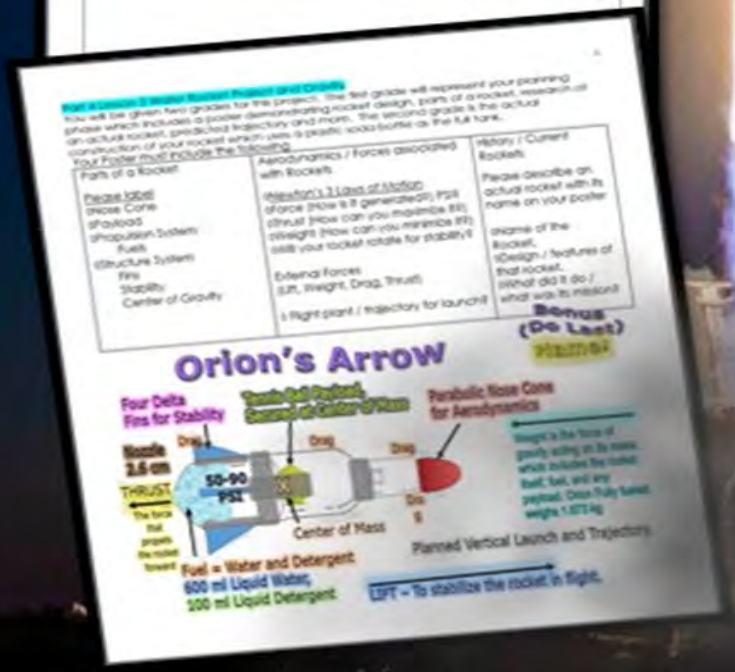
ROCKETRY

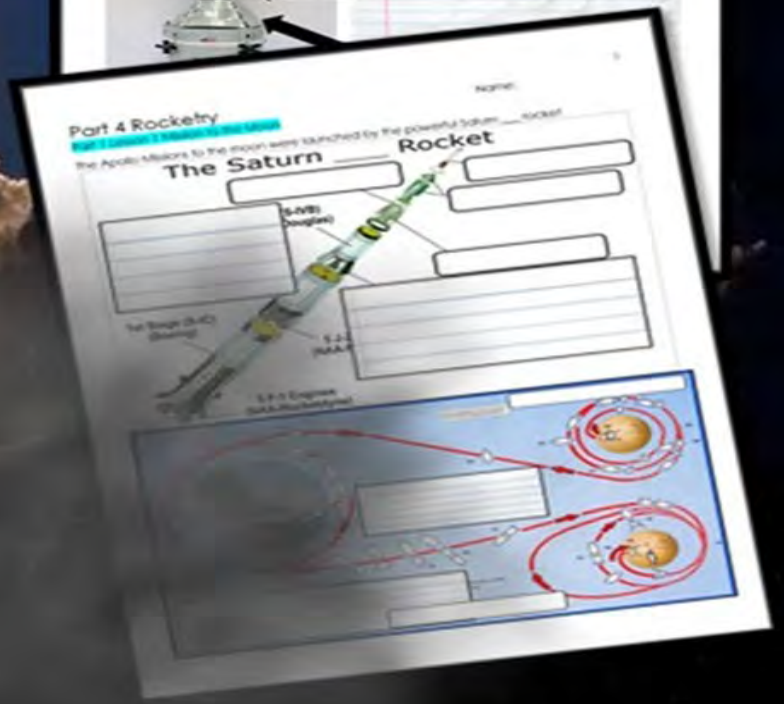
Work Bundle

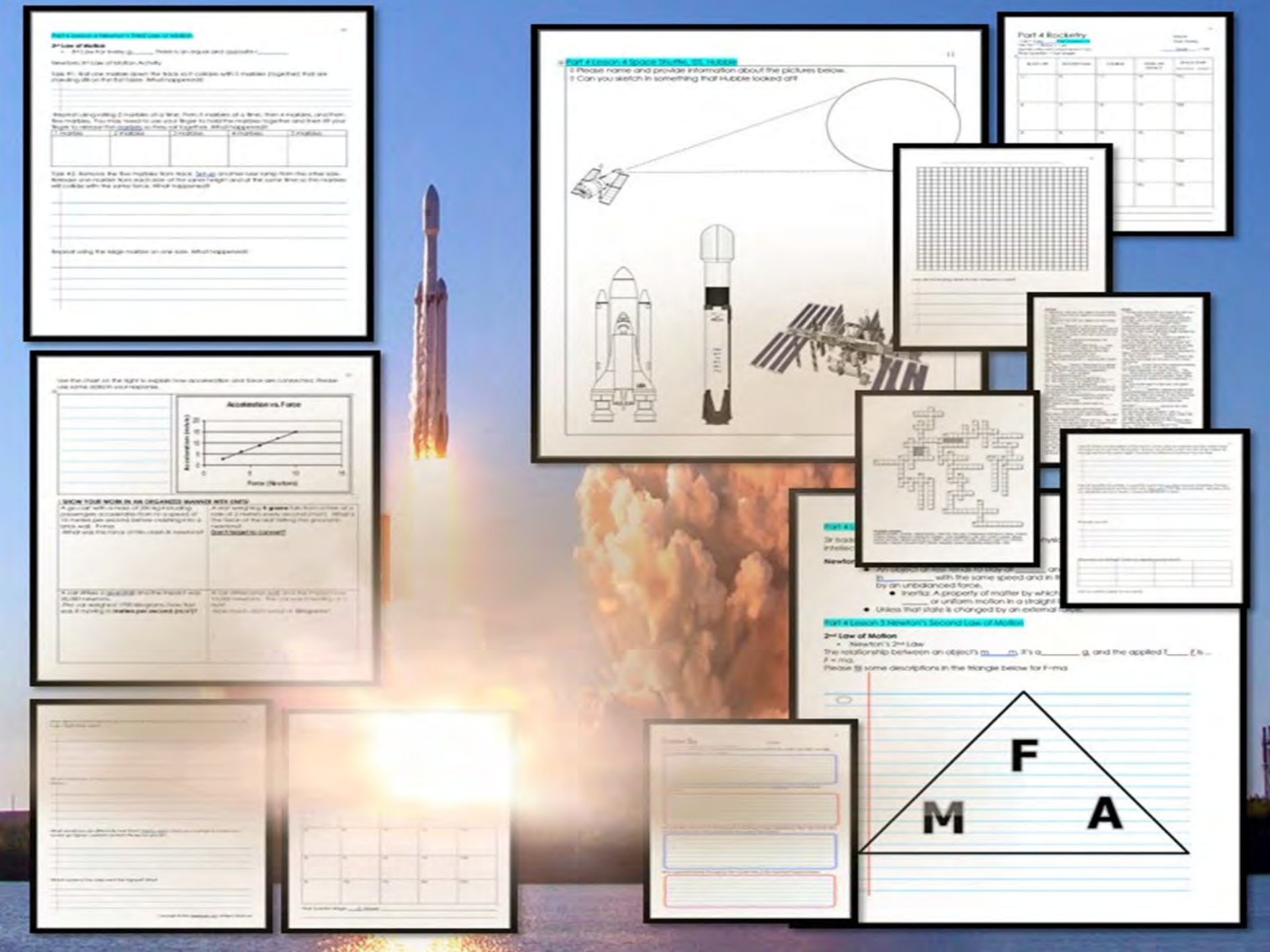
1 Please visit NASA homepage about the Apollo Missions.
1 Please visit at least three different Apollo missions and explore their mission. Tell about some of the exciting details in the space below.
https://www.nasa.gov/mission_pages/apollo/missions/index.html

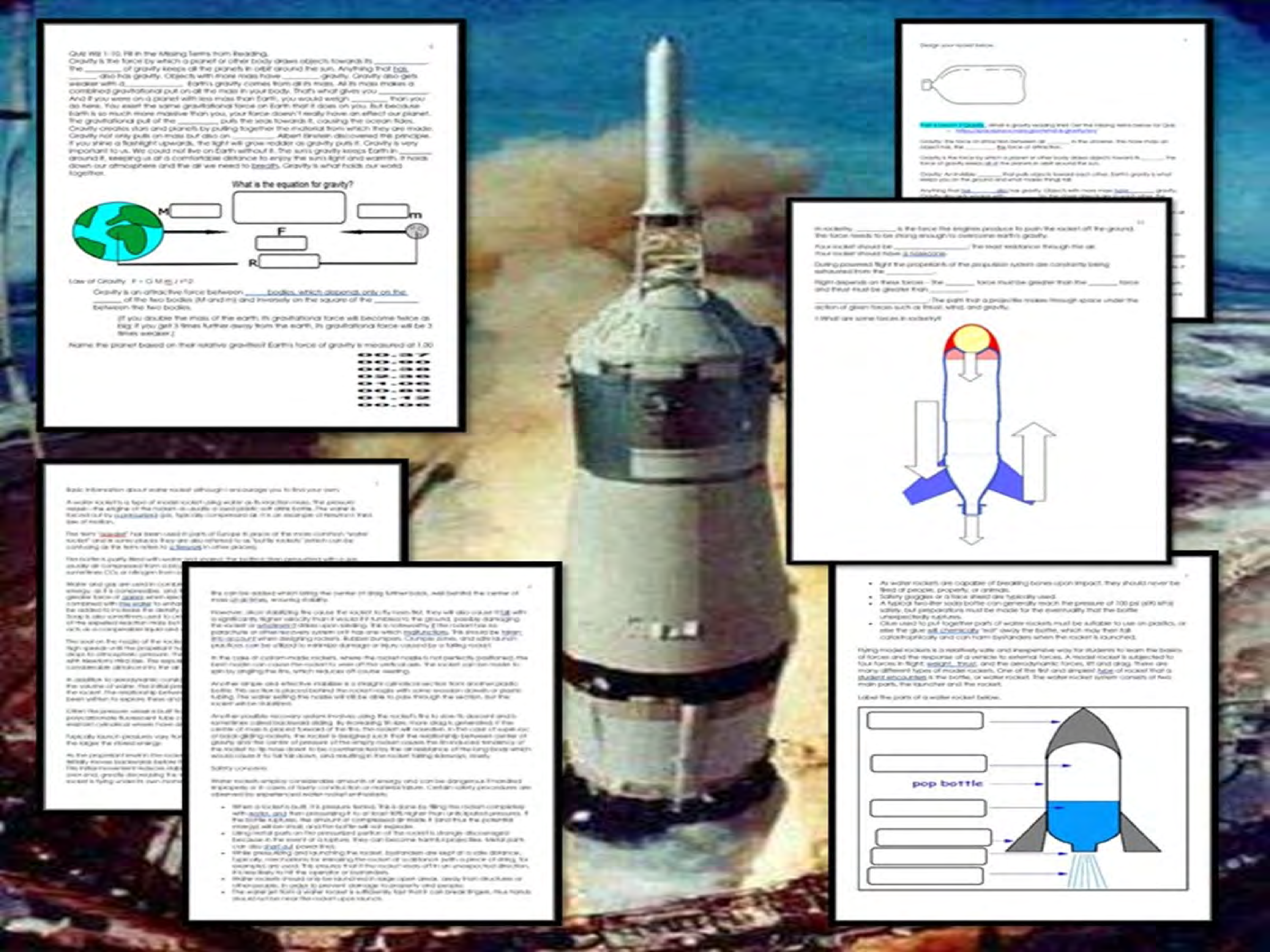
The Journey.... Record some info. Which is lunar landing, return home, Launch, Touchdown!!

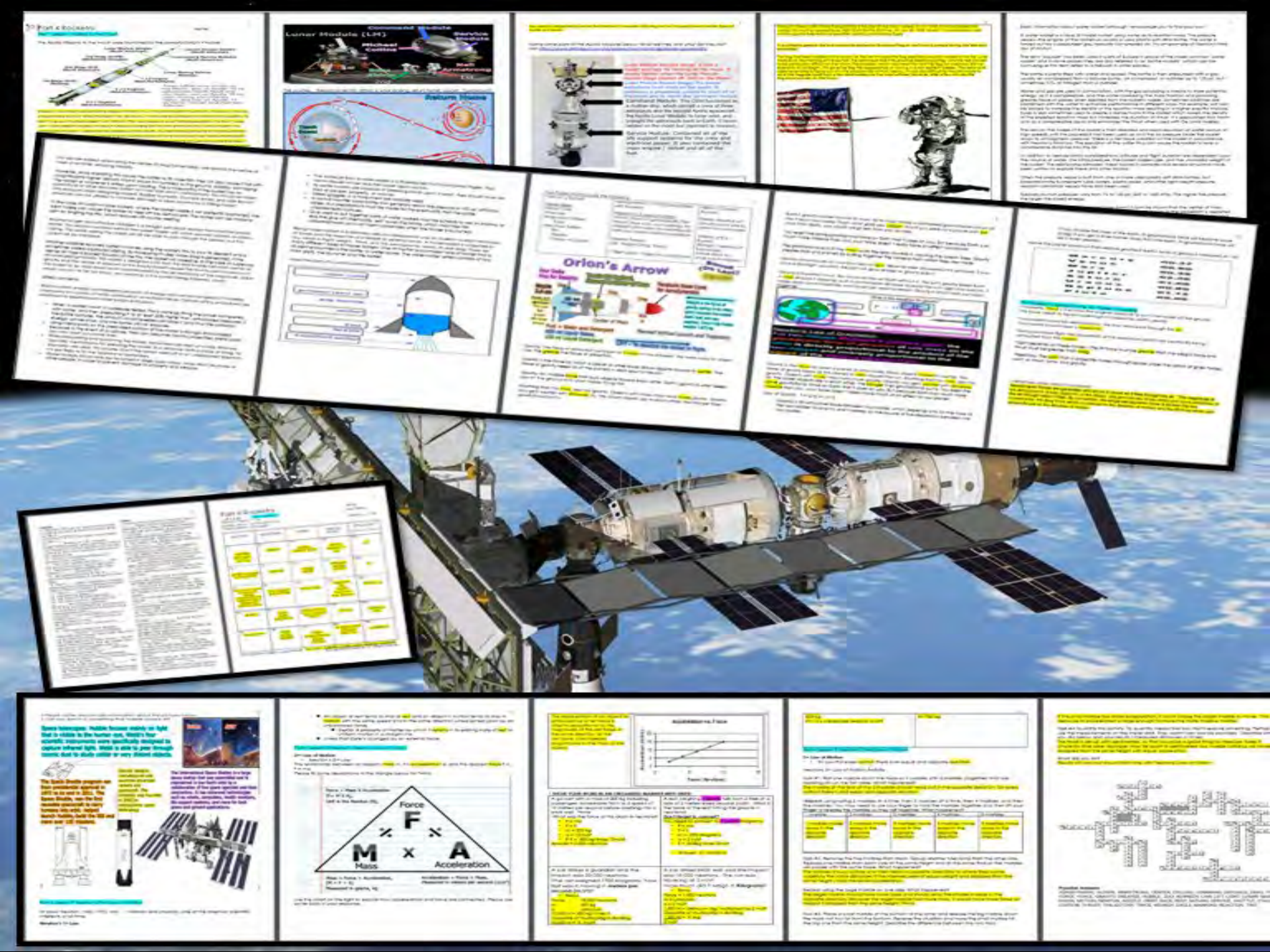
Name some parts of the Apollo Modules below. What are they and what did they do?
Visit https://grandspace.il.edu/explore/stories/tools-and-technology-apollo-program





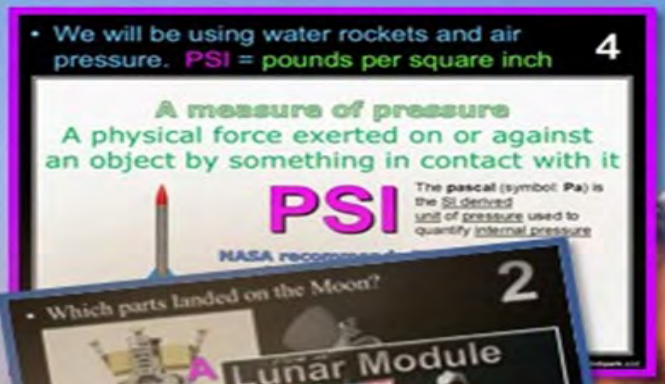

Part 4 Lesson 4 Space Shuttle, ISS, Hubble
1) Please name and provide information about the pictures below.
2) Can you sketch in something that Hubble looked at?
Part 4 Rocketry
Acceleration vs. Force
Acceleration (m/s/s)
Force (Newtons)
Part 4 Lesson 3 Newton's Second Law of Motion
2nd Law of Motion
Newton's 2nd Law
F
M
A


What is the equation for gravity?
M
m
F
R
pop bottle


Lunar Module (LM)
Command Module
Service Module
Michael Collins
Buzz Aldrin
Neil Armstrong
Return Home
Orion's Arrow
Force
F
M
Mass
x
A
Acceleration

ROCKETRY

Quiz Game



- If you double the mass of the earth, its gravitational force will become twice as big; if you get 3 times further away from the earth, its gravitational force will be 3 times weaker.

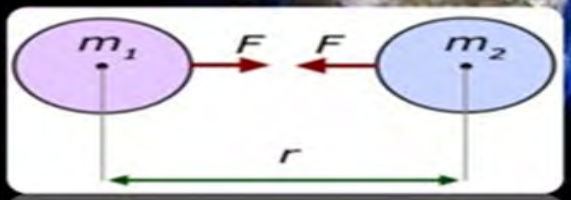
Twice
Three

- Anything that has mass also has gravity. Objects with more mass have more gravity. Gravity also gets weaker with distance. So, the closer objects are to each other, the stronger their gravitational pull is

Mass
More Gravity
Distance

9

Gravity is...
Two objects interacting with each other



8

- This is the path that a projectile makes through space under the action of given forces such as thrust, wind, and gravity.

5

The more mass the objects have, the [redacted] the force of attraction

7

- What was the … of this spacecraft that can launch into orbit ar… …turn to Earth and be reused

14

- In rocketry we can use gravity to speed up an object and change directions.
- This is called a…

11

A.) Gravity Assist
B.) Warp Speed
C.) Lunar Test
D.) Aldrin Maneuver
E.) Max Boost

- This feature on the top of your rocket allows it to be more aerodynamic / offering the least resistance through the air.

13

Nose Cone

- Led by the United States, this draws upon the scientific and technological resources of 16 nations: Canada, Japan, Russia, 11 nations of the European Space Agency and Brazil.

The International Space Station (ISS)

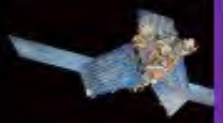
15

- During powered flight, the propellants of the propulsion system are constantly being exhausted from the nozzle. This creates Thrust!

12

- There is generally no friction in space. A space vehicle will travel in the same direction at the same speed until acted upon by a force. This is an example of…
  - A.) Newton's First Law of Motion
  - B.) The Speed of Light
  - C.) Quantum Force Theory
  - D.) An impossible calculation
  - E.) Warp Speed

16



- Name the parts of a simple rocket? (1 pt each)

18

Name A, B, and C?

17

Note: A and B can be switched as both arrows are pointing down.

Lift

A

Drag

Weight

B

Thrust

C

Note: Downward thrust causes the rocket to lift.

In rocketry, you want to limit…A and B, and Increase C.

- Newton's Second Law F=ma stands for…
  - A.) Force = Momentum times altitude
  - B.) Force = Measurement of Mass
  - C.) Flight = Multiple times Angle
  - D.) Force = Mass times Acceleration
  - E.) This is not one of Newton's Laws

19

Gravity is the force by which a planet or other body draws objects toward its center. The force of gravity keeps all the planets in orbit around the sun. Anything that has mass also has gravity. Objects with more mass have more gravity. Gravity also gets weaker with distance.

- Please finish Newton's 3rd Law
  - For every action there is an equal and opposite reaction.

Part 5: Main Asteroid Belt, protoplanet Ceres, Vesta, Meteors, Meteorites, Asteroids, Bolides, Chicxulub Crater, Tunguska Event, Chelyabinsk meteor, Craters, Parts of a Crater, Crater Impact Activity, NEO's, Torino Scale,

Part 5: Astronomy Unit

Part 5 Lesson 1 Main Asteroid Belt

Part 5 Lesson 2 Tunguska Event

Part 5 Lesson 3 NEOs

Part 5 Lesson 4 Impact Lab

Part 5 Lesson 5 Research and Wrap Up

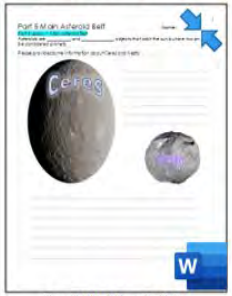
Part 5 Lesson 6 Review Game

Part 5 Lesson 7 Review Game Answers


Part 5 Materials List

Part 5 Work Bundle Answers

Part 5 Work Bundle Digital



Part 5 Work Bundle Print

Part 5 Work Bundle Writable pdf

Asteroids, Craters, NEO's

Preview is a compressed file

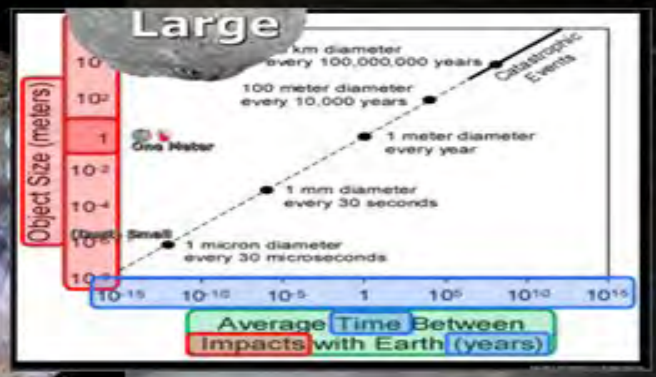
- Asteroids are rocky and metallic objects th
  orbit the sun but are too small to be
  considered planets.

- Which is Ceres and which is Vesta?

A

Vesta

Cere



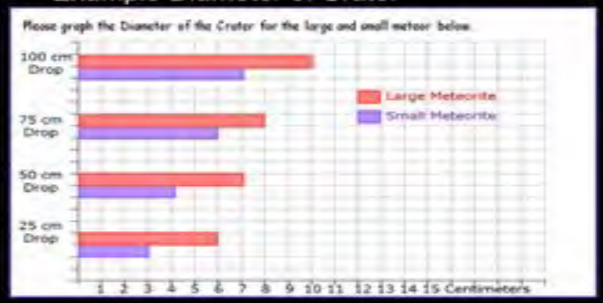
- Lake Manicouagan, Canada
  – 212 million years old.

- Vesta Protoplanet

Protoplanet: A large body of matter in orbit around the sun or a star and thought to be developing into a planet.

Planetary Embryo

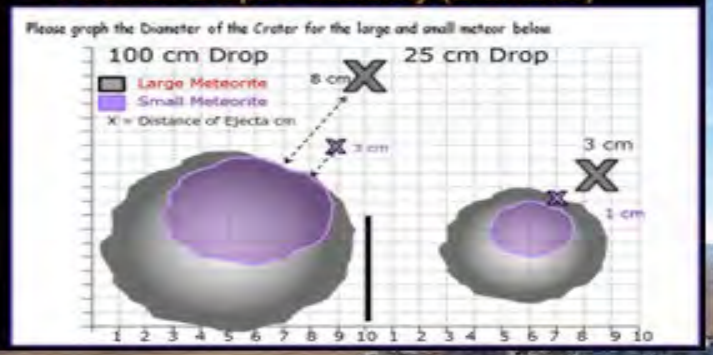
- Example Diameter of Crater



- Meteorite: Space matter that has fallen to the earth's surface from outer space.

Interactive Slideshows

- Another Graph Possibility (Diameter)



- NEO's: Near Earth Objects
  - (Comets and asteroids that come very close to Earth.)

- Craters can be found on earth, but most craters are eroded away by wind and water.
  - Small meteors also burn up in our atmosphere.

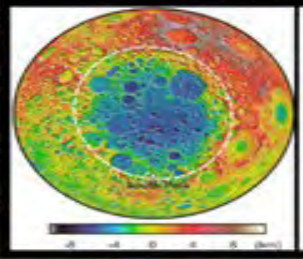
- There are three main types of meteorites.
  - Iron, Stone, and Stony-Iron

Stony-Irons: They are comprised of roughly equal amounts of nickel-iron and stone. They are thought to have formed at the core/mantle boundary of their parent bodies.

Stone——: Once formed part of the outer crust of a planet or asteroid. Contain small, colorful, grain-like inclusions known as "chondrules." These tiny grains originated in the solar nebula, and therefore pre-date the formation of our planet and the rest of the solar system

- Chicxulub Crater
  - 65 million years ago

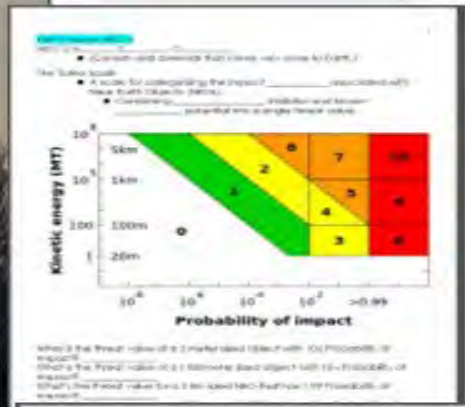
- The largest known impact basin in the solar system is the…
  - South Pole-Aitken Basin on far-side of the moon. 3.9 billion years ago. During Late Bombardment

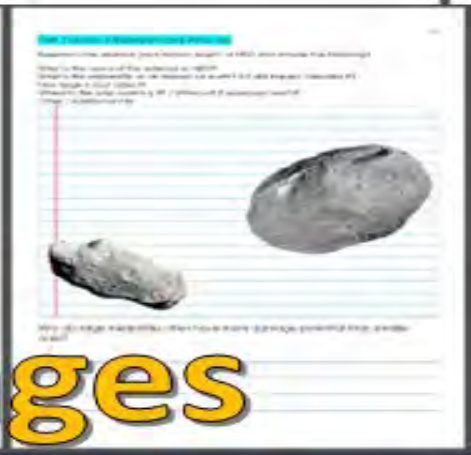


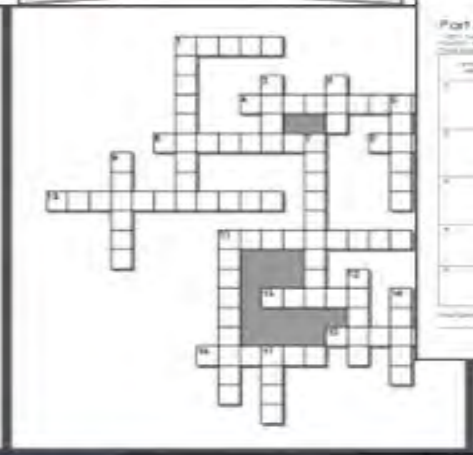
Asteroid 2004 MN4 will come close to Earth on April 13, 2029, but it will not hit.
- (It's a Friday the 13th …Ohhh)

…nall (dust size to coin) piece of …t hits the earth's atmosphere and …

Follow Along Work Bundle







13 Pages

Activities, Notes, Assessments, Keys and more all built-in

- The Torino Scale
  - A scale for categorizing the impact hazard associated with Near-Earth Objects (NEOs).
    - Combining probability statistics and known damage potentials into a single threat value.

- Why do large meteorites often have more damage potential than smaller ones?
  - A.) Large meteorites travel faster.
  - B.) Large meteorites have more mass.
  - C.) Large meteorites are made of iron.
  - D.) Large meteorites explode in the air.
  - E.) Large meteorites spin as they travel.

19

F=ma

- Tunguska event (1908).
  - A (comet or meteorite) exploded just above the surface of the earth causing a massive explosion.

- Name this famous crater in Arizona?
  - It was from an impactor about 50,000 years ago.

- Chelyabinsk Asteroid. February 15th, 2013
  - Injured 1,200 people in Chelyabinsk, Russia.
  - Created a supersonic shockwave that collapsed roofs and blew out windows.
    - Parts of the asteroid exploded 42 miles above the ground.

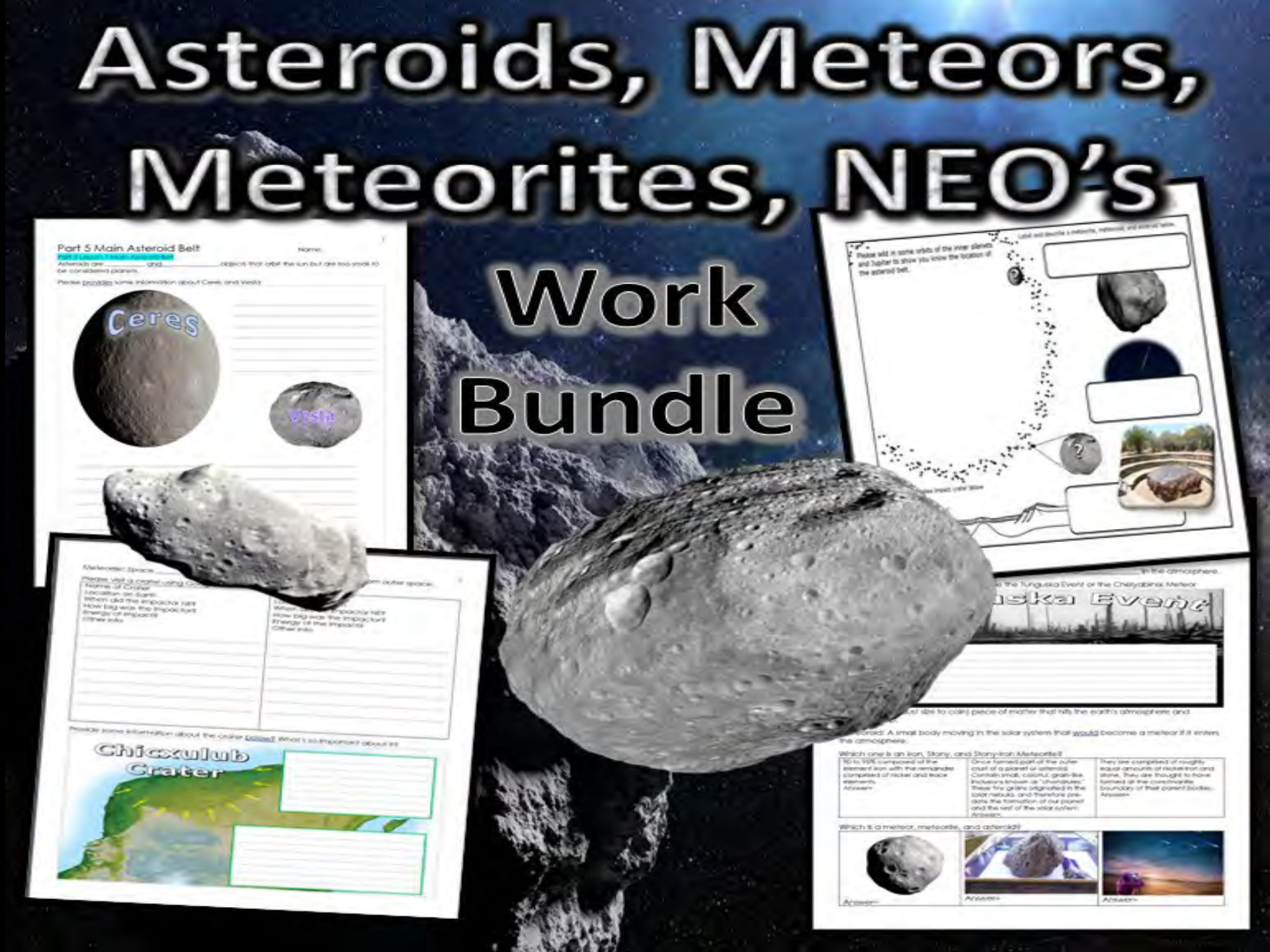
The "Asteroid" is really A bolide.
Bolide: A large meteor that explodes in the atmosphere.

- A layer of Iridium can be found across the globe in rock layers around 65 million years ago. K-T(Pg) Mass Extinction Event
  - Iridium is found on Meteorites.

- Which is an asteroid, meteorite, and meteor?

- Tunguska event (1908).
  - A (comet or meteorite) exploded just above the surface of the earth causing a massive explosion.

Asteroids, Meteors, Meteorites, NEO's Work Bundle



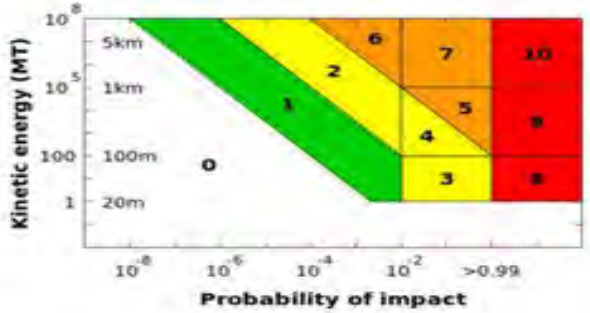
Part 2 (page/NEO's)

NEO's: N_____ E_____ O_____

- (Comets and Asteroids that come very close to Earth.)

The Torino Scale

- A scale for categorizing the impact _____ associated with Near Earth Objects (NEOs).
- Combining _____ statistics and known _____ potential into a single threat value.

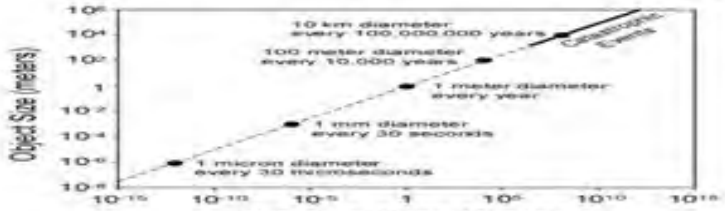


What is the threat value of a 5 meter sized object with 10-6 Probability of impact? _____

What is the threat value of a 1 kilometer sized object with 10-4 Probability of impact? _____

What's the threat value for a 5 km sized NEO that has >.99 Probability of impact? _____

What's the threat value for a 100 m sized NEO that has 10-4 Probability of impact?



How often do smaller meteoroids one millimeter (mm) enter earth's atmosphere?	
How often do smaller meteoroids 1 micron in diameter enter earth's atmosphere?	
How large does the object need to be to cause a catastrophic event?	
The Tunguska impactor may have been 100 meters, how often does an impact of this magnitude occur?	
The Chicxulub impactor may have been 10+km in diameter, how often do impacts of this size occur? What happened 65 million years ago?	

Are large or small impacts/mass common? Explain below using data:

Visit the reading of Asteroid 2011 AG5

https://www.space.com/14463-big-asteroid-2011-ag5-threat-earth.html

When could it hit?

Is the earth in danger if it hits us? Consider its mass and composition. Are these known values?

What are the odds of impact? Are you worried?

Part 3 (page/Impact Lab)

Meteor Impact Activity

Please label the impact crater below as described in the slideshow.

Small Meteorite

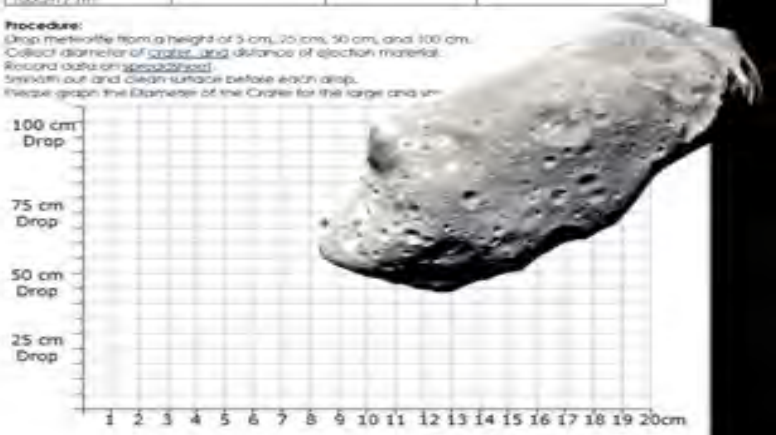
Height (Centimeters)	Mass of Meteor	Diameter of Crater	Distance of Ejecta (cm)
25cm			
50cm			
75cm			
100m / 1m			

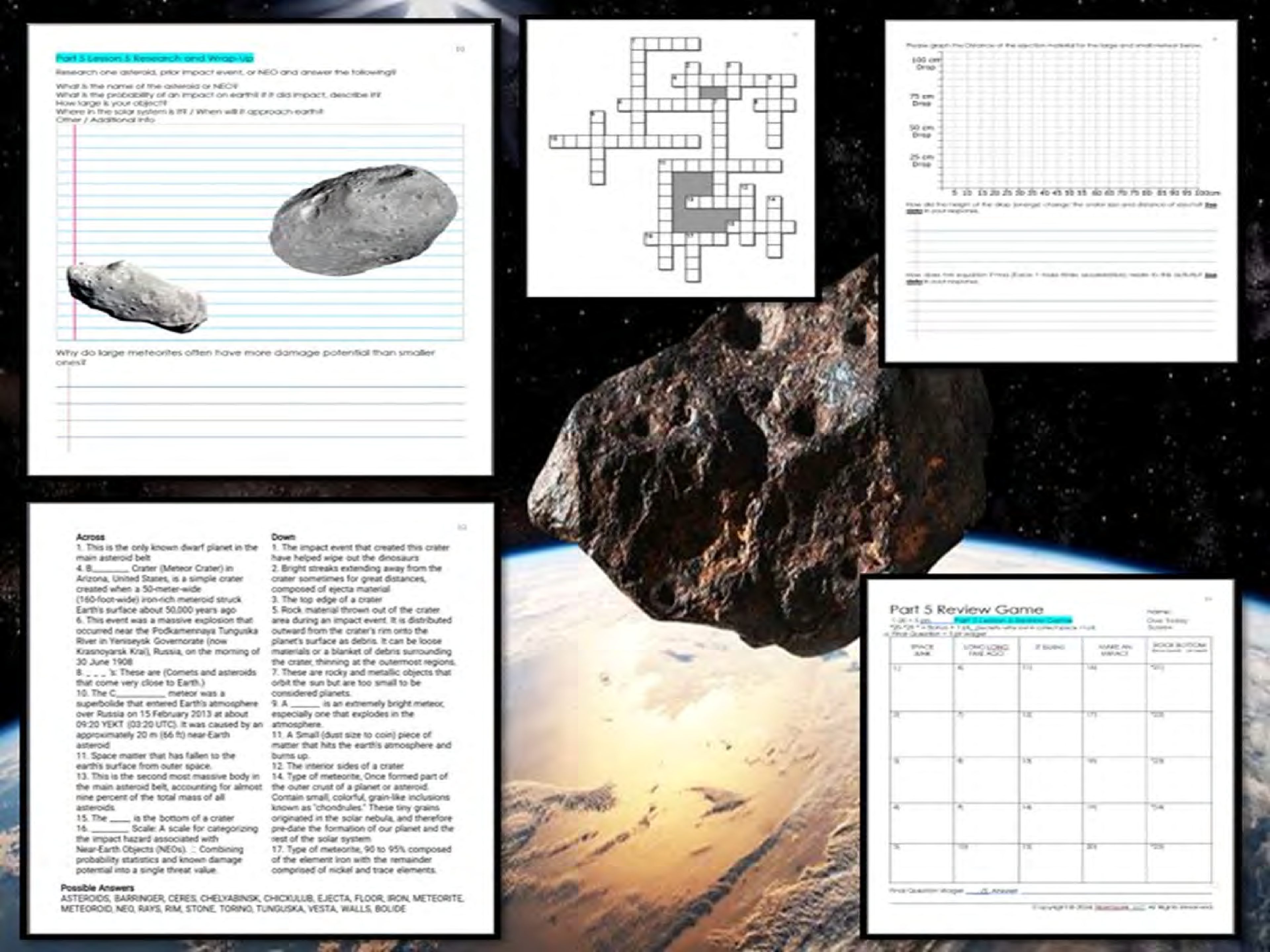
Large Meteorite

Height (Centimeters)	Mass of Meteor	Diameter of Crater	Distance of Ejecta (cm)
25cm			
50cm			
75cm			
100cm / 1m			

Procedure:

Drop meteorite from a height of 5 cm, 25 cm, 50 cm, and 100 cm.
Collect diameter of crater and distance of ejection material.
Record data on spreadsheet.
Smooth out and clean surface before each drop.
Please graph the Diameter of the Crater for the large and s





Part 5 Lesson 5 Research and Wrap-Up

Research one asteroid, prior impact event, or NEO and answer the following!!

What is the name of the asteroid or NEO?
What is the probability of an impact on earth? If it did impact, describe it?
How large is your object?
Where in the solar system is it? / When will it approach earth?
Other / Additional Info

Why do large meteorites often have more damage potential than smaller ones?

Across

1. This is the only known dwarf planet in the main asteroid belt
4. B________ Crater (Meteor Crater) in Arizona, United States, is a simple crater created when a 50-meter-wide (160-foot-wide) iron-rich meteoroid struck Earth's surface about 50,000 years ago
6. This event was a massive explosion that occurred near the Podkamennaya Tunguska River in Yeniseysk Governorate (now Krasnoyarsk Krai), Russia, on the morning of 30 June 1908
8. _ _ _ 's: These are (Comets and asteroids that come very close to Earth.)
10. The C____________ meteor was a superbolide that entered Earth's atmosphere over Russia on 15 February 2013 at about 09:20 YEKT (03:20 UTC). It was caused by an approximately 20 m (66 ft) near-Earth asteroid
11. Space matter that has fallen to the earth's surface from outer space.
13. This is the second most massive body in the main asteroid belt, accounting for almost nine percent of the total mass of all asteroids.
15. The _____ is the bottom of a crater
16. _________ Scale: A scale for categorizing the impact hazard associated with Near-Earth Objects (NEOs). : Combining probability statistics and known damage potential into a single threat value.

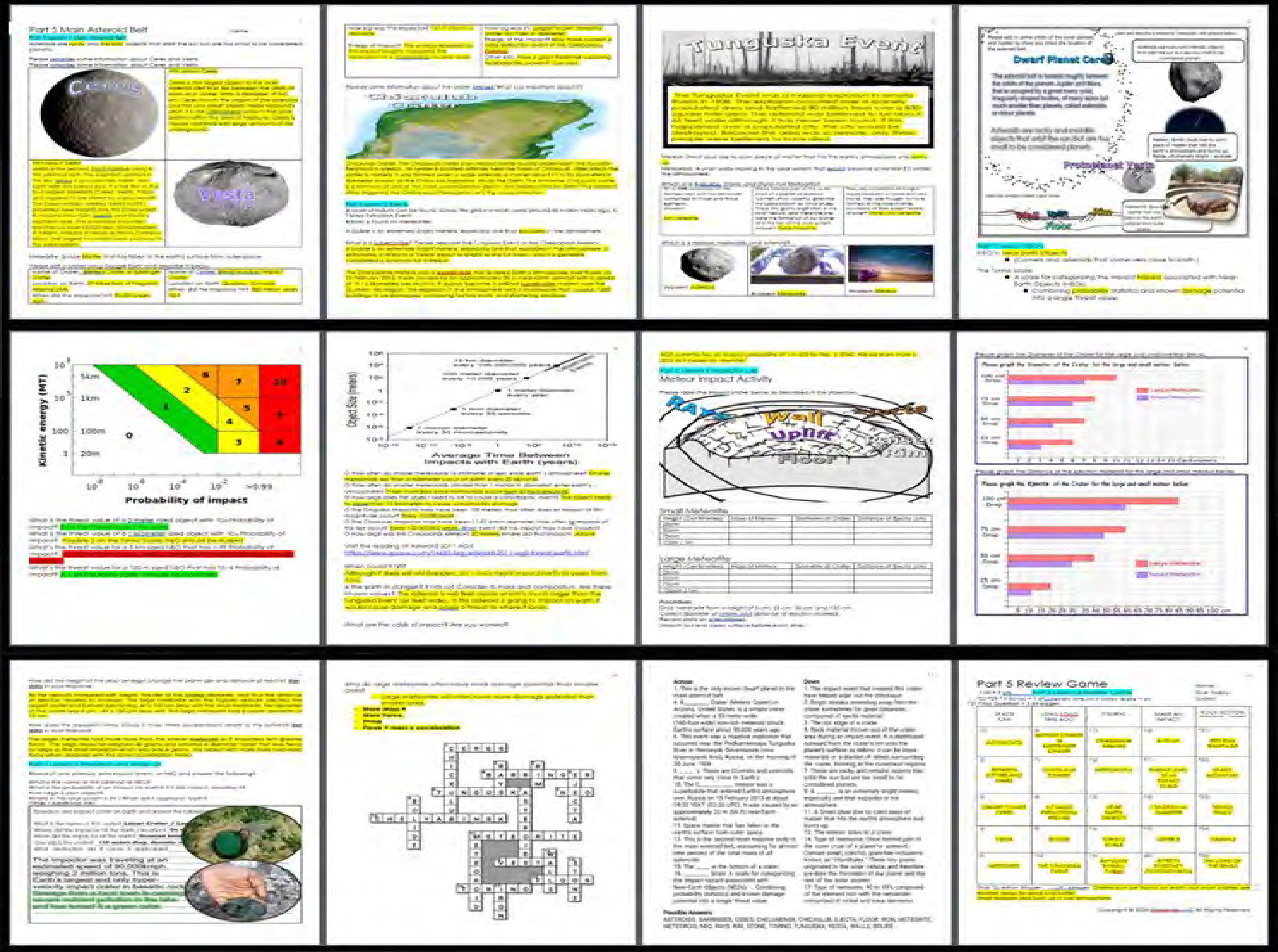
Down

1. The impact event that created this crater have helped wipe out the dinosaurs
2. Bright streaks extending away from the crater sometimes for great distances, composed of ejecta material
3. The top edge of a crater
5. Rock material thrown out of the crater area during an impact event. It is distributed outward from the crater's rim onto the planet's surface as debris. It can be loose materials or a blanket of debris surrounding the crater, thinning at the outermost regions.
7. These are rocky and metallic objects that orbit the sun but are too small to be considered planets.
9. A _______ is an extremely bright meteor, especially one that explodes in the atmosphere.
11. A Small (dust size to coin) piece of matter that hits the earth's atmosphere and burns up.
12. The interior sides of a crater
14. Type of meteorite, Once formed part of the outer crust of a planet or asteroid. Contain small, colorful, grain-like inclusions known as "chondrules." These tiny grains originated in the solar nebula, and therefore pre-date the formation of our planet and the rest of the solar system.
17. Type of meteorite, 90 to 95% composed of the element iron with the remainder comprised of nickel and trace elements.

Possible Answers

ASTEROIDS, BARRINGER, CERES, CHELYABINSK, CHICXULUB, EJECTA, FLOOR, IRON, METEORITE, METEOROID, NEO, RAYS, RIM, STONE, TORINO, TUNGUSKA, VESTA, WALLS, BOLIDE

Part 5 Review Game



Part 5 Main Asteroid Belt
Ceres
Vesta
Tunguska Event
Dwarf Planet Ceres
Protoplanet Vesta
Floor
Kinetic energy (MT)
Probability of impact
Average Time Between Impacts with Earth (years)
Meteor Impact Activity
Rays
Wall
Uplift
Floor
Rim
Part 5 Review Game

Asteroids, Meteors, Meteorites, NEO's

Quiz Game

- This is the name for rocky and metallic objects that orbit the sun but are too small to be considered planets.

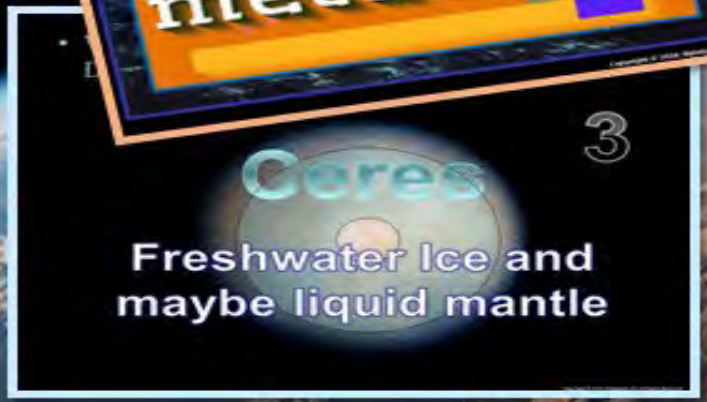
1

- This is the second largest object by both mass and volume in the asteroid belt with a minor-planet designation:
  - It constitutes an estimated 9% of the mass of the asteroid belt and also has the largest mtn in the solar system.

4

- This is the name for space matter that has fallen to the earth's surface from outer space.

5

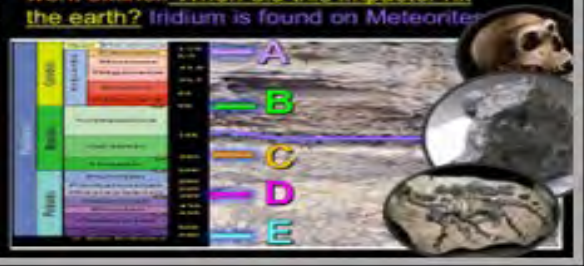


3

- The Main Asteroid Belt lies between these two planets?

- Name this famous crater in Arizona?
  - It was from an impactor about 50,000 years ago.

- A layer of Iridium can be found across the globe in rock layers when the dinosaurs went extinct. When did this impactor hit the earth? Iridium is found on Meteorites



- Name this crater whose impactor may have contributed the extinction of the dinosaurs? 7

- This is an extremely bright meteor, especially one that explodes in the atmosphere.

- This event occurred in (1908) over remote Siberia where a comet or meteorite exploded just above the surface of the earth causing a massive explosion.

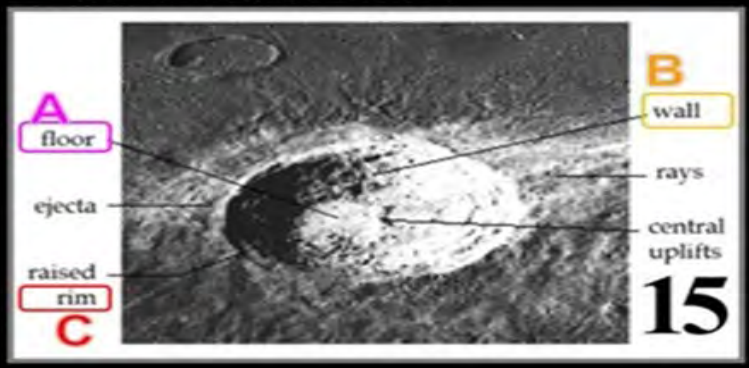
- This meteor exploded in the air above Russia February 15th, 2013 11
  - Injured 1,200 people
  - Created a supersonic shockwave that collapsed roofs and blew out windows.
    - Parts of the asteroid exploded 42 miles above the ground. Some parts landed in a lake.
  - Weighed 10 tons and was traveling at 45,000 mph

- This is a piece of matter that hits the earth's atmosphere and (burns up).

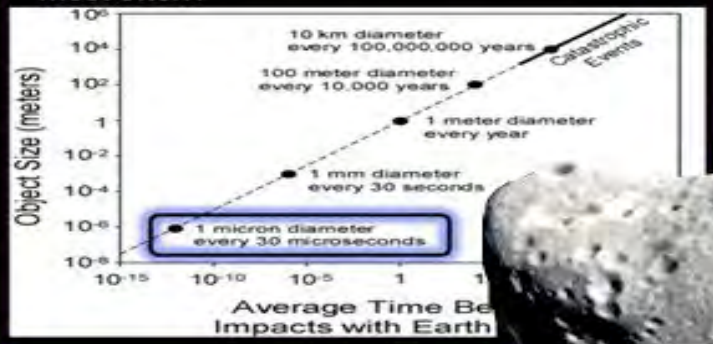
- NEO's stand for _____
  - (These are comets and asteroids that come very close to Earth.)

- This is a scale for categorizing the impact hazard associated with (NEOs).
  - Combining probability statistics and known damage potentials into a single threat value.

- Please name the terms below?



- What size meteorites enter our atmosphere most often?



- There are three main types of meteorites. 20
  - Which is Iron, Stone, and Stony-Iron

Stony-Irons: They are comprised of roughly equal amounts of nickel-iron and stone. They are thought to have formed at the core/mantle boundary of their parent bodies.

Iron------: 90 to 95% composed of the element iron with the remainder composed of nickel and trace elements.

Stone------: Once formed part of the outer crust of a planet or asteroid. Contain small, ful, grain-like inclusions known as les." These tiny grains originated ebula, and therefore pre-date ur planet and the rest of

- What is the threat value on the Torino Scale?
  - A 5 km size object with a very high probability of impact. Threat Level 10

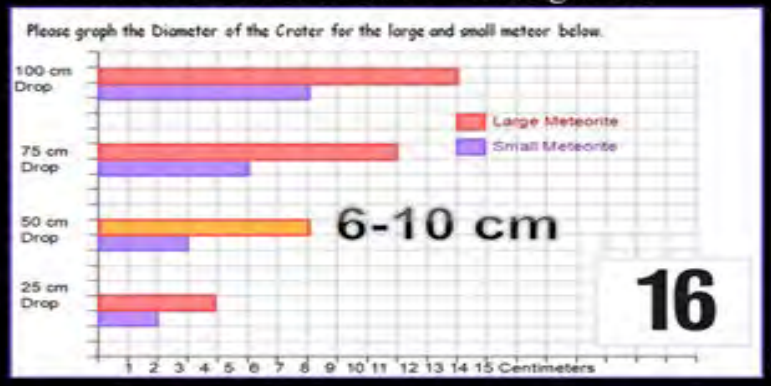
arge meteorites often have more potential than smaller ones?

- e meteorites travel faster.
- ge meteorites have more mass.
- Large meteorites are made of iron.
- D.) Large meteorites explode in the air.
- E.) Large meteorites spin as they travel.

19

F=ma

- Predict the diameter of the missing crater



- Craters can be found on earth, but most craters are eroded away by wind and water.
  - Small meteors also burn up in our atmosphere.

Part 6 of Astronomy Unit: The Outer Planets, Gas Giants, Ice Giants, Density of Outer Planets, Jupiter, Red Spot, Composition of Outer Planets, Jovian Moons, Saturn and its Moons, Uranus and its Moons, Neptune and its Moons, The Kuiper Belt, Demotion of Pluto, Oort Cloud, Comets

[Part 6 Astronomy Unit]

Part 6 Lesson 1 Gas Giants

Part 6 Lesson 2 Jupiter

Part 6 Lesson 3 Jovian Moons

Part 6 Lesson 4 Saturn

Part 6 Lesson 5 Ice Giants

Part 6 Lesson 6 Outer Solar System

Part 6 Lesson 7 Review Game

Part 6 Lesson 8 Review Game Answers

Part 6 Lesson 9 Space Expo Project

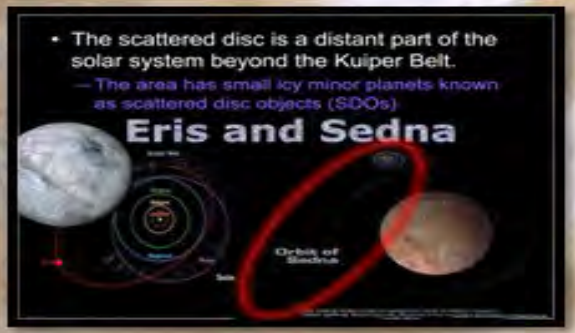

Part 6 Work Bundle Answers


Part 6 Work Bundle Digital


Part 6 Work Bundle Print

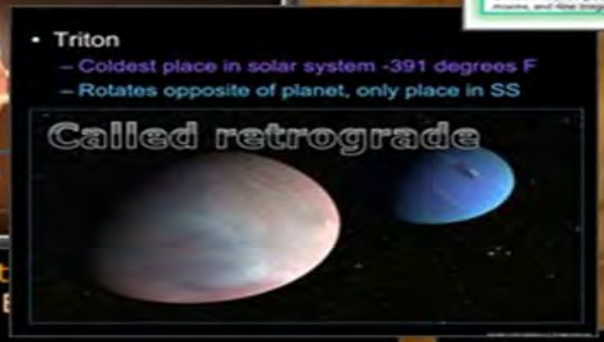
Outer Planetary Topics

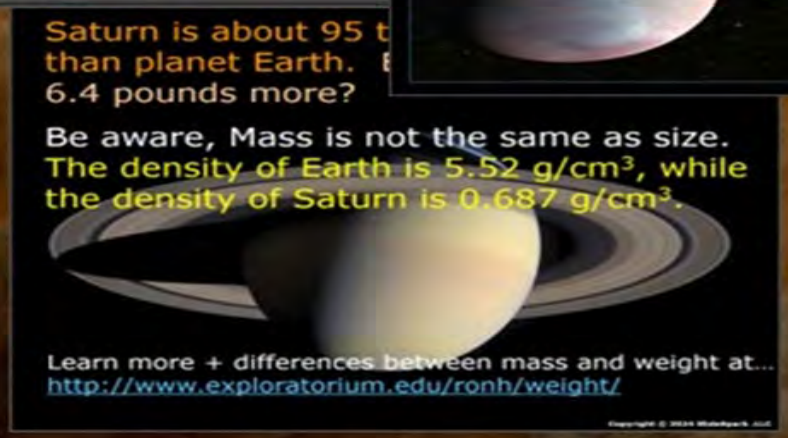
Preview is a compressed file

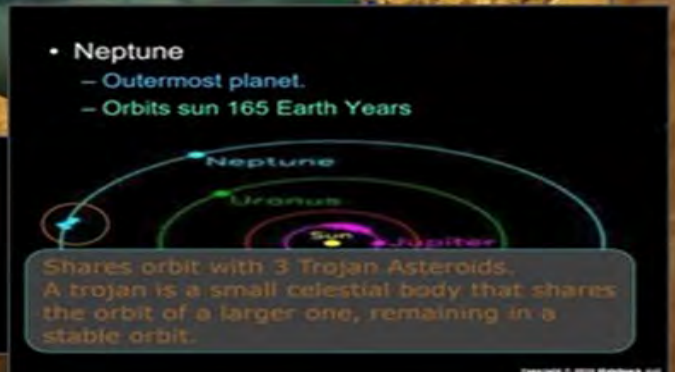


8 Lessons

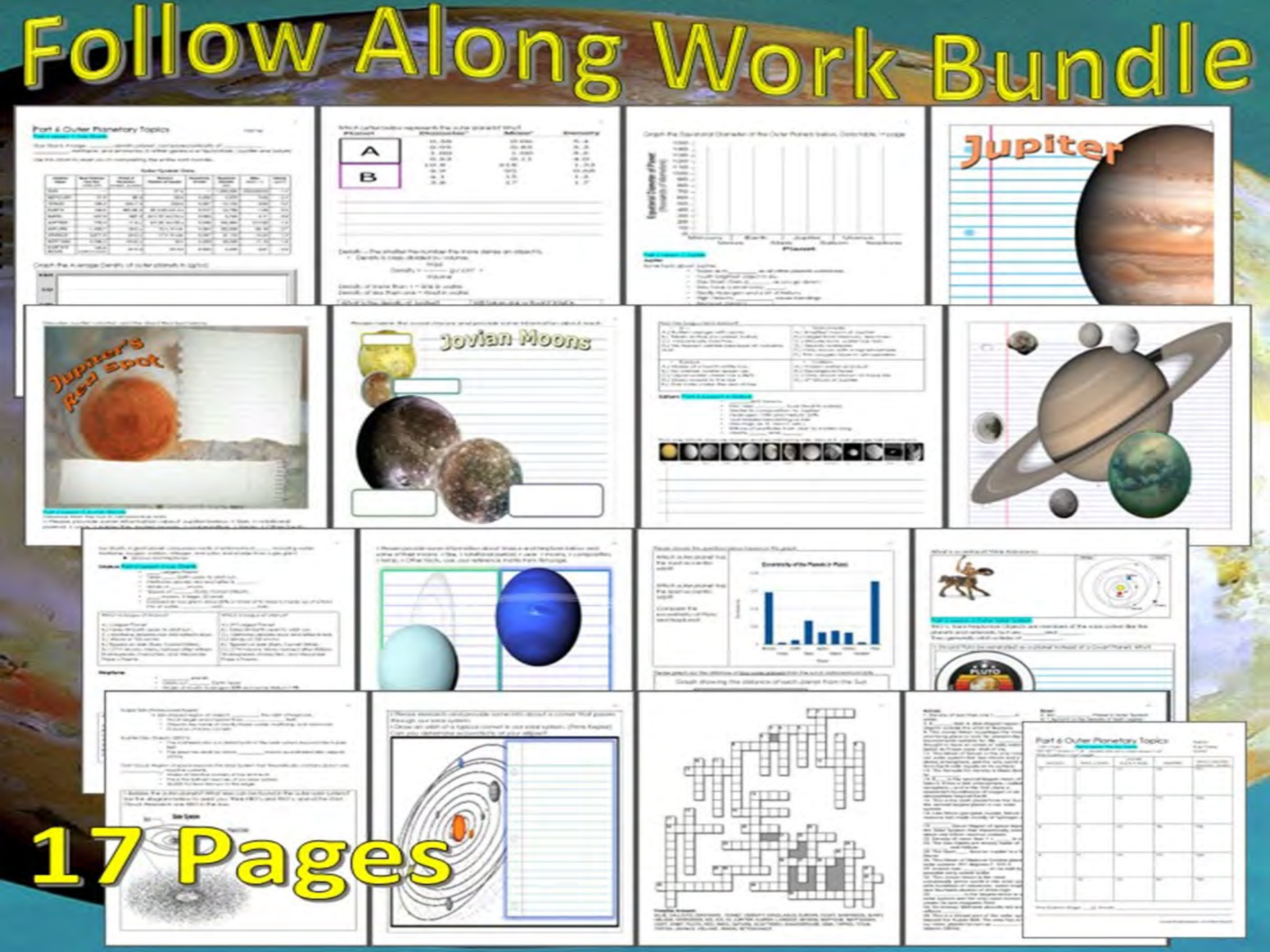
Interactive Slideshows







Follow Along Work Bundle

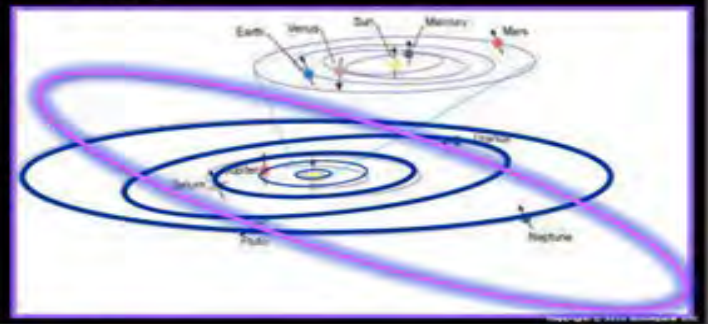


Activities, Notes, Keys, Games Assessments, and more all built-in

- Uranus

– Tipped on side (Early Comet Strike?).

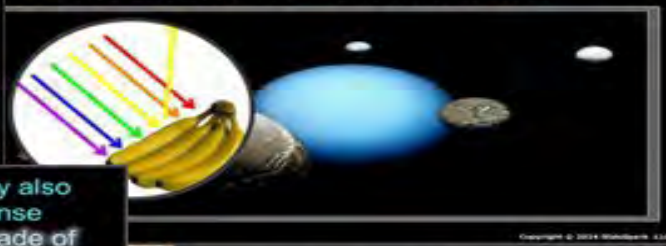
– Orbits on a different plane than all the others.



- Ice Giants: A giant planet composed mostly of astronomical ices including water, metha… oxygen, carbon, nitrogen, and sulfur, an… smaller than a gas giant.
  - (Uranus and Neptune)

- Io –

- Uranus
  - 3rd Largest Planet
  - Takes 84 Earth years to orbit sun.
  - Methane absorbs red and reflects blue.

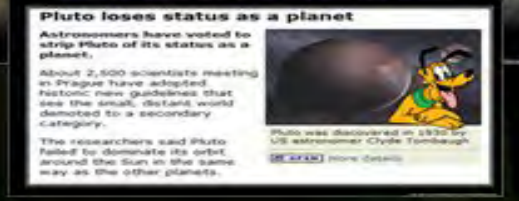


- Jupiter's Red Spot
  - 2 Earth's would fit inside
  - Storm has been raging for 400 years.
  - It's a storm that becomes larger by consuming other storms.

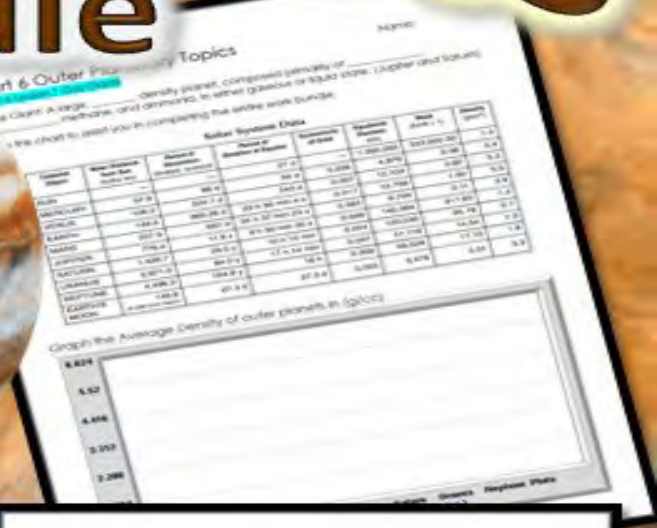
- If the planet wasn't cool enough, it may also rain diamonds which then float in a dense liquid layer forming "diamondbergs" made of uncut diamonds.

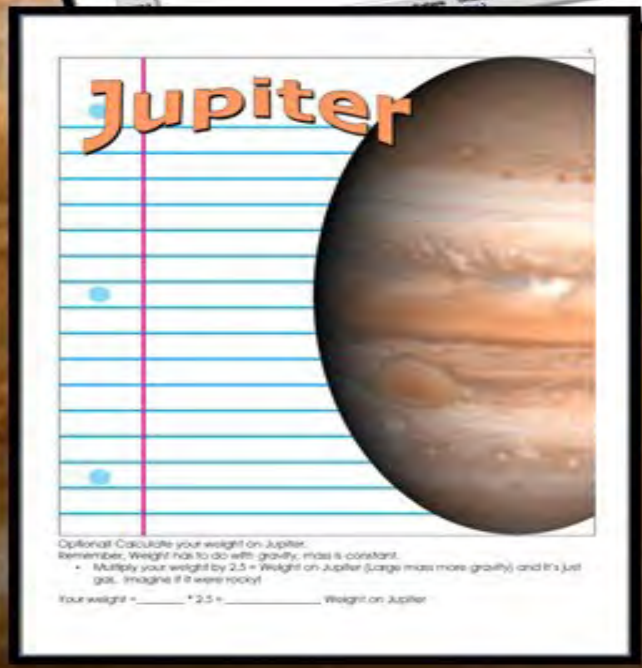
Learn more about how these planets may be able to rain diamonds at...

- Questions for Article (On Next Slide)
  - Who made this decision?
  - What disqualifies Pluto and qualifies a planet?



Outer Planets
Work Bundle





Find the bogus term below?

• Io – A.) Rotten orange with acne. B.) Tidally active (no water, Sulfur). C.) Volcanically inactive. D.) No impact craters because of volcanic dust.	• Ganymede A.) Smallest moon of Jupiter B.) Larger than Mercury, less mass C.) Silicate rock, water ice, iron D.) Heavily cratered E.) Only moon with magnetosphere F.) Thin oxygen layer in atmosphere
• Europa A.) Made of smooth white ice. B.) No craters (water seeps up) C.) Liquid water under ice (Life?) D.) Many cracks in the ice E.) Gas core under the sea of ice.	• Callisto A.) Frozen water and dust B.) Geological Dead C.) Only moon known to have life D.) 4th Moon of Jupiter

Saturn Part 6 Lesson 4 Saturn

- _____ of Moons (274+ Moons)
- Not very _____ (can float in water).
- Similar in composition to Jupiter
- Hydrogen 75% and Helium 25%
- Just missed becoming a star
- Has rings (A, B, and C etc.)
- Billions of particles from dust to meters long
- Mostly _____ and _____

Pick one Saturn obscure moons and record some info about it. Just google Saturn's Moons

Ice Giants: A giant planet composed mostly of astronomical _____ including water, methane, oxygen, carbon, nitrogen, and sulfur, and smaller than a gas giant.

- (Uranus and Neptune)

Uranus Part 6 Lesson 5 Ice Giants

- _____ Largest Planet
- Takes _____ Earth years to orbit sun.
- Methane absorbs red and reflects _____.
- Winds of _____ km/hr.
- Tipped on _____ (Early Comet Strike?).
- _____ moons, 5 large, 22 small.
- Dubbed an ice giant, since 80% or more of its mass is made up of a fluid mix of water, _____, and _____ices.

Which is bogus of Uranus?	Which is bogus of Uranus?
A.) Largest Planet B.) Takes 84 Earth years to orbit sun. C.) Methane absorbs red and reflects blue. D.) Winds of 700 km/hr. E.) Tipped on side (Early Comet Strike). D.) 27+9 Moons, Many named after William Shakespeare characters, and Alexander Pope's Poems	A.) 3rd Largest Planet B.) Takes 84 Earth years to orbit sun. C.) Methane absorbs red and reflects red. D.) Winds of 700 km/hr. E.) Tipped on side (Early Comet Strike). D.) 27+9 Moons, Many named after William Shakespeare characters, and Alexander Pope's Poems

Neptune

- _____ planet.
- Orbits sun _____ Earth Years
- Made of mostly Hydrogen 80% and some Helium 19%
- Also Molten Rock, Methane, Water, Ammonia
- Winds of _____ mph
- 4 faint rings
- _____ Moons

Which is bogus of Neptune?	Which is bogus of Neptune?
A.) innermost gas planet. B.) Orbits sun 165 Earth Years C.) Molten Rock, Methane, Water, [illegible] 200 mph	A.) Outermost gas planet. B.) Orbits sun 165 Earth Years C.) Molten Rock, Methane, Water, Ammonia D.) Soft winds of 12 mph E.) 4 faint rings. F.) 14 Moons

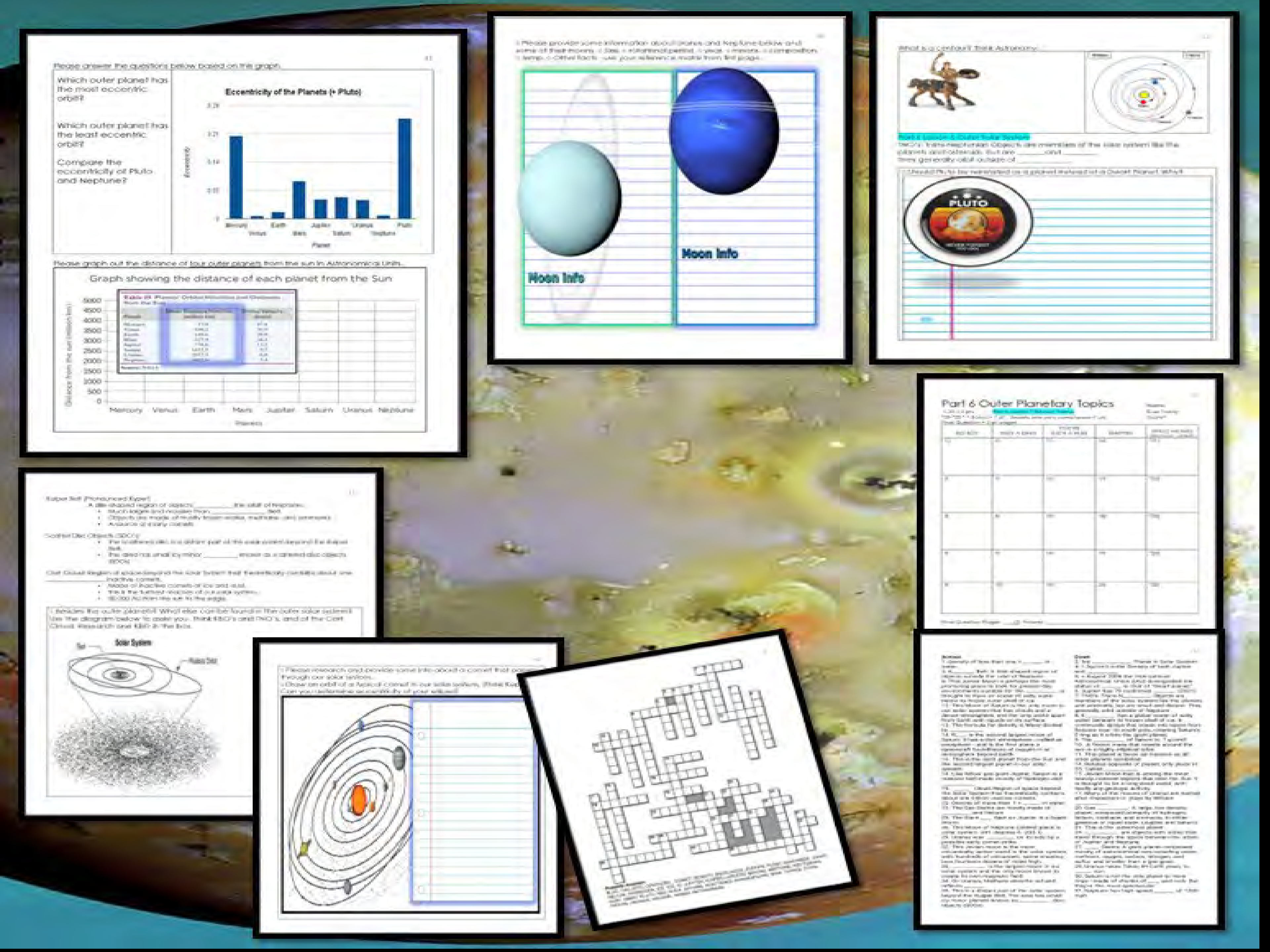
Please name the Jovian Moons and provide some information about each.

[illegible]tion and the Giant Red Spot below.

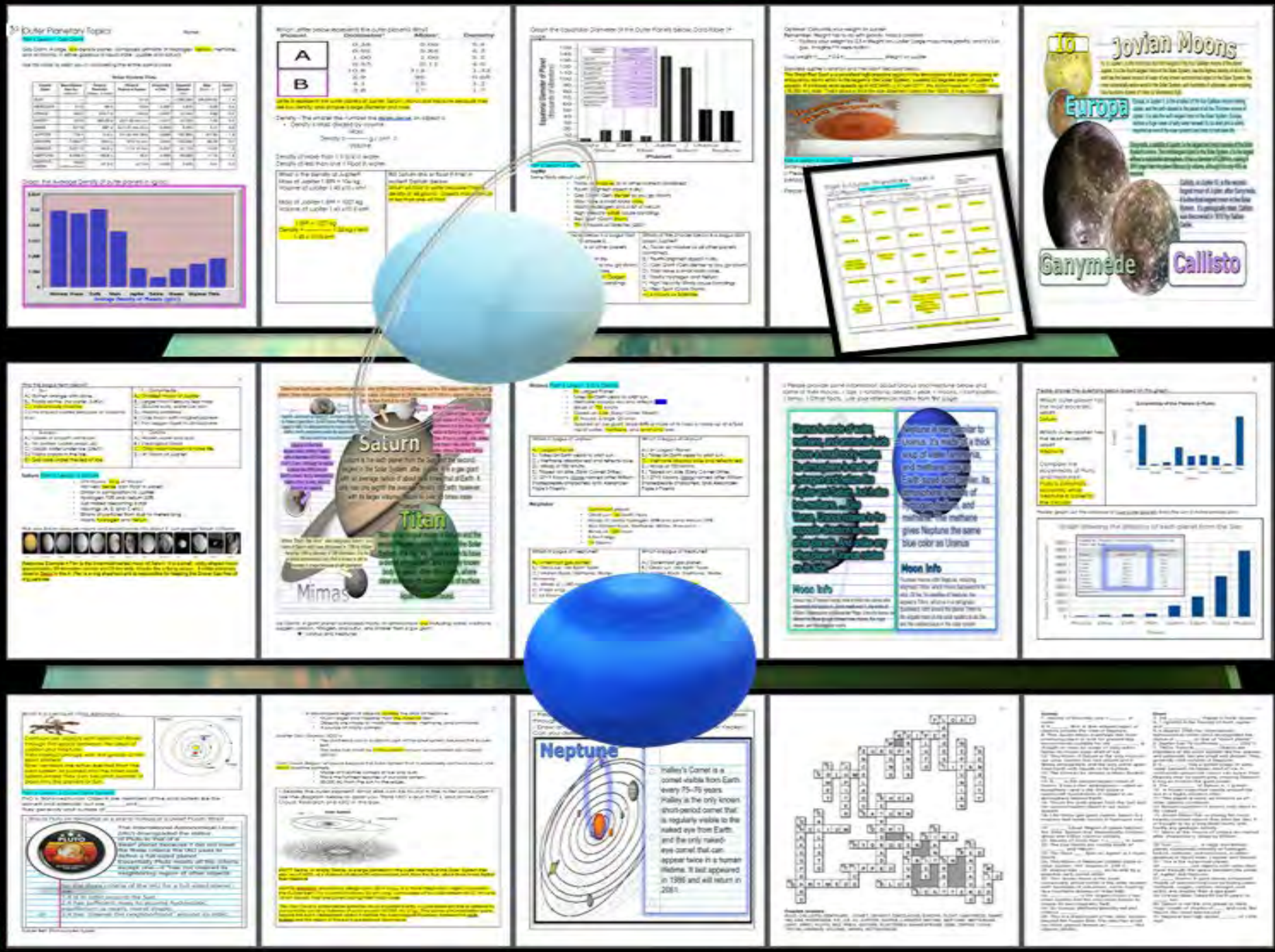
Part 6 Lesson 3 Jovian Moons

Distance from the Sun in Astronomical Units

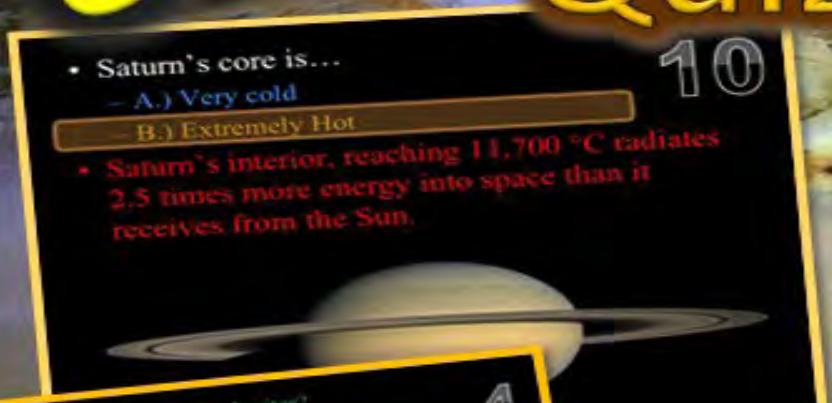
◊ Please provide some information about Jupiter below. ◊ Size. ◊ rotational period, ◊ year, ◊ name the Jovian moons. ◊ composition. ◊ temp.. ◊ Other facts.

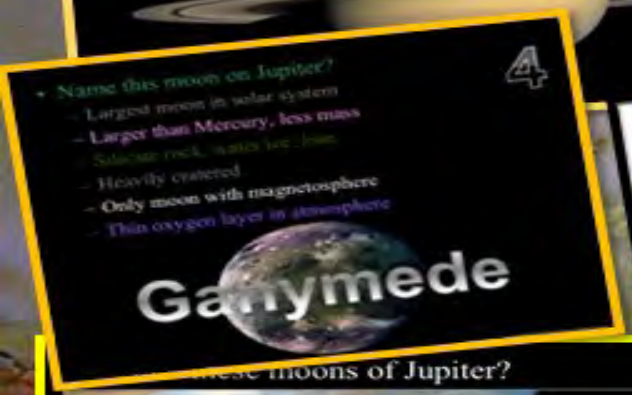


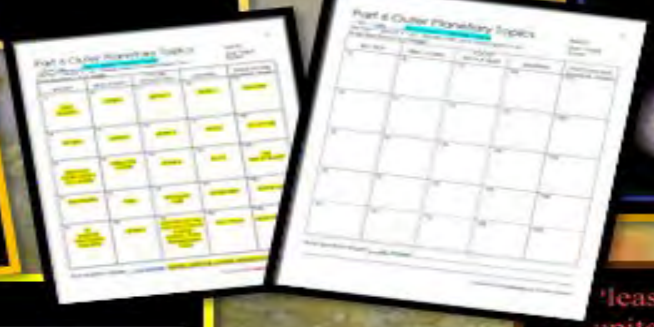
Please answer the questions below based on this graph.
Which outer planet has the most eccentric orbit?
Which outer planet has the least eccentric orbit?
Compare the eccentricity of Pluto and Neptune?
Eccentricity of the Planets (+ Pluto)
Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune
Pluto
Planet
Please graph out the distance of four outer planets from the sun in Astronomical Units.
Graph showing the distance of each planet from the Sun
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Mercury Venus Earth Mars Jupiter Saturn Uranus Neptune
Planets
Moon Info
Moon Info
What is a centaur? Think Astronomy.
PLUTO
Part 6 Outer Planetary Topics
Solar System

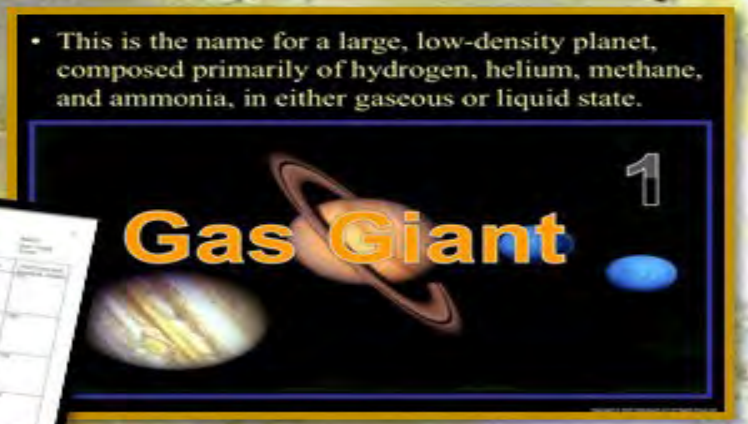

Io
Jovian Moons
Europa
Ganymede
Callisto
Saturn
Titan
Mimas
Neptune
Halley's Comet is a comet visible from Earth every 75–76 years. Halley is the only known short-period comet that is regularly visible to the naked eye from Earth, and the only naked-eye comet that can appear twice in a human lifetime. It last appeared in 1986 and will return in 2061.

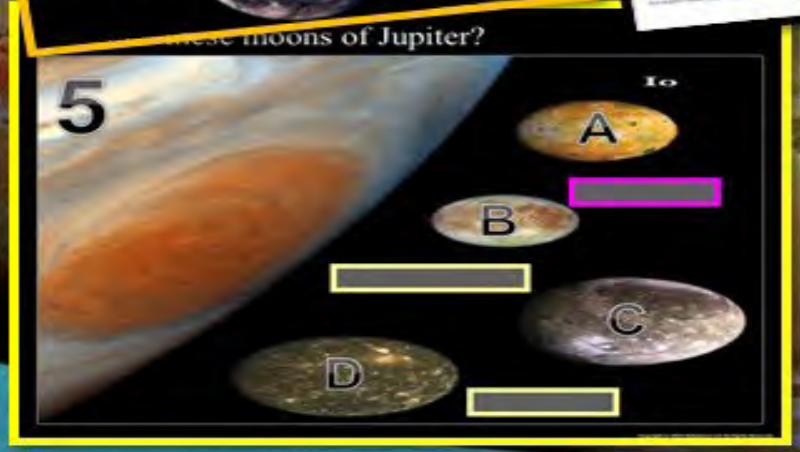
OUTER PLANETS
Quiz Game











- Name these two moons of Saturn?

8

Rhea

Dione

- Which of the choices below is a bogus fact about Jupiter? Bogus answer is…
  - A.) Twice as massive as all other planets combined.
  - B.) Fourth brightest object in sky.
  - C.) Gas Giant (Gets denser as you go down)
  - D.) May have a small rocky core.
  - E.) Mostly Hydrogen and Helium.
  - F.) High Velocity Winds cause bandings
  - G.) Red Spot (Giant Storm)
  - H.) 79+? Moons or Satellites

2

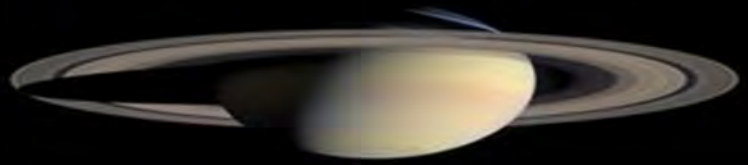
- Saturn's rings are primarily composed of…
  - A.) Hydrogen and Helium
  - B.) All Rocks and Debris
  - C.) Methane Gas
  - D.) Tidally Active Sulfur
  - E.) Mostly Ice

7

THE ICE IS VERY REFLECTIVE

- What is the density of Saturn?
  - A.) 5.52 g/cm³ Earth
  - B.) 0.687 g/cm³ Saturn
  - C..) 1.638 g/cm³ Neptune
  - D.) 1.326 g/cm³ Jupiter
  - E.) 17 AU's ?

6



- This moon has liquid lakes of methane on it.
  - The only known place in our solar system.

9

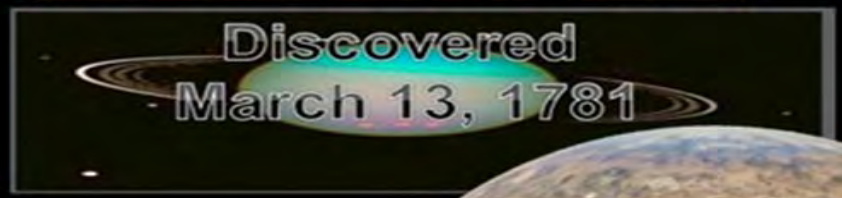
Titan

- What famous person characters are the moons of Uranus named after? (Just one needed)
  - Also name at least one moon of Uranus.

15

- Which is not correct of Uranus?
  - A.) Winds of 700 km/hr.
  - B.) 27 moons
  - C.) Has Methane which absorbs red and reflects blue.
  - D.) Tipped on side (Early Comet Strike) which creates extreme seasons.
  - E.) The first planet observed by Ancient Greeks.

13



- It takes Uranus ____ years to orbit the sun?
  - A.) 1 Earth year
  - B.) 7 Earth years
  - C.) 84 Earth years
  - D.) 798 Earth years
  - E.) 100,000,000 Earth years

12

- Uranus is sometimes dubbed a Ice Giant since 80 percent or more of its mass is made up of a fluid mix of water, methane, and ammonia ices.

14

- Uranus the _____ largest p
  - A.) 1st Largest planet
  - B.) 2nd Largest planet
  - C.) 3rd Largest Planet
  - D.) 5th Largest planet
  - E.) Cannot be determined

- Name each planet based on its symbol below?

A B C D

Saturn Jupiter Neptune Uranus

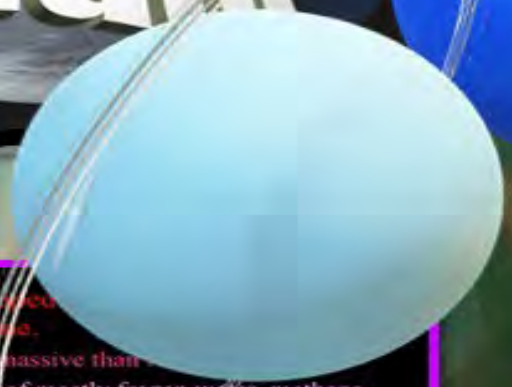
- Name this region of space beyond the Solar System that theoretically contains about one trillion inactive comets.

- Which fact is bogus from the list below about Neptune?

16

A.) Outermost gas planet.
B.) Orbits sun 165 Earth Years
C.) Softest winds in the solar system of 12 mph
D.) 4 faint rings.
E.) 13+? Moons

Name this demoted planet and h…
Dwarf Planet?



…n of Neptune is….

17

- Coldest place in solar system -391 degrees F
- Rotates opposite of planet, only place in SS
- Has an atmosphere (Nitrogen)

- Name the disk-sh… the orbit of Nept…
  - Much larger an… massive than …
  - Objects are ma… of mostly frozen water, methane, and ammonia.

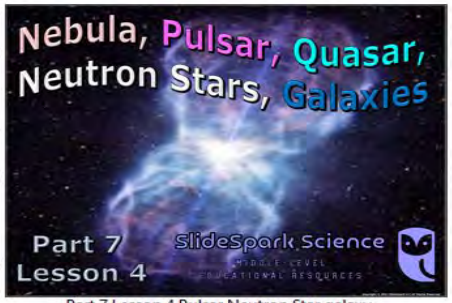
Astronomy Unit Part 7: Constellations, Hubble Space Telescope, Spitzer Space Telescope, Speed of Light, Nebulas, Types of Nebulas, Galaxies , Type of Galaxies, Gravity, The Special Theory of Relativity , Blackholes, Neutron Stars, Spacetime, Pulsars, Quasars, Exoplanets, Hubble Deep Field, Beyond the Solar System, Black holes, Exoplanets, The Big Bang, Evidence for the Big Bang

Part 7: Astronomy Unit

Part 7 Lesson 1 Constellations Hubble

Part 7 Lesson 2 Speed of Light More

Part 7 Lesson 3 Spacetime



Part 7 Lesson 4 Pulsar Neutron Star galaxy

Part 7 Lesson 5 Galaxies

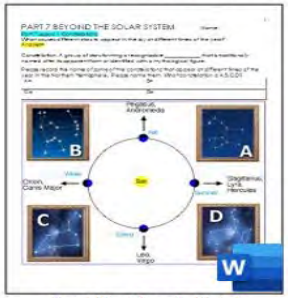
Part 7 Lesson 6 Exoplanets

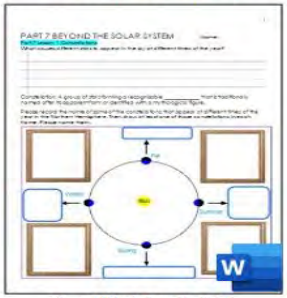
Part 7 Lesson 7 Big Bang

Part 7 Lesson 8 Review Game

Part 7 Lesson 9 Review Game Answers


Part 7 Work Bundle Answers


Part 7 Work Bundle Digital


Part 7 Work Bundle Print

Beyond the Solar System Unit

Preview is a compressed file

can form stars and galaxies

- Nebulae are divided into two catego (Bright and Dark)
  - Bright nebulae are close to stars.
  - Dark nebulae are not close to stars an visible when a bright nebulae is behin

A Barred

B Irregular

C Elliptical

D Spiral

Pegasus, Andromeda

Fall

Winter

Orion, Canis Major

Sun

Leo

Leo, Virgo

- This is the name for a large cloud of gas and dust which can form stars and galaxies.

NEBULA 5

- Super-Earth GJ 1214b is an example of a…

13

Extrasolar Planet or Exoplanet

Answer is

- A light-year is a unit o
  - It is the distance that l (9,500,000,000,000 kil
  - Light moves at a velocity of about 3 kilometers (km) each second in a vac

- Name two methods for detecting extra solar planets?
  - Transit method, radial velocity method, and direct imaging method.

A Transit Method

B Radial Velocity Method

C Direct Imaging

14

gravitational field.

- A region of spacetime from which gravity prevents anything, including light, from escaping.

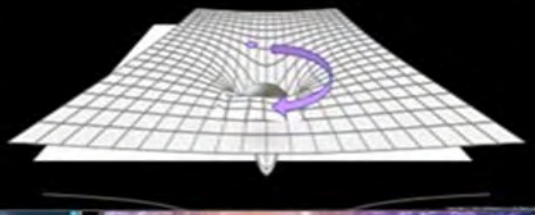
A black hole is anything but empty space. Rather, it is a great amount of matter packed into a very small area.

Not empty!

Interactive Slideshows

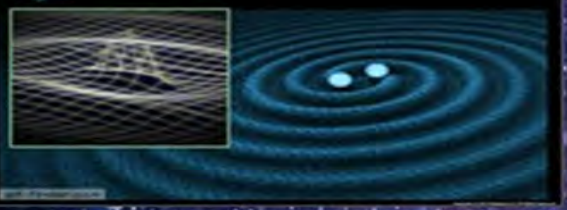
- Which is the Spiral Galaxy from the g
  below? Answer: D

- Activity! Spacetime.
  - 3) Toss in lots of small marbles with an orbital velocity so they orbit the "Sun/ Shotput"



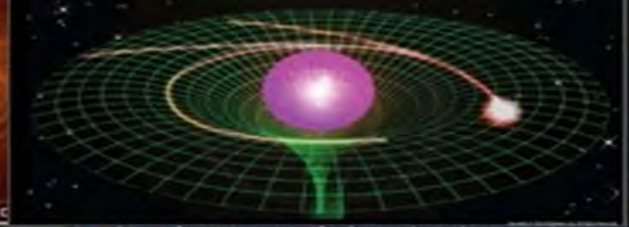
- What causes different stars to appear in the sky at different times of the year?
  - There are two major motions affecting the Earth:
    - The earths rotation around its axis, and its rotation around the Sun (revolution).

- Gravitational Wave: Disturbances or ripples in the curvature of spacetime, generated by accelerated masses, that propagate as waves outward from their source at the speed of light.



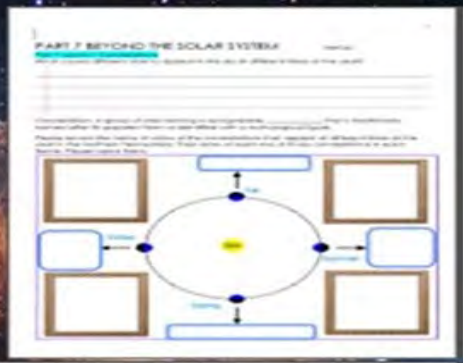
- Video (Optional) Crash Course Astronomy Black Holes.
  - https://www.youtube.com/watch?v=qZWPBKUI

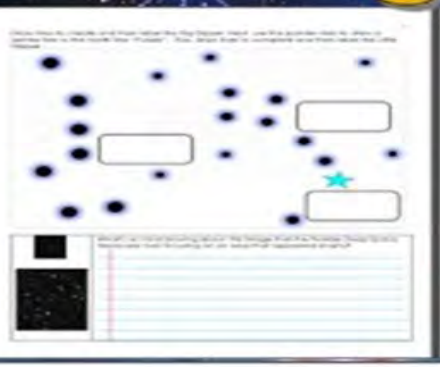
- Warping the Fabric of Space and Time.
- https://lab.nationalmedals.org/gravity/
- 1) How does an objects mass and distance change gravitation?
  - Change the mass and distance of celestial bodies. 5 minutes how it works / play.

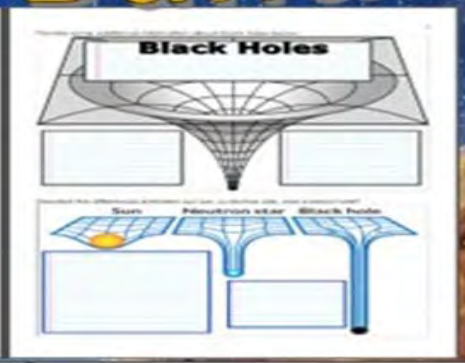


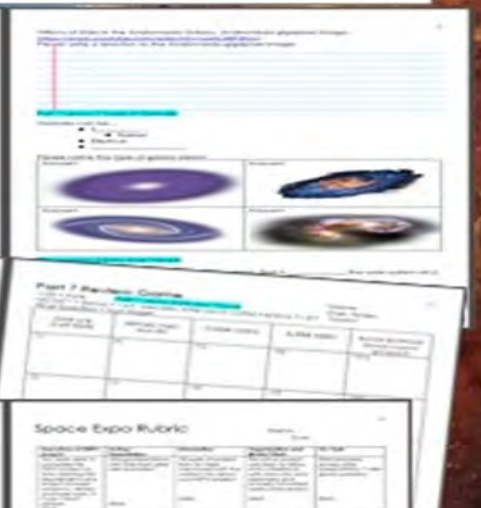
- It's been serviced in space five times and been in use for more than 25 years.
  - It has changed our view of the universe and our place within it.

Follow Along Work Bundle





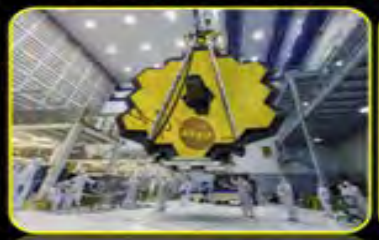




15+ Pages

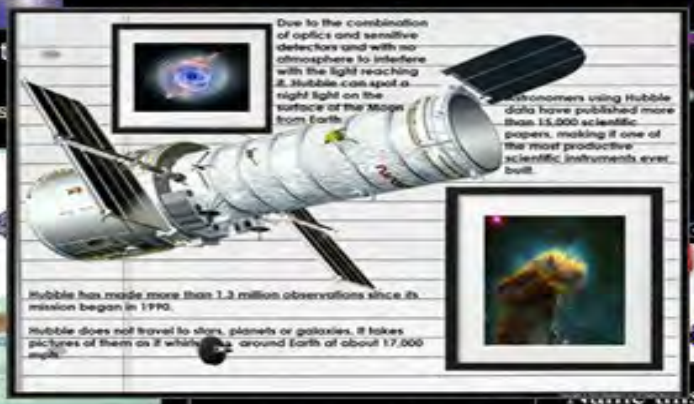
Activities, Notes, Keys, Assessments and more all built-in

- The James Webb Space Telescope is a space telescope currently conducting infrared astronomy.
  - Equipped with high-resolution and high-se instruments, allowing it to view objects too distant, or faint for the Hubble Space Teles



- Neutron Star: Type of star leftover when a star collapses.

- Don't think of the expansion as just headed away from each other.
  - Space is expanding, and the galaxies along for the ride.



named after its apparent form or identi with a mythological figure.

on the spiral arm of the Milky Galaxy.

Galactic Year

How many Galactic Years has our solar system experien

A.) 200,000,000
B.) 2,000
C.) 20
D.) 2

225-250 million years

Name this very important device?

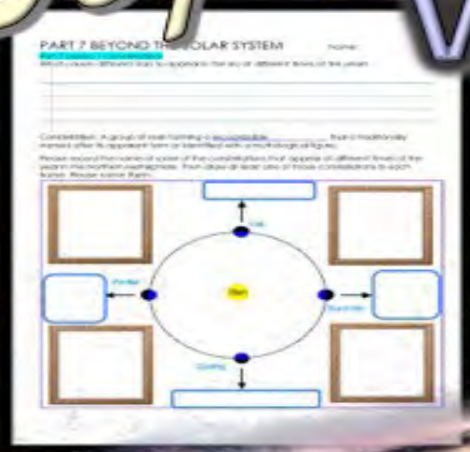
3

Hubble Space Telescope

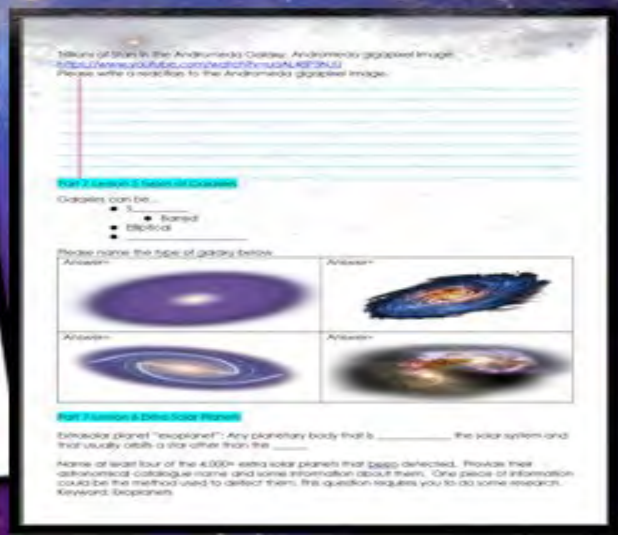
answer is...

Beyond the Solar System

Work Bundle


PART 7 BEYOND THE SOLAR SYSTEM

Name:



Billions of Stars in the Andromeda Galaxy. Andromeda gigapixel image!

Please write a reaction to the Andromeda gigapixel image.

Galaxies can be...

- S_____
  - Barred
- Elliptical
- _____

Please name the type of galaxy below.

Answer=

Answer=

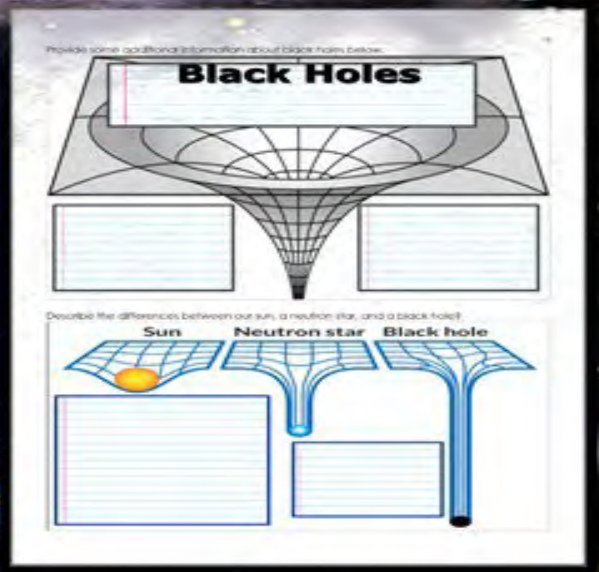
Answer=

Answer=

Part 7 Lesson 4 Extra Solar Planets

Extrasolar planet "exoplanet": Any planetary body that is _____ the solar system and that usually orbits a star other than the _____.

Name at least four of the 4,000+ extra solar planets that have detected. Provide their astronomical catalogue name and some information about them. One piece of information could be the method used to detect them, this question requires you to do some research. Keyword: exoplanets



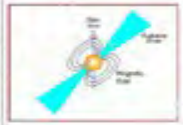
Pulsar: A rapidly _____ neutron star that emits radiation, usually _____ waves, in narrow beams.

Which is a Pulsar, Neutron Star, and Quasar

Answer=

Artistic rendition

Answer=



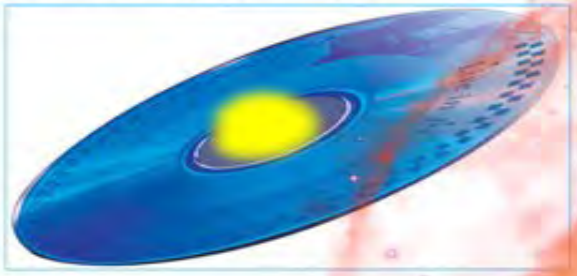
Answer=

Artistic rendition

Galaxy: Large group of stars, gas, and dust that constitute the Universe.

- Hundreds of _____ of stars.

Please label this old CD with a gumdrop as if it were a galaxy.

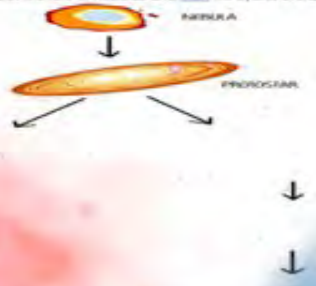


What type of Nebulas are below?

Answer=

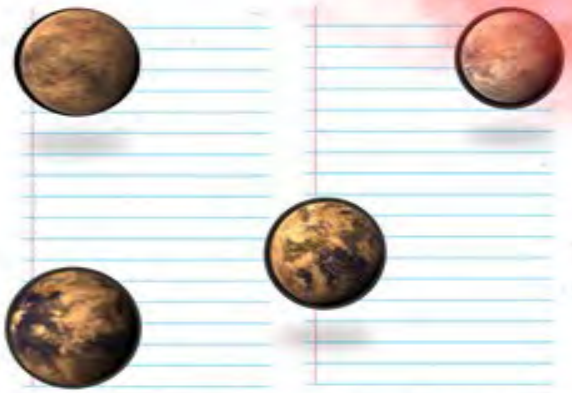
Answer=

Please provide a review about the role of nebulas and then life cycles of stars.

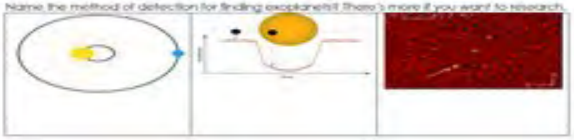


Quasar: Extremely bright masses of _____ and light.
-Emits enormous _____ and extremely old.

Neutron star: type of star left over when a star _____



Name the method of detection for finding exoplanets!! There's more if you want to research.



Part 6 Lesson 6 Spacetime

Einstein's theory describes that _____ and _____ are actually different aspects of the same thing space-time. Gravity is the bend in space-time. Gravity is....Ripples and warps in the fabric of space and time.

Please fill in the blanks below from Newton to Einstein.

two objects exert a f_____ of attraction on one another known as g_____. Sir Isaac N_____ quantified the gravity between t_____ objects when he formulated his three laws of the _____. the force tugging between t_____ bodies depends on how mu_____ are each one is and how f_____ apart the two lie. Even as the center of the Earth is pulling you, your center of m_____ is pulling b_____ at the Earth. Newton's universal law of gravitation: F = Gm1m2/R, where F is the fo_____ due to gr_____ between two m_____ es (m1 and m2), which are a g_____ e_____ apart; G is the g_____ ftional constant. The more m_____ tive body barely feels the tug from you, while with your much smaller m_____ you find yourself firmly rooted thanks to that same fo_____. Newton's l_____ assume that gravity is an invisible force of an object that can act over a di_____. Albert E_____. In his theory of special r_____, determined that the laws of phy_____ are the sa_____ for all non-accelerating observers, and he showed that the speed of l_____ within a vacuum is the s_____ no matter the sp_____ of which an observer travels. As a result, he found that spa_____ and t_____ were interwoven into a single continuum known as space t_____. Events that occur at the same ti_____ for one observer could occur at different times for another. The equations for his general th_____ of relativity, Einstein realized that _____ ssive objects caused a distortion in s_____-time. Imagine setting a bowling ball in the center of a trampoline. The body would press down into the fa_____ of "space-time", causing it to bend. A marble rolled around the edge would spiral inward toward the bo_____ it, pulled in much the same way that the gr_____ of a planet pulls at obj_____ in sp_____.

Visit Gravity Simulator. Warping the Fabric of Space and Time. Create all of the examples https://phet.colorado.edu/en/simulation/gravity-and-orbits

1) How does an object's mass and distance change gravitation!! Change the mass and distance of celestial bodies. 5 minutes how it works.
2) Create a Sun. Lay out lots of small objects and then put something massive in the middle. What happened!!
3) Create Sun, with orbiting Earth, and orbiting Moon.
4) Create a model of our solar system 8 planets Needs s Large Planet (Jupiter and Saturn)
5) Create a Binary System of two stars. Create a Binary System of two stars with at least two planets that orbit each star. Create a triple or Quadruple Star System
6) Create a Blackhole! It's going to need a lot of mass.

Part 7 Lesson 4 Pulsar, Quasars, Galaxies

Nebula: Large cloud of _____ and _____ which can form _____ and _____.

- Nebulae are divided into two categories (Bright and Dark)

Bright nebulae are _____ by stars.
Dark nebulae are not close to stars and only visible when a bright nebula is _____ it.

Across

3. S____ Galaxies: These are the most common type of galaxy.
5. A region of space resulting from the collapse of a star with an extremely high gravitational field.
6. Extremely bright masses of energy and light.
9. The Big _____ is a clipped version of the constellation Ursa Major the Big Bear.
11. _____ Star: Type of star leftover when a star explodes.
14. A black hole is a region of s_____ from which gravity prevents anything, including light, from escaping. A blackhole is anything but empty! Rather, it is a great amount of matter packed into a small area.
15. General relativity describes that space and _____ are actually different aspects of the same thing -space-time.
16. Gravity: The force tugging between two bodies depends on how massive each one is and how f___ apart the two lie.
17. A nebula can form s____
18. It is the distance that _____ can travel in one year. (9,500,000,000,000 kilometers.)
20. The _____shift of Galaxies is one evidence of the Big Bang.
21. The name of the north star is_____. It's the brightest star of the constellation – Ursa Minor.
22. _____ Space Telescope. Since its 1990 launch, it has changed our fundamental understanding of the universe.
23. Large cloud of gas and dust which can form stars and galaxies.

Down

1. Two objects exert a force of attraction on one another known as g_____
2. The _____ Theory: The cosmic explosion that is hypothesized to have marked the origin of the Universe.
4. _____ A rapidly spinning neutron star that emits radiation, usually radio waves, in narrow beams.
7. This is the closest galaxy to the Milky Way. A_____ Galaxy.
8. Constellation: A group forming a recognizable pattern that is named after its apparent form or is identified with a mythological figure.
10. E_____ for short: Any planetary body that is outside the solar system and that usually orbits a star other than the Sun.
11. Dark _____ are not close to stars and only visible when a bright nebula is behind it.
12. One evidence of the Big Bang is Cosmic M_____ Background has been accurately measured by orbiting detectors.
13. These nebulae are close to stars.
19. Large group of stars, gas, and dust that constitute the Universe.

Possible Answers

ANDROMEDA, BIGBANG, BLACKHOLE, BRIGHT, CONSTELLATION, DIPPER, EXOPLANET, FAR, GALAXY, GRAVITY, HUBBLE, LIGHT, MICROWAVE, NEBULA, NEBULAE, NEUTRON, POLARIS, PULSAR, QUASAR, RED, SPIRAL, STARS, TIME, SPACETIME

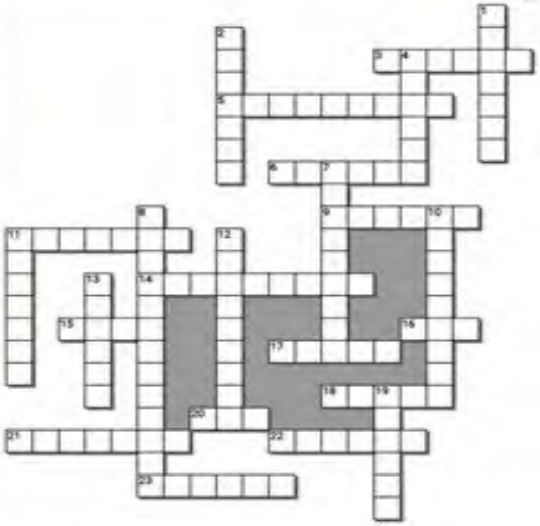
Part 7 Review Game

Name:
Due: Today

1-20 = 5 pts Part 7 Lesson 8 Review Game
* *20-25 * = Bonus = 1 pt. Correctly write out in correct space = 1 pt. Score=
Final Question = 5 pt wager

STAR LITE STAR BRITE	RIPPLES AND WAVES	OUTER LIMITS	SUPER SIZED	ROCK BOTTOM Bonus round 1pt each
1)	6)	11)	16)	*21)
2)	7)	12)	17)	*22)
3)	8)	13)	18)	*23)
4)	9)	14)	19)	*24)
5)	10)	15)	20)	*25)

Final Question Wager: ____/5 Answer: _____



Part 7 Lesson 2 The Big Bang

The Big Bang Theory: The cosmic _____ that is hypothesized to have marked the origin of the Universe.

Help Sheldon Blue he drawing board with some information about the Big Bang Theory!!
https://www.youtube.com/watch?v=9bZkp7q19f0

How will the universe end? Can you provide three theories below?

General Theme

The Universe is...

BIG

FAST

OLD

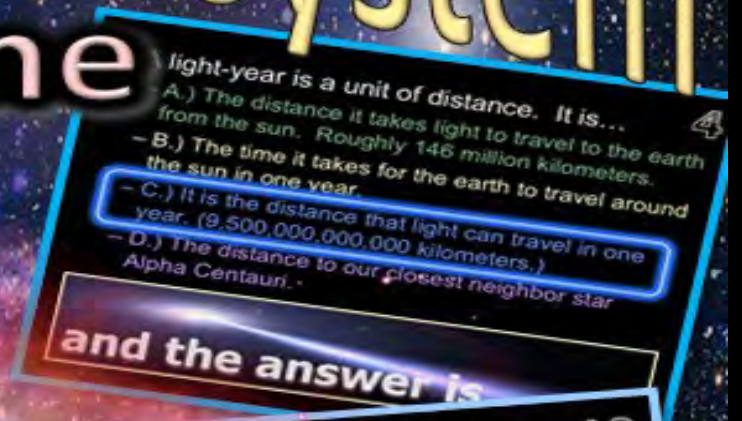
FAR

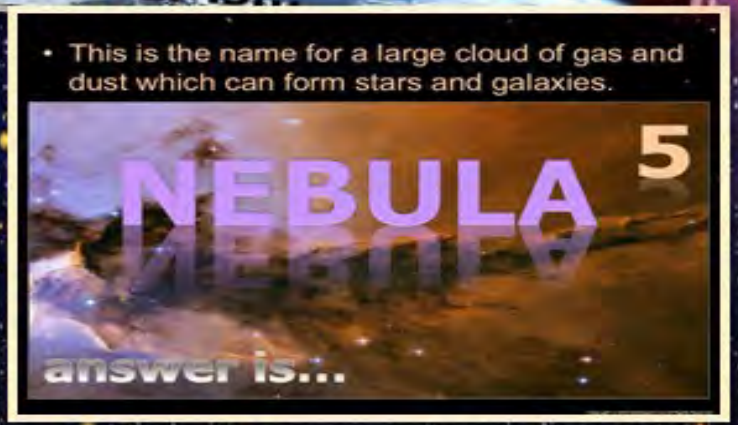
Powerful


Black Holes
Nuclear Bulge
Kepler 22b
Kepler-186f
Kepler 452b
Ross 128 b
Part 7 Review Game
RIP

Beyond the Solar System

Quiz Game





- This is the type of star leftover when a star collapses.
  - Very small and dense star made almost completely of... Neutrons

8 **Neutron Star**

answer is...

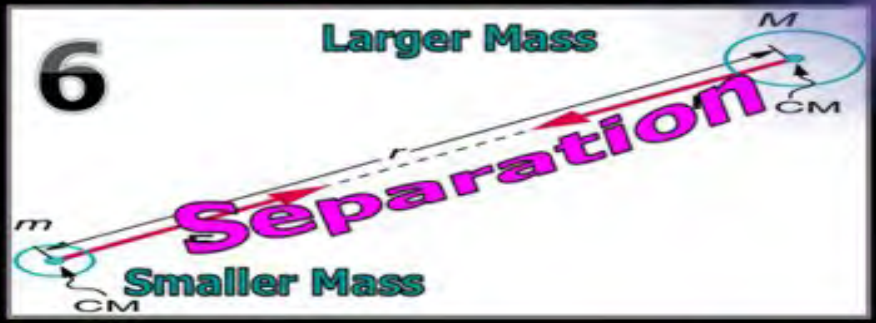
- This is the name for a large group of stars, gas, and dust that constitute the Universe.
  - Large = Hundreds of billions of stars.

GALAXY 9

answer is...

- ...is a region of space resulting from the collapse of a star with an extremely high gravitational field.
  - A region of spacetime from which gravity prevents anything, including light, from escaping.

- Law of Gravity $F = G M m / r^2$
  - Gravity is an attractive force between two bodies which depends only on the mass of the two bodies (M and m) and inversely on the square of the separation between the two bodies.



Name the Galaxy we live in?

The Milky Way

Galactic Disc

12

- Name two methods for detecting extra solar planets?
  - Transit method, radial velocity method, and direct imaging method.

A B C 14

What is this, it ta... of hundred million years?

A Galactic Year

- This is the cosmic explosion that is hypothesized to have marked the origin of the Universe.

15

THE BIG BANG THEORY

answer is...

- Super-Earth GJ 1214b is an example of a...

13

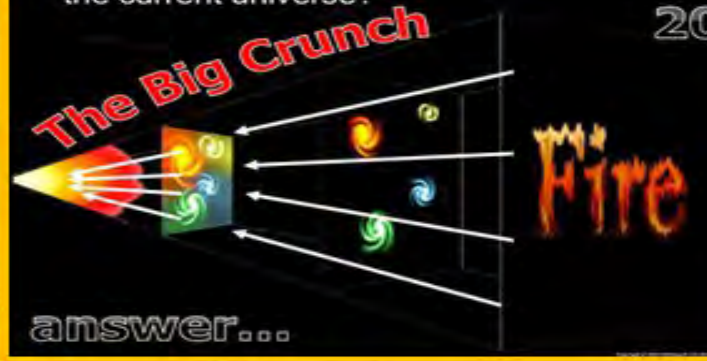
Extrasolar Planet or Exoplanet

Answer is...

- This is a rapidly spinning neutron star that emits radiation, usually radio waves, in narrow beams.

- What's the name for this possible ending to the current universe?

20



- The second law of thermodynamics reminds us that the fate of the universe could be...?
  - A.) The universe will eventually run out of energy. Everything will become lifeless and frozen at some point.

- True or False? The atoms that make up your hand were once part of a star that exploded?

18

- Which comment below is [illegible]tely bogus about the Big Bang Theory?

17

  - A.) As the Universe expanded and cooled some of the elements that we see today were created.
  - B.) The cosmic forces in the universe have been increasing in size and scale as described by increasing radiation.
  - C.) The redshift of distant galaxies means that the Universe is probably increasing.
  - D.) The Cosmic Microwave Background has been accurately measured by orbiting detectors.

answer is...

- Using information gathered from the WMAP satellite, the universe is believed to be [illegible] old?
  - A.) 157 thousand years old
  - B.) 57.6 Trillion years old?
  - C.) 57 Billion years old?
  - D.) 13.75 Billion years old?
  - E.) The WMAP satellite is a governm[illegible]up.

16

Curriculum Guide

Number of Lessons in each unit (50 min, daily lessons) and difficult rating scale / intended grade level.

=Easier,


= More difficult,


=Most difficult

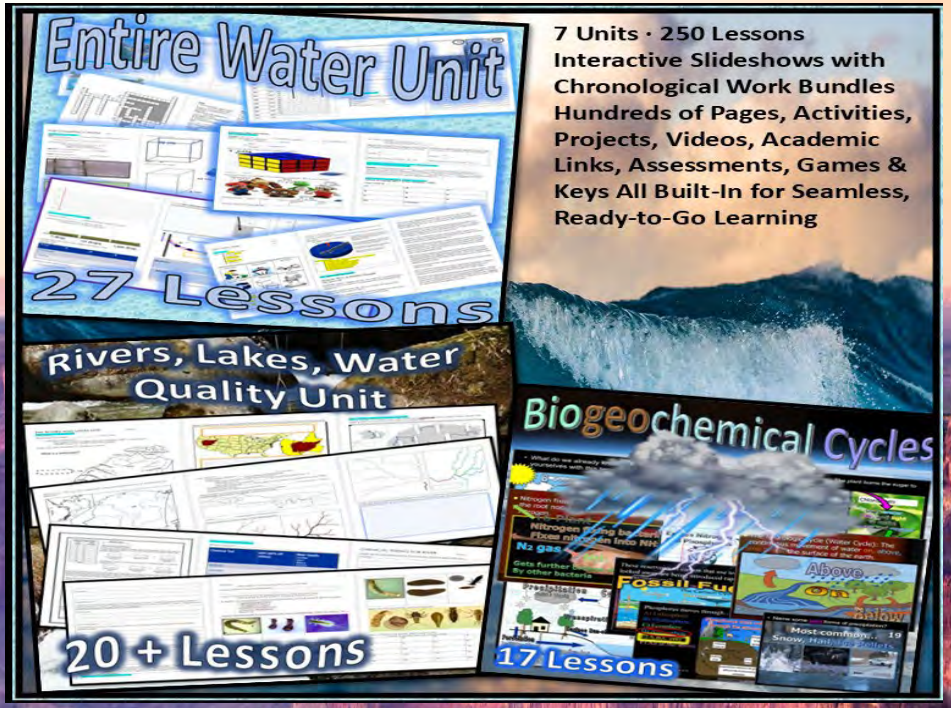
Earth Science Units	Daily Lessons	Intended Grade	
Geology Topics Unit	60 Lessons	6-8 medium difficulty	MORE DIFFICULT
Weather and Climate Unit	40 Lessons	6-8 medium difficulty	MORE DIFFICULT
Astronomy Unit	60 Lessons	6-8 medium difficulty	MORE DIFFICULT
Weathering, Soil Sciences	28 Lessons	5-7 easier	EASIEST
Rivers and Water Quality	25 Lessons	5-7 easier	EASIEST
Water Molecule Unit	20 Lessons	5-7 easier	EASIEST
Biogeochemical Cycles Unit	16 Lessons	5-7 easier	EASIEST

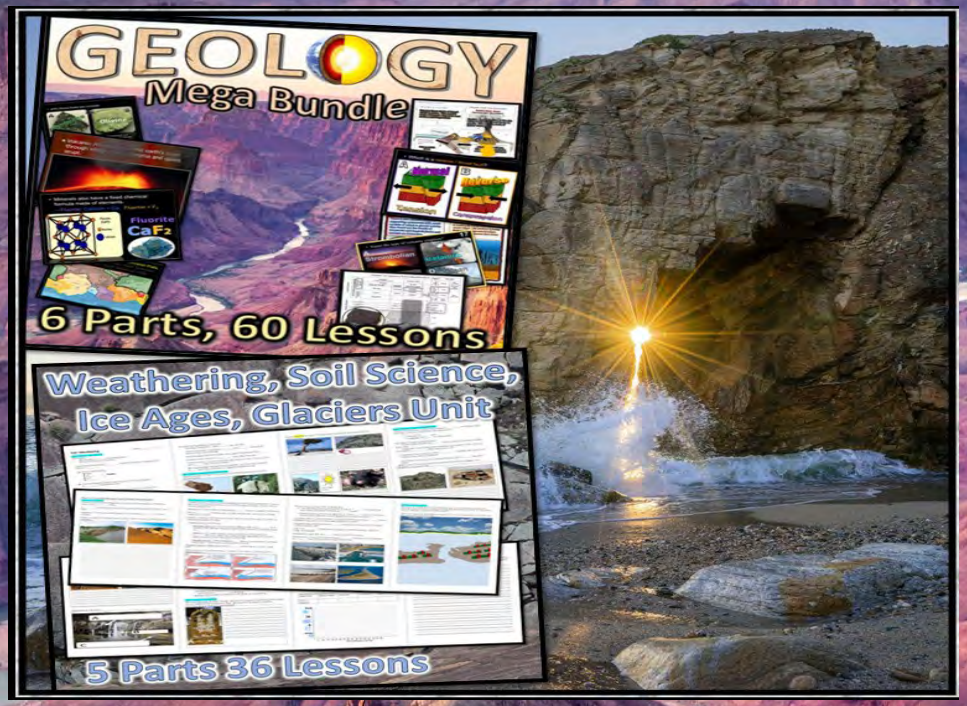
Earth Science Curriculum

Earth Science Curriculum

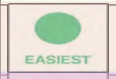
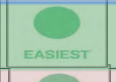
SlideSpark Science

MIDDLE-LEVEL EDUCATIONAL RESOURCES



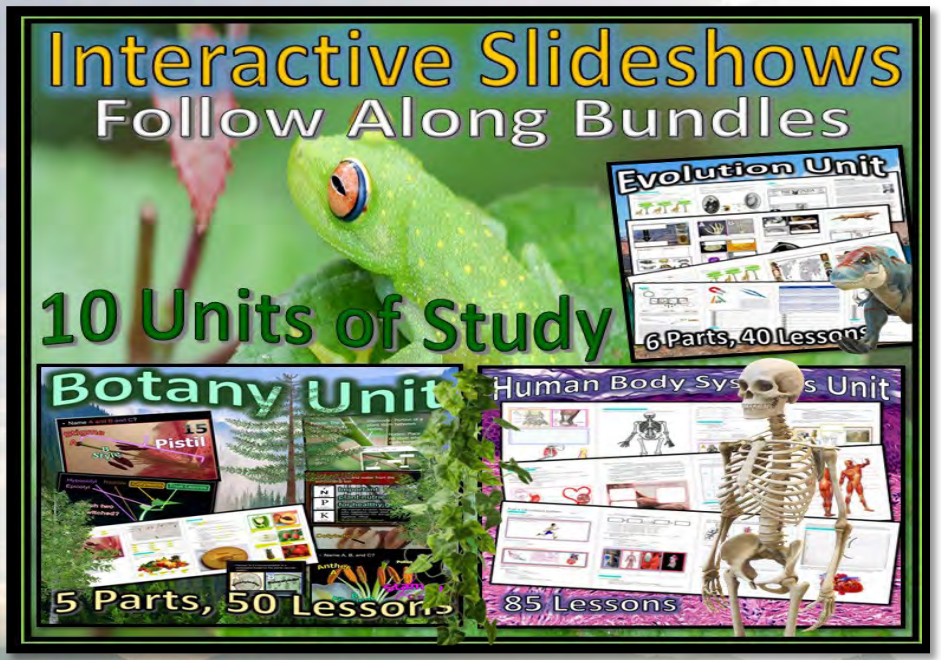


Life Science Units

	Daily Lessons	Intended Grade	
Ecology Feeding Levels Unit	13 Lessons	5-6 easier	
Ecology Interactions Unit	30 Lessons	5-6 easier	
Ecology Abiotic Factors Unit	13 Lessons	5-6 easier	
Botany Unit	50 Lessons	5-7 easier	
Evolution and Natural Selection	40 Lessons	5-7 easier	
Taxonomy and Classification	50 Lessons	6-8 medium difficulty	
Infectious Diseases Unit	30 Lessons	7-9 more difficult	
DNA and Genetics Unit	42 Lessons	8-10 most difficult	
Human Body Systems Unit	85 Lessons	6-8 medium difficulty	
Cell Biology Unit	30 Lessons	8-10 most difficult	

Life Science Curriculum


Life
Science
Curriculum
SlideSpark Science
MIDDLE-LEVEL
EDUCATIONAL RESOURCES


Interactive Slideshows
Follow Along Bundles
10 Units of Study
Evolution Unit
6 Parts, 40 Lessons
Botany Unit
5 Parts, 50 Lessons
Human Body Sys s Unit
85 Lessons


Cellular Biology Unit
Form Follows Function
30 Lessons of 50 minutes
DNA and Genetics Unit
40 Lessons
Infectious Diseases
30 Lessons


Taxonomy and Classification Unit
6 Parts
50 Lessons
Ecology Interactions Unit
30 Lessons
Ecology Feeding Le
Full Unit
Ecology Abiotic Factors Unit
27 Lessons

Physical Science	Daily Lessons	Intended Grade	
Laws of Motion and Machines Unit	33 Lessons	8-10 most difficult	
Matter Energy and the Environment	58 Lessons	7-10 medium difficulty	
Atoms and Periodic Table Unit	44 Lessons	8-10 most difficult	
Science Skills Unit	30 Lessons	5-7 medium difficulty	

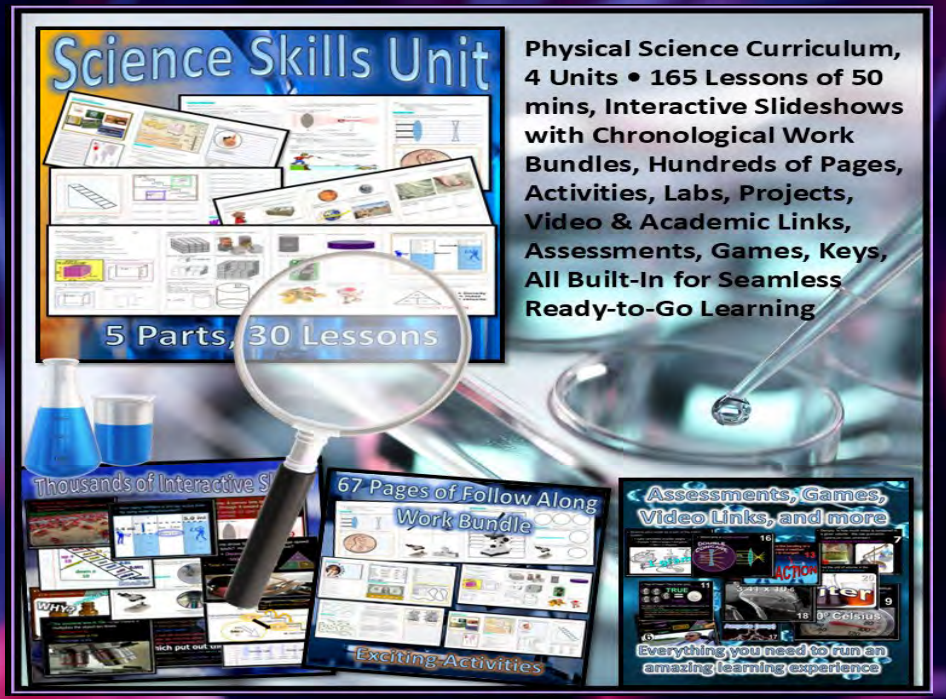
Physical Science Curriculum

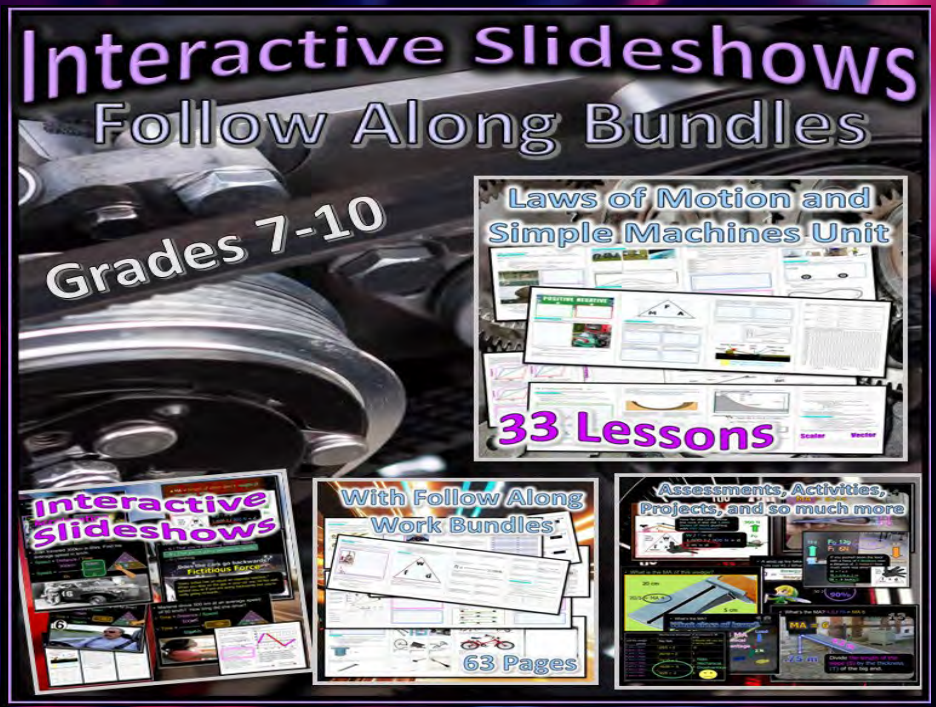
Entire SlideSpark Science Curriculum

Physical Science Curriculum

SlideSpark Science

MIDDLE-LEVEL EDUCATIONAL RESOURCES





Dear Valued Educator,

Our fully editable .pptx and .doc resources are perfect for educators looking to bring enthusiasm and creativity to their lessons. We encourage you to make changes to fit your needs and style. As science educators, we're committed to providing students with the tools they need to succeed in the classroom and beyond. Each unit in the curriculum includes a range of resources that have been developed through extensive research and use in a busy classroom. Our teaching approach is designed to make science education engaging and exciting for learners of all ages. We offer a one-of-a-kind science curriculum that will challenge, inspire, and educate students to become tomorrow's scientists and leaders. Join us today and learn more about how our program can help you achieve your classroom goals.

With appreciation,

Support@SlideSpark.net

Thank you for your time and interest in our Science curriculum. We strive to provide students with engaging and informative lessons that will spark their curiosity and encourage scientific exploration. Should you have any questions or concerns, please do not hesitate to contact us. Thank you again for considering our curriculum, and we wish you all the best in your educational journey.

Sincerely,

Support@slidespark.net

SlideSpark Science

MIDDLE-LEVEL

EDUCATIONAL RESOURCES

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