

Name: [Answer Key](#)
Earth Science

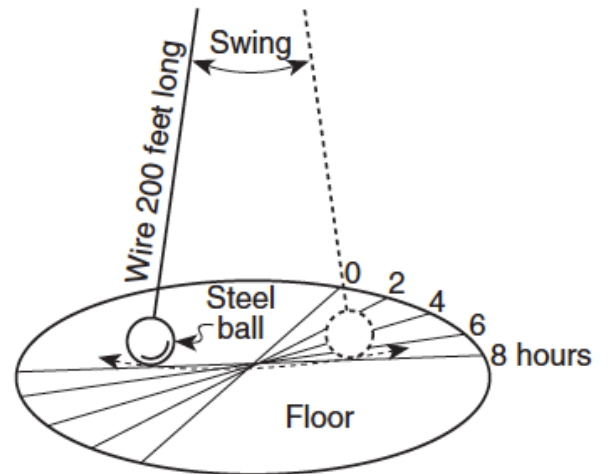
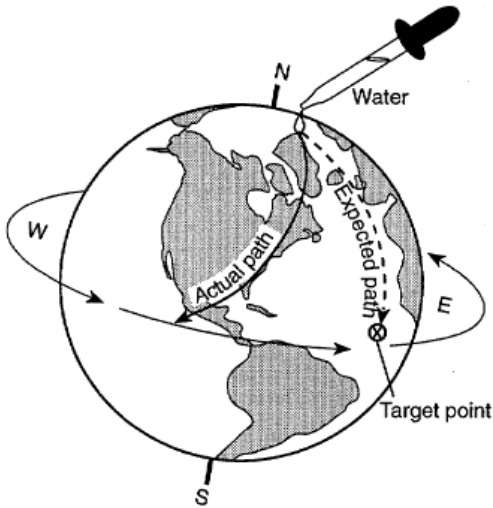
Date:
Period:

Earth Science Regents Review Workbook

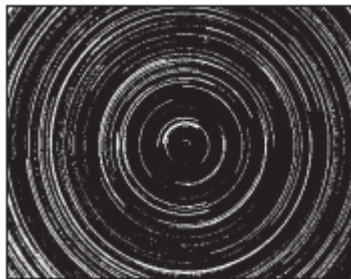
Part 2: Astronomy

Part 2: Astronomy

Earth's Rotation



1. In which direction does Earth rotate? From west to east
2. What is Earth's hourly rate of rotation? 15°/hour
3. How often does Earth rotate once? Daily (every 24 hours)
4. What causes the Coriolis effect? Bending of winds due to Earth's rotation
5. In which direction do wind and water currents deflect towards in the Northern Hemisphere?
To the right
6. In which direction do wind and water currents deflect towards in the Southern Hemisphere?
To the left
7. Which of Earth's motions does the Foucault pendulum support? Earth's rotation
8. The photograph of star trails was taken by an observer in New York State facing north.



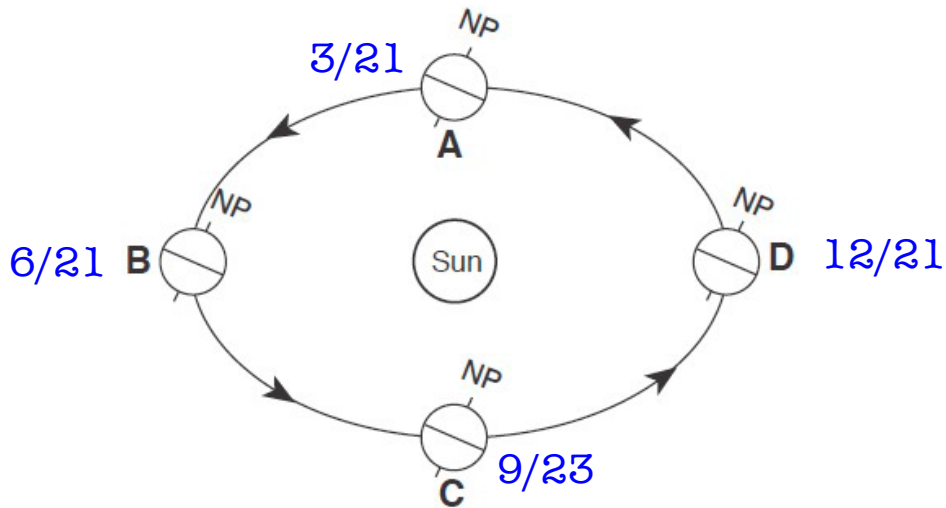
- a. Which star is in the middle of the diagram? Polaris
- b. The star trail is measured to have an angular distance of 120 degrees. How many hours did it take to create this photograph?

$$120^\circ \div 15^\circ/\text{hour} = 8 \text{ hours}$$

Part 2: Astronomy

Seasons

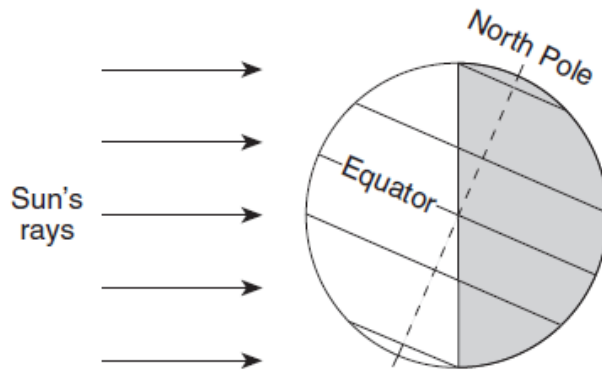
First, label the dates of A, B, C, and D on the diagram below. Use this information to help you fill in the table below.



Description	Position	Description	Position
March 21	A	24 hours of darkness at North Pole	D
December 21	D	24 hours of darkness at South Pole	B
September 23	C	24 hours of daylight at North Pole	B
June 21	B	24 hours of daylight at South Pole	D
Winter in N. Hemisphere	D	Earth is at aphelion	B
Summer in N. Hemisphere	B	Earth is at perihelion	D
Spring in N. Hemisphere	A	Sun is overhead at Tropic of Capricorn	D
Fall in N. Hemisphere	C	Sun is overhead at Tropic of Cancer	B
Winter in S. Hemisphere	B	Sun is overhead at Equator	A, C
Summer in S. Hemisphere	D	Earth has greatest orbital velocity	D
Spring in S. Hemisphere	C	Earth has the lowest orbital velocity	B
Fall in S. Hemisphere	A	9 hours of daylight in NY	D
Earth is closest to Sun	D	15 hours of daylight in NY	B
Earth is farthest from Sun	B	12 hours of daylight in NY	A, C

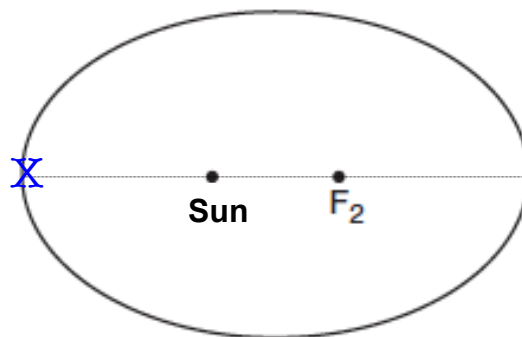
Part 2: Astronomy

Seasons



1. What is the date represented in the diagram above? 12/21
 2. What season is it in New York State? Winter
 3. What latitude is receiving the most direct rays of insolation? 23.5°S (Tropic of Capricorn)
 4. In three months, how will the intensity of insolation change for NY?
In three months (March 21), the intensity of insolation will increase.
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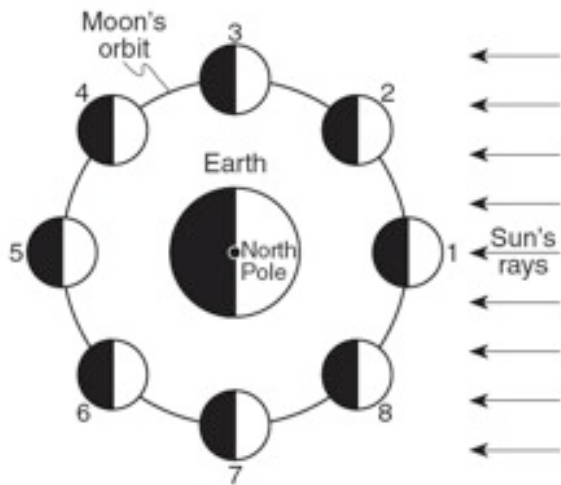
Eccentricity



1. Calculate the eccentricity of the ellipse above. Show all work. Round your answer to the nearest thousandth.
$$e = \frac{d}{L} = \frac{1.7 \text{ cm}}{6.7 \text{ cm}} = 0.2535211 = 0.254$$
2. How does the orbital velocity change as a planet gets closer to the star? Orbital velocity increases as distance decreases
3. On the orbital path above, place an X where the planet's fastest orbital speed will be.
4. As an ellipse gets more elliptical, what happens to the value of its eccentricity? Value increases (gets closer to 1)
5. Describe the shape of Earth's orbit. Slightly elliptical

Part 2: Astronomy

Moon Phases



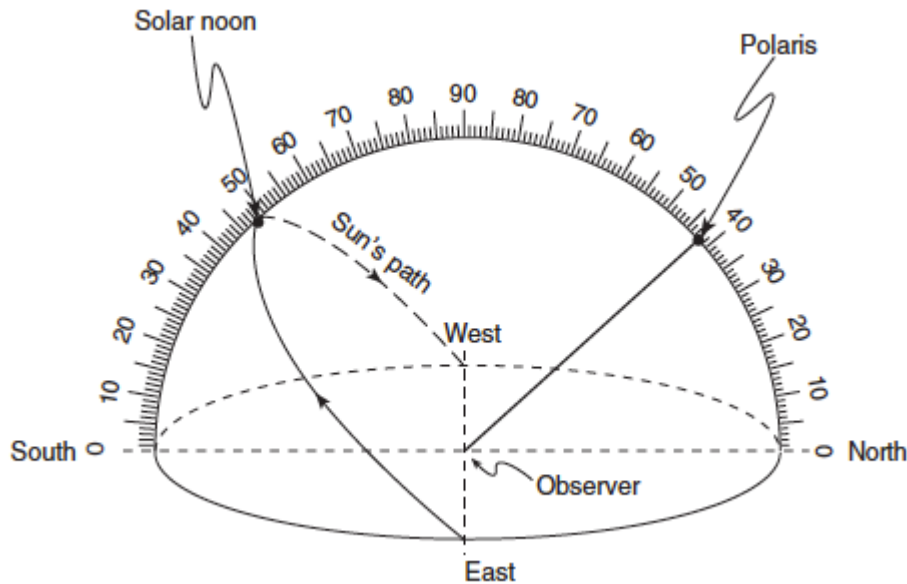
Draw the Phase!			
1 	2 	3 	4
5 	6 	7 	8

- How long is one revolution of the Moon around Earth? 27.3 days
- How many days does it take for the Moon to complete one complete cycle of phases? 29.5 days
- What causes the phases of the Moon? Moon's revolution around the Earth
- Which phase (name and number) causes a solar eclipse? New moon (1)
- Which phase (name and number) causes a lunar eclipse? Full moon (5)
- Why do we see the same side of the moon every day? Moon's period of revolution equals Moon's period of rotation
- Describe the height of high tide and low tide of spring tides. Highest high tide & lowest low tide
- Which two phases (name and number) cause spring tides? New (1) & Full (5)
- Describe the height of high tide and low tide of neap tides. Lowest high tide & highest low tide
- Which two phases (name and number) cause neap tides? 1st Quarter (3) & 3rd Quarter (7)
- Why does the Moon have more influence on the tides than the Sun? Moon is closer than Sun
- Approximately how much time is there between consecutive high tides? 12 hours 26 min
- Why are there so many more impact craters on the Moon than on Earth? Earth's atmosphere has destroyed craters.

Part 2: Astronomy

New York State Celestial Sphere

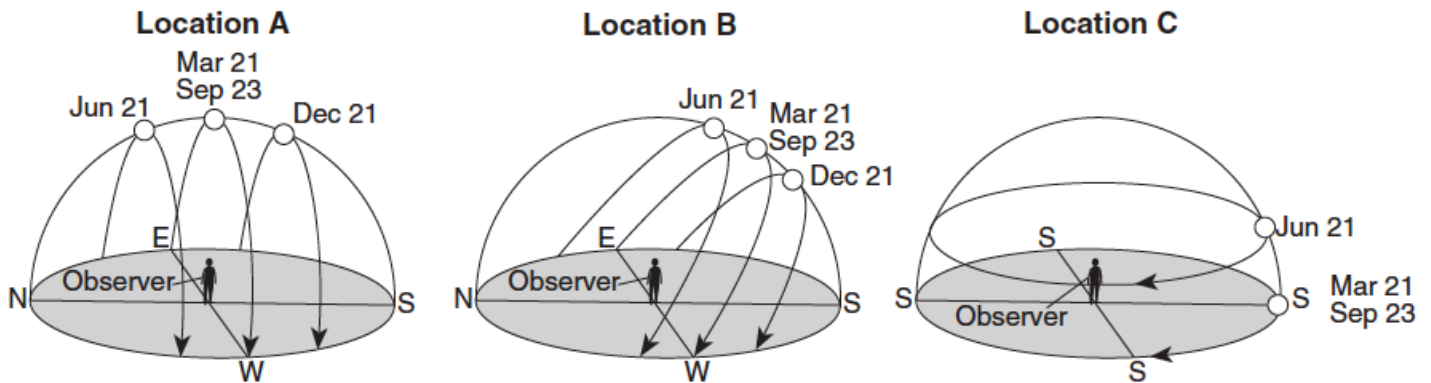
Use the diagram of a celestial sphere for an observer in New York State on the first day of a season below to answer the questions that follow.



1. Identify one possible date the Sun will travel across the path shown above. March 21 or Sept 23
2. What is the altitude of the noon sun on this date? 48°
3. Which direction would the noon shadow of the observer point? Due north
4. What is the altitude of Polaris for this observer? 42°
5. Name one city in NYS where this observer could be located. Jamestown, Binghamton, Elmira, Mt Slide, Kingston
6. What would the altitude of the noon sun be on June 21? 71.5° (add 23.5° to equinox altitude)
7. What is the zenith? Point directly overhead
8. When does the sun reach the zenith in New York State? Never
9. Which season has the greatest angle of insolation? Summer
10. Which season has the lowest angle of insolation? Winter
11. What happens to the length of a shadow from sunrise to noon? Shadow length decreases
12. What happens to the length of a shadow from noon to sunset? Shadow length increases
13. Which season has the longest noontime shadow? Winter
14. Which season has the shortest noontime shadow? Summer

Part 2: Astronomy

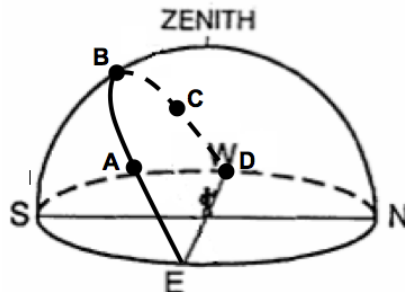
Celestial Spheres from Around the World



1. Identify the cause of the apparent daily motion of the Sun through the sky. Earth's rotation
2. How many hours of daylight is the observer at location C experiencing on June 21? 24 hours
3. What is the latitude of location C? Explain how you determined this using the diagram.
North Pole – all directions are south
4. Explain how you know location A is at the equator.
Sun is directly overhead at noon on equinox
5. How do you know location B is in the Northern Hemisphere?
Sun is due South at noon each day

Celestial Spheres: Time & Shadows

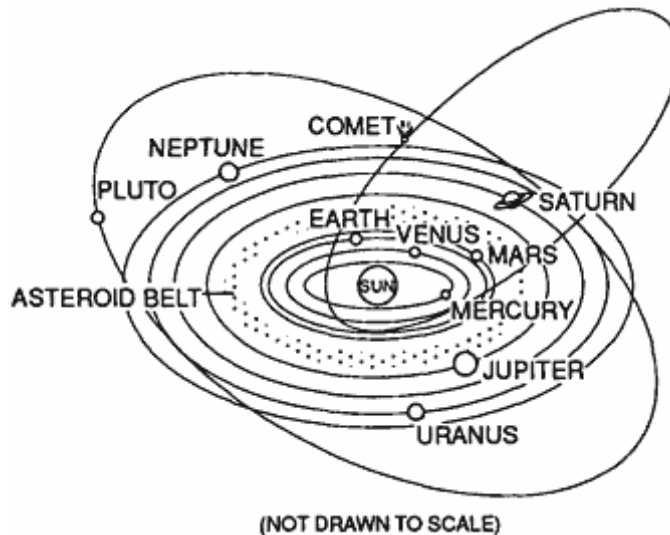
Locations of the Sun along an apparent path for an observer in NYS in April are shown on the diagram below.



1. Determine the approximate time of day and shadow direction for each location of the Sun above:
 - a. Point A: 9 a.m. – Northwest
 - b. Point B: 12 p.m. (noon) – Due north
 - c. Point C: 3 p.m. – Northeast
 - d. Point D: 6 p.m. – Due east

Part 2: Astronomy

Our Solar System

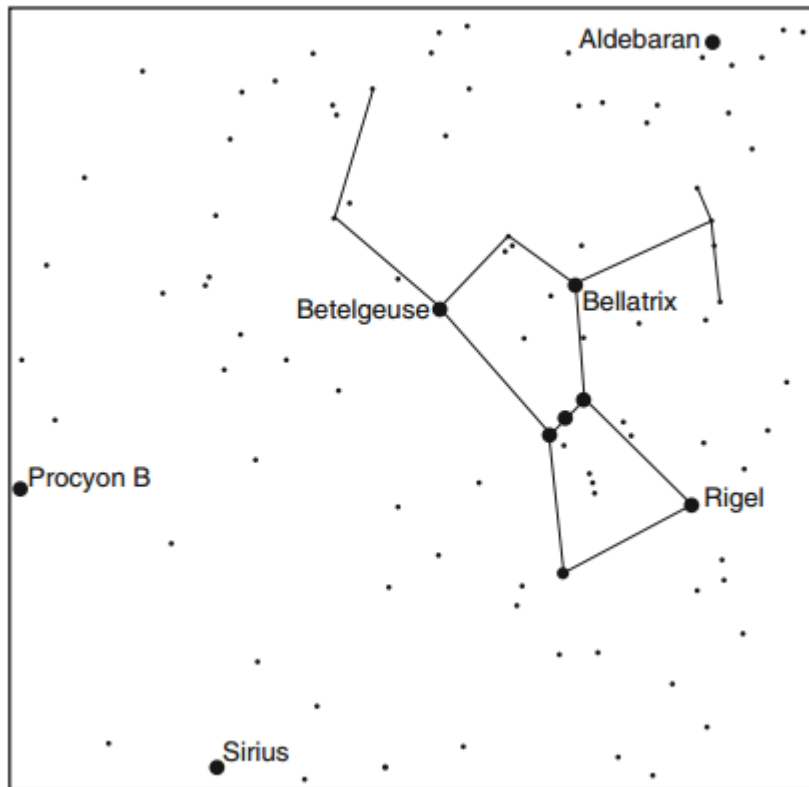


1. What is the age of our solar system (including our Sun & all planets)? 4.6 billion years
2. Which planets are terrestrial? Inner 4 – Mercury, Venus, Earth, Mars
3. What are the characteristics of these planets? Small & rocky
4. Which planets are Jovian? Outer 4 – Jupiter, Saturn, Uranus, Neptune
5. What are the characteristics of these planets? Large & gaseous
6. Which planet is most similar in size to Earth? Venus
7. Which planet has a longer day than year? Venus
8. Which planet would float in water (if you had a container large enough)? Saturn
9. How many times larger is Jupiter than the Earth? 11 times larger
10. Between which two planets is the Asteroid Belt located? Mars & Jupiter
11. Why does Venus have the highest surface temperatures, even though it is not the closest planet to the Sun?
Runaway greenhouse effect – Venus' atmosphere is 95% CO₂. This greenhouse gas allows short-wave visible sunlight to pass through, but traps long-wave infrared heat near surface.
12. Describe the eccentricity of comets. Comets have very elliptical orbits

Part 2: Astronomy

Stars

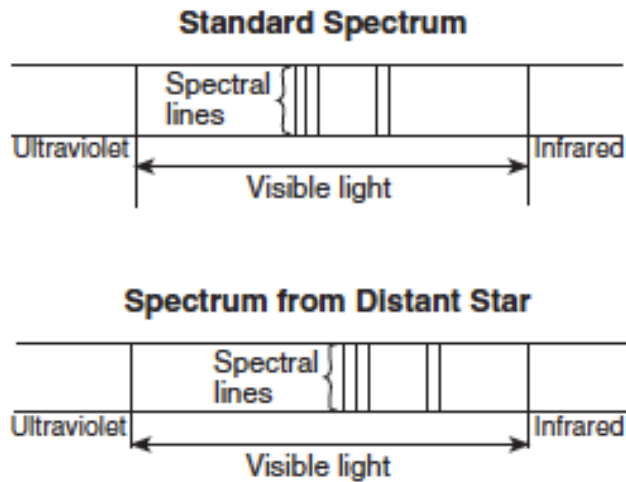
The diagram below shows the constellation Orion which is visible in the winter months in the Northern Hemisphere.



1. Why can we see Orion in December, but not in June? Earth revolves around the Sun
2. What is the luminosity and temperature of Betelgeuse? Luminosity 100,000 x
Temperature 3200 K
3. What is the color of Rigel? Blue white
4. Which group of stars does Aldebaran belong to? Giants
5. What is the process by which stars produce energy? Nuclear fusion
6. What is the "fuel" of the Sun? Hydrogen
7. Which category does a majority of the stars fit into? Main sequence
8. Our Sun is apart of which group of stars? Main sequence
9. In 5 billion years, our sun will reach its intermediate stage and become a Red giant.
10. What is the ultimate fate of our sun? Become a white dwarf

Part 2: Astronomy

Origins of Our Universe



1. How long ago did the Big Bang occur? 13.7 billion years ago
2. What are the two pieces of evidence of the Big Bang?
Red shift of light from distant galaxies & Cosmic microwave background radiation
2. Red shift supports the idea that objects are moving away from Earth.
3. Blue shift supports the idea that objects are moving toward Earth.
4. Is the spectrum for the distant star above moving towards or away from the observer? Away
5. What is the name of the galaxy we live in? Milky Way
6. What type of galaxy do we live in? Spiral shaped
7. How does the age of our universe compare to the age of our solar system? _____
Our universe is much older than our solar system