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| http://www.physicalgeography.net/fundamentals/images/earth_rotation.jpgEarth’s Rotation |
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| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Earth’s Revolution http://www.physicalgeography.net/fundamentals/images/helions.jpg\_\_\_\_\_\_\_/7 |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Earth’s Seasons\_\_\_\_\_\_\_/3http://www.physicalgeography.net/fundamentals/images/ecliptic_plane.jpg |
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| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_/3Tideshttp://bayoffundy.com/assets/spring-vs-neap-tide-large1.jpg |
| * Earth spins on its axis
	+ This occurs at 467 m/sec
* 1 rotation takes 24 hours
	+ This creates our day and night cycles
	+ At any moment in time, half of Earth is in sunlight and half of Earth is in darkness
 | http://www.physicalgeography.net/fundamentals/images/earth_rotation.jpgEarth’s Motions in SpaceEarth’s Rotation |
| * The spinning of Earth (like a spinning top)
	+ The tilt = 23.5o
	+ The North Pole points in the direction of Polaris (the North Star)
	+ Each spin = 1 year
* It takes 26,000 years to complete 1 cycle around the center
 | http://upload.wikimedia.org/wikipedia/commons/thumb/8/82/Gyroscope_precession.gif/220px-Gyroscope_precession.gifEarth’s Precession |
| * The path followed by Earth through its precession is not a straight line

ii.* + It wobbles back-and-forth

i.iii.* + Each wobble takes about 18.6 years (same time as the Moon’s orbit around Earth)
* 2 causes for this movement
	+ Gravitational pull of the Sun and Moon

iv.* Differences between the liquid and solid portions of Earth’s core
 | http://www.starrynighteducation.com/sntimes/2009/june/wwwgfx_cur/Precession_Nutation.pngEarth’s Nutation |
| * Earth circles around the Sun
	+ This takes 365.26 days to occur (results in an extra day every 4 years)
	+ Shape of the orbit is elliptical (oval)
	+ Creates seasons on Earth
	+ Aphelion – Earth is farthest from the Sun
	+ Perihelion – Earth is closest to the Sun
 | Earth’s Revolution http://www.physicalgeography.net/fundamentals/images/helions.jpg |
| * Fall and Spring Equinox (equal)
	+ The Sun’s radiation hits directly at the Equator
	+ Heats Northern and Southern Hemispheres equally
* June Solstice
	+ The Sun’s radiation hits at the Tropic of Cancer
	+ Heats the Northern Hemisphere more, creating summer
	+ Heats the Southern Hemisphere less, creating winter
* December Solstice
	+ The Sun’s radiation hits at the Tropic of Capricorn
	+ Heats the Southern Hemisphere more, creating summer
	+ Heats the Northern Hemisphere less, creating winter
 | Earth’s Seasonshttp://www.physicalgeography.net/fundamentals/images/ecliptic_plane.jpg |
| * Solar Eclipse
	+ The Sun, Moon, and Earth are in a straight line
	+ The Moon blocks the Sun’s light from Earth and casts a shadow over a portion of Earth
* Lunar Eclipse
	+ The Sun, Earth, and Moon are in a straight line
	+ Earth blocks the Sun’s light from reaching the Moon and casts a shadow over the Moon
* Umbra – the area where the Sun’s light is completely blocked by Earth or the Moon
	+ Penumbra – the area where the Sun’s light is partially blocked by Earth or the Moon
 | Solar and Lunar Eclipseshttp://www.astropix.com/IMAGES/I_ASTROP/ECLIPSE/TOTAL2.JPGhttp://2.bp.blogspot.com/-9yBmxLFNAgo/T6S2qg2Ev-I/AAAAAAAADBA/POUv6oaHdWQ/s1600/090126-eclipse-hmed-502p.grid-6x2.jpghttp://standup4islam.files.wordpress.com/2011/01/annular-solar-eclipse.jpgLunar Eclipse Geometry Partial Eclipse (penumbra)Total Eclipse (umbra) |
| * Tides – gravitational pull of the Sun and Moon
* Spring Tide – Large high tides, small low tides
	+ Earth, Moon and Sun line up in a straight line
* Neap Tide – small high tides, large low tides
	+ Earth, Moon, and Sun make a 90o angle
 | http://bayoffundy.com/assets/spring-vs-neap-tide-large1.jpgTides |

Earth’s Motions in Space

Foldable Instructions

1. Hold the paper in the landscape position and fold it “hamburger” style so the title “Earth’s Motions in Space” appears at the top of the front page.

Earth’s Motions in Space

Fold Here

1. On the back side of each picture, answer the questions written below. The answers can be found in Chapter 22, Section 2 (starting on page 622).
2. Questions
	1. Earth’s Rotation
		1. What is Earth’s rotation?
		2. How often does Earth make 1 rotation?
		3. What phenomenon does this create?
	2. Earth’s Precession
		1. What is precession?
		2. At which degree is Earth tilted?
		3. In which direction does Earth’s axis point?
		4. How long does each spin last?
		5. How long does it take for a complete cycle?
	3. Earth’s Nutation
		1. What is nutation?
		2. What is another name for nutation?
		3. How long does each “wobble” take?
		4. What are the 2 causes of this motion?
	4. Earth’s Revolution
		1. What is revolution?
		2. How long does this take?
		3. What do we do to compensate for the fraction of the day?
		4. What is the shape of Earth’s revolution?
		5. What phenomenon is created by this?
		6. What is aphelion?
		7. What is perihelion?
	5. Earth’s Seasons
		1. Fall and Spring – Where does the Sun hit during these seasons? What is the effect?
		2. Winter – Where does the Sun hit during this season? What is the effect?
		3. Summer – Where does the Sun hit during this season? What is the effect?
	6. Solar and Lunar Eclipses
		1. Solar Eclipse – How is the eclipse created? What are the positions of the Sun, Earth, and Moon?
		2. Lunar Eclipse – How is the eclipse created? What are the positions of the Sun, Earth, and Moon?
		3. What is the penumbra?
		4. What is the umbra?
	7. Tides
		1. What causes tides on Earth?
		2. What is a spring tide?
			1. What positions are Earth, the Sun, and Moon in during a spring tide?
		3. What is a neap tide?
			1. What positions are Earth, the Sun, and Moon in during a neap tide?