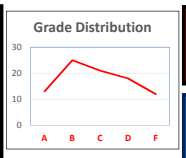
**Exam 1 Grades**
Maximum score 105
Highest score = 102
4 people = 95+
13 - A 18 - D
25 - B 12 - F
21 - C 4 - absent




## REMINDERS

- ❖ Two required essays are due by Mar. 27, 2018. (A third may be used for extra credit in place of a "Think Geographically" essay.)
  ESSAY TOPICS (choose any two):
  - Contributions of a noted geographer, earth scientist or explorer (chapter 1)
  - Relationship of climate change to a listed current event topic (ch. 2)
  - Discuss a natural process that is deemed a natural hazard (ch. 3)
- ❖ Extra Credit: "Think Geographically" Essays from any five of the text-book's 12 chapters.
  - Last day to submit is MAY 15 but it is best to do them as you finish reading a chapter.
- ➢ Any essay may be submit-ted before the deadline.
- ➢ Don't wait for the night before to write them!!

# GEOG 101 Part II
# People and their Physical Environment

## 10: Earth-Sun Relationship

Prof. Anthony Grande
Hunter College Geography



**Textbook Chapters: 2, 3, 4, 5**

## Introduction to People and their Physical Environment

- ✓ I. Introduction to the Physical Environment
- ➢ II. Earth-Sun Relationship
- III. Earth Systems
  - A. The Hydrosphere: Oceans
  - B. The Atmosphere: Weather and Climate
  - C. The Lithosphere: Geologic Influences
- IV. Earth Habitat
  - A. Biosphere
  - B. Natural Controls and Cycles
  - C. Human Impact
  - D. Natural Hazards

**EXAM 2 covers all the topics listed**



## Earth-Sun Relationships

❖ The most important aspect of the earth-sun relationship is **temperature**.

**The earth's temperature is influenced by three major variations:**

1. **Proximity** (distance to the sun)
2. **Earth movements and positions** (angle at which the sun's rays hit the earth)
3. **Variations on the sun's surface** (emission of solar radiation from the sun)



## Earth-Sun Relationship

**Proximity:** The earth is the third planet from the sun.

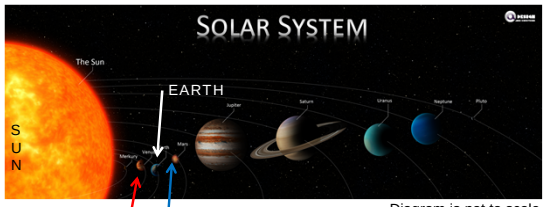



Diagram is not to scale



## Earth Movements and Positions

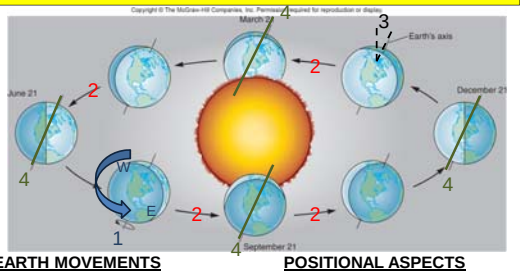
**Two MOVEMENTS**

1. **Rotation** (on its axis)
2. **Revolution** (around the sun)

**Two POSITIONS**

1. **Inclination** (tilted at 23½°)
2. **Parallelism** (axis is always parallel to itself)

## Earth Movements and Positions




**EARTH MOVEMENTS**
1. Rotates on its axis from W to E.
2. Revolves around the sun in a counterclockwise direction.

**POSITIONAL ASPECTS**
3. Axis is tilted 23½° off vertical.
4. Axis remains parallel to itself throughout its orbit.

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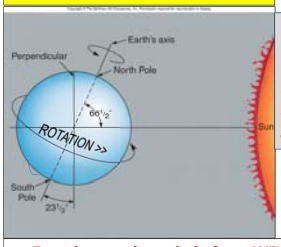
## ROTATION




**ROTATION** gives us:
1. **Day** and **night**
2. **Equalizes temperatures**
3. **Influences daily ocean tides**
4. **Creates the Coriolis Effect**

- **Rotation on the axis is from WEST to EAST.**
- One rotation takes 23 hrs., 56 min., 4 sec.
- Speed of rotation at the equator is 1,000+ mph (25,000 mi/24 hrs.)

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## TIDES

❖ The earth's **TIDES** are influenced by **ROTATION.** Rotation creates a centrifugal force and is responsible in part for the location of the "bulge of water" (high tide) on earth's surface. In conjunction with the positions of the moon and the sun, the location and height of the bulge varies every day.

➢ ***Tides are created because water is less resistant to the forces of nature than is land and can be pulled and stretched.***

✓ **There are two high tides** and **two low tides daily.**

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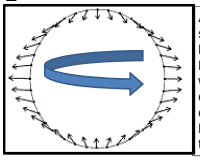
## TIDES

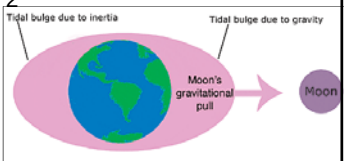
**1.** The spin of the earth creates **centrifugal force** which attempts to throw the water off the surface, thus creating the tidal bulge **(high tide).**
**2. Gravitational forces** of the moon and along with that of the sun pull water towards them, creating larger bulges **(higher tides).**

1



A water-covered, spinning Earth without landmasses would have a permanent water bulge at the equator (due to centrifugal force) with lower water levels at the poles.

2

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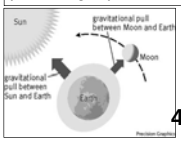
## TIDES

**3. Low tide is the period between the high tides.** It is created during the time when water is **drawn away** from the area and pulled to where the centrifugal and gravitational forces are the strongest (at the high tide area).
**4. Different tide cycles** occur because the earth's rotation varies its position in relation to the moon and sun (different pull strengths).

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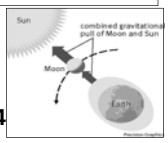


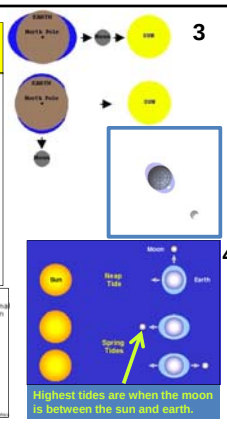


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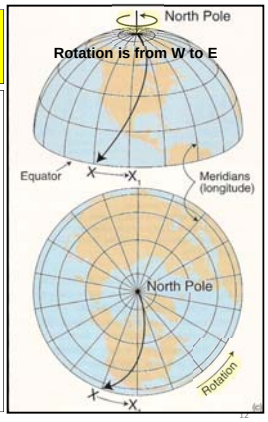
## CORIOLIS EFFECT

❖ **CORIOLIS: the apparent deflection of moving bodies not attached to the surface due to the earth's rotation.**

Amount of deflection is based on the speed of rotation at any latitude.

The earth rotates under the object (or away from its path) so it ***seems*** that the object is curving off course.

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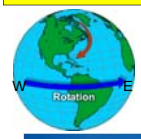
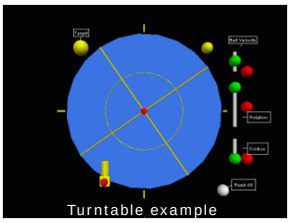
## CORIOLIS EFFECT





https://www.youtube.com/watch?v=dt_X9p77-mk

https://www.youtube.com/watch?v=i2mec3vgeal
3 min Coriolis Animation

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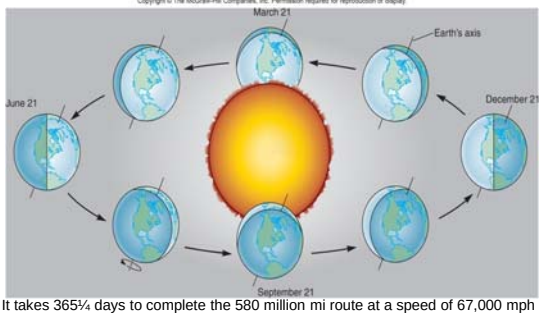
## REVOLUTION

The earth revolves around the sun in a counterclockwise elliptical orbit.




It takes 365¼ days to complete the 580 million mi route at a speed of 67,000 mph

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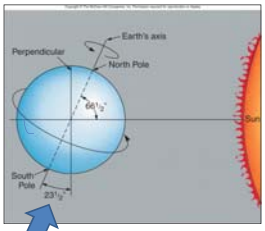
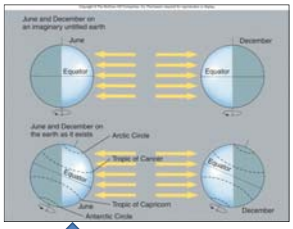
## INCLINATION

The earth's axis is inclined at a 23½° angle.




Because of inclination, the intensity of the sun's rays varies at any latitude throughout the year.

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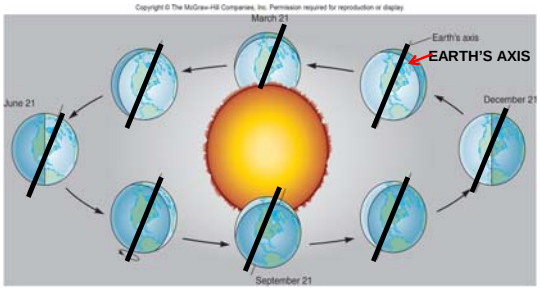
## PARALLELISM of AXIS




At every point in its orbit around the sun, the earth's axis is parallel to itself.

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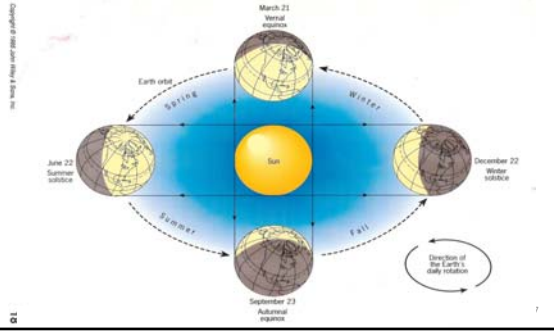
## THE SEASONS

Revolution + Inclination + Parallelism = SEASONS

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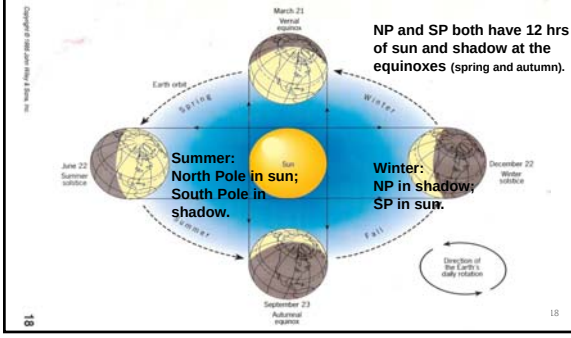
## THE SEASONS

Revolution + Inclination + Parallelism = SEASONS




NP and SP both have 12 hrs of sun and shadow at the equinoxes (spring and autumn).

Summer:
North Pole in sun;
South Pole in shadow.

Winter:
NP in shadow;
SP in sun.

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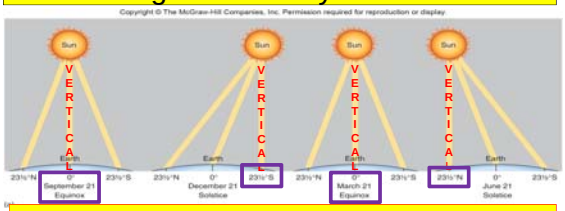
## THE SEASONS
Shifting Vertical Rays of the Sun




**Angle of the sun's rays varies with both time of year and latitude.**
The vertical rays of the sun move daily between the Tropic of Cancer (23½°N) and the Tropic of Capricorn (23½°S).

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## Earth-Sun Relationships

**ASTRONOMICAL: earth in relation to the sun**
1. Cycle duration
2. Precession
3. Tilt variation

**SOLAR: conditions on the sun's surface**
1. Sunspot activity
2. Ultraviolet rays
3. Solar wind

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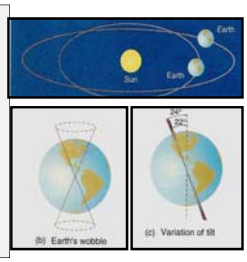
## Earth-Sun Variations

**ASTRONOMICAL FACTORS**

a) **Cycle Duration** - variation of earth's orbit around the sun.

b) **Precession** - the earth wobbles (its spin is uneven like that of a toy top)

c) **Tilt Variation** - earth's axis has tilted at different angles (from present 23½°)




❖**These actions influence the amount of heat received from the sun.**

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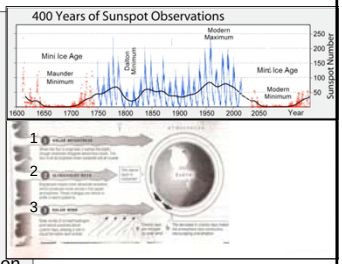
## Earth-Sun Variations

**SOLAR ENERGY**

**1. Sunspot Activity -** brightness/heat

**2. Ultraviolet Rays -** upper atmosphere oxygen absorbs UV light to create ozone; ozone effects storm patterns.

**3. Solar Wind -** ionized particles affect cloud formation and rainfall; strong emissions may effect electronic communications.




✓ **These are short term influences on the earth's temperature.**

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## N E X T

**The Hydrosphere: Oceans**

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