**IDX G9 GEOGRAPHY H STUDY GUIDE ISSUE 2**

**By Heidi and Ethan Swee**

—**Milky Way Galaxy:** flattened, disk-shaped collection w/ ~300 billion stars

—**Gravity:** mutual attraction exerted by every object upon all other objects in proportion to their masses

—**Planetesimal Hypothesis (or dust cloud hypothesis):** hypothesis where small grains of cosmic dust & other solids gather to form planetesimals that eventually reach the size of planets

—basically, everything came from dust

—**Speed of Light:** 3x108 m/s

—**Perihelion:** Earth’s closest position to the sun

—**Aphelion:** Earth’s farthest position from the sun

—Earth’s orbit changes after long periods, but doesn’t really affect anything

—**Fusion:** two or more atomic nuclei combining to form one or more atomic nuclei. Releases more energy than fission

—in the sun, mass gets turned into energy

—**Solar cycle:** periodic variation in the sun’s activity and appearance over time

—**Sunspot:** surface disturbance caused by magnetic storm

—**Solar minimum:** period of years when fewer sunspots are visible

—**Solar maximum:** period of years when sunspots are most numerous

—these cycle once every 11 years

—**Solar flares:** magnetic storms that cause surface explosions

—**Prominence eruptions:** outbursts of gases arcing from the surface of the sun

—**Solar wind:** clouds of electrically charged particles emitted from the sun

—takes ~3 days to reach Earth

—disrupts radio broadcasts and satellite transmissions

—**Magnetosphere:** magnetic field generated by dynamo-like motions of our planet. Deflects solar wind to Earth’s poles so only a small portion of it enters the upper atmosphere

—**Coronal mass ejections (CMEs):** large outbursts of charged material. Cause auroras

—**Auroras:** folded sheets of green/yellow/blue/red light that appear at high latitudes

—**Electromagnetic spectrum:** spectrum of all possible wavelengths of electromagnetic energy.

—**Wavelength:** distance between corresponding points on any two successive waves

—hotter the object, shorter the wavelengths

—**Frequency:** number of waves passing a fixed point every second

—sun emits uv, x-ray, gamma, visible light, and infrared . . . shortwave radiation

—earth emits mostly infrared . . . longwave radiation

—**Blackbody:** a perfect absorber of radiant energy; also emits all the radiant energy it receives.

—**Thermopause:** outer boundary of Earth’s energy system. At the top of the atmosphere.

—**Insolation:** incoming solar radiation intercepted by the Earth.

—**Solar constant:** average insolation received at the Thermopause when Earth is at its average distance from the sun (1372 w/m2)

—**Subsolar point:** point where insolation arrives perpendicular to the surface

—between 23.5°N/S

—equatorial regions receive a lot more insolation than polar regions

—**Isolines:** lines connecting points of equal value

—**Altitude:** angle between horizon and sun

—**Declination:** latitude of subsolar point

—**Daylength:** interval between sunrise & sunset

—**Sunrise:** moment when Sun first appears

—**Sunset:** moment when Sun entirely disappears

—daylength never changes on the equator (12h day, 12h night)

—varies the more extreme the latitude gets (poles have 6 months of day & 6 months of night)

—Seasons are caused by variations in altitude, declination, and daylength. These are in turn caused by earth’s revolution, rotation, its tilted axis, its unchanging orientation of said axis, and its sphericity.

—**Revolution:** orbit

—**Rotation:** turning around on an axis

—**Axis:** imaginary line extending through a planet from its geographic North and South poles

—**Circle of illumination:** dividing line between day and night

—**Mean solar time:** 24h

—**Axial tilt:** tilt relative to an axis

—**Plane of the ecliptic:** plane that intersects Earth’s elliptical orbit around the sun

—**Axial parallelism:** Earth’s axis maintaining the same alignment relative to the plant of the ecliptic

—**Sphericity:** Earth’s spherical shape

—this causes the parallel rays of the sun to fall at uneven angles on Earth’s surface. Therefore, insolation angles and net radiation can vary depending on latitude

—**Tropic of Cancer:** 23.5°N

—**Tropic of Capricorn:** 23.5°S

—the subsolar point travels between these two lines. The Tropic of Cancer is the farthest north the subsolar point can go, and the Tropic of Capricorn is the farthest south the subsolar point can go

—**Arctic Circle:** 66.5°N

—**Antarctic Circle:** 66.5°S

—these two are the lowest latitudes that experience 24-hr periods of daylight/darkness

—**December Solstice:** (winter solstice in Northern Hemisphere, summer solstice in Southern Hemisphere). Subsolar point at 23.5°S. Circle of Illumination excludes North Pole region from sunlight but includes South Pole region.

—**March Equinox:** (vernal equinox in Northern Hemisphere, autumnal equinox in Southern Hemisphere). Subsolar point at equator (0°). Circle of illumination passes through both poles, so everywhere on earth experiences 12-hr day and 12-hr night.

—**June Solstice:** (summer solstice in Northern Hemisphere, winter solstice in Southern Hemisphere). Subsolar point at 23.5°S. Circle of Illumination excludes South Pole region from sunlight but includes North Pole region.

—**September Equinox:** (autumnal equinox in Northern Hemisphere, vernal equinox in Southern Hemisphere). Subsolar point at equator. Circle of Illumination passes through both poles, so everywhere on earth experiences 12-hr day and 12-hr night.

—**Twilight:**

—dawn: period of diffused light that occurs before sunrise

—dusk: period of diffused light that occurs before sunset

**OTHER STUFF NOT ON TEXTBOOK:**

—**Finding Latitude: (position of sun)**

—you are in north hemisphere, subsolar point in north hemisphere:

x = (90 – A) + |B|

(x = latitude, A = solar height, B = solar declination)

—you are in north hemisphere, subsolar point in south hemisphere:

x = (90 – A) - |B|

—know how to graph this

—**Finding Latitude: (position of North Star during night)**

—measure the angle of the North Star above the horizon and that will be equal to your latitude (only for use in north hemisphere because you can’t see North Star in south hemisphere

—**Finding Longitude: (calling Greenwich)**

—Step 1: figure out when noon is at your location (put a stick on the ground and find when the shadows are shortest. That time is noon)

—Step 2: call Greenwich when it is noon at your place (assume you have a phone) and find out the Greenwich time now

—Step 3: calculate time difference and determine your longitude (1 hour = 15°)

—**Sun Structure:**

—Core

—Radiative Zone

—Convection Zone

—Photosphere

—Chromosphere (cannot be observed)

—Corona (can only be seen with the naked eye during a total solar eclipse/with use of coronagraph)

—Prominence: large, bright, gaseous loop; contain much cooler plasma than flare; last for months; relatively harmless

—Flare: violent eruption of plasma, last for minutes to hours, harmful

—Sunspot: cooler areas

—Faculae: bright spot near sunspots

—**Solar Eclipse:** *(make sure you know how to draw the diagram)*

—Full eclipse: observed when standing in the umbra

—Annular eclipse: observed when standing in the antumbra

—Partial eclipse: observed when standing in the penumbra

—on average, 2.38 solar eclipses each year; total solar eclipse about once every 1.5yrs; total solar eclipse occurs in one place about once every 330yrs (540yrs in the south)

—**Lunar Eclipse:** *(make sure you know how to draw the diagram)*

—Full/total eclipse: in umbra, red moon

—Partial eclipse: half in umbra, half in penumbra

—Penumbral eclipse/lunar appulse: in penumbra

—on average 2 lunar eclipses each year, but can be up to 3 or 5; total lunar eclipse about once every 2.5yrs

—**Moon Phases:**

—new moon → waxing crescent → first quarter → waxing gibbous → full moon → waning gibbous → third quarter → waning crescent → new moon again

—the order of the moon’s appearances during each of these phases is reversed for opposite hemispheres