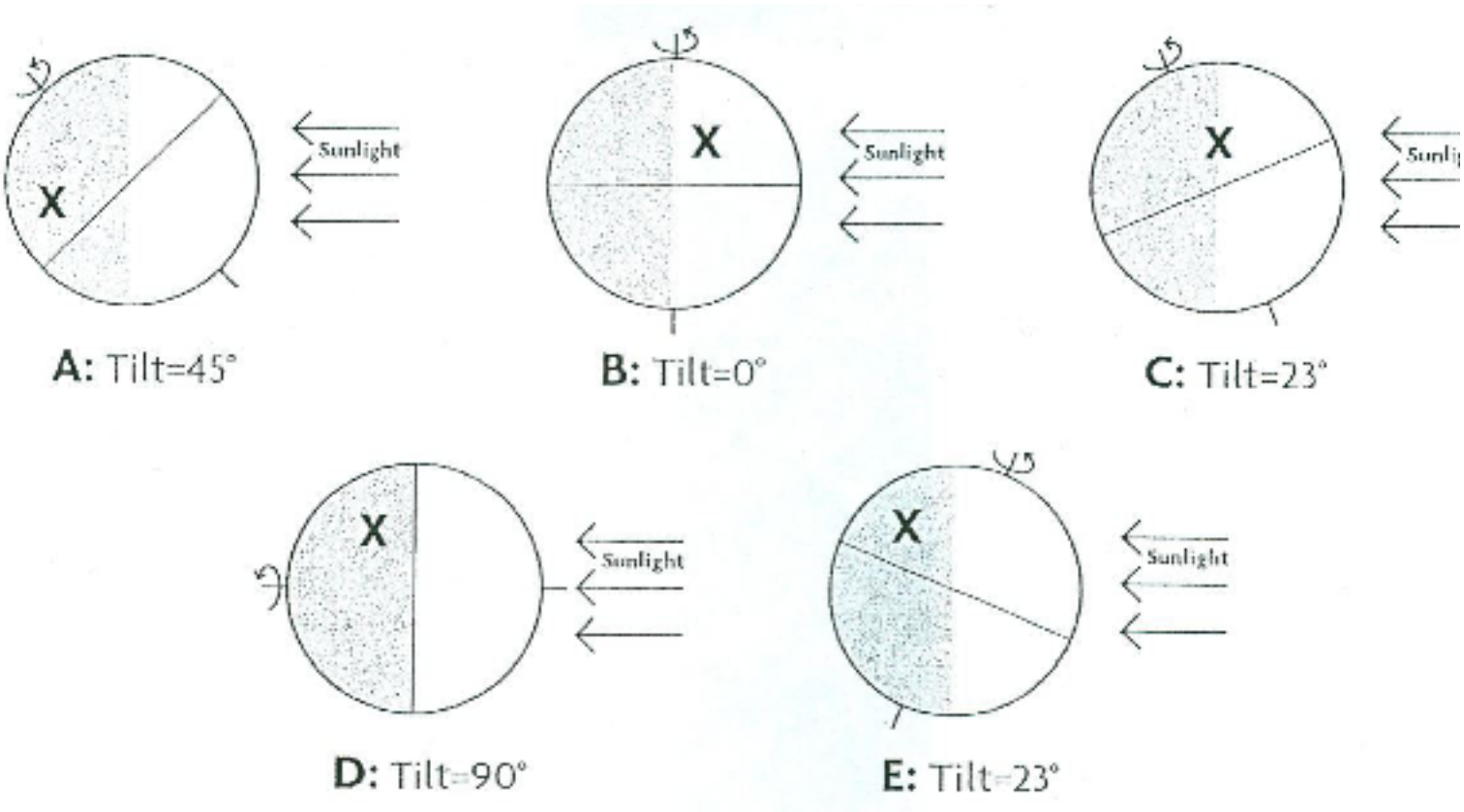
NAME(S)_____ SECTION DAYS & TIMES_____
ASTRONOMY 20 LLOYD

PROBLEM SET #3
SEASONS ON OTHER PLANETS
MOON PHASES

PART I. SEASONS ON OTHER PLANETS

In the diagram below, the Earth (Tilt = 23°) is shown at two times of the year and is compared with three alien planets. Like the Earth, the alien planets rotate so that each location (indicated by an X) is sometimes in daylight and sometimes in darkness. All the planets rotate in 24 hours. The point X is at the same distance from the equator (the same latitude) on all planets.



1. Draw a light line through each X showing how that point moves as the planet rotates. Rank the time (from longest to shortest) that each location X spends in daylight during the 24-hour rotation period. (Make the night side darker if it came out light on your copy.)

Ranking Order:
Longest time 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ Shortest time

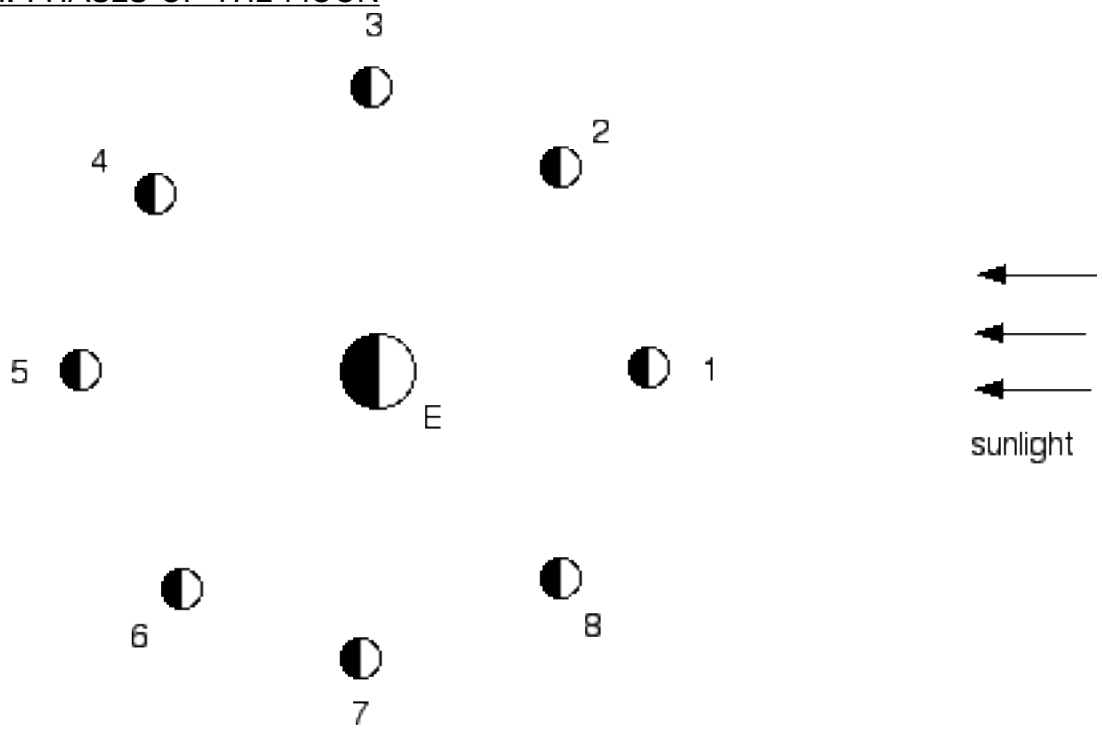
Carefully explain your reasoning for your ranking, *or* explain why you think the times are all the same. "Carefully explain" means to tell what you did to come to your conclusions.

2. Extend the light rays to the planet's surface. Rank the intensity of maximum (noontime) sunlight falling on each location X, from **most intense** to **least intense**. Assume that the incoming sunlight is equally intense at the sub-solar point in all cases.

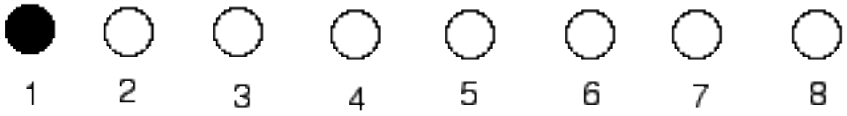
Most intense 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ Least intense

Carefully explain your reasoning for your ranking, *or* explain why you think the sun intensities are all the same. Please do not use the words "direct" or "directly"; use "vertical" or "vertically" or similar words.

PART II: PHASES OF THE MOON



Angle 0° ___ ___ ___ 180° ___ 90° ___



1. Draw the correct phase of the Moon (that is, what the Moon looks like from Earth) in the circles at the bottom. Note that in the upper diagram, the Sun is shining from right to left. Darken the part of the Moon in **night**; leave the part of the Moon in daylight white. The numbers below the circles correspond to the Moon positions in the upper diagram.

2. Estimate the angle between the Sun and the Moon as seen from the Earth. (90° is a right angle; 180° is the opposite direction.) For the phases past full, choose the angle that is less than 180°. Write in the blanks.

3. Complete the following sentence with either "more full" or "less full":

The greater the angle between the Sun and the Moon, the _____ the phase of the Moon.

4. The diagrams below show the Sun and the Moon in the sky as seen from California. Fill in the phase of the Moon in the diagrams below. Darken the part of the Moon that is in night; leave the bright part of the Moon white. *Hint:* Remember that the Moon is much closer to us than the Sun is.