THE SEASON CYCLER

ACTIVITY #1

Objectives: Distinguish between rotation and revolution.
Describe the direction of the Earth's rotation.

I. On the Season Cycler, label the arrows going around the sun in a counterclockwise direction, "REVOLUTION".

The movement of an object around another object is called revolution. In this illustration, the Earth is moving around the sun. Another example of a revolution involves the movement of the moon around the _____.

II. On the Season Cycler, draw the moon on the right side of the Earth and draw arrows, counterclockwise, to illustrate it revolving around the Earth.

III. As the Earth revolves around the sun, it also spins on its axis. This spinning movement is called "ROTATION".

Line up the Earth on the Season Cycler so that the poles are straight up and down. With your marker, extend the axis about 5.08 cm north and south from the poles. At the South Pole, around this extended axis, draw arrows spinning counterclockwise. Below the South Pole region label the arrows, "ROTATION OF THE EARTH"

IV. The movement of the sun within the Milky Way galaxy would be termed _____

The changing of night to day is caused by the constant _____ of the Earth on its axis.

What are the differences between a rotation and a revolution?

_____

_____

THE SEASON CYCLER

ACTIVITY #2

Objective: Explain the cause for differences in solar radiation.

I. On the Season Cycler, label just above and below the large arrow "DIRECT RAYS OF THE SUN" and then draw parallel lines 1 cm apart extending from the sun to the Earth. The lines are to extend to the poles.

Place the Earth so that the north & south axis is in a vertical position. Observe that the amount of solar radiation is the same for each 1 cm unit. The major change in the use of solar energy occurs when it reaches the Earth!

Measure the length between the units at the surface of the Earth near the equator. This measurement should equal 1 cm. Right!

II. Now, compare the length of the unit near the poles with that at the equator. Why is there a difference? _____

_____

IF the Earth stayed in the north & south position, the amount of solar radiation would be constant throughout the year. Notice, that as you approach the poles, the same amount of solar radiation would be required to heat a larger surface area. This in turn would account for cooler temperatures toward the poles and hotter temperatures near the equator.

Do the poles receive the same amount of solar radiation as the equator? Explain. _____

_____

_____

_____

_____

THE SEASON CYCLER

ACTIVITY #3

Objective: Describe the effects caused by the tilting of the Earth.

I. Tilt the Earth on the Cycler so that the direct rays of the sun are on the dotted line north of the equator.

Now, extend the Earth's axis about 2.54 cm north and south from the poles. The angle between the original and tilted axis is 23.5 degrees. Label the space between the two axes "23.5°".

The tilt of the Earth's axis toward the sun allows more solar radiation to reach the polar areas. This means that the solar radiation is now utilized in a smaller surface area at the poles, because of the increased angle of incidence.

II. Now, tilt the Earth on the Cycler so that the direct rays of the sun are on the dotted line below the Equator. As before, extend the Earth's axis about 2.54 cm north & south from the poles. The angle between the original and tilted axis is _____ degrees. Label the space between the two axes. Above the labeled axes write; "TILT OF THE EARTH'S AXIS." As the Earth rotates, the tilting effect allows solar radiation to warm the Earth above and below the equator.

III. Because of the tilting of the Earth, what general areas on the Earth receive the most solar radiation? _____

_____

_____

What could result if the Earth's tilt was increased to 30 degrees?

_____

_____

What accounts for the seasonal changes on the Earth?_____

_____

_____

THE SEASON CYCLER

ACTIVITY #4

Objective: Label and explain the position of the Tropic of Cancer and the Tropic of Capricorn.

I. On the Cycler, tilt the Earth so the Northern Hemisphere is receiving the greatest solar radiation. The direct rays of the sun should be on the dotted line north of the Equator. This is the northern most latitude on which the sun's path is directly overhead. On the Cycler, label the dotted line; "THE TROPIC OF CANCER."

II. Next, tilt the Earth so the Southern Hemisphere is now receiving the greatest solar radiation. The direct rays of the sun should be on the dotted line below the Equator. This is the southern most latitude on which the sun's path is directly overhead. On the Cycler, label the dotted line; "THE TROPIC OF CAPRICORN."

III. It is the tilting of the Earth's axis that causes the variations in temperatures on the Earth. The angle of tilting is 23.5 degrees, as discussed earlier. The equator is located at latitude 0 degrees. Because of the tilting of the Earth, the Tropic of Cancer and the Tropic of Capricorn have the same latitude north and south of the Equator respectively. On the Cycler, label "**23.5°**" on the Tropics of Cancer and Capricorn.

IV. Where are the tropics located on the Earth? _____

_____

Explain why the Tropic of Cancer and Tropic of Capricorn are the same distance north or south of the Equator. _____

_____

If the Earth's axis was tilted 30 degrees, what effect would this have on the tropical latitudes? _____

_____

THE SEASON CYCLER

ACTIVITY #5

Objective: Explain and list dates for the winter solstice, summer solstice, vernal equinox, and autumnal equinox.

I. On the Season Cycler, tilt the Earth so that the direct rays of the sun are on the Tropic of Cancer. On this day, at latitude 23.5 N., the sun will pass directly overhead. You will cast a shadow that is directly under you. (At high noon, that is!) This marks the first day of summer, around June 21, which is called the summer solstice. In the window of the Cycler, label "SUMMER SOLSTICE JUNE 21."

II. Now that summer is passing, tilt the Cycler so that the direct rays of the sun are above the Equator. On this day, around September 21, the sun is directly overhead. The days and nights are equal in length of time! This day is known as the autumnal equinox. Both hemispheres of the Earth receive equal daylight and night. "Equi" means equal and "nox" means night. This day marks the first day of autumn or fall in the Northern Hemisphere. In the top half of the window on the Cycler, label "AUTUMNAL EQUINOX SEPTEMBER 21."

III. With the passing of fall, the days get shorter and the Earth continues to tilt away from the direct rays of the sun. Around December 21, the sun's rays are directly over the Tropic of Capricorn. Tilt the Cycler to illustrate the above sentences. In the Northern Hemisphere, this marks the first day of winter. It happens to be the shortest day or longest night! In the window of the Cycler label "WINTER SOLSTICE DECEMBER 21."

IV. As winter leads into spring in the Northern Hemisphere, the days grow longer and the sun's rays are more direct over the Equator. This brings more solar radiation to this hemisphere.

Again, as before, the days and nights are equal in length of time. At high noon the sun is directly overhead, thus causing your shadow to be directly beneath you! This marks the first day of spring, around March 21. This day is also known as the vernal equinox. At the bottom half of the window on the Cycler, label "MARCH 21 VERNAL EQUINOX."

V. When it is winter in the Northern Hemisphere, what season is it in the Southern Hemisphere?_____

_____

You live in the Northern Hemisphere, what length of shadow will you cast on December 21? Long or Short? Explain. _____

_____

_____

What do March 21 and September 21 have in common? _____

_____

_____

You are standing at the Equator, in which direction will you cast a shadow at noon on June 21? Explain. _____

_____

_____