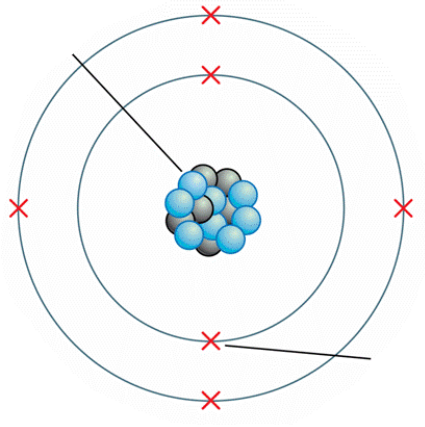
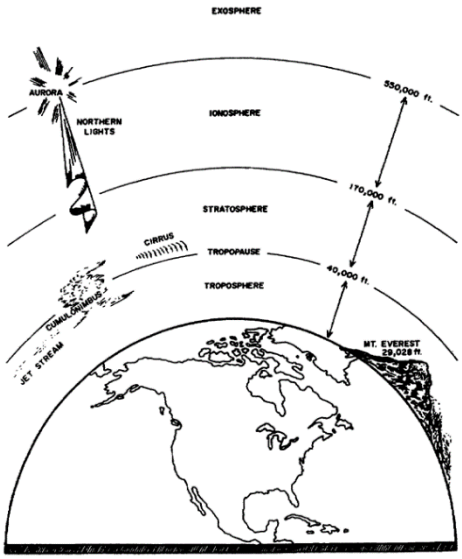
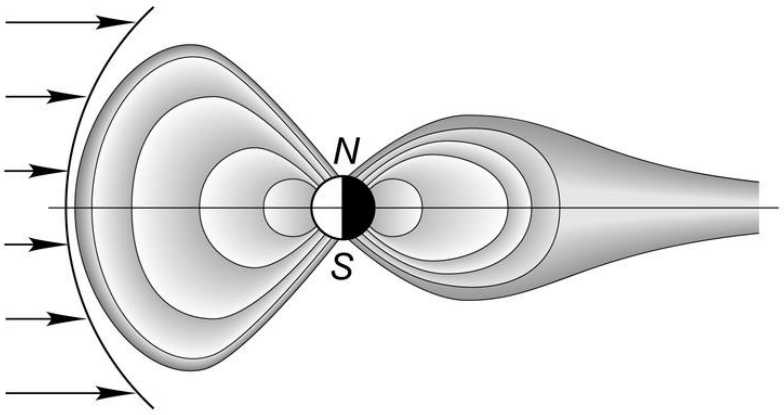
Section 8: The Sun and its Effects







Section 8 Question: What are sunspots and solar flares and what is their effect on Earth?

What Do You See?

(cartoon)

What Do You Think?

Consider the following debate between two students regarding the energy given off by Earth's surface.

Student #1: *The Sun mainly gives off visible light and so does Earth's surface because I can see it during the daytime.*

Student #2: *But that's just reflected sunlight. Earth's surface is much cooler than the Sun and mostly gives off energy closer to the kind that our bodies give off — infrared light. I'm not sure, but I think the surface probably radiates infrared light during both the daytime and the nighttime based upon its temperature.*

Do you agree or disagree with either or both of the students? Explain your reasoning.

What Do You Think Now?

Focus Question A: What can we learn from observing sunspot activity?

Explore:

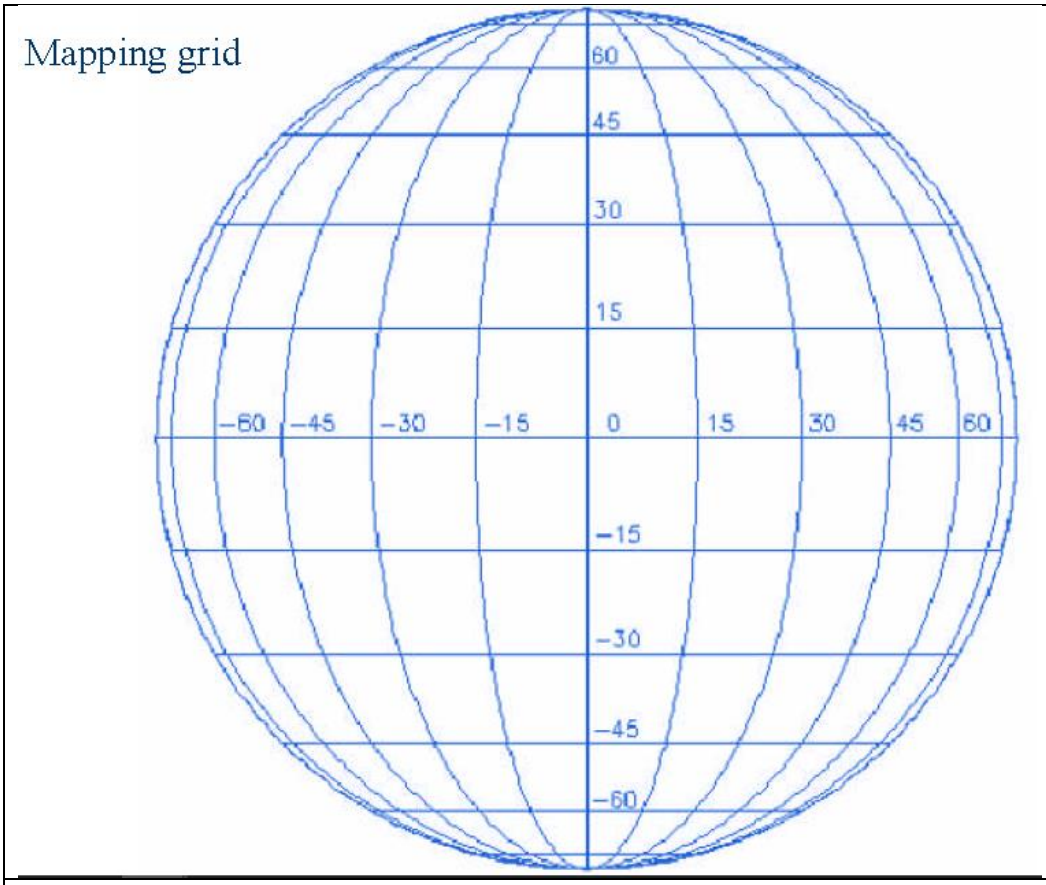
Using the information on the next page, construct a graph of sunspot activity

Observe:

(What patterns can you see in the data that you have plotted?)

Table 1: Sunspot Activity							
Year	Number of Sunspots	Year	Number of Sunspots	Year	Number of Sunspots	Year	Number of Sunspots
1899	12.1	1927	69.0	1955	38.0	1983	66.6
1900	9.5	1928	77.8	1956	141.7	1984	45.9
1901	2.7	1929	64.9	1957	190.2	1985	17.9
1902	5.0	1930	35.7	1958	184.8	1986	13.4
1903	24.4	1931	21.2	1959	159.0	1987	29.4
1904	42.0	1932	11.1	1960	112.3	1988	100.2
1905	63.5	1933	5.7	1961	53.9	1989	157.6
1906	53.8	1934	8.7	1962	37.6	1990	142.6
1907	62.0	1935	36.1	1963	27.9	1991	145.7
1908	48.5	1936	79.7	1964	10.2	1992	94.3
1909	43.9	1937	114.4	1965	15.1	1993	54.6
1910	18.6	1938	109.6	1966	47.0	1994	29.9
1911	5.7	1939	88.8	1967	93.8	1995	17.5
1912	3.6	1940	67.8	1968	105.9	1996	8.6
1913	1.4	1941	47.5	1969	105.5	1997	21.5
1914	9.6	1942	30.6	1970	104.5	1998	64.3
1915	47.4	1943	16.3	1971	66.6	1999	93.3
1916	57.1	1944	9.6	1972	68.9	2000	119.6
1917	103.9	1945	33.2	1973	38.0	2001	111.0
1918	80.6	1946	92.6	1974	34.5	2002	104.0
1919	63.6	1947	151.6	1975	15.5	2003	63.7
1920	37.6	1948	136.3	1976	12.6	2004	40.4
1921	26.1	1949	134.7	1977	27.5	2005	29.8
1922	14.2	1950	83.9	1978	92.5	2006	15.2
1923	5.8	1951	69.4	1979	155.4	2007	7.5
1924	16.7	1952	31.5	1980	154.6	2008	2.9
1925	44.3	1953	13.9	1981	140.4	2009	3.1
1926	63.9	1954	4.4	1982	115.9	2010	16.5

The number of sunspots on the visible solar surface is counted by many solar observatories and is averaged into a single-standardized quantity called the sunspot number. This explains the decimal values in the table.



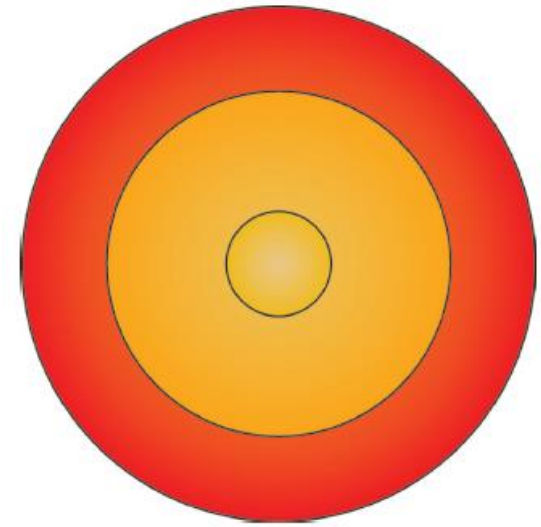
Observe:

Claim:

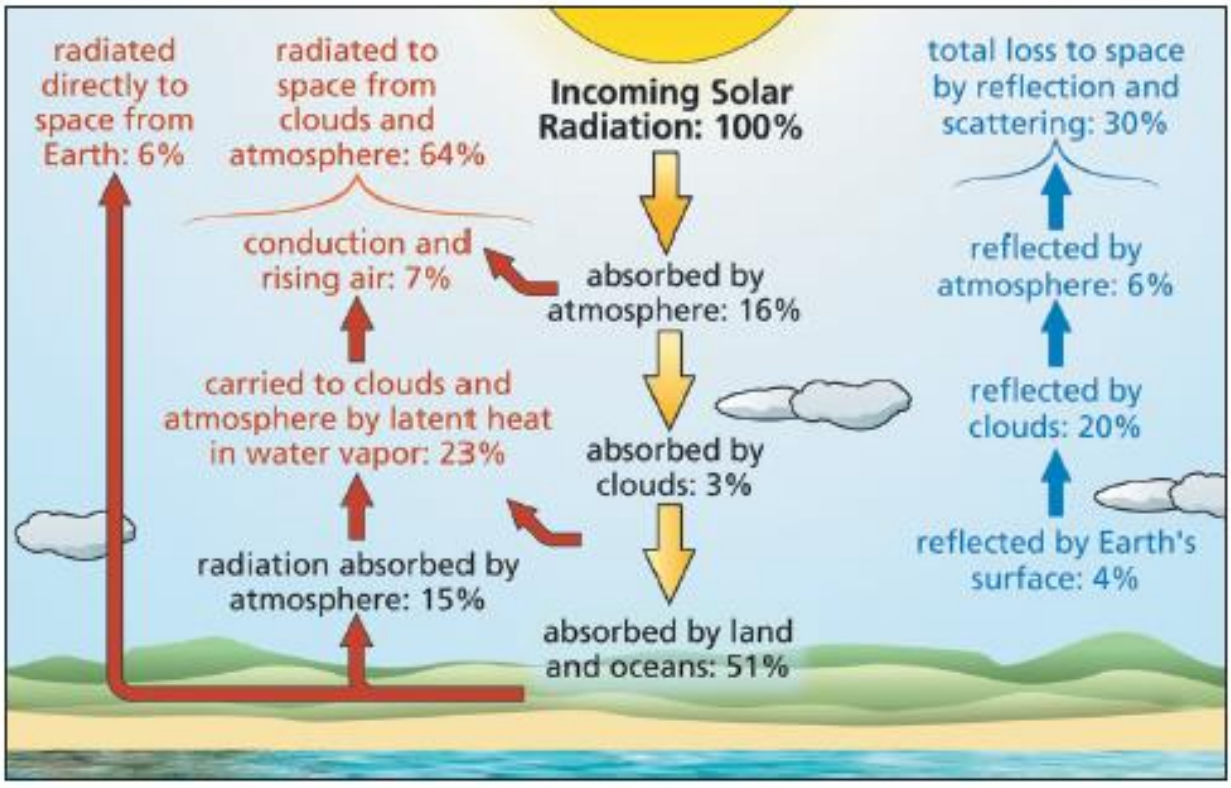
Evidence:

RETURN TO WDYTN

DIGGING DEEPER

Structure of the Sun	
• Nuclear fusion occurs in the core of the Sun where hydrogen atoms are fused together to create helium and energy in the form of heat and light. • Energy is absorbed and reemitted in the radiative zone. • Energy is transferred through the movement of gases in the convective zone. • The Sun's atmosphere consists of three layers.	Layer the illustration of the Sun as shown in the video. 

Earth's solar Energy budget	
• Of all the incoming solar radiation from the Sun, about half is absorbed by the surface of Earth. • The rest is either absorbed by the atmosphere or reflected or scattered back into space by Earth or clouds.	Describe the role of dust and gas in Earth's energy budget. Describe the role of ozone in Earth's atmosphere.



Sunspots Solar Flares	
• Sunspots appear as dark areas on the visible surface of the Sun • Sunspots form where magnetic lines poke through the surface of the Sun. • Solar flares can release large amounts of radiation in a short amount of time.	What information can sunspots tell us about the Sun? How can Sunspots and solar flares affect here on Earth?

Chapter 1, Section 8 E.B.C.
The Sun and its Effects

Name:_____
Period:_____

Question (2)		
Claim 1 (2)		
A. Supporting Evidence (3)	B. Supporting Evidence (3)	
Claim 2 (2)		
A. Supporting Evidence (3)	B. Supporting Evidence (3)	
Analysis (6)		

	Claim *A statement or conclusion that answers the original question/problem.*	**Evidence** *Scientific data that supports the claim. The data needs to be appropriate and sufficient to support the claim.*	**Analysis** *A justification that connects the evidence to the claims. It shows why the data counts as evidence by using appropriate and sufficient scientific principles and vocabulary.*
0	Does not make a claim, or makes an inaccurate claim.	Does not provide evidence, or only provides inaccurate or vague evidence.	Does not provide an analysis, or only provides an irrelevant analysis.
1	Makes an accurate but vague or incomplete claim.	Provides vague evidence and does not include specific data.	Repeats evidence and links it to claim, but does not include specific scientific principles.
2	Makes accurate and complete claim.	Provides correct evidence but does not include specific data.	Connects all evidence to the claims using scientific principles or vocabulary but not both.
3		Provides correct evidence and includes specific data.	Connects all evidence to both claims using scientific principles and vocabulary.

CHECKING UP: Page 103, 1 through 3 (2 points each)

____
14

1.

2.

3.

Earth has an albedo about 0.3 (8 points)

I. In your own words, describe what this means.

II. Is Earth's albedo constant? Why or why not?

III. How does changing a planets albedo change a planet's temperature? Why does this occur?

IV. If Earth's albedo was higher, but Earth was farther away from the Sun, could Earth have the same temperature? Why or why not?