Name _____

Sunspots are some of the most interesting, and longest studied, phenomena on the sun's surface. They were known to ancient Chinese observers over 2000 years ago. Below is a list of the largest sunspots seen since 1859 when careful measurements were first made of their sizes. Their sizes are given in terms of the area of the solar hemisphere facing earth. For example, '3600' means 3600 millionths of the solar area or (3600/1000000). On this scale, the area of Earth is '169'. All of these spots were large enough to be seen with the naked eye when proper (and safe!) viewing glasses were used.

Date	Size	Earths
February 10, 1917	3600	**21.3**
January 25, 1926	3700	
January 18, 1938	3650	
February 6, 1946	5250	
July 27, 1946	4700	
March 10, 1947	4650	
April 7, 1947	6150	
May 16, 1951	4850	
Nov. 14, 1970	3500	
August 23, 1971	3500	
October 30, 1972	4120	
Nov. 11, 1980	3820	
July 28, 1981	3800	

Date	Size	Earths
October 14, 1981	4180	
October 19, 1981	4500	
February 10, 1982	3800	
June 18, 1982	4400	
July 15, 1982	4900	
April 28, 1984	5400	
May 13, 1984	3700	
March 13, 1989	5230	
September 5, 1989	3500	

Years of Peak Sunspot Activity:

Sunspot Cycle	Peak Year
14	1906
15	1917
16	1928
17	1937
18	1947
19	1958
20	1968
21	1979
22	1989

Question 1: The peaks of the 11-year sunspot cycle during the 20th century occurred during the years shown to the left. On average, how close to sunspot maximum do the largest spots occur?

Question 2: From this sample, do more of these spots happen in the 5 years before sunspot maximum, or within 5 years after sunspot maximum?

Question 3: Convert the sunspot areas into an equivalent area of the Earth. (Note the first one has been done as an example). What is the average large spot size in terms of Earth?

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Date	Size	Area In Earths	Nearest Sunspot Max. Year	Difference In Years
February 10, 1917	3600	21.3	1917	0
January 25, 1926	3700	21.9	1928	-2
January 18, 1938	3650	21.6	1937	+1
February 6, 1946	5250	31.1	1947	-1
July 27, 1946	4700	27.8	1947	-1
March 10, 1947	4650	27.5	1947	0
April 7, 1947	6150	36.4	1947	0
May 16, 1951	4850	28.7	1951	0
Nov. 14, 1970	3500	20.7	1968	+2
August 23, 1971	3500	20.7	1968	+3
October 30, 1972	4120	24.4	1968	+4
Nov. 11, 1980	3820	22.6	1979	+1
July 28, 1981	3800	22.5	1979	+2
October 14, 1981	4180	24.7	1979	+2
October 19, 1981	4500	26.6	1979	+2
February 10, 1982	3800	22.5	1979	+3
June 18, 1982	4400	26.0	1979	+3
July 15, 1982	4900	29.0	1979	+3
April 28, 1984	5400	32.0	1989	-5
May 13, 1984	3700	21.9	1989	-5
March 13, 1989	5230	31.0	1989	0
September 5, 1989	3500	20.7	1989	0

Question 1: On average, how close to sunspot maximum do the largest spots occur? **Answer**: Find the average of the differences in last column = 0 years. So, the largest sunspots occur, on average, close to the peak of the sunspot cycle.

Question 2: For this sample, do more of these spots happen in the 5 years before sunspot maximum, or within 5 years after sunspot maximum? **Answer**: More happen after the peak. Five happen before the peak (negative differences) and 11 happen after the peak (Positive differences).

Question 3: What is the average large spot size in terms of Earth? **Answer:** Average = (561.6/22) = 25.5 Earth Areas.