NAME_____.

THE CONSTANTLY CHANGING SUN

The Sun changes in many ways during the course of the year. Sunspots come and go. Solar Flares and other massive explosions occur on the surface. We are going to investigate one of the more subtle changes. I have downloaded a visual light image of the sun taken by the SOHO satellite on the first of each month for an entire year.

1. Go the Internet, and open http://www.gatesscience.info/teamescience/sunsize.htm

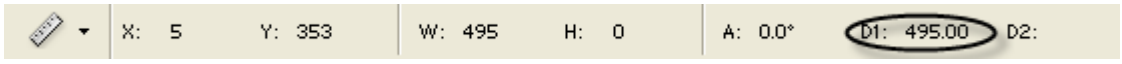
2. Open the *Adobe Photoshop* program. Under "**edit**" go to "**Preferences**." In "**Preferences"** select "**Units and Rulers**." Change "**Rulers**" to "**Pixels**" and click "**Okay**" Under "**File**" go to "**New**" and click "**Okay**."

3. Go back to the "Constantly Changing Sun" website. **Left click** on the "**January"** image. Then **right click** on the larger image, and select "**Copy**."

4. Go back to the *Photoshop* program and, under "**Edit**," select "**Paste**."

5. Select the "**Measuring Tool**" which is the tenth down in the right column of the toolbox. It should look like a **ruler.** If it doesn't, **right click** on the icon and select the **ruler**.

6. Holding down the **shift key**, click and drag across the diameter of the Sun. Be as accurate as you possibly can. Be sure you start right at the edge of the Sun, and end at the edge. Be sure you go through the middle of the Sun. **DO NOT USE THE WHITE, RECTANGULAR BOX AS A GUIDE FOR FINDING THE MIDDLE. THE BOX CAN BE IN A VARIETY OF PLACES IN THE IMAGE!!!**
   At the top of the screen, look next to "**D1:**" for the number of pixels. Record the answer to the nearest whole number in the chart under "**January**."



7. Do **steps 3 through 6** for each month.

Month	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT.	OCT.	NOV.	DEC.
Diameter in Pixels												

8. Find the average of the 12 diameters to the nearest pixel (whole number).

9. Your answer to number 8 is the average size of the Sun. When it is at that size, its distance from the Earth is 150,000,000 km (93,000,000 miles). As the Sun becomes larger, its distance from us must be getting smaller. Your math book calls this an **inverse variation.** Because of this relationship we can solve for any combination of size of the Sun and distance. The formula is:

$$X_1 \times Y_1 = X_2 \times Y_2$$

X_1 = The diameter of the sun in pixels for that month

Y_1 = The distance the Earth is from the Sun in millions of km for that month

X_2 = The average diameter of the Sun in pixels — (Your answer to #8) _____ pixels

Y_2 = The average distance the Earth is from the Sun — I5O **million km.**

($X_2 \times Y_2$) never changes. It's a **constant.** Once you have that answer, all you do is divide it by the month's diameter to get the answer for that month.

$X_2 \times Y_2 = X_2 \times 150 =$ _____

The formula we will use to find the Earth's distance from the Sun each month will be:

$$Y_1 = (X_2 \times Y_2) \div X_1$$

MONTH	DIAMETER (Pixels) X_1	$X_2 \times Y_2$ (A Constant)	Distance from the Sun in Million Km (Y_1) (Round to the nearest whole number)
JANUARY			
FEBRUARY			
MARCH			
APRIL			
MAY			
JUNE			
JULY			
AUGUST			
SEPTEMBER			
OCTOBER			
NOVEMBER			
DECEMBER			

10.Look at your **Diameter** answer. In which month(s) was the Sun the smallest?_____ That size occurs when the Earth is at **aphelion, its greatest distance from the Sun.** Which season is the **northern hemisphere (us)** having then?

11. Look at your **Diameter** answer. In which month(s) was the Sun the largest_____ That size occurs when the Earth is at **perihelion, its smallest distance from the Sun.** Which season is the **northern hemisphere (us)** having then?