Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**NOVA SUN LAB**

**PART 1: INTRODUCTION TO THE SUN**

Today you will be investigating the Sun, its anatomy, how it produces energy, and how solar storms and space weather affect us here on Earth.

Brainstorm:

Before you begin, please brainstorm (list) everything you currently know about the Sun.

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**PART 2: LEARNING ACTIVITIES**

**Sun 101**

1. Watch ***Anatomy of the Sun***: <http://www.pbslearningmedia.org/asset/nvsl_vid_anatsun/> (3:22 min.)

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| **How are scientists able to observe the Sun’s outermost layers (other than simply the visible layer)?** |
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| **How could this information be used to predict solar storms in the future?** |
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1. Watch ***The Sun’s Energy***: <http://www.pbslearningmedia.org/asset/nvsl_vid_sunenergy/> (1:49 min.)

**Which two complementary forces keep the Sun from blowing itself up?**

1. Fusion and Magnetism
2. Helium and Hydrogen
3. Photons and Magnetism
4. Fusion and Gravity

**Explain.**

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1. Watch ***The Dynamic Sun***: <http://www.pbslearningmedia.org/asset/nvsl_vid_dynamic/> (3:17 min.)

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| **What forces cause the Sun’s magnetic field to become both stronger and more tangled?** |
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| **How do these changes influence solar activity and the potential for powerful solar storms?** |
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**Space Weather**

1. Watch ***Earth’s Magnetic Shield***: <http://www.pbslearningmedia.org/asset/nvsl_vid_magnetic/> (2:04 min.)

**What is the most vital function of Earth’s magnetic field?**

* 1. It deflects asteroids and meteors
  2. It keeps energy from escaping into space
  3. It deflects most of the solar wind
  4. It helps birds and other animals navigate?

**Technology and Discovery**

1. Watch ***The Electromagnetic Spectrum***: <http://www.pbslearningmedia.org/asset/nvsl_vid_spectrum/> (2:56 min.)

True or False

“The longer the wavelength, the more energy light carries” True or False

1. Watch ***Solar Space Telescopes***: <http://www.pbslearningmedia.org/asset/nvsl_vid_telescope/> (3:50 min.)

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| **If you could work on one of these missions, which would it be?** |
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| **What kind of job would you most like to have?** |
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**PART 3: SOLAR CYCLE – LAB RESEARCH CHALLENGE**

1. Take the NOVA Sun Lab Research Challenge: <http://www.pbs.org/wgbh/nova/labs/lab/sun/research>

You will estimate the level of solar activity by observing sunspots. A small number of sunspots indicates a calmer Sun, while an increase in sunspots suggests higher levels of solar activity.

**Complete the Table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Sunspot Number (R)** | | | |
| **Dates** | **Your Estimate** |  | **Scientific Estimate** | |
| December 2010 |  |  |  |
| March 2011 |  |  |  |
| July 2011 |  |  |  |
| October 2011 |  |  |  |
| January 2012 |  |  |  |

**Answer the Questions:**

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| **How do your estimates compare to the scientific estimates?** |
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| **Why do you think that various estimates are different?** |
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| **After completing your five estimates, how do your estimates relate to the solar cycle graph?** |
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| **Based upon the overall sunspot trends, in what year do you think will be the next solar maximum?** |

**PART 4: STORM PREDICTION: LAB RESEARCH CHALLENGE**

1. Take the NOVA Sun Lab Research Challenge: <http://www.pbs.org/wgbh/nova/labs/lab/sun/research>

**Note what you learn about each scenario:**

|  |
| --- |
| **Huge Spots** |
|  |
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|  |
| **Complicated Spots** |
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|  |
| **Rapid Growth** |
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|  |
| **Mixed-Up Magnetic Fields** |
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|  |
|  |
| **Threatening Filaments** |
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**Answer the Questions:**

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| --- |
| **What does the size of a sunspot tell us about the Sun’s magnetic field and how does it help us predict solar storms?** |
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| **What does the complexity of sunspots tell us?** |
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| **What does rapid sunspot growth tell us about the Sun’s magnetic field?** |
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| **How does the mixing of magnetic fields help us to predict solar flares or CMEs?** |
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| **While observing the chromosphere and corona of the Sun, scientists often observe bands of plasmas, called filaments. What can these filaments tell us about the possibility of a solar storm?** |
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