"The Aurora" website worksheet Name_____KEY_____
Mods_____

*The answers to the following questions can be found at this website:
http://sprg.ssl.berkeley.edu/rocket_cast/index.htm
Use this site—it is to your advantage!

(2) 1. Who coined the term "aurora borealis", and what is it describing?
GALILEO; THE NORTHERN LIGHTS

(2) 2. As people began to study the aurora, theories about its origin developed. Name two theories.
1. REFLECTED SUNLIGHT FROM ARCTIC ICE
2. FIRELIGHT FROM EDGE OF THE WORLD

(2) 3. There is a satellite program aimed at learning more about the aurora. Name it, and tell what the acronym stands for.
"FAST" SATELLITE PROGRAM
--FAST AURORAL SNAPSHOT EXPLORER

(1) 4. When was the aforementioned satellite launched into orbit?
AUGUST 21, 1996

(4) 5. Name four things that the Earth's atmosphere is filled with.
PARTICLES, MAGNETIC FIELDS, ELECTRIC CURRENTS
ELECTROMAGNETIC WAVES, GRAVITATIONAL FORCES

(1) 6. What is the collective term for the gas-like mixture of charged sub-atomic particles emitted from the sun? PLASMA

(2) 7. a. What does "IMF" stand for?
INTERPLANETARY MAGNETIC FIELD

b. Changes in the direction of the IMF relative to the
(EARTH'S NORTHERN AXIS) can cause auroral activity.

(2) 8. Explain how the Earth's magnetic field works. Be specific.
--SIMILAR TO A BAR MAGNET; FIELD LINES ARE CLOSER TOGETHER NEAR N&S POLES, FIELDS STRONGEST THERE; FIELDS WEAKEST WHERE LINES ARE FARTHEST APART.

(2) 9. Define *mean free path*. How long is this path in the neighborhood of the Earth?

--DEF: AVERAGE DISTANCE A PARTICLE TRAVELS FROM THE SUN WITHOUT ENCOUNTERING A SECOND PARTICLE
--1 ASTRONOMICAL UNIT; 150 MIL. KM.; 93 MIL. MILES

(2) 10. What two things happen when the IMF collides with Earth's magnetosphere?

--ENERGY & MOMENTUM ARE TRANSFERRED TO EARTH'S MAGNETIC FIELD
--MAGNETOSPHERE STRETCHES IN DIRECTION OF SOLAR WIND FLOW

(2) 11. Most particles are deflected around the Earth's magnetosphere at a boundary called the (MAGNETOPAUSE).
What percentage of those particles is actually able to enter the magnetosphere?

--LESS THAN 1%

(1) 12. What is the easiest way to determine the direction in which currents and magnetic fields point?

--USE THE "RIGHT-HAND RULE"

(2) 13. What is the ionosphere and how is it created?

--AN AREA IN THE UPPERMOST FRINGES OF THE EARTH'S ATMOSPHERE
--IT IS CREATED WHEN SOLAR ULTRAVIOLET RAYS IONIZE A PORTION OF THE EARTH'S NEUTRAL ATMOSPHERE

(2) 14. Explain what happens in the auroral acceleration region.

--CHARGED PARTICLES MOVE ALONG THE EARTH'S MAGNETIC FIELD LINES AND ARE ACCELERATED BY STRONG VOLTAGE DIFFERENCES

(2) 15. The ionosphere acts as a (CONDUCTOR). This allows for what to happen?

--CURRENTS ARE ABLE TO CROSS MAGNETIC FIELD LINES

(2) 16. The auroras are always present where? What shape do they take when seen from space?

--NEAR THE EARTH'S N&S POLAR REGIONS

(2) 17. Name two types of aurora.
--DIFFUSE, DISCRETE

(6) 18. In your own words, explain how energy and particulate matter from the sun can create an aurora on Earth. Be as specific as you can.

ANSWER SHOULD INCLUDE –
SOLAR WIND CARRYING PARTICLES AND ENERGY STRIKE THE EARTH'S MAGNETOPAUSE AND CAUSE THE EARTH'S MAGNETIC FIELD TO DEFORM. SOME OF THE PARTICLES ENTER THE MAGNETOSPHERE ADDING TO THE ONES ALREADY THERE (FROM THE IONOSPHERE). THESE PARTICLES ARE FORCED INTO THE POLAR REGIONS WHEN THE MAGNETOSPHERE IS STRETCHED. THIS CAUSED A HIGH NUMBER OF PARTICLES TO ENTER THE POLAR IONOSPHERE AND CREATE THE AURORA. THE AURORA ARE CREATED WHEN THESE PARTICLES STRIKE ATOMS AND ATMOSPHERIC MOLECULES CAUSING THEM TO JUMP ENERGY LEVELS AND GIVE OFF LIGHT.