Name_____ Class _____ Date _____

Skills Worksheet

Directed Reading 29.2 (EVEN)

Section: Solar Activity

1. How do the gases that make up the sun's interior and atmosphere behave?

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2. What causes the continuous rising and sinking of the sun's gases?

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3. What else keeps the sun's gases in motion?

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4. Why don't all locations on the sun rotate at the same speed?

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5. On average, how long does it take the sun to rotate once?

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SUNSPOTS

_____ 6. What do the movements of gases in the sun's convective zone and the movements caused by the sun's rotation produce?
   a. solar wind
   b. convection currents
   c. charged ions
   d. magnetic fields

_____ 7. Why are some regions of the photosphere so much cooler than others?
   a. The sun's surface temperatures vary wildly.
   b. Less energy is being transferred to the regions.
   c. Changes in the magnetic fields reduce heat.
   d. More energy is being transferred to the regions.

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_____ 8. How much cooler are the cool regions than the surrounding photosphere?
a. up to 3,000,000 °C
b. up to 300,000 °C
c. up to 30,000 °C
d. up to 3,000 °C

9. What is a sunspot?

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10. What is granulation?

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11. How might the diameter of a large sunspot compare to the size of Earth?

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THE SUNSPOT CYCLE

_____ 12. What did sunspots first reveal about the sun?
a. The sun rotates.
b. The sun is not made of fire.
c. The sun is fueled by nuclear fusion.
d. The sun has a core.

_____ 13. Later, astronomers learned that the numbers and positions of sunspots vary in a cycle that lasts about
a. 75 years.
b. 50 years.
c. 27 years.
d. 11 years.

_____ 14. A sunspot cycle begins when
a. there is a sudden increase in the number of sunspots all across the sun.
b. the number of sunspots is very high but begins to decrease.
c. the number of sunspots is very low but begins to increase.
d. the location of sunspots on the sun suddenly changes.

_____ 15. Where do groups of sunspots initially appear?
a. at the sun's poles
b. at the sun's equator
c. all across the sun's surface
d. about midway between the sun's equator and poles

_____ 16. Over the next few years after they appear, the number of sunspots
a. increases until they reach a peak of 10 to 20 sunspots.
b. increases until they reach a peak of more than 100 sunspots.
c. decreases steadily until there are no sunspots at all.
d. stabilizes between 40 and 50 sunspots.

17. What happens after the number of sunspots reaches its peak?

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18. At what point does the sunspot cycle end and begin again?

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SOLAR ERUPTIONS

_____ 19. The solar-activity cycle is caused by
a. the alignment of solar system planets.
b. the changing solar magnetic field.
c. the rate at which fusion occurs in the solar core.
d. the changing pattern of currents in the convective layer.

_____ 20. The solar-activity cycle is characterized by
a. decreases in solar surface events.
b. increases in solar surface events.
c. increases and decreases in sunspot activity.
d. increases and decreases in various types of solar activities.

_____ 21. What are events in which the sun emits atomic particles called?
a. solar cycles
b. solar eruptions
c. solar ejections
d. solar events

_____ 22. One form of atmospheric disturbance on the sun is called a prominence, which can be described as
a. whirlpools in the photosphere.
b. great clouds of glowing gases.
c. rivers of gas that look like streams.
d. dark regions in the photosphere.

_____ 23. What shape do prominences take?
a. huge arches that reach high above the sun's surface
b. huge circular storms on the sun's surface
c. massive waves that cross the sun's surface
d. giant masses of gas that resemble mountains

_____ 24. How does each solar prominence get its shape?
a. It follows curved lines of magnetic force from a region of one magnetic polarity to a field of the same polarity.
b. It erupts from the sun's surface but is pulled back down by the sun's gravity, forming a curve.
c. It follows the curved shape of the sun's surface.
d. It follows curved lines of magnetic force from a region of one magnetic polarity to a field of the opposite polarity.

_____ 25. What are the most violent of all solar disturbances?
a. prominences
b. sunspots
c. solar flares
d. coronal mass ejections

_____ 26. A solar flare is a
a. sudden outward eruption of electrically charged particles, such as electrons and protons.
b. brief outward eruption of atomic particles, such as protons and neutrinos.
c. gradual increase in the stream of charged particles that make up the solar wind.
d. huge, arched prominence that breaks its magnetic field and streams outward.

_____ 27. Although the trigger for a solar flare is unknown, scientists know that
a. solar flares occur on a regular cycle that lasts about two years.
b. solar flares release the energy stored in the strong magnetic fields of sunspots.
c. solar flares are closely associated with the alignment of the planets in the solar system.
d. solar flares are so powerful that they can be seen clearly in daytime.

_____ 28. What can be formed by the release of energy in a solar flare?
a. prominences
b. oronal streams
c. coronal loops
d. waves in the solar wind

_____ 29. How long do most solar flares last?
a. Few eruptions last more than an hour.
b. Most eruptions last for two or three hours.
c. Few eruptions last more than a minute.
d. Most eruptions last for a week.

_____ 30. A coronal mass ejection is
a. a part of the corona that is thrown off from the sun.
b. a part of a coronal loop that does not curve back to the sun.
c. a prominence that breaks away from its magnetic field.
d. another name for a certain type of solar flare.

_____ 31. What is the space around Earth that contains a magnetic field?
a. the magnetometer
b. the magnetic corona
c. the magnetosphere
d. the magnet band

32. What are geomagnetic storms? What causes them?

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33. With what frequency do geomagnetic storms occur?

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AURORAS

_____ 34. What are auroras?
a. halos of light around stars and the moon
b. long arches of gas on the sun's surface
c. electromagnetic sparks in the sun's atmosphere
d. bands of light in the sky

_____ 35. How are auroras caused?
- a. They are caused by the interaction of solar wind and Earth's magnetosphere.
- b. They are caused by the interaction of solar wind and Earth's atmosphere.
- c. The solar wind bends around Earth.
- d. The solar wind changes as it gets farther from the sun.

_____ 36. Where on Earth are auroras usually seen?
- a. near Earth's equator
- b. everywhere in Earth's atmosphere
- c. close to Earth's magnetic poles
- d. only in Earth's northern hemisphere

_____ 37. Why are auroras usually seen close to Earth's magnetic poles?
- a. Electrically charged particles reach only Earth's magnetic poles.
- b. Electrically charged particles are guided toward the poles by the planet's rotation.
- c. Electrically charged particles are guided toward Earth's magnetic poles by Earth's magnetosphere.
- d. Electrically charged particles are more easily seen through the thin air near the poles.

_____ 38. How are the auroras produced?
- a. Electrically charged particles heat up in Earth's atmosphere and begin to glow.
- b. Electrically charged particles strike the atoms and gas molecules in the upper atmosphere.
- c. Electrically charged particles enter the magnetosphere and begin to glow.
- d. Electrically charged particles explode once they are in contact with the atoms and gases of the atmosphere.

_____ 39. What are auroras near the North Pole called?
- a. aurora borealis (eastern lights)
- b. aurora australis (aurora occidentalis)
- c. aurora borealis (northern lights)
- d. aurora australis (southern lights)

_____ 40. What are auroras near the South Pole called?
- a. aurora borealis (eastern lights)
- b. aurora australis (aurora occidentalis)
- c. aurora borealis (northern lights)
- d. aurora australis (southern lights)

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41. How far above Earth's surface do auroras normally occur?

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42. When are auroras most frequent?

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43. How often are auroras visible across the northern contiguous United States?

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44. Where in the United States are auroras visible almost every clear, dark night?

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45. In addition to Earth, where else have auroras been recorded?

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