Name_____ Class _____ Date _____

Skills Worksheet

Directed Reading 26.1 (ODD)

Section: Viewing the Universe

1. How did observations of the sky help farmers in the past?

_____

2. How did observations of the sky help sailors in the past?

_____

3. What is the main reason people study the sky today?

_____

4. What is astronomy?

_____

THE VALUE OF ASTRONOMY

5. List four exciting space discoveries that astronomers have made.

_____

_____

_____

_____

6. What have astronomers learned from these discoveries?

_____

_____

7. What are the potential benefits to humans of studying the universe?

_____

_____

_____

8. List two federal agencies that support astronomical research.

_____

_____

_____

CHARACTERISTICS OF THE UNIVERSE

_____ 9. The study of the origin, properties, processes, and evolution of the universe is called
a. astronomy.
b. the big bang.
c. gravity.
d. cosmology.

_____ 10. Most astronomers agree that the universe began with the big bang, which was a
a. gradual blooming of stars and planets.
b. great dust swirl that appeared about 4 billion years ago.
c. giant explosion that occurred about 14 billion years ago.
d. black hole that turned inside out.

_____ 11. In addition to telescopes, what do astronomers commonly use to study the universe?
a. computer and mathematical models
b. experiments
c. microscopes
d. computer games

_____ 12. What is the nearest part of the universe to Earth?
a. the Milky Way
b. the solar system
c. Mars
d. a galaxy

_____ 13. A large collection of stars, dust, and gas bound together by gravity is called a
a. solar system.
b. Milky Way.
c. comet.
d. galaxy.

_____ 14. The Milky Way is
a. Earth's solar system.
b. Earth's galaxy.
c. a star.
d. an asteroid.

_____ 15. How many galaxies exist in the universe?
a. one
b. hundreds
c. millions
d. billions

16. What is the average distance between Earth and the sun? What is this distance called?

_____

17. How far does light travel in one year? What is this distance called?

_____

18. How far from Earth is the nearest star besides the sun?

_____

OBSERVING SPACE

_____ 19. Astronomers can see planets because planets
- a. reflect light.
- b. emit light.
- c. emit radio waves.
- d. emit X rays.

_____ 20. What are all the frequencies or wavelengths of electromagnetic radiation called?
- a. visible light
- b. the electric spectrum
- c. the radiation frequencies
- d. the electromagnetic spectrum

_____ 21. Which is NOT an example of electromagnetic radiation?
- a. radio waves
- b. X rays
- c. gravity
- d. visible light

22. Of what is electromagnetic radiation composed?

_____

_____

23. What happens when white light passes through a prism?

_____

24. What causes the different colors in the color spectrum?

_____

_____

25. Which colors of light have the shortest wavelengths? Which have the longest?

_____

26. Which wavelengths of electromagnetic radiation cannot be seen by humans?

27. List six examples of invisible wavelengths that can only be detected by special instruments.

28. How do the temperatures of the colors of the visible spectrum change?

29. How did Sir William Herschel discover infrared?

30. What does the word *infrared* mean?

31. How long are infrared waves compared with waves of visible light?

32. Are radio wavelengths longer or shorter than infrared wavelengths?

33. Are violet wavelengths longer or shorter than ultraviolet light wavelengths?

34. What does the word *ultraviolet* mean?

35. Are X-ray wavelengths longer or shorter than ultraviolet wavelengths?

36. What are the shortest wavelengths?

TELESCOPES

_____ 37. Galileo is known for
- a. discovering the moon.
- b. naming the Milky Way.
- c. using a telescope to study the sky.
- d. inventing the telescope.

_____ 38. A telescope is an instrument that
- a. collects electromagnetic radiation from the sky and concentrates it.
- b. changes X rays from the sky to visible light.
- c. makes infrared radiation visible to humans.
- d. reflects light from the craters on the moon.

In the space provided, write the letter of the definition that best matches the term or phrase.

_____ 39. optical telescope

_____ 40. lens

_____ 41. refracting telescope

_____ 42. reflecting telescope

_____ 43. radio telescope

- a. an instrument that uses a set of lenses to gather and focus light from distant objects
- b. an instrument that uses a curved mirror to gather and focus light from distant objects
- c. an instrument that detects radio waves from space
- d. a telescope that collects only visible light
- e. a clear object shaped to bend light in special ways

44. What are two problems with refracting telescopes?

_____

_____

_____

_____

_____

45. What problem does a reflecting telescope solve?

_____

46. Describe what happens to light that enters a reflecting telescope.

_____

_____

47. In what way are the mirrors in reflecting telescopes better than the objective lenses in refracting telescopes?

48. What are the largest reflecting telescopes, and how large are they?

49. List four kinds of invisible radiation that telescopes have been developed to detect.

50. What effect does Earth's atmosphere have on many forms of electromagnetic radiation?

51. Why do ground-based telescopes that detect invisible radiation work best at high elevations?

SPACE-BASED ASTRONOMY

52. Why have spacecraft with telescopes and other instruments been launched?

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Directed Reading *continued*

In the space provided, write the letter of the description that best matches the term or phrase.

_____ 53. Hubble Space Telescope

_____ 54. Chandra X-ray Observatory

_____ 55. Compton Gamma Ray Observatory

_____ 56. Spitzer Space Telescope

_____ 57. James Webb Space Telescope

a. detects infrared radiation

b. orbits Earth to collect electromagnetic radiation from objects in space

c. will be launched in 2013 to detect near- and mid-range infrared radiation from objects in space

d. was used to detect gamma rays from objects such as black holes

e. makes clear images using X rays from objects in space

58. What planets were investigated by the space probes *Voyager 1* and *Voyager 2?*

59. What information did the *Galileo* space probe gather about Jupiter?

60. What spacecraft began orbiting Saturn in 2004?

61. What did the *Huygens* space probe do in December 2004?

62. What did the twin Mars rovers, *Spirit* and *Opportunity,* confirm in 2004?

Use the terms from the list below to complete the sentences that follow. Each term may be used only once. Some terms may not be used.

Earth's moon	robotic	space shuttle
crewed spacecraft	solar system	space port

63. Spacecraft that carry only instruments and computers are described as _____.

64. Spacecraft that do not carry humans can explore space and travel beyond the _____.

65. Spacecraft that carry humans are _____.

66. Humans have never traveled in space beyond _____.

67. An example of a crewed spacecraft that orbits Earth to repair satellites and perform experiments is the _____.

68. Why is it taking NASA a long time to launch a voyage to Mars?

_____

_____

69. What events focused public attention on the risks of human space exploration?

_____

_____

_____

70. How have space programs helped make weather predictions more accurate?

_____

_____

71. What kind of help do satellites give car drivers and airplane pilots?

_____

_____

72. How has space exploration led to improved electronics?

_____

73. Give an example of how space exploration has helped improve medical equipment.

_____