

Rummert

Name: _____ Date: _____

Choose the letter of the best answer.

- ____ 1. Which statement is most likely to be true of the number of stars in the universe?
- A. Only about one hundred stars exist.
 - B. Each hemisphere has about one hundred stars.
 - C. There are exactly as many stars as there are planets.
 - D. There are more stars than anyone can easily count.
- ____ 2. Which of these instruments would be used to get a clearer view of distant objects in the sky?
- A. a microscope
 - B. a telescope
 - C. a kaleidoscope
 - D. a stethoscope
- ____ 3. Which of the following statements is true about most inventions?
- A. New uses are often found for the original invention.
 - B. Inventions are always used only for their original purposes.
 - C. Inventions always take many years to develop.
 - D. Inventions do not change much from their original designs.
- ____ 4. The term *data* refers to
- A. scientific instruments
 - B. objects in space
 - C. people's opinions
 - D. scientific facts
- ____ 5. Gravity is a force that
- A. pulls an object toward another object
 - B. exists only on Earth
 - C. causes two objects in contact to slow down or stop moving
 - D. exists only on planets
- ____ 6. Which of the following statements is true?
- A. There is no gravitational pull underwater.
 - B. Because of gravity, nothing can ever leave Earth's atmosphere.
 - C. There is no gravity in space.
 - D. All objects exert a gravitational pull on other objects.
- ____ 7. Which of the following choices best describes energy?
- A. Energy is the transfer of motion.
 - B. Energy is a change in position.
 - C. Energy is a stable condition.
 - D. Energy is the ability to cause change.

- ___ 8. Technology is
- A. unaltered scientific information
 - B. the transfer of energy among objects
 - C. the use of knowledge to create products
 - D. any complex material or device
- ___ 9. Which of the following statements about technology is true?
- A. It always involves computers.
 - B. It has been around only since the Industrial Revolution.
 - C. It takes many forms and can be used in many ways.
 - D. It is always complicated.
- ___ 10. Earth is one of nine planets that orbit the
- A. Moon
 - B. Sun
 - C. Milky Way galaxy
 - D. universe
- ___ 11. Which of the following choices best describes the Moon?
- A. It is a planet.
 - B. It used to be a sun.
 - C. It is a star.
 - D. It orbits Earth.
- ___ 12. How often does Earth make one complete turn on its axis?
- A. once a year
 - B. once a month
 - C. once a week
 - D. once a day
- ___ 13. The number 1000 is the product of
- A. 10
 - B. $10 \cdot 10$
 - C. $10 \cdot 10 \cdot 10$
 - D. $10 \cdot 10 \cdot 10 \cdot 10$

Key Concepts

Choose the letter of the best answer.

- ___ 14. What is the correct arrangement of these structures from largest to smallest?
- A. universe, solar system, galaxy
 - B. universe, galaxy, solar system
 - C. solar system, universe, galaxy
 - D. galaxy, solar system, Earth, universe

- ____ 15. What is the solar system?
- A. planets and smaller bodies that orbit Earth
 - B. planets and smaller bodies that orbit the Sun
 - C. stars and planets that orbit a galaxy
 - D. stars and smaller bodies that orbit planets
- ____ 16. How are the stars in a constellation related?
- A. All are equally bright.
 - B. All are an equal distance from Earth.
 - C. They form a pattern in the sky.
 - D. They are close to one another in space.
- ____ 17. Which of the following statements is true?
- A. Polaris seems to rise in the east and set in the west.
 - B. Polaris seems to rise in the west and set in the east.
 - C. Polaris seems to move in large circles around the North Pole.
 - D. Polaris seems to stay in the same place above the North Pole.
- ____ 18. The movement of which of these objects would be the easiest to observe from Earth without a telescope?
- A. the Moon
 - B. a star located near Polaris
 - C. the planet Venus
 - D. a star 2000 light-years from Earth

Extended Response

Answer the following question on the back of this paper or on a separate sheet of paper.

19. Explain the relationships among the Milky Way, our solar system, the Sun, Earth, and the Moon.

Key Concepts

If the statement is true, write "true" on the line. If it is false, change the underlined word or words to make it true.

- _____ 20. Electromagnetic radiation is energy that travels as waves.
- _____ 21. The forms of radiation in the electromagnetic spectrum are arranged according to their colors.
- _____ 22. A refracting telescope uses a lens to gather visible light.
- _____ 23. Reflecting telescopes use mirrors to gather visible light, infrared radiation, or ultraviolet radiation.

- _____ 24. Radio telescopes are affected by clouds and bad weather.
- _____ 25. The Hubble Space Telescope can produce especially clear images because it is NOT affected by Earth's magnetic field.

Extended Response

Answer the following question on the back of this paper or on a separate sheet of paper.

26. Research telescopes located on Earth have limitations to their use. Describe one limitation of a visible-light telescope and one limitation of a radio telescope. Explain how each limitation is overcome.

Key Concepts

Choose the letter of the best answer.

- _____ 27. When they are in orbit around Earth, astronauts must get used to
- A. darkness
 - B. weightlessness
 - C. gravity
 - D. thinner air
- _____ 28. An object that orbits another, larger object in space is called a
- A. sun
 - B. flyby
 - C. probe
 - D. satellite
- _____ 29. One of the most important activities carried out on a space station is
- A. storing supplies for missions to Mars
 - B. designing spacecraft
 - C. performing experiments
 - D. observing distant galaxies
- _____ 30. Which type of mission can provide information about more than one planet?
- A. flyby
 - B. orbiter
 - C. lander
 - D. probe

- ____ 31. Which type of mission often involves collecting and testing samples from a planet's surface?
- A. flyby
 - B. orbiter
 - C. lander
 - D. probe

Extended Response

Answer the following question on the back of this paper or on a separate sheet of paper.

32. Identify and discuss three obstacles to sending humans to other planets and one way in which spacecraft without crews help us study other planets.

Key Concepts

If the statement is true, write "true" on the line. If it is false, change the underlined word or words to make it true.

- _____ 33. Scientists have learned that gravity works the same way in space as it does on Earth.
- _____ 34. The Moon has fewer impact craters than Earth.
- _____ 35. Scientists compare Earth with planets that have no atmospheres to learn how liquid water has affected the development of Earth's atmosphere.
- _____ 36. Satellite technology is used to collect data from every region of Earth.
- _____ 37. Designers often try to make devices used in spacecraft as large and heavy as possible.

Extended Response

Answer the following question on the back of this paper or on a separate sheet of paper.

38. Describe two spinoffs from the space program. What was the original need that led to the development of each of these technologies?

Key Concepts

Choose the letter of the best answer. (4 points each)

- ____ 39. The Sun, Earth, eight other planets, and smaller bodies make up our
- A. constellation
 - B. solar system
 - C. universe
 - D. galaxy
- ____ 40. A group of stars that form a pattern in the sky is
- A. a universe
 - B. an orbit
 - C. a constellation
 - D. a galaxy
- ____ 41. How do stars near the North Pole appear to move?
- A. in circles around Polaris
 - B. in orbit around the Sun
 - C. in orbit around the Moon
 - D. in circles around Cygnus, the Swan
- ____ 42. All of the different forms of electromagnetic radiation together make up
- A. infrared waves
 - B. invisible waves
 - C. the colors of visible light
 - D. the electromagnetic spectrum
- ____ 43. Ultraviolet radiation and infrared radiation differ in
- A. color
 - B. wavelength
 - C. direction
 - D. speed
- ____ 44. Which type of telescope gathers radiation with a metal dish?
- A. reflecting telescope
 - B. refracting telescope
 - C. radio telescope
 - D. Hubble Space Telescope
- ____ 45. Apollo astronauts practiced important procedures in space to prepare for landing on
- A. the International Space Station
 - B. Mars
 - C. the Moon
 - D. Venus

- ___ 46. Which of these missions would NOT be used to explore another planet?
- A. space station
 - B. flyby
 - C. orbiter
 - D. lander
- ___ 47. Scientists have found few impact craters on Earth because
- A. Earth is never struck by objects from space.
 - B. Earth's surface is constantly worn down.
 - C. Earth's surface is very hard.
 - D. Earth's surface is difficult to view.
- ___ 48. Which technology has been improved due to the development of space suits that protect astronauts against extreme heat?
- A. satellite technology
 - B. medical devices
 - C. firefighting equipment
 - D. water filters

Reading in Science

Using the passage, answer the following questions. (5 points each)

The spacecraft *Galileo* was launched in 1989. It reached Jupiter, the largest planet in our solar system, in 1995. Jupiter became the first gaseous planet to be studied by an orbiting spacecraft.

On September 21, 2003, the craft plunged into Jupiter's atmosphere. The heat and friction caused by the craft's passing through the atmosphere destroyed *Galileo*.

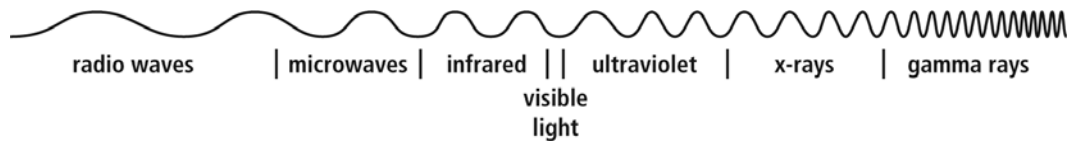
During its mission, *Galileo* discovered the first known moon of an asteroid. It also took images of the impact between a comet and Jupiter. *Galileo* discovered evidence of salty oceans on three of Jupiter's moons. It was also the first spacecraft to gather data directly from the atmosphere of Jupiter. Cameras and other instruments on *Galileo* made about 14,000 images. These images were sent back to Earth for study.

49. *Galileo* was an orbiter. Explain what orbiters are and what they do.
50. What information from the passage tells you that Jupiter cannot be explored with a lander?
51. What were *Galileo's* two discoveries?

52. What instrument would *Galileo* have used to gather data from Jupiter's atmosphere?

Interpreting Visuals

Using the diagram, answer the following questions. (4 points each)



53. Which term is used to describe the full range of radiation shown in the diagram?

54. Which form of radiation has the longest wavelength?

55. Which of the different forms of radiation can be seen by humans?

56. What appears when visible light passes through a prism?

Extended Response

Answer the following questions on the back of this paper or on a separate sheet of paper. (8 points each)

57. **Describing** Describe how the objects in the universe are arranged. Use the terms *planet*, *star*, *solar system*, *galaxy*, and *universe* in your response.

58. **Comparing and Contrasting** Tell how visible-light telescopes and radio telescopes are the same and how they are different. Include these terms in your response: *lenses*, *mirrors*, *dishes*, *antennas*, and *electromagnetic radiation*.

59. **Explaining** Explain how exploring space has helped scientists learn more about Earth's surface features and atmosphere. Use the term *impact crater* in your response.

Key Concepts

Choose the letter of the best answer. (4 points each)

- ____ 60. Which of the following contains only one star?
- A. constellation
 - B. solar system
 - C. galaxy
 - D. universe
- ____ 61. A constellation is a group of
- A. planets and other objects that orbit a single star
 - B. planets that form a pattern in the sky
 - C. stars that form a pattern in the sky
 - D. stars that are very close to one another
- ____ 62. What causes a constellation to change positions in the night sky?
- A. the rotation of Earth
 - B. the rotation of Polaris
 - C. the orbit of Earth around the constellation
 - D. the orbit of the constellation around Earth
- ____ 63. Ultraviolet waves, infrared waves, and x-rays are forms of
- A. microwaves
 - B. visible light
 - C. radio telescopes
 - D. electromagnetic radiation

- ___ 64. Wavelength is
- A. the distance that a wave travels in space
 - B. the length of time in which a wave travels
 - C. the length of radio waves traveling in space
 - D. the distance between one wave peak and the next peak
- ___ 65. Which part of a radio telescope gathers radiation?
- A. an objective lens
 - B. a mirror
 - C. a dish
 - D. an eyepiece
- ___ 66. On which type of spacecraft would scientists study the effects of weightlessness on human cell tissue growth?
- A. flyby craft
 - B. space station
 - C. lander
 - D. probe
- ___ 67. Astronauts orbited the Moon in these before they landed on its surface.
- A. space suits
 - B. probes
 - C. artificial satellites
 - D. weather satellites
- ___ 68. Wind and water reduce evidence of impact craters on
- A. the Moon more than on Earth
 - B. Earth more than on the Moon
 - C. the Sun more than on Earth
 - D. Mars more than on the Sun
- ___ 69. Which of the following conditions in space has led to improvements in firefighting equipment used on Earth?
- A. weightlessness
 - B. long distances
 - C. extreme temperatures
 - D. stronger gravity

Reading in Science

Using the passage, answer the following questions. (5 points each)

The spacecraft *Galileo* was named after the Italian astronomer Galileo Galilei, who discovered Jupiter's four main moons. *Galileo* spent many years circling the gaseous Jupiter, exploring the planet and its moons.

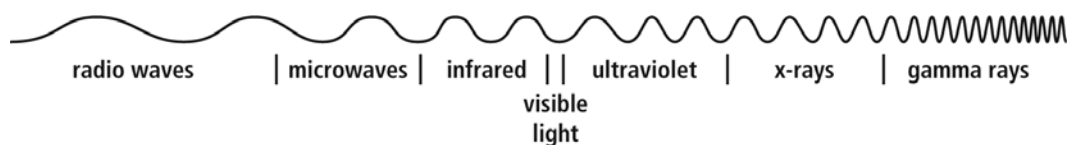
Galileo disappeared in the planet's atmosphere on September 21, 2003. The spacecraft was destroyed by the heat and friction caused by its passage through Jupiter's atmosphere at nearly 50 kilometers per second.

During its mission, *Galileo* experienced many "firsts." The spacecraft discovered a small moon orbiting an asteroid. Its cameras recorded the impact between Jupiter and a comet. Instrumentation aboard the craft also gathered evidence that saltwater oceans exist on three of the planet's moons. *Galileo* released an instrument that descended through Jupiter's atmosphere to directly measure the atmosphere's properties. *Galileo's* mission to Jupiter produced about 14,000 images. Scientists on Earth have been studying them in an effort to unveil some of Jupiter's secrets.

70. What information from the passage tells you that *Galileo* was an orbiter?
71. Why didn't *Galileo* release a lander to explore Jupiter?
72. *Galileo* discovered evidence of oceans on three of Jupiter's moons. What were *Galileo's* other achievements?
73. What information from the passage tells you that one of the instruments used by *Galileo* was a probe?

Interpreting Visuals

Using the diagram, answer the following questions. (4 points each)



74. Which term is used to describe the full range of radiation shown in the diagram?

75. Which form of radiation has the shortest wavelength?

76. Which form of radiation has a wavelength shorter than that of microwaves and longer than that of visible light?

77. Which form of radiation includes red light?

Extended Response

Answer the following questions on the back of this paper or on a separate sheet of paper. (8 points each)

78. **Describing** Describe how objects are arranged in the universe. Explain how Earth, the solar system, the Milky Way, and the universe are related.

79. **Comparing and Contrasting** Compare and contrast reflecting telescopes, refracting telescopes, and radio telescopes. Be sure to tell where each type works best. Include these terms in your response: *lenses*, *mirrors*, *dishes*, *antennas*, *electromagnetic radiation*, *visible light*, and *radio waves*.

80. **Explaining** Explain how space exploration has helped scientists learn more about impacts on Earth's surface, the effect of liquid water on the development of Earth's atmosphere, and the effect of changes in the Sun on Earth's atmosphere.

Key Concepts

Choose the letter of the best answer. (4 points each)

- ___ 81. A galaxy is a group of stars
- A. kept apart by the planets between them
 - B. held together by their own gravity
 - C. that form a pattern in the sky
 - D. that orbit a solar system
- ___ 82. A constellation is a group of stars that
- A. form a pattern when orbiting Polaris
 - B. are very close to one another
 - C. seem grouped together when viewed from Earth
 - D. always appear in the same position in the sky
- ___ 83. What causes a constellation to rise and set in the sky?
- A. Earth's rotation
 - B. the rotation of Polaris
 - C. the orbit of Earth around the constellation
 - D. the orbit of the constellation around Earth
- ___ 84. All electromagnetic radiation is
- A. invisible to the human eye
 - B. visible to the human eye
 - C. energy that travels in one direction through space
 - D. energy that travels through space as waves
- ___ 85. What is the visible spectrum?
- A. the range of wavelengths that can travel through space
 - B. the range of all types of electromagnetic radiation
 - C. the range of colors of light that occurs when white light passes through a colored filter
 - D. the range of colors of light that occurs when white light passes through a prism
- ___ 86. What advantage does the Hubble Space Telescope have over visible-light telescopes on Earth?
- A. It is not affected by Earth's atmosphere.
 - B. It is closer to the objects it is imaging.
 - C. It can collect radio waves and visible light.
 - D. It has larger mirrors.
- ___ 87. Which of these crafts would be most effective in carrying out a detailed study of Venus's atmosphere?
- A. a flyby craft
 - B. a space station
 - C. a lander
 - D. a probe

- ___ 88. Which of these is NOT a satellite?
- A. an orbiter
 - B. a space telescope
 - C. a lander
 - D. the Moon
- ___ 89. An impact crater forms when
- A. water, wind, and gravity change the surface of an object in space
 - B. an object traveling in space collides with a larger object in space
 - C. periods of atmospheric cooling take place on an object in space
 - D. periods of atmospheric warming take place on an object in space
- ___ 90. Which achievement in space exploration has led to improvements in weather forecasting on Earth?
- A. development of techniques for enhancing images
 - B. design of lightweight devices
 - C. development of fire-resistant materials
 - D. analysis of weather on the Moon

Reading in Science

Using the passage, answer the following questions. (5 points each)

The spacecraft *Galileo*, launched in 1989, circled Jupiter for many years. It was named after seventeenth-century Italian astronomer Galileo Galilei, who discovered Jupiter's four main moons. Like its namesake, *Galileo* was credited with many achievements. Instruments aboard the spacecraft discovered the first known moon of an asteroid and provided remarkable images of the impact between a comet and Jupiter's atmosphere. *Galileo* also discovered evidence of oceans on three of Jupiter's moons. It released an instrument to descend into the giant planet's deep atmosphere, becoming the first craft to directly measure conditions there. *Galileo* generated about 14,000 images that are being studied in hopes that they will reveal some of the planet's secrets.

On September 21, 2003, the spacecraft *Galileo* plunged into Jupiter's atmosphere, ending its mission to explore the largest planet in our solar system. Shortly after entering Jupiter's atmosphere, *Galileo* was destroyed by the heat and friction caused by its tumble through the planet's atmosphere.

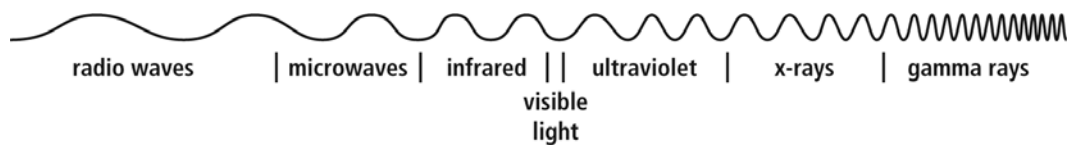
91. What type of spacecraft was *Galileo*? Explain.
92. What type of spacecraft could NOT be used to explore Jupiter? Explain.

93. What were the achievements of *Galileo* ?

94. The spacecraft used many instruments on its voyage. How do you know that one of them was a probe?

Interpreting Visuals

Using this diagram, answer the following questions. (4 points each)



95. Describe what this diagram shows.

96. Which waves have the longest wavelengths, and which have the shortest wavelengths?

97. If you look at the night sky through a telescope in your backyard, what wavelength of electromagnetic radiation is the telescope capturing?

98. List the forms of radiation that are invisible to humans.

Extended Response

Answer the following questions on the back of this paper or on a separate sheet of paper. (8 points each)

99. **Describing** Describe how objects are arranged in the universe. Explain how the Moon, Earth, the Sun, the solar system, the Milky Way, and the universe are related.

100. **Comparing and Contrasting** Compare and contrast both types of visible-light telescopes and radio telescopes.

101. **Identifying** Identify and briefly discuss three different ways in which space exploration has benefited scientists as well as other people on Earth.