Name:_____ Class:_____ Date:_____

CHAPTER 1 - THE SCALE OF THE COSMOS: SPACE AND TIME

1. Why is scientific notation used in science?
   a. because it makes it easy to write very big or very small numbers
   b. because all astronomical distances are expressed in metric units
   c. because it makes conversions between units easy
   d. because it makes conversions between distances easy

   ANSWER: a

2. What is the approximate diameter of the Earth?
   a. 1 AU
   b. 13,000 light-years
   c. 13,000 kilometres
   d. 1,000,000 kilometres

   ANSWER: c

3. What is the average distance from Earth to the Sun?
   a. 1 ly
   b. 1 AU
   c. 1 million km
   d. 1 billion km

   ANSWER: b

4. Which one of the following statements best describes a planet?
   a. a non-luminous body
   b. an irregular shape
   c. a body that generates energy by nuclear fusion
   d. a body located at the centre of the Solar System

   ANSWER: a

5. Which one of the following statements best describes the Sun?
   a. generates energy by nuclear fusion
   b. located 10 AU from Earth
   c. orbiting the Solar System
   d. located in the centre of the Milky Way

   ANSWER: a

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6. What does the Solar System contain?
   a. the Sun, its planets, and some smaller bodies
   b. the Sun, galaxies, planets, and stars
   c. the Sun, planets, moons, and stars
   d. the Sun, planets, asteroids, and galaxies

   ANSWER: a

7. Approximately how many times larger than the diameter of a typical planet (the Earth) is the diameter of a typical star (the Sun)?
   a. 10 times
   b. 100 times
   c. 1000 times
   d. 10,000 times

   ANSWER: b

8. How does the radius of the Moon's *orbit* compare to the radius of the Earth?
   a. It is 0.6 times as large.
   b. It is 6 times as large.
   c. It is 60 times as large.
   d. It is 600 times as large.

   ANSWER: c

9. Which of the following is no longer considered a major planet?
   a. Mercury
   b. Uranus
   c. Pluto
   d. Saturn

   ANSWER: c

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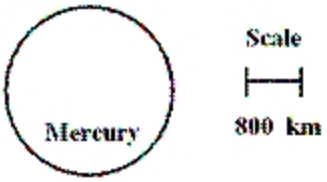
10. In the diagram, what is the diameter of Mercury?



a. about 240 km
b. about 2400 km
c. about 24,000 km
d. about 240,000 km

ANSWER: b

11. If the distance from the Sun to the Earth is represented by roughly 15 metres, then what would the distance from the Earth to the Moon on the same scale be?
a. about 30 metres
b. about 10 metres
c. about 1 metre
d. smaller than the width of your hand

ANSWER: d

12. Earth has a radius of about 6400 km, the Sun has a radius of about 7.0×10^5 km, and a rubber ball has a radius of 6.4 cm. If you were to construct a scale model of the Solar System using the rubber ball to represent Earth, what is the radius of a ball needed to represent the Sun in your model?
a. 7.0×10^5 cm
b. 7.0 cm
c. 700 cm
d. 70 cm

ANSWER: c

13. How is a planet different from a star?
a. Planets are larger than stars.
b. Planets reflect light, while stars produce their own light.
c. Stars move faster in the sky than planets.
d. Planets are brighter than stars.

ANSWER: b

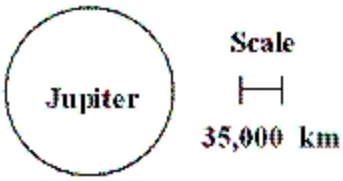
14. Which of the following is the smallest?
    a. size of a typical planet
    b. 1 AU
    c. 1 light-year
    d. size of a typical galaxy

    ANSWER: a

15. Assume the size of the Sun is represented by a baseball (diameter about 7 cm). At this scale, the Earth is about 15 metres (150 million km or 8 light-minutes) away. How far away, to scale, would the nearest stars to the Sun be? Pick the closest answer.
    a. about the distance between Windsor and Toronto (about 400 km)
    b. about 100 metres away
    c. about the distance across Canada from Toronto to Vancouver (about 4300 km)
    d. about the distance across 50 football fields (50 x 100 m, or 5 km)

    ANSWER: c

16. In the diagram, what is the diameter of Jupiter?



    a. about 7.0×10^4 km
    b. about 7.0×10^5 km
    c. about 1.4×10^4 km
    d. about 1.4×10^5 km

    ANSWER: d

17. What is 5.7×10^7 the same as?
    a. 5.7 million
    b. 57 thousand
    c. 570 thousand
    d. 57 million

    ANSWER: d

18. What is 1.95 billion the same as?
    a. 1.95×10^{12}
    b. 1.95×10^{9}
    c. 1.95×10^{6}
    d. 1.95×10^{5}

    ANSWER: b

19. How many centimetres are there in one kilometre?
    a. 100
    b. 1,000
    c. 10,000
    d. 100,000

    ANSWER: d

20. What is one thousandth of one metre?
    a. one kilometre
    b. one centimetre
    c. one millimetre
    d. one hectometre

    ANSWER: c

21. Which of the following has the distances arranged in order from smallest to largest?
    a. kilometre, light year, millimetre, Astronomical Unit
    b. Astronomical Unit, millimetre, light year, kilometre
    c. millimetre, kilometre, Astronomical Unit, light year
    d. light year, kilometre, Astronomical Unit, millimetre

    ANSWER: c

22. Which of the following has the distances arranged in order from largest to smallest?
    a. light year, Astronomical Unit, kilometre, millimetre
    b. Astronomical Unit, millimetre, light year, kilometre
    c. kilometre, millimetre, Astronomical Unit, light year
    d. light year, kilometre, Astronomical Unit, millimetre

    ANSWER: a

23. It takes light 1.3 seconds to travel from the Moon to Earth and 8 minutes for light to travel from the Sun to Earth. Which of the following statements is true?
    a. The Sun is 6.2 times farther from Earth than the Moon.
    b. The Sun is 10 times farther from Earth than the Moon.
    c. The Sun is 370 times farther from Earth than the Moon.
    d. The Sun is 0.10 times farther from Earth than the Moon.

    ANSWER: c

24. If light takes 8 minutes to travel from the Sun to Earth, and over 4 hours to travel from the Sun to the planet Neptune, what is the distance from the Sun to Neptune?
    a. 5 AU
    b. 30 AU
    c. 30 ly
    d. 5 ly

    ANSWER: b

25. How long does it take for light to travel from the Sun to Neptune?
    a. several seconds
    b. several minutes
    c. several hours
    d. several weeks

    ANSWER: c

26. The speed of light is 3.0×10^5 km/s, and it takes 1.3 seconds for light to travel from the Moon to Earth. Based on this information, what is the distance from the Earth to the Moon?
    a. 390,000 km
    b. 230,000 km
    c. 3.9 km
    d. 2.3 km

    ANSWER: a

27. Which sequence is correct when ordered by increasing size?
    a. Earth, Solar System, Milky Way Galaxy, clusters of galaxies
    b. Solar System, Earth, galaxy clusters, Milky Way Galaxy
    c. Earth, Milky Way Galaxy, Solar System, galaxy clusters
    d. galaxy clusters, Solar System, Milky Way Galaxy, Earth

    ANSWER: a

28. How does one light-year relate to Astronomical Units, roughly?
    a. 63,000 AU
    b. 10,000 AU
    c. 380,000 AU
    d. 1,400 AU

    ANSWER: a

29. What does a typical galaxy like our Milky Way galaxy contain?
    a. primarily planets
    b. gas only
    c. stars (some with planets), gas, and dust
    d. a single star and planets

    ANSWER: c

30. If the distance to a star is 450 light-years, what can we conclude about the star?
    a. The star is 450 million AU away.
    b. The star's light takes 450 years to reach us.
    c. The star must have formed 450 billion years ago.
    d. The star must be very young.

    ANSWER: b

31. How long does it take for light to cross the Milky Way galaxy?
    a. about 8 minutes
    b. about 8 years
    c. about 80,000 years
    d. about 200 million years

    ANSWER: c

32. Which statement best describes the Milky Way Galaxy?
    a. It contains about 100 billion stars.
    b. It is about 400 light-years in diameter.
    c. It is the largest known object in the universe.
    d. It contains numerous clusters and superclusters.

    ANSWER: a

33. What is the name of the hazy band of light that circles our sky, produced by the glow of our galaxy?
    a. the Milky Way
    b. the Solar System
    c. a spiral arm
    d. Alpha Centauri

    ANSWER: a

34. If we say that an object is 1,000 light-years away, how does that affect how we see it?
    a. We see it as it looked 1,000 years ago.
    b. We see it as it would appear to our ancestors 1,000 years ago.
    c. We see it as it looked 1,000 light-years ago.
    d. We see it as it is right now, but it appears 1,000 times dimmer.

    ANSWER: a

35. What is the implication if the distance to the nearest star is 4.2 light-years?
    a. The star is 4.2 million AU away.
    b. The light we see left the star 4.2 years ago.
    c. The star must be very old.
    d. The star must be very young.

    ANSWER: b

36. Which statement best describes the Milky Way Galaxy?
    a. It is a spiral galaxy.
    b. It is comprised of several smaller galaxies.
    c. It is about 1,000 light-years in diameter.
    d. It is type of supercluster.

    ANSWER: a

37. What is the reason for compressing the history of the universe into a single year in the cosmic calendar?
    a. to compare astronomical timescales with human experience
    b. to emphasize how old the universe is
    c. to simplify calculations of ages of objects in the universe
    d. to express the distances of objects in light-years

    ANSWER: a

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38. Using the cosmic calendar, where the Big Bang happened January 1, in what month did the Milky Way form?
    a. January
    b. March
    c. August
    d. December

    ANSWER: b

39. The name of the average distance from Earth to the Sun is one _____.

    ANSWER: Astronomical Unit

40. Light takes about 8 minutes to travel from the Sun to Earth and about 40 minutes to travel from the Sun to Jupiter. Jupiter is about _____ AU from the Sun.

    ANSWER: five (5)

41. The number 52,700,000,000 would be written in scientific notation as _____.

    ANSWER: 5.27×10^{10}

42. A(n) _____ is the largest known structure in the universe.

    ANSWER: filament

43. A(n) _____ is the distance that light would travel in one year.

    ANSWER: light-year

44. A cluster of galaxy clusters is called a(n) _____.

    ANSWER: supercluster

45. Proxima Centauri is 4.2 ly away. That means that it takes light _____ years to travel from Proxima Centauri to the Earth.

    ANSWER: 4.2

46. The average distance from Earth to the Sun is 1 AU.
    a. True
    b. False

    ANSWER: True

47. The nearest star is 1 ly from the Solar System.
    a. True
    b. False

    ANSWER: False

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48. A light-year is the distance that light travels in one year.
    a. True
    b. False

    ANSWER: True

49. A kilometre contains 1 million metres.
    a. True
    b. False

    ANSWER: False

50. The Sun is a star in the Milky Way Galaxy.
    a. True
    b. False

    ANSWER: True

51. The metric system is a decimal system.
    a. True
    b. False

    ANSWER: True

52. 3.49×10^7 km is the same as 3.49×10^4 m.
    a. True
    b. False

    ANSWER: False

53. The numbers 9.85×10^5 and 985,000 are equivalent.
    a. True
    b. False

    ANSWER: True

54. An astronomical unit is larger than a light-year.
    a. True
    b. False

    ANSWER: False

55. The Sun is located at the centre of the Milky Way.
    a. True
    b. False

    ANSWER: False

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56. A supercluster refers to a large group of stars within the Milky Way.
    a. True
    b. False

    ANSWER: False

57. Explain the difference between a light-year and the orbital period of Earth.

    ANSWER: Answer not provided.

58. What is scientific notation? Explain.

    ANSWER: Answer not provided.

59. Why would the English system of units be more useful if a foot contained 10 inches?

    ANSWER: Answer not provided.

60. Why do we measure some distances in astronomy in light-years and some in astronomical units?

    ANSWER: Answer not provided.

61. From what you know about astronomical units and light-years, how would you define a light-minute?

    ANSWER: Answer not provided.

62. "I live 20 minutes from Centre City." How is this statement similar to giving astronomical distances in light-years?

    ANSWER: Answer not provided.

63. Describe the difference between a solar system and a galaxy.

    ANSWER: Answer not provided.

64. Considering that the Sun is about 1/100 AU in diameter and a typical planet like Earth is 1/10,000 AU, discuss whether or not our Solar System is crowded or empty.

    ANSWER: Answer not provided.

65. Briefly describe the scientific method.

    ANSWER: No answer provided.