Chapter 1: MEASUREMENT

1. The SI standard of time is based on:
   A. the daily rotation of the earth
   B. the frequency of light emitted by R^{86}
   C. the yearly revolution of the earth about the sun
   D. a precision pendulum clock
   E. none of these

   Ans: E

2. A nanosecond is:
   A. 10^{9} s
   B. 10^{-9} s
   C. 10^{-10} s
   D. 10^{-10} s
   E. 10^{-12} s

   Ans: B

3. The SI standard of length is based on:
   A. the distance from the north pole to the equator along a meridian passing through Paris
   B. wavelength of light emitted by Hg^{198}
   C. wavelength of light emitted by Kr^{86}
   D. a precision meter stick in Paris
   E. the speed of light

   Ans: E

4. In 1866, the U. S. Congress defined the U. S. yard as exactly 3600/3937 international meter. This was done primarily because:
   A. length can be measured more accurately in meters than in yards
   B. the meter is more stable than the yard
   C. this definition relates the common U. S. length units to a more widely used system
   D. there are more wavelengths in a yard than in a meter
   E. the members of this Congress were exceptionally intelligent

   Ans: C

5. Which of the following is closest to a yard in length?
   A. 0.01 m
   B. 0.1 m
   C. 1 m
   D. 100 m
   E. 1000 m

   Ans: C

6. There is no SI base unit for area because:
   A. an area has no thickness; hence no physical standard can be built
   B. we live in a three (not a two) dimensional world
   C. it is impossible to express square feet in terms of meters
   D. area can be expressed in terms of square meters
   E. area is not an important physical quantity

   Ans: D

7. The SI base unit for mass is:
   A. gram
   B. pound
   C. kilogram
   D. ounce
   E. kilopound

   Ans: C

8. A gram is:
   A. 10^{-6} kg
   B. 10^{-3} kg
   C. 1 kg
   D. 10^{3} kg
   E. 10^{6} kg

   Ans: B

9. Which of the following weighs about a pound?
   A. 0.05 kg
   B. 0.5 kg
   C. 5 kg
   D. 50 kg
   E. 500 kg

   Ans: B

10. $5.0 \times 10^4 \times 3.0 \times 10^6 =$
   A. 1.5×10^{9}
   B. 1.5×10^{10}
   C. 1.5×10^{11}
   D. 1.5×10^{12}
   E. 1.5×10^{13}

   Ans: C

11. $5.0 \times 10^4 \times 3.0 \times 10^{-6} =$
   A. 1.5×10^{-3}
   B. 1.5×10^{-1}
   C. 1.5×10^{1}
   D. 1.5×10^{3}
   E. 1.5×10^{5}

   Ans: B

12. $5.0 \times 10^5 + 3.0 \times 10^6 =$

A. 8.0×10^5
B. 8.0×10^6
C. 5.3×10^5
D. 3.5×10^5
E. 3.5×10^6

Ans: E

13. $7.0 \times 10^6 / 2.0 \times 10^{-6} =$

A. 3.5×10^{-12}
B. 3.5×10^{-6}
C. 3.5
D. 3.5×10^6
E. 3.5×10^{12}

Ans: E

14. The number of significant figures in 0.00150 is:

A. 2
B. 3
C. 4
D. 5
E. 6

Ans: B

15. The number of significant figures in 15.0 is:

A. 1
B. 2
C. 3
D. 4
E. 5

Ans: C

16. $3.2 \times 2.7 =$

A. 9
B. 8
C. 8.6
D. 8.64
E. 8.640

Ans: C

17. $1.513 + 27.3 =$

A. 29
B. 28.8
C. 28.9
D. 28.81
E. 28.813

Ans: B

18. 1 mi is equivalent to 1609 m so 55 mph is:

A. 15 m/s
B. 25 m/s
C. 66 m/s
D. 88 m/s
E. 1500 m/s

Ans: B

19. The order of magnitude of the number 0.0649 is:

A. -2
B. 6×10^{-2}
C. 10^{-2}
D. 10^{-1}
E. 0.06

Ans: D

20. A marble has a radius of 2 mm. The order of magnitude of the number of these marbles that can be placed in a jar with a radius of 3 cm and a height of 10 cm is:

A. 10
B. 10^2
C. 10^4
D. 10^6
E. 19^8

Ans: C

21. A sphere with a radius of 1.7 cm has a volume of:

A. 2.1×10^{-5} m^3
B. 9.1×10^{-4} m^3
C. 3.6×10^{-3} m^3
D. 0.11 m^3
E. 21 m^3

Ans: A

22. A sphere with a radius of 1.7 cm has a surface area of:

A. 2.1×10^{-5} m^2
B. 9.1×10^{-4} m^2
C. 3.6×10^{-3} m^2
D. 0.11 m^2
E. 36 m^2

Ans: C

23. A right circular cylinder with a radius of 2.3 cm and a height of 1.4 m has a volume of:
    A. 0.20 m^3
    B. 0.14 m^3
    C. 9.3×10^{-3} m^3
    D. 2.3×10^{-3} m^3
    E. 7.4×10^{-4} m^3

    Ans: D

24. A right circular cylinder with a radius of 2.3 cm and a height of 1.4 cm has a total surface area of:
    A. 1.7×10^{-3} m^2
    B. 3.2×10^{-3} m^2
    C. 2.0×10^{-3} m^3
    D. 5.3×10^{-3} m^2
    E. 7.4×10^{-3} m^2

    Ans: D

25. A cubic box with an edge of exactly 1 cm has a volume of:
    A. 10^{-9} m^3
    B. 10^{-6} m^3
    C. 10^{-3} m^3
    D. 10^{3} m^3
    E. 10^{6} m^3

    Ans: B

26. A square with an edge of exactly 1 cm has an area of:
    A. 10^{-6} m^2
    B. 10^{-4} m^2
    C. 10^{2} m^2
    D. 10^{4} m^2
    E. 10^{6} m^2

    Ans: B

27. 1 m is equivalent to 3.281 ft. A cube with an edge of 1.5 ft has a volume of:
    A. 1.2×10^{2} m^3
    B. 9.6×10^{-2} m^3
    C. 10.5 m^3
    D. 9.5×10^{-2} m^3
    E. 0.21 m^3

    Ans: B

28. During a short time interval the speed v in m/s of an automobile is given by $v = at^2 + bt^3$, where the time t is in seconds. The units of a and b are respectively:

A. $\mathrm{m} \cdot \mathrm{s}^2$; $\mathrm{m} \cdot \mathrm{s}^4$
B. s^3/m; s^4/m
C. m/s^2; m/s^3
D. m/s^3; m/s^4
E. m/s^4; m/s^5

Ans: D

29. If $A = BC$, where A has the dimension length/mass and C has the dimension length/time, then B has the dimension:

A. time/mass
B. length^2/time·mass
C. time·mass/length^2
D. length^2·time/mass
E. mass/length^2·time

Ans: A

30. Suppose $A = B^n C^m$, where A has dimensions length·time, B has dimensions length^2·time^{-1}, and C has dimensions length·time^2. Then the exponents n and m have the values:

A. 2/3; 1/3
B. 2; 3
C. 4/5; $-1/5$
D. 1/5; 3/5
E. 1/2; 1/2

Ans: D