

## Chapter 1: MEASUREMENT

1.  $(5.0 \times 10^4) \times (3.0 \times 10^6) =$

- A.  $1.5 \times 10^9$
- B.  $1.5 \times 10^{10}$
- C.  $1.5 \times 10^{11}$
- D.  $1.5 \times 10^{12}$
- E.  $1.5 \times 10^{13}$

Ans: C

Section: 1–3; Difficulty: E

2.  $(5.0 \times 10^4) \times (3.0 \times 10^{-6}) =$

- A.  $1.5 \times 10^{-3}$
- B.  $1.5 \times 10^{-1}$
- C.  $1.5 \times 10^1$
- D.  $1.5 \times 10^3$
- E.  $1.5 \times 10^5$

Ans: B

Section: 1–3; Difficulty: E

3.  $5.0 \times 10^5 + 3.0 \times 10^6 =$

- A.  $8.0 \times 10^5$
- B.  $8.0 \times 10^6$
- C.  $5.3 \times 10^5$
- D.  $3.5 \times 10^5$
- E.  $3.5 \times 10^6$

Ans: E

Section: 1–3; Difficulty: E

4.  $(7.0 \times 10^6)/(2.0 \times 10^{-6}) =$

- A.  $3.5 \times 10^{-12}$
- B.  $3.5 \times 10^{-6}$
- C. 3.5
- D.  $3.5 \times 10^6$
- E.  $3.5 \times 10^{12}$

Ans: E

Section: 1–3; Difficulty: E

5. 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

Section: 1–4; Difficulty: M

6. 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  $\text{Hg}^{198}$
  - C. wavelength of light emitted by  $\text{Kr}^{86}$
  - D. a precision meter stick in Paris
  - E. the speed of light

Ans: E

Section: 1–5; Difficulty: E

7. 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

Section: 1–5; Difficulty: E

8. 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

Section: 1–5; Difficulty: E

9. 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

Section: 1–5; Difficulty: E

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

Ans: B

Section: 1–5; Difficulty: M

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

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

Ans: A

Section: 1–4, 5; Difficulty: M

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

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

Ans: C

Section: 1–4, 5; Difficulty: M

13. A right circular cylinder with a radius of 2.3 cm and a height of 1.4 m has a volume of:

A.  $0.20 \text{ m}^3$   
B.  $0.14 \text{ m}^3$   
C.  $9.3 \times 10^{-3} \text{ m}^3$   
D.  $2.3 \times 10^{-3} \text{ m}^3$   
E.  $7.4 \times 10^{-4} \text{ m}^3$

Ans: D

Section: 1–4, 5; Difficulty: M

14. 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.  $1.7 \times 10^{-3} \text{ m}^2$   
B.  $3.2 \times 10^{-3} \text{ m}^2$   
C.  $2.0 \times 10^{-3} \text{ m}^3$   
D.  $5.3 \times 10^{-3} \text{ m}^2$   
E.  $7.4 \times 10^{-3} \text{ m}^2$

Ans: D

Section: 1–4, 5; Difficulty: M

15. A cubic box with an edge of exactly 1 cm has a volume of:

A.  $10^{-9} \text{ m}^3$   
B.  $10^{-6} \text{ m}^3$   
C.  $10^{-3} \text{ m}^3$   
D.  $10^3 \text{ m}^3$   
E.  $10^6 \text{ m}^3$

Ans: B

Section: 1–4, 5; Difficulty: M

16. A square with an edge of exactly 1 cm has an area of:

- A.  $10^{-6} \text{ m}^2$
- B.  $10^{-4} \text{ m}^2$
- C.  $10^2 \text{ m}^2$
- D.  $10^4 \text{ m}^2$
- E.  $10^6 \text{ m}^2$

Ans: B

Section: 1–4, 5; Difficulty: M

17. The SI standard of time is based on:

- A. the daily rotation of the earth
- B. the frequency of light emitted by  $\text{Kr}^{86}$
- C. the yearly revolution of the earth about the sun
- D. a precision pendulum clock
- E. none of these

Ans: E

Section: 1–6; Difficulty: E

18. A nanosecond is:

- A.  $10^9 \text{ s}$
- B.  $10^{-9} \text{ s}$
- C.  $10^{-10} \text{ s}$
- D.  $10^{-10} \text{ s}$
- E.  $10^{-12}$

Ans: B

Section: 1–3, 6; Difficulty: E

19. The SI base unit for mass is:

- A. gram
- B. pound
- C. kilogram
- D. ounce
- E. kilopound

Ans: C

Section: 1–7; Difficulty: E

20. 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: D

Section: 1–7; Difficulty: E

21. A gram is:

- A.  $10^{-6}$  kg
- B.  $10^{-3}$  kg
- C. 1 kg
- D.  $10^3$  kg
- E.  $10^6$  kg

Ans: B

Section: 1-3, 7; Difficulty: E

22. Two girders are made of the same material. Girder A is twice as long as girder B and has a cross-sectional area that is twice as great. The ratio of the mass density of girder A to the mass density of girder B is:

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

Ans: C

Section 1-7; Difficulty: E

23. The unit of mass density might be:

- A. pound per cubic foot
- B. gram per liter
- C. kilogram per meter
- D. cubic kilogram per meter
- E. cubic meter per kilogram

Ans: B

Section 1-7; Difficulty: E

24. A sphere has a radius of 21 cm and a mass of 1.9 kg. Its mass density is about:

- A.  $2.0 \times 10^{-6}$  kg/m<sup>3</sup>
- B.  $2.0 \times 10^{-2}$  kg/m<sup>3</sup>
- C. 1.4 kg/m<sup>3</sup>
- D. 14 kg/m<sup>3</sup>
- E. 49 kg/m<sup>3</sup>

Ans: E

Section 1-7; Difficulty: E

25. The number of significant figures in 0.00150 is:

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

Ans: B

Difficulty: E

26. The number of significant figures in 15.0 is:

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

Ans: C

Difficulty: E

27.  $3.2 \times 2.7 =$

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

Ans: C

Difficulty: E

28.  $1.513 + 27.3 =$

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

Ans: B

Difficulty: E

29. During a short interval of time 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.  $\text{m} \cdot \text{s}^2$ ;  $\text{m} \cdot \text{s}^4$
- B.  $\text{s}^3/\text{m}$ ;  $\text{s}^4/\text{m}$
- C.  $\text{m}/\text{s}^2$ ;  $\text{m}/\text{s}^3$
- D.  $\text{m}/\text{s}^3$ ;  $\text{m}/\text{s}^4$
- E.  $\text{m}/\text{s}^4$ ;  $\text{m}/\text{s}^5$

Ans: D

Difficulty: M

30. Suppose  $A = BC$ , where  $A$  has the dimension L/M and  $C$  has the dimension L/T. Then  $B$  has the dimension:

- A. T/M
- B.  $\text{L}^2/\text{TM}$
- C.  $\text{TM}/\text{L}^2$
- D.  $\text{L}^2\text{T}/\text{M}$
- E.  $\text{M}/\text{L}^2\text{T}$

Ans: A

Difficulty: M

31. Suppose  $A = B^n C^m$ , where  $A$  has dimensions  $LT$ ,  $B$  has dimensions  $L^2T^{-1}$ , and  $C$  has dimensions  $LT^2$ . 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

Difficulty: M