Chapter 1: Measurements

1	The fundamental unit of mass in SI system is
	a) Gram b) **Kilogram** c) Ib d) newton
2	2.25 cm = …….
	a) **22.5** c) 225 b) 0.225 d) 2250
3	The number of significant figure for 0.00709 is
	a) 5 c) 2 b) 4 **d) 3**
4	One kilogram is equal ……
	a) 10 gram c) 100 gram b) **1000 gram** d) 0.001 gram
5	Displacement is a……
	a) Scalar quantity c) Derived quantity b) **Vector quantity** d) Base quantity
6	Volume is a …….
	a) **Scalar quantity** c) Derived quantity b) Vector quantity d) Base quantity
7	500 seconds = ……
	a) **8.33 min** c) 83.3 min b) 3000 min d) 0.002 min
8	The dimension of the force (force = mass X acceleration) is
	a) $M\ \frac{L}{T}$ c) MLT b) $\boldsymbol{M\ \frac{L}{T^2}}$ d) $M\ \frac{T}{L^2}$
9	The dimension of the density (density = mass / volume) is
	a) M/L^2 **c) $\boldsymbol{M\ /L^3}$** b) M T^2 d) $M\ L^3$
10	By using scientific notation, we can write 0.0088 as
	a) $8.8\ \times 10^{-4}$ **b) $\boldsymbol{8.8\ \times 10^{-3}}$** c) $8.80\ \times 10^{-3}$ d) 88×10^{-4}

11	The number of significant figure for 120300 is
	a) 5 c) 6 b) 3 **d) 4**
12	Subtract the following numbers and report your answer using significant figures 416 g - 210 g =……..
	a) 210. g **c) 210 g** b) 200 g d) 210.0
13	Convert 63 feet to yard (1yard=3 feet) is …….
	a) **21** c) 0.189 b) 189 d) 0.21
14	10^{-6} called ……
	a) Mega c) **micro** b) Pico d) Tera
15	In S.I. system, the unit for acceleration is……..
	a) m / sec c) m^2/sec b) m.sec **d) m/sec^2**
16	The speed in meters per second equivalent to 66 miles per hour (1 miles (mi) = 1,609.344 m)
	a) 25 m/sec c) 45 m/sec b) 35 m/sec **d) 29.49 m/sec**
17	What is the diameter of hydrogen atom has diameter 10nm .
	a) **10×10^{-9}m** c) 10×10^{8}m b) 10×10^{9}m d) 10×10^{-8}m
18	If the height of a plane in air 35000ft , the height of the unit SI . (1m=3.281ft)
	a) 1116.5 m c) 23151.4m b) **10667.4m** d) 20668.5m
19	A train traveling 100 km/h .The speed of this train is SI:
	a) **28 m/sec** c) 50 m/sec b) 30 m/sec d) no correct answer
20	A car is traveling 120 m/h . The speed of this car is SI:
	a) 23.3 m/sec c) 43.3 m/sec b) **33.3 m/sec** d) 50.5 m/sec
21	A circle with a radius of 5 cm has an area of : (area=πr^2)
	a) 5×10^{-3} m^2 c) 6×10^{3} m^2 b) **8×10^{-3} m^2** d) no correct answer

22	The dimension of acceleration is
	a) $\frac{L}{T}$ c) $\frac{L}{T^2}$ b) $\frac{T^2}{L}$ d) L T
23	A car is traveling 50 Km/h. The speed of this car in SI units is
	a) **14 m/sec** c) 150 m/sec b) 180 m/sec d) no correct answer
24	One mg is equal to **……..**
	a) **10^{-3} g** c) 10^{-6} g b) 10^{-2} g d) 10^{3} g
25	The acceleration a in m/s^2 of a car is given by $a=bt^2$, where the t is the time in sec. using the dimensional analysis, the unit of b is …….
	a) m/s^2 **c) m/s^4** b) m/s^3 d) no correct answer
26	One µm is equal to ……..
	a) **10^{-6} m** c) 10^{6} m b) 10^{-3} m d) 10^{3} m
27	A sphere with a radius of 4 inches has a surface area of: (surface area = $4\pi r^2$) [1 inch = 2.54 cm]
	a) **$1.3x10^3$ cm^2** c) $13x10^{-2}$ cm^2 b) $1.3x10^{-3}$ cm^2 d) no correct answer
28	The dimension of the Pressure (P) is: [Pressure = Force/area]
	a) MLT c) $ML^{-2}T^{-2}$ b) $ML^{-1}T^{-1}$ **d) $ML^{-1}T^{-2}$**
29	If $x=kt^4$ where x is the displacement in m and t is the time in s. The dimension of k
	a) **LT^{-4}** c) LT^4 b) LT^{-3} d) LT^{-2}
30	One Mg is equal to …….
	a) **10^6 m** c) 10^9 m b) 10^{-6} m d) 10^3 m
31	One nanometer is equal to……
	a) 10^{-6} m **c) 10^{-9} m** b) 10^{-8} m d) 10^{-12} m

32	Physical quantities that describe laws of physics are divided into……
	a) **2 types** c) 4 types b) 4 types d) 5 types
33	Zero in the number 4509 is
	a) significant b) non significant c) may not be significant d) maybe significant
34	Which of the following is a vector quantity?
	a) Time c) Temperature b) Energy **d) velocity**
35	Light year is a measurement of……
	a) Speed of airplanes b) Speed of rocket **c) Star distances** d) Speed of light
36	Which of the following is used to measure the length
	a) Pound **c) light year** b) Kg d) hour
37	Example of basic physics quantity is …….
	a) Velocity c) Force b) Acceleration **d) Mass**
38	Number 0.0000548 can be represented in scientific notation as
	a) 5.48 c) 5.480×10^{-5} b) $\mathbf{5.48 \times 10^{-5}}$ d) 54.8
39	Prefix for 10^9 is…….
	a) nano c) micro b) pico **d) giga**

Solve the following problems

1. Using the dimensional analysis check that this equation $x = \frac{1}{2} at^2$ is correct, where x is the distance, a is the acceleration and t is the time.

Solution

$$L = \frac{L}{T^2} \times T^2 = L$$

This equation is correct because the dimension of the left and right side of the equation have the same dimensions.

2. Show that the expression $v = vo + at$ is dimensionally correct, where v and vo are the velocities and a is the acceleration, and t is the time.

Solution

The right hand side

$$[v] = \frac{L}{T}$$

The left hand side

$$[at] = \frac{L}{T^2} \times T = \frac{L}{T}$$

Therefore, the expression is dimensionally correct.

3. Suppose that the acceleration of a particle moving in circle of radius *r* with uniform velocity *v* is proportional to the r^n and v^m. Use the dimensional analysis to determine the power n and m.

Solution

Let us assume a is represented in this expression

$$a = k\, r^n v^m$$

Where k is the proportionality constant of dimensionless unit.

The right hand side

$$[a] = \frac{L}{T^2}$$

The left hand side

$$[k\ r^n\ v^m] = L^n\left(\frac{L}{T}\right)^m = \frac{L^{n+m}}{T^m}$$

therefore

$$\frac{L}{T^2} = \frac{L^{n+m}}{T^m}$$

hence

$n+m=1$ and $m=2$

Therefore. n =-1 and the acceleration a is

$$a = k\, r^{-1}\, v^2$$

$k = 1$

$$a = \frac{v^2}{r}$$