NEETUG (2024)
Physics
Quiz-2

SECTION - A

1. If density D, frequency F and velocity V are taken as fundamental quantities then the dimensional formula for kinetic energy should be
(1) $[DF^{-3}V^5]$ (2) $[D^{-2}F^2V^{-3}]$
(3) $[D^{-3}F^5V]$ (4) $[DFV^{-3}]$

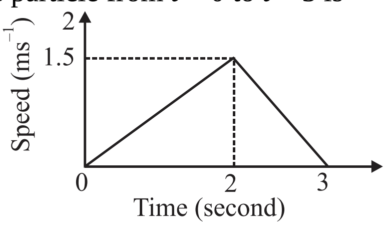
2. The motion of a particle along a straight line is described by equation $x = 8 + 12t - t^3$, where x is in metre and t in second. The retardation of the particle when its velocity becomes zero is
(1) 6 ms^{-2} (2) 12 ms^{-2}
(3) 24 ms^{-2} (4) Zero

3. The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}$ ms^{-2} in the third second is
(1) $\frac{19}{3}$ m (2) 6 m
(3) 4 m (4) $\frac{10}{3}$ m

4. If energy (E), velocity (V) and time (T) are chosen as the fundamental quantities, the dimensional formula of surface tension will be
(1) $[E^{-2}V^{-1}T^{-3}]$ (2) $[EV^{-2}T^{-1}]$
(3) $[EV^{-1}T^{-2}]$ (4) $[EV^{-2}T^{-2}]$

5. The dimensions of $(\mu_0\varepsilon_0)^{-1/2}$ are
(1) $[L^{-1/2}T^{1/2}]$ (2) $[L^{1/2}T^{-1/2}]$
(3) $[L^{-1}T]$ (4) $[LT^{-1}]$

6. The speed-time graph of a particle moving along a solid curve is shown below. The distance traversed by the particle from $t = 0$ to $t = 3$ is



(1) $\frac{9}{2}$m (2) $\frac{9}{4}$m
(3) $\frac{10}{3}$m (4) $\frac{10}{5}$m

7. What are the dimensions of the change in velocity?
(1) $[M^0L^0T^0]$ (2) $[LT^{-1}]$
(3) $[MLT^{-1}]$ (4) $[LT^{-2}]$

8. The equation of a stationary wave is
$$y = 2A\sin\left(\frac{2\pi ct}{\lambda}\right)\cos\left(\frac{2\pi x}{\lambda}\right)$$
Which of the following statements is incorrect?
(1) The unit of ct is same as that of λ
(2) The unit of x is same as that of λ
(3) The unit of $\frac{2\pi c}{\lambda}$ is same as that of $\frac{2\pi x}{\lambda t}$
(4) The unit of $\frac{c}{\lambda}$ is same as that of $\frac{x}{\lambda}$

9. The dimensions of $\frac{\alpha}{\beta}$ in the equation $F = \frac{\alpha - t^2}{\beta v^2}$, where F is the force, v is velocity and t is time, is
(1) $[MLT^{-1}]$
(2) $[ML^{-1}T^{-2}]$
(3) $[ML^3T^{-4}]$
(4) $[ML^2T^{-4}]$

10. A car travels from A to B at a speed of 40 km h^{-1} and returns back on the same track at a speed of 60 km h^{-1}. Average velocity will be
(1) 60 km h^{-1} (2) Zero
(3) 48 km h^{-1} (4) 50 km h^{-1}

11. An athlete completes one round of a circular track of radius R in 20 s with constant speed. What will be his displacement at the end of 1 minute 10 second?
(1) Zero (2) $2R$
(3) $2\pi R$ (4) $7\pi R$

12. The numerical ratio of displacement to the distance covered is always
(1) < 1 (2) = 1
(3) ≤1 (4) ≥ 1

13. The position of a body moving in a straight line is $x = (2t^2 + 2t + 9)$, where x is in metre and t is in second. The velocity $v\left(v = \frac{dx}{dt}\right)$ of the body at $t = 1$ s is
(1) 6 m/s (2) 8 m/s
(3) 4 m/s (4) 2 m/s

14. The position of a particle moving along the y-axis is given as $y = 3t - t^2$, where y is in metre and t is in second. The time when the particle attains maximum position in positive y direction will be
(1) 1.5 s (2) 4 s
(3) 2 s (4) 3 s

15. Motion of a particle is given by equation $s = (3t^3 + 7t^2 + 14t + 8)$m
The value of acceleration of the particle at $t = 1$s is
(1) 10 m/s^2 (2) 32 m/s^2
(3) 23 m/s^2 (4) 16 m/s^2

16. If the initial speed of a particle is u and its acceleration is given as $a = At^3$, where A is constant and t is time, then its final speed v will be given as

(1) $u + At^4$ (2) $u + \frac{At^4}{4}$

(3) $u + At^3$ (4) $u + \frac{At^3}{3}$

17. Choose the correct statement.

(1) Average velocity is a vector quantity
(2) Average speed does not have direction
(3) Distance covered cannot be less than the magnitude of displacement
(4) All of these

18. Galileo's law of odd numbers reflects that a particle starting from rest with uniform acceleration covers distance (in equal time intervals in straight line motion) in the ratio

(1) 1 : 2 : 3 : 4 (2) 1 : 1 : 1 : 1
(3) 1 : 2 : 4 : 8 (4) 1 : 3 : 5 : 7

19. If a particle is at rest then it

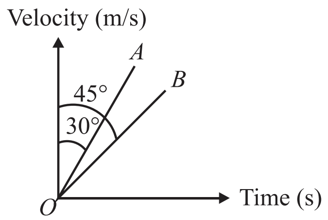
(1) May be accelerated
(2) Must be accelerated
(3) May not be accelerated
(4) Both (1) and (3)

20. A car moves from x to y with a uniform speed v_u and returns to y with a uniform speed v_d. The average speed for this round trip is

(1) $\frac{v_u + v_d}{2}$ (2) $\frac{2v_u v_d}{v_d + v_u}$

(3) $\sqrt{v_u v_d}$ (4) $\frac{v_d + v_u}{v_d + v_u}$

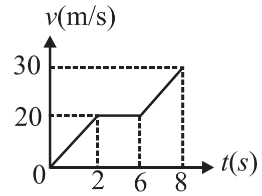
21. Two graphs between velocity and time of particles A and B are given. The ratio of their acceleration $\frac{a_A}{a_B}$ is



(1) $\frac{\sqrt{3}}{2}$ (2) $\frac{1}{\sqrt{3}}$

(3) $\sqrt{3}$ (4) $\frac{2}{\sqrt{3}}$

22. Figure given below shows the graph of velocity v of particle moving along x-axis as a function of time t. Average acceleration during $t = 1$ s to $t = 7$ s is



(1) 1.5 m/s^2 (2) 1 m/s^2
(3) 2 m/s^2 (4) 2.5 m/s^2

23. A person travelling in a straight line moves with a constant velocity v_1 for certain distance 'x' and with a constant velocity v_2 for next equal distance. The average velocity v is given by the relation

(1) $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2}$ (2) $\frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$

(3) $\frac{v}{2} = \frac{v_1 + v_2}{2}$ (4) $v = \sqrt{v_1 v_2}$

24. Two cars P and Q start from a point at the same time in a straight line and their positions are represented by $xP(t) = at + bt^2$ and $xQ(t) = ft - t^2$. At what time do the cars have the same velocity?

(1) $\frac{a-f}{1+b}$ (2) $\frac{a+f}{2(b-1)}$

(3) $\frac{a+f}{2(1+b)}$ (4) $\frac{f-a}{2(1+b)}$

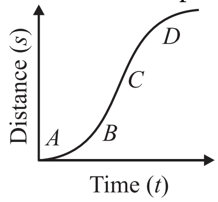
25. A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h_1, h_2 and h_3 is

(1) $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$
(2) $h_2 = 3h_1$ and $h_3 = 3h_2$
(3) $h_1 = h_2 = h_3$
(4) $h_1 = 2h_2 = 3h_3$

26. If frictional force acting on a body is directly proportional to its velocity then the dimensional formula of constant of proportionality is

(1) $[MLT^{-2}]$ (2) $[MLT^{-3}]$
(3) $[MT^{-3}]$ (4) $[MT^{-1}]$

27. A particle shows distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point

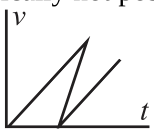


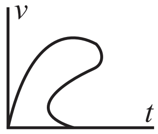
(1) A (2) B
(3) C (4) D

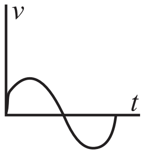
28. The dimensional formula $[ML^{-1}T^{-2}]$ is for the quantity

(1) Force (2) Acceleration
(3) Pressure (4) Work

29. Which of the following speed-time (v - t) graphs is physically not possible?

(1) 

(2) 

(3) 

(4) All of these

30. Two bodies of different masses m_a and m_b and dropped from two different heights, namely a and b. The ratio of times taken by the two to drop through these distance is

(1) $a : b$

(2) $\frac{m_a}{m_b} : \frac{b}{a}$

(3) $\sqrt{a} : \sqrt{b}$

(4) $a^2 : b^2$

31. A rocket is fired vertically from the ground. It moves upwards with a constant acceleration of $10\ m/s^2$. After 30 seconds the fuel is finished. After what time from the instant of firing the rocket will it attain the maximum height? $g = 10\ m/s^2$:

(1) 60 s (2) 45 s

(3) 90 s (4) 65 s

32. A body moves along curved path of a quarter circle. The ratio of magnitude of displacement to distance is:

(1) $\frac{\pi}{2\sqrt{2}}$ (2) $\frac{\pi}{2}$

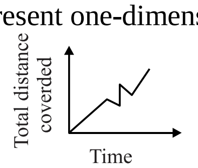
(3) $\frac{2\sqrt{2}}{\pi}$ (4) $\frac{3\pi}{2\sqrt{2}}$

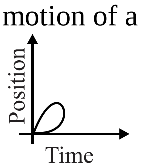
33. The dimensions of potential energy of an object in mass length and time are respectively

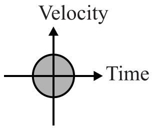
(1) 2, 2, 1 (2) 1, 2, –2

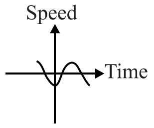
(3) –2, 1, 2 (4) 1, –1, 2

34. Which of the following graphs cannot possibly represent one-dimensional motion of a particle ?

(I) 

(II) 

(III) 

(IV) 

(1) I and II (2) II and III

(3) II and IV (4) All of these

35. What is the dimension of surface tension?

(1) $[ML^1T^0]$ (2) $[ML^1T^{-1}]$

(3) $[M^1L^1T^{-2}]$ (4) $[M^1L^0T^{-2}]$

SECTION - B

36. A stone is dropped into a well in which the level of water is h below the top of the well. If v is velocity of sound, the time T after which the splash is heard is given by.

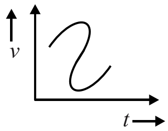
(1) $T = \frac{3h}{v}$

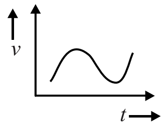
(2) $T = \sqrt{\frac{h}{4g}} + \frac{2h}{v}$

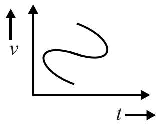
(3) $T = \sqrt{\frac{6h}{v}} + \frac{h}{2g}$

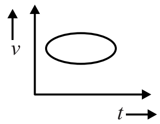
(4) $T = \sqrt{\frac{2h}{g}} + \frac{h}{v}$

37. Which of the following velocity-time graph shows a realistic situation for a body in motion?

(1) 

(2) 

(3) 

(4) 

38. The unit of "impulse per unit area" is same as that of

(1) Coefficient Viscosity

(2) Surface tension

(3) Bulk modulus

(4) Force

39. The acceleration 'a' in m/s^2 of a particle is given by $a = 3t^2 + 2t + 2$ where t is the time. If the particle starts out with a velocity $u = 2m/s$ at $t = 0$, then the velocity at the end of 2 second is:

(1) 12 m/s (2) 18 m/s

(3) 27 m/s (4) 36 m/s

40. In a new system of units, unit of mass is x kg, unit of length is y metre and unit of time is z second. Now if 1 newton = F new units then F =

(1) $\frac{z}{xy}$ (2) $\frac{z^2}{xy}$

(3) $\frac{z}{xy^2}$ (4) $\frac{z}{x^2y}$

41. The velocity v of a particle at time t is given by $v = at + (b/(t + c))$, where a, b and c are constants. The dimensions of a, b and c are

(1) L, LT and LT^{-2} (2) LT^{-2}, L and T

(3) L^2, T and LT^2 (4) LT^2, LT and L

42. Which of the following practical units of length is not correct?

(1) 1 fermi = 10^{-15} m

(2) 1 astronomical unit = 1.496×10^{11} m

(3) 1 parsec = 3.26 light year

(4) 1 light year = 9.46×10^{12} m

43. Which of the following does not have dimensions of force?

(1) Weight
(2) Rate of change of momentum
(3) Work per unit length
(4) Work done per unit charge

44. Which of the following physical quantities has derived unit?

(1) Acceleration
(2) Mass
(3) Current
(4) Amount of substances

45. Acceleration of a particle varies with position (x) as $a = 2x$. If particle starts from rest from x = 2m then find its speed at x = 4m.

(1) $\sqrt{17}$m/s (2) $\sqrt{24}$m/s
(3) $\sqrt{12}$m/s (4) $\sqrt{10}$m/s

46. A force F is given by $F = at + bt^2$, where t is time. What are the dimensions of a and b

(1) MLT^{-3} and ML^2T^{-4}
(2) MLT^{-3} and MLT^{-4}
(3) MLT^{-1} and MLT^0
(4) MLT^{-4} and MLT^1

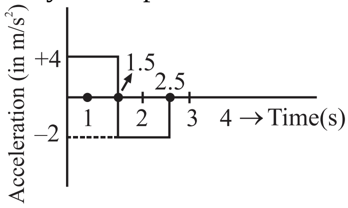
47. If P and Q have different non-zero dimensions, which of the following operation is possible:

(1) $P^2 + Q^2$ (2) PQ^2
(3) $P^2 - Q^2$ (4) $1 - P/Q$

48. The density of a material in CGS system of units is 4 g/cm^3. In a system of units in which unit of length is 10 cm and unit of mass is 100 g, the value of density of material will be

(1) 400 (2) 0.04
(3) 0.4 (4) 40

49. A particle starts from rest at t = 0 and moves in a straight line with an acceleration as shown below. The velocity of the particle at t = 3s is :



(1) 2 ms^{-1} (2) 4 ms^{-1}
(3) 6 ms^{-1} (4) 8 ms^{-1}

50. An equation is given here $(P + (a/V^2)) = b(\theta/V)$ where P = Pressure, V = Volume and θ = Absolute temperature. If a and b are constants, the dimensions of a will be

(1) $[ML^{-5}T^{-1}]$ (2) $[ML^5T^1]$
(3) $[ML^5T^{-2}]$ (4) $[M^{-1}L^5T^2]$

Solution

1. **(1)**

$[ML^2T^{-2}] = [D^xF^yV^z]$

2. **(2)**

$$x = 8 + 12t - t^3$$

$$\frac{dx}{dt} = 12 - 3t^2$$

If $v = 0$, then $12 - 3t^2 = 0$

$$\Rightarrow \ 4 = t^2$$

$$\Rightarrow \ t = 2 \text{ s}$$

$$a = \frac{d^2x}{dt^2} = -6t$$

$$a|_{t=2\text{ s}} \Rightarrow -12 \text{ ms}^{-2}$$

$$|a| = 12 \text{ ms}^{-2}$$

3. **(4)**

$$S_{n^{\text{th}}} = u + \frac{a}{2}(2n-1)$$

$$n = 3, \text{ (given)}, \ a = \frac{4}{3} \text{ ms}^{-2}$$

$$S_{n^{\text{th}}} = u + \frac{a}{2}(2n-1)$$

$$\Rightarrow S_{3^{\text{rd}}} = 0 + \frac{4}{3} \times \frac{1}{2}(2 \times 3 - 1) = \frac{2}{3} \times 5$$

$$\Rightarrow \frac{10}{3} \text{ m} = S_{3^{\text{rd}}}$$

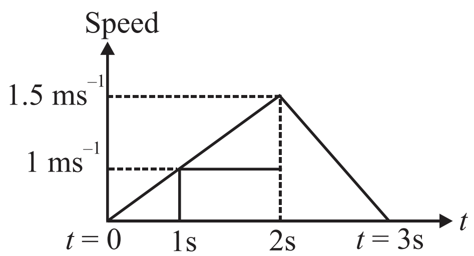
4. **(4)**

5. **(4)**

Speed of light, $c = \dfrac{1}{\sqrt{\mu_0\varepsilon_0}} \Rightarrow c = (\mu_0\varepsilon_0)^{-1/2}$

So, dimensional formula of $(\mu_0\varepsilon_0)^{-1/2}$ is $[LT^{-1}]$

6. **(2)**



Area under the speed-time graph gives distance.

Area $= \dfrac{1}{2} \times 3 \times 1.5 \Rightarrow \dfrac{9}{4}$ m

7. **(2)**

The dimensions of change in velocity is same as that of velocity $[M^0LT^{-1}]$

8. **(4)**

$$y = 2A\sin\left(\frac{2\pi ct}{\lambda}\right)\cos\left(\frac{2\pi x}{\lambda}\right)$$

$$\frac{ct}{\lambda} = \text{ dimensionless} \Rightarrow ct = \lambda$$

$$\frac{x}{\lambda} = \text{ dimensionless} \Rightarrow x = \lambda$$

9. **(3)**

$$F = \frac{\alpha - t^2}{\beta v^2}$$

Dimensionally, $\alpha = [T^2]$

$$[MLT^{-2}] = \frac{[T^2]}{\beta[L^2T^{-2}]}$$

$$\beta = \frac{T^2}{[MLT^{-2} \cdot L^2T^{-2}]}$$

$$\Rightarrow \ \beta = [M^{-1}L^{-3}T^6]$$

Dimensions of

$$\frac{\alpha}{\beta} = \frac{T^2}{M^{-1}L^{-3}T^6} = [ML^3T^{-4}]$$

10. **(2)**

$$\vec{v}_{\text{avg}} = \frac{\text{Displacement}}{\text{Time}} = \frac{0}{\text{Time}} = 0$$

11. **(2)**

After 1 minute 10 second, the athlete will be at dimetrically opposite hence displacement $= 2R$.

12. **(3)**

Distance $\geq$ |Displacement|

13. **(1)**

$$v = \frac{dx}{dt} = 4t + 2$$

$$\Rightarrow v(t = 1\text{ s}) = 6 \text{ m/s}$$

14. **(1)**

y will be maximum when $\dfrac{dy}{dt} = 0$ and $\dfrac{d^2y}{dt^2} < 0$

Now $\dfrac{dy}{dt} = 3 - 2t = 0$

$$\Rightarrow t = \frac{3}{2} \text{ s}$$

15. (2)

$$s = 3t^3 + 7t^2 + 14t + 8$$

$$v = \frac{ds}{dt} = 9t^2 + 14t + 14$$

$$a = \frac{d^2s}{dt^2} = 18t + 14$$

$$a|_{t=1\text{ s}} = 18 + 14$$

$$a|_{t=1\text{ s}} = 32 \text{ ms}^{-2}$$

16. (2)

$$\int_u^v dv = \int_0^t At^3 dt$$

$$\therefore\ v - u = \frac{At^4}{4}$$

17. (4)

18. (4)

19. (4)

20. (2)

21. (3)

$$a_A = \tan 60^\circ, a_B = \tan 45^\circ = 1 \text{ m/s}^2$$

$$a_A = \sqrt{3} \text{ m/s}^2$$

$$\therefore\ \frac{a_A}{a_B} = \sqrt{3}$$

22. (4)

From the graph at $t = 1\text{ s}, v_i = 10 \text{ m/s}$

At $t = 7\text{ s}, v_f = 25 \text{ m/s}$

$$a_{\text{average}} = \frac{v_f - v_i}{\Delta t} = \frac{15}{6} = 2.5 \text{ m/s}^2$$

23. (2)

Time taken : t_1 t_2

As $t_1 = \frac{x}{v_1}$ and $t_2 = \frac{x}{v_2}$

$$\therefore\ v = \frac{x+x}{t_1+t_2}$$

$$= \frac{2x}{\frac{x}{v_1} + \frac{x}{v_2}} = \frac{2v_1v_2}{v_1+v_2}$$

$$\therefore\ \frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$$

24. (4)

$$v_P = \frac{dx_P}{dt} = a + 2bt$$

$$v_Q = \frac{dx_Q}{dt} = f - 2t$$

$$v_P = v_Q$$

$$\Rightarrow\ a + 2bt = f - 2t$$

$$2t + 2bt = f - a \Rightarrow t = \frac{f-a}{2(b+1)}$$

25. (1)

When a body starts from rest and under the effect of constant acceleration then the distance travelled by the body in same time intervals is in the ratio of odd number i.e., 1 : 3 : 5 : 7

So, $h_1 : h_2 : h_3 \Rightarrow 1 : 3 : 5$

$$\frac{h_1}{h_2} = \frac{1}{3}, \frac{h_1}{h_3} = \frac{1}{5}$$

$$\Rightarrow\ h_1 = \frac{h_2}{3}, h_1 = \frac{h_3}{5}$$

So, $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$

26. (4)

$F \propto V$

$$K = \frac{F}{V} = \frac{\text{MLT}^{-2}}{\text{LT}^{-1}} = [\text{MT}^{-1}]$$

27. (3)

Maximum instantaneous velocity will be at that point which has maximum slope.

As clear from the graph 'C' has maximum slope.

28. (3)

The dimensional formula for pressure

$$P = \frac{\text{Force}}{\text{Area}} = \frac{\text{MLT}^{-2}}{\text{L}^2} \Rightarrow \left[\text{ML}^{-1}\ \text{T}^{-2}\right]$$

29. (4)

None of the graph is physically possible

30. (3)

31. (1)

For upward motion $\Rightarrow$ velocity after 30 sec.

$v = u +$ at

$v = 0 + 10 \times 30 = 300$ m/s

32. (3)

Distance $= \frac{\pi r}{2}$ and Displacement $= r\sqrt{2}$

$$\frac{\text{Displacement}}{\text{Distance}} = \frac{r\sqrt{2}}{\frac{\pi r}{2}} = \frac{2\sqrt{2}}{\pi}$$

33. (2)

The dimensional formula of energy

$E = [\text{ML}^2\text{T}^{-2}]$

So, dimension of (i) Mass $\to$ 1 (ii) Length $\to$ 2 (iii) Time $\to$ –2

34. **(4)**
Speed and distance never be negative.
In practice, the body cannot have multiple position and velocity at the same time.
Total distance travelled cannot decrease with time.

35. **(4)**

$$\text{Surface tension} = \frac{\text{Force}}{\text{Length}} = \frac{\text{MLT}^{-2}}{\text{L}}$$

Surface tension = $[\text{MT}^{-2}]$

36. **(2)**

Time taken by stone to do down $t_1 = \sqrt{\frac{2h}{g}}$

Time taken by sound to come up $t_2 = \frac{h}{v}$

$$\therefore \quad T = t_1 + t_2 = \sqrt{\frac{2h}{g}} + \frac{h}{v}$$

37. **(2)**
In practice, the body cannot have multiple velocity vector at the same time.

38. **(1)**

$$\frac{\text{Impulse}}{\text{Area}} = \frac{\text{MLT}^{-1}}{\text{L}^2} \Rightarrow [\text{ML}^{-1}\ \text{T}^{-1}]$$

Coefficient of viscosity $\Rightarrow \eta = [\text{ML}^{-1}\ \text{T}^{-1}]$

So, $\frac{\text{Impulse}}{\text{Area}}$ = coefficient of viscosity

39. **(2)**
$a, t, v = ?$

$$a = \frac{dv}{dt} \Rightarrow \int dv = \int a dt$$

$$\int_u^v dv = \int_0^t \left(3t^2 + 2t + 2\right) dt$$

$$V - 2 = 3\left(\frac{t^3}{3}\right) + 2\left(\frac{t^2}{2}\right) + 2(t)$$

at $t = 2$

$$V - 2 = 2^3 + 2^2 + 2(2)$$

$V - 2 = 16 \Rightarrow \boxed{V = 18\text{m/s}}$

40. **(2)**

$$\frac{1\ \text{kg m}}{s^2} = \frac{F\left(x\ \text{kg}\right)\left(ym\right)}{(zs)^2}$$

$$\therefore \quad F = \frac{z^2}{xy}$$

41. **(2)**

$$v = at + \frac{b}{t+c}$$

By the principle of homogeneity,

$$c = t = [\text{T}]$$

$$at = v \Rightarrow a = \left[\text{LT}^{-2}\right]$$

$$\frac{b}{T} = \text{LT}^{-1} \Rightarrow b = [\text{L}]$$

42. **(4)**
1 light year = 9.46×10^{15} m

43. **(4)**

Dimension of $\frac{W}{q} = [\text{ML}^2\text{A}^{-1}\text{T}^{-3}]$

which is different from dimension of force $[\text{MLT}^{-2}]$

44. **(1)**

45. **(2)**
$a = 2x$

$$v\frac{dv}{dx} = 2x$$

$$\int v dv = \int 2x dx$$

$$\left(\frac{v^2}{2}\right)_0^v = \left(x^2\right)_2^4$$

$$\frac{v^2}{2} = 16 - 4$$

$$\boxed{V = \sqrt{24}\,\text{m/s}}$$

46. **(2)**
$F = at + bt^2$

$$F \rightarrow \text{N} \rightarrow kg\frac{m}{s^2}$$

$$at \rightarrow \text{N} \rightarrow a.t = \text{kg}\frac{\text{m}}{\text{s}^2};\ a = \text{kg}\frac{\text{m}}{\text{s}^3};$$

$$\boxed{[a] = \left[\text{MLT}^{-3}\right]}$$

$$bt^2 \rightarrow \text{N} \rightarrow bt^2 = \text{kg}\frac{\text{m}}{\text{s}^2};\ b = \text{kg}\frac{\text{m}}{\text{s}^4};$$

$$\boxed{[b] = [\text{MLT}^{-4}]}$$

47. **(2)**
Unit same $\rightarrow$ Add, sub, Multi, Div.
Unit Diff $\rightarrow$ Multi, Div.

48. **(4)**

$$n_1 u_1 = n_2 u_2$$

$$\Rightarrow \quad \frac{4\text{g}}{\text{cm}^3} = n_2 \times \frac{100\ \text{g}}{10^3\,\text{cm}^3}$$

$$\Rightarrow \quad \boxed{n_2 = 40}$$

49. **(2)**

Write relation

$$a = \frac{dv}{dt} \Rightarrow \int_u^v dv = \int a dt$$

$(V - u)$ = Area under the at curve

$V - 0 = 6 - 2$

$\boxed{V = 4\text{m/s}}$

50. **(3)**

$$\left(P + \frac{a}{V^2}\right) = b\frac{\theta}{V}$$

Dimensionally,

$$P = \frac{a}{V^2}$$

$$\text{ML}^{-1}\text{T}^{-2} \times \text{L}^6 = a \quad \Rightarrow \quad \boxed{a = [\text{ML}^5\,\text{T}^{-2}]}$$