	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	**Department: SCIENCE 2021 – 22** **SUBJECT: PHYSICS**	**Date of submission:** **21.06.2020**
Worksheet No:01 **WITH HINTS**	**Topic: units and measurements**	**Note:** **A4 FILE FORMAT**
CLASS/SEC	**NAME OF THE STUDENT:**	**ROLL NO.**

MCQ TYPE QUESTIONS

1.The velocity of a body is given by the equation: $\upsilon = (b/t) + ct^2 + dt^3$.
The dimensional formula for b is
(a) $[M^0LT^0]$ (b) $[ML^0T^0]$ (c) $[M^0L^0T]$ (d) $[MLT^{-1}]$

2. Suppose a quantity y can be the dimensionally represented in terms M, L and T, that is $[y] = [M^aL^bT^c]$. The quantity mass;
(a) may be represented in terms of L, T and y if a = 0
(b) may be represented in terms of L, T and y if a≠ 0.
(c) can always be dimensionally represented in terms of L, T and y.
(d) can never be dimensionally represented in terms of L, T and y.

3. if I is the moment of inertia and ω the angular velocity, what is the dimensional formula of rotational kinetic energy ½ Iω2.
(a) $[ML^2T^{-1}]$ (b) $[M^2L^{-1}T^{-2}]$ (c) $[ML^2T^{-2}]$ (d) $[M^2L^{-1}T^{-2}]$

4. if $Y = a+bt+ct^2$, where y is in meter and t in second, then the unit of c is
(a)m (b) s^{-2} (c)ms^{-1} (d) ms^{-2}

5. The dimensional formula $[ML^2T^{-2}]$ represents
(a) momentum (b) moment of force (c) acceleration (d) force.

6. g cm s^{-2} stands for the unit of
(a) Energy (b) force (c) momentum (d) acceleration

7. The dimensional formula for PV, where P is pressure and V is volume is the same as that of
(a) work (b) power (c) Elastic modulus (d) Pressure.
8. The quantity having dimensions -2 in the time is
(a) force (b) pressure (c) gravitational constant (d) all of these

9. in the equation $[P+(a/V^2)] (V-b) = RT$, the S.I unit of a is
(a) Nm^2 (b) Nm^4 (c) Nm^{-3} (d) Nm^{-2}

10. The physical quantities of which one is a vector and the other is a scalar, having same dimensions are
(a) moment and momentum (b) power and pressure
(c) impulse and momentum (d) torque and work.

11. given that $r = m^2 \sin pt$, where t represents time, the unit of m is N, then the unit of r is
(a) N (b) N^2 (c) Ns (d) N^2s

12. linear momentum and Angular momentum have the same dimensions in
(a) Mass and length (b) Length and time
(c) Mass and time (d) mass, length and time.

13. The dimensional formula of velocity gradient is
(a) $[M^0L^0T^{-1}]$ (b) $[MLT^{-1}]$ (c) $[ML^0T^{-1}]$ (d) $[M^0LT^{-2}]$

14. In the equation: $S_{nth} = u+(a/2) (2n-1)$, the letters have their usual meanings. The dimensional formula of S_{nth} is
(a) $[M^1L^0T^1]$ (b) $[M^1L^{-1}T^{-1}]$ (c) $[M^0L^1T^{-1}]$ (d) $[M^0L^1T^0]$

15. The dimensionless quantity
(a) does not exist (b) always has a unit
(c)never has a unit (d) may have a unit.

16. The number of significant figures in 0.06900 is
(a) 5 (b) 4 (c) 2 (d) 3

17. The sum of the numbers 436.32, 227.2 and 0.301 in appropriate significant figures is
(a) 663.821 (b) 664 (c) 663.8 (d) 663.82

18. The mass and volume of a body are 4.237 g and 2.5 cm^3, respectively. The density of the material of the body in correct significant figures is
(a) 1.6048 g cm^{-3} (b) 1.69 g cm^{-3} (c) 1.7 g cm^{-3} (d) 1.695 g cm^{-3}

19. The numbers 2.745 and 2.735 on rounding off to 3 significant figures will give
(a) 2.75 and 2.74 (b) 2.74 and 2.73 (c) 2.75 and 2.73(d) 2.74 and 2.74

20. Measure of two quantities along with the precision of respective measuring instrument is A = 2.5 m s^{-1} ± 0.5 ms^{-1} B = 0.10 s ± 0.01 s
The value of A B will be
(a) (0.25 ± 0.08) m (b) (0.25 ± 0.5) m
(c) (0.25 ± 0.05) m (d) (0.25 ± 0.135) m

21. You measure two quantities as A = 1.0 m ± 0.2 m, B = 2.0 m ± 0.2 m. We should report correct value for √AB as:
(a) 1.4 m ± 0.4 m (b) 1.41m ± 0.15 m
(c) 1.4m ± 0.3 m (d) 1.4m ± 0.2 m

22. Which of the following measurements is most precise?
(a) 5.00 mm (b) 5.00 cm (c) 5.00 m (d) 5.00 km.

23. The mean length of an object is 5 cm. Which of the following measurements is most accurate?
(a) 4.9 cm (b) 4.805 cm (c) 5.25 cm (d) 5.4 cm

24. Which of the following ratios express pressure?
(a) Force/ Area (b) Energy/ Volume
(c) Energy/ Area (d) Force/ Volume

25. Which of the following are not a unit of time?
(a) Second (b) Parsec (c) Year (d) Light year

VERY SHORT ANSWERS TYPE QUESTIONS

1. Why do we have different units for the same physical quantity?

Ans: - because this units are used in different parts of the world.

2.The radius of atom is of the order of 1 Å and radius of nucleus is of the order of fermi. How many magnitudes higher is the volume of atom as compared to the volume of nucleus?

Ans: - 10^{15} Approx.

3.Name the device used for measuring the mass of atoms and molecules.

Ans: - mass spectrograph.

4.Express unified atomic mass unit in kg.

Ans: - 1 amu = 1.661 x 10^{-27} kg.

5.Why length, mass and time are chosen as base quantities in mechanics?

Ans: - In mechanics all the derived physical quantities can be derived only by length, mass and time.

SHORT ANSWERS TYPE QUESTIONS

1. The distance of a galaxy is of the order of 10^{25} m. Calculate the order of magnitude of time taken by light to reach us from the galaxy.
Hints: - find total time to travel this distance by distance/speed. Power of ten part is the answer.

2. If the unit of force is 100 N, unit of length is 10 m and unit of time is 100 s, what is the unit of mass in this system of units?
Hints: - $F = ml/t^2$, $m = F \times t^2/l = 100N \times 10000\ S^2/\ 10m = 10^5\ Nm/S^2$

3. Give an example of
(a) a physical quantity which has a unit but no dimensions.
(b) a physical quantity which has neither unit nor dimensions. (c) a constant which has a unit.
(d) a constant which has no unit.
Hints: -(a) angle, (b) strain, refractive index etc. (co-efficient of friction or spring constant).

4. Calculate the length of the arc of a circle of radius 31.0 cm which π/6 subtends an angle of at the centre.
Hints: - 2πr/12.

5. The displacement of a progressive wave is represented by y = Asin (ωt – kx), where x is distance and t is time. Write the dimensional formula of
(i) ω and (ii) k.

Hints: -(i) $[T^{-1}]$, (ii) $[L^{-1}]$.

6. Which of the following time measuring devices is most precise?
(a) A wall clock.
(b) A stop watch.
(c) A digital watch.
(d) An atomic clock.
Give reason for your answer.

Hints: -(d) An atomic clock. NIST (National Institute of Standards and Technology) is world's most accurate clock which is Cesium based atomic clock. It loses only 1 second in about 30 million years. It is in USA.

LONG ANSWERS TYPE QUESTIONS

1.A new system of units is proposed in which unit of mass is α kg, unit of length β m and unit of time γ s. How much will 5 J measure in this new system?

Hints: - 5 J = 5 kgm^2s^{-2} = 5 $\alpha \beta^2 \gamma^{-2}$.

2. A physical quantity X is related to four measurable quantities a, b, c and d as follows: X = $a^2b^3c^{5/2}d^{-2}$. The percentage error in the measurement of a, b, c and d are 1%, 2%, 3% and 4%, respectively. What is the percentage error in quantity X? If the value of X calculated on the basis of the above relation is 2.763, to what value should you round off the result.

Hints: - refer to notebook same type question we have solved.

3. In the expression P = E $l^2m^{-5}G^{-2}$, E, m, l and G denote energy, mass, angular momentum and gravitational constant, respectively. Show that P is a dimensionless quantity.

Hints: - put dimensions of each quantity.

4. If velocity of light c, Planck's constant h and gravitational constant G are taken as fundamental quantities then express mass, length and time in terms of dimensions of these quantities.

Hints: -apply property of dimension to derive relation between two or more quantity.

Answer Key of MCQs;-

1. (a), 2. (b), 3. (c), 4. (d), 5. (b), 6. (b), 7. (a), 8. (d), 9. (b), 10. (d), 11. (b), 12. (c), 13. (a), 14. (c), 15. (d), 16. (b), 17. (b), 18. (c), 19. (d), 20, (a), 21. (d), 22. (a), 23. (a), 24. (a, b), 25. (b, d).

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