JASWANT MODERN SR. SEC. SCHOOL WORKSHEET CLASS 11TH PHYSICS SET A

UNITS AND MEASUREMENT

1. Give any two advantages of SI system.
2. Obtain the value of 1 parsec in metre.
3. Define 1 par sec.
4. The length, breadth and thickness of a rectangular sheet of metal arc 4.234m, 1.005 m and 2.01 cm respectively. Find the area and volume of the sheet to correct significant figure.
5. The numbers 2.745 and 2.735 on rounding off to 3 significant figures will be which number?
6. Round off the following numbers as indicated:

(a) 18.35 up to 3 digits
(b) 143.45 up to 4 digits
(c) 18967 up to 3 digits

7. Convert the value of universal gravitational constant into CGS system using dimensional analysis.
8. A small spherical ball of radius (r) falls with terminal velocity (v) through a liquid having coefficient of viscosity (ɳ). The viscous force (F) depends on r, v and ɳ. Using dimensional analysis find a relation among them.
9. The velocity v of particle depends upon time t according to equation $v = bt + \frac{c}{a+t}$. write the dimension of $\left(\frac{a\,b}{c}\right)$.
10. Give an example of a quantity having units but still be dimensionless.
11. Name the physical quantity whose dimension is $M^{-1} L^3 T^{-2}$.
12. Write the dimensions of a and b in the relation
    P = b – x^2/at, where P= power, x = distance and t= time
13. The dimension $M L^2 T^{-3}$ are of …….
14. The expression of power P of a particle at any instant ''t'' having a velocity ''v'' can be represented by $P = a v + b t^3$. Find the dimensions of a and b.
15. Convert 0.01 joule into erg using the method of dimensions.

MOTION IN A STRAIGHT LINE

1. What is the average speed of a car which goes at 20 km/hr for 30 km and 50 km/hr for 25 km?
2. The position x of an object moves along X- axis at any instant time is given by $x = 20 t + 4 t^2$. Calculate (i) instantaneous velocity at t = 3 s (ii) average velocity between t = 2 s to t = 3 s (iii) instantaneous acceleration
3. Read each statement given below carefully and state with reasons, if it is true or false, a particle in one dimensional motion
   (a) With zero speed at an instant may have non- zero acceleration at that instant
   (b) With positive value of acceleration must be speeding up.
4. The acceleration of a particle is given as $a = 3t^2 + 2t + 2$, Where t is time. If the particle starts with velocity 2 m/s at t = 0, find out the velocity at the end of 2 sec.
5. Derive the equation of motion $s = ut + \frac{1}{2} a t^2$ using graphical method.
6. A particle describes 66 cm and 82 cm respectively in 12th and 16th second of its motion. How much distance will the particle describes in first 10 seconds?
7. A ball is thrown straight up. What is the velocity and acceleration at the top?
8. A ball is thrown vertically upwards with a velocity of 20 m/s from the top of a multistory building, the height of a point from where the ball is thrown is 25 m from the ground
   (a) How high will ball rise?
   (b) How long will it be before the ball hits the ground?
9. Two bodies are thrown vertically upward, with the same initial velocity of 98 m/s, but another one 4 seconds later when first is thrown. How long after the first one is thrown when they meet?

10. A ball is released from the top of a tower of height h. it takes t seconds to reach the ground. What is the position of the ball in t/3 seconds from the ground?
11. The velocity of a body which has fallen freely under gravity varies as $g^p h^q$, where g is the acceleration due to gravity at the place and h is the height through which the body has fallen. Determine the value of p and q.
12. From the top of a tower 100 m in height, a ball is dropped and at the same time another ball is projected vertically upwards from the ground with a velocity of 25 m/s. find when and where the two balls meet.
13. Draw position graph for non-uniform motion, when body starts from origin with (i) increasing velocity (ii) decreasing velocity.
14. Define uniform motion. Draw the velocity- time graph for an object in uniform motion. Show that the area under the velocity- time graph gives the displacement of an object in given time interval.
15. Plot the speed versus time graph and acceleration versus time graph and velocity versus time graph for an object projected vertically upwards with a speed u from the surface of earth, which comes back to the same point after some time.

MOTION IN A PLANE

1. Define the following vectors
   (a) Free vector
   (b) Unit vector
   (c) Coplanar vectors
2. Prove polygon law of vector addition using triangle law of vector addition.
3. State parallelogram law of vector addition. The vector sum of two vectors of the same magnitude has also same magnitude. Calculate angle between two vectors.
4. Derive an expression for the magnitude of vectors A and B having an angle θ in between and also derive an expression for the direction of the resultant R.
5. Suppose you have two forces F and F. how would you combine them in order to have resultants force of magnitude (a) zero (b) 2 F?
6. The resultant of two vectors $\vec{P}$ and $\vec{Q}$ is perpendicular to $\vec{P}$ and its magnitude is half that of $|\vec{Q}|$. What is the angle between $\vec{P}$ and $\vec{Q}$?
7. Two vectors $\vec{A}$ and $\vec{B}$ are equal in magnitude and perpendicular to each other. Represent the following diagrammatically: (a) 3 $\vec{A}$ + $\vec{B}$ (b) 2 $\vec{A}$ - $\vec{B}$
8. A particle starts from the origin at t = 0 second with a velocity of 10 $\hat{j}$ m/s and moves in the x-y plane with a constant acceleration of ($8\,\hat{\imath} + 2\,\hat{\jmath}$) ms^{-2}. (a) At what time in the x- coordinate of the particle 16 m? (b) what is the speed of the particle at the time?
9. The velocity of particle, when it is at the greatest height is $\sqrt{2/5}$ times its velocity when it is at half of its greatest height. Determine the angle of projection.
10. Find the angle of projection for which the horizontal range and the maximum height attained by an object at certain angle with horizontal are equal.
11. What is projectile? A projectile is thrown with velocity u making angle θ with the horizontal. Show that its trajectory is a parabola.
12. A ball is thrown with the speed of 70 m/s at a projectile angle of 30^0 above the horizontal. Determine the time of maximum height and the maximum height.
13. Define time of flight and derive expression for it. Show that there are two angle of projection for which horizontal range is same. Prove that the sum of maximum height for these angle does not depend upon the angle of projection.
14. A truck starts from the rest and accelerates uniformly with 2 m/s^2. At t = 10 s, a stone is dropped by a person standing on the top of the truck (6 m high from ground). What are (i) velocity (ii) acceleration of stone at t = 1 s. (neglect air resistance)
15. Show there are two angles of projection for which the horizontal range is same for a projectile.

16. A projectile can have same range R for the two angles of the projection, if T_1 and T_2 be times of flights in the two cases. Find the value of $T_1 \times T_2$.
17. A shell is fired horizontally from a gun situated at a height of 88.2 m above a horizontal plane with a muzzle velocity of 600 m/s to hit the target on the horizontal plane. Find (i) the time taken to hit the target (ii) horizontal distance of the target (iii) horizontal and vertical component of velocity with which the shell strikes the target.
18. Find out the expression for centripetal acceleration for an object moving uniformly on the circumference of circle. What will be the direction of this acceleration?
19. Find the magnitude of centripetal acceleration of a particle on the tip of a blade, 0.6 m diameter, rotating at 1200 rev/ min.
20. Calculate angular velocity of hour hands of a clock.