# PHYSICS WORKSHEET FOR GRADE 11

## I. Choose the correct answer from the given alternatives

1. Which of the following the correct procedure in scientific method?
   A. Experiment, observation, data analysis, hypothesis and conclusion
   B. Experiment, observation, hypothesis, data analysis and conclusion
   C. Hypothesis, experiment, observation, data analysis and conclusion
   D. Observation, hypothesis, experiment, data analysis and conclusion
2. What will be the vertical component of a force of 5 N acting on a particle in a 60° angle?
   A. 3N B. 2.5N C. 10N D. 4N
3. What is the smallest number of distinct magnitude coplanar vectors that can be joined to yield a consequent of zero? A. 1 B. 2 C. 3 D. 4
4. What will be the y-component of the same applied force if the x-component of a force of 50N is 30N? A. 20N B. 25N C. 40N D. 45
5. The displacement vector of the particle when it has travelled from point $\overrightarrow{r_1}$ (2,3,5) to $\overrightarrow{r_2}$ (3,4,5) will be:
   A. $\hat{\imath} + \hat{\jmath} + \hat{k}$ B. $\hat{\imath} + 5\,\hat{\jmath} + \hat{k}$ C. $\hat{\imath} + \hat{\jmath}$ D. $2\,\hat{\imath} + 4\hat{\jmath} + 4\hat{k}$
6. The angle formed by the vector (1,1) with respect to the x-axis is:
   A. $90^0$ B. $45^0$ C. $22.5^0$ D. $30^0$
7. Which one is **not true** about scalar product?
   A. Scalar product of two perpendicular vector is zero
   B. Scalar product is commutative
   C. Scalar product of a vector with itself is equal to the square of their magnitude
   D. The scalar product of two parallel vector is equal to zero
8. If the initial and terminal points of a vector are coincident then the vector is called as:
   A. Zero vector B. Free vector C. Unit vector D. Equal vector
9. Vector $\vec{A}$ is directed to the west and $\vec{B}$ is directed to the north. Which of the following quadrants is the operation $\vec{B} - \vec{A}$ fall?
   A. 1st quadrant B. 2nd quadrant C. 3rd quadrant D. 4th quadrant
10. Let $\vec{C}=\vec{A} \times \vec{B}$ and $\theta \neq 90^0$, where $\theta$ is the smaller angle between $\vec{A}$ and $\vec{B}$ when they are drawn with their tails at the point. Which one of the following is **not true**?
    A. $\vec{A}.\vec{B} = 0$ B. $\vec{A}.\vec{C}=0$ C. $|\vec{C}|=|\vec{A}||\vec{B}| \sin\theta$ D. $-\vec{C}=\vec{B} \times \vec{A}$
11. $\vec{A}\times\vec{B} \neq \vec{B}\times\vec{A}$ because
    A. Their direction is different C. Both their magnitude and direction are different

B. Their magnitude is different D. No two cross-product are the same

12. If more than three forces are acting on the massive point object, then the object will be in equilibrium if and only if all the forces are

A. collinear B. coplanar

C. acting in random directions D. represented by the sides of a closed polygon

13. Which one is **true** two about two vectors $\vec{A}$ *and* $\vec{B}$ orthogonal?

A. Their vector product is equal to zero C. Their dot product is equal to 1

B. Their dot product is equal to zero D. Their vector product is equal to -1

14. Which one of the following statements is **wrong**?

A. Vector product is not commutative

B. Vector product of two vectors given magnitude has maximum value when they at $90^0$

C. The angle between vector product of two vectors $\vec{A}$ *and* $\vec{B}$ is given by $\cos\theta = \frac{|\vec{A}\times\vec{B}|}{|\vec{A}|\vec{B}|}$

D. Cross product of two parallel vectors is a null vector

15. Which one of the following products is **incorrect**?

A. $\hat{k}.(\hat{\imath}\times\hat{\jmath})$=1 B. $\hat{\jmath}.(\hat{k}\times\hat{\imath})$=1 C. $\hat{\imath}.(\hat{\jmath}\times\hat{k})$=0 D. $\hat{k}.(\hat{\jmath}\times\hat{k})$=0

16. The two vectors have magnitudes of 3 and 5. If the angle between them is $60^0$, then the **dot product two vector** will be ____ A. 6.5 B. 8 C. 7.5 D. 7.9

17. A force vector of magnitude 12N is added to a force vector of magnitude 15N. The magnitude of the resultant vector **can never be**?

A. 3N B. 27N C. 29N D. 19N

18. The vector projection of $2\hat{\imath}+4\hat{k}$ on y-axis is

A. 2 B. 4 C. 0 D. 6

19. A vector that represents the location of an object in relation to another object is ____

A. Position vector C. unit vector

B. Collinear vector D. coplanar vector

20. The (X, Y, Z) coordinates of two point A and B are given respectively as (0, 3,-1) and (-2, 6, 4). The displacement of vector from A to B is

A. $-2\hat{\imath}+6\hat{\jmath}+4\hat{k}$ B. $-2\hat{\imath}+3\hat{\jmath}+43$ C. $-2\hat{\imath}+3\hat{\jmath}+3\hat{k}$ D. $2\hat{\imath}-3\hat{\jmath}-3\hat{k}$

21. If two $\hat{\imath}-3\hat{\jmath}+5\hat{k}$ and $-\hat{\imath}-3\hat{\jmath}-\alpha\hat{k}$ are equal vectors, then the value of $\alpha$ ?

A. -3 B. 2 C. 5 D. 3

22. . For a vector quantity, which of the following is true?

A. It just has the magnitude C. It has only the direction

B. It has both the magnitude as well as the direction D. None of the mentioned

23. What will be the vertical component of a force of 5 N acting on a particle in a 60° angle?

A. 3N B. 2.5N C. 10N D. 4N

24. In a rectangular-coordinate system, a particle's position is (3, 2, 5). Then it will have a position vector of

A. $3\hat{\imath} + 5\hat{\jmath} + 2\hat{k}$ B. $3\hat{\imath}+2\hat{\jmath}+5\hat{k}$ C. $5\hat{\imath}+3\hat{\jmath}+2\hat{k}$ D. $-3\hat{\imath}-2\hat{\jmath}-5\hat{k}$

25. The displacement vector of the particle when it has travelled from point P (2,3,5) to Q (3,4,5) will be:

A. $\hat{\imath} + \hat{\jmath} + 10\hat{k}$ B. $\hat{\imath} + \hat{\jmath} + 5\hat{k}$ C. $\hat{\imath} + \hat{\jmath}$ D. $2\hat{\imath} + 4\hat{\jmath} + 6\hat{k}$

26. Find the value of c for which the vector $0.3\hat{\imath} + 0.7\hat{\jmath} + c\hat{k}$ is a unit vector.

A. 0.35 B. 1.44 C. 0.22 D. 0.67

27. If the initial and terminal points of a vector are coincident then the vector is called as:

A. Zero vector B. Free vector C. Unit vector D. Equal vector

28. If more than three forces are acting on the massive point object, then the object will be in equilibrium if and only if all the forces are

A. Collinear C. acting in random directions

B. Coplanar D. represented by the sides of a closed polygon

29. Two forces of 200 N and 120 N are inclined at an angle of $60^0$. The resultant force will be

A. 40 N B. 180 N C. 280 N D. 340 N

30. Can the resultant of two vectors be zero?

A. Yes, when the 2 vectors are same in magnitude and direction

B. No C. Yes, when the 2 vectors are same in magnitude but opposite in sense

D. Yes, when the 2 vectors are same in magnitude making an angle of 2/3 with each other

31. The position of a particle in a rectangular co-ordinate system is (3,2,5). then its position vector will be

A. $5\hat{\imath} + 6\hat{\jmath} + 2\,\hat{k}$ B. $3\hat{\imath} + 2\hat{\jmath} + 5\hat{k}$ C. $5\hat{\imath} + 3\hat{\jmath} + 2\,\hat{k}$ D. $5\hat{\imath} + 6\hat{\jmath} + 2\,\hat{k}$

32. The vectors $\vec{A} = 5\hat{\imath} + 8\hat{\jmath}$ and $\vec{B} = 2\hat{\imath} + 7\hat{\jmath}$ are added. The magnitude of the sum of this vector is

A. $\sqrt{274}$ B. 38 C. 238 D. 560

33. Use the given vectors to find the specified scalar. A = 6i + 5j, B= 6i - 9j, C = 7i - 3j; Find A · (B + C).

A. -7 B. -9 C. 27 D. 18

34. Velocity of a particle as a function of time is given by $v(t)=3t^2-4t+5$ what is the instantaneous acceleration of a particle at t= 2 seconds

A. $2ms^{-2}$ B. $3ms^{-2}$ C. $4ms^{-2}$ D. $5ms^{-2}$

35. instantaneous and average velocity becomes equal when a body

A. has zero acceleration
C. has variable acceleration
B. Has uniform acceleration
D. moves in a circle

36. A 30kg child swings at the end of 5m long rope. The child is moving 3.0 $^{m}/_{s}$ at the lowest point of the motion. What is the tension at this point? (use g=9.8 $^{m}/_{s^2}$)
A. 345 N B. 150N C. 980N D. 300N

37. When a velocity- time graph is a straight line parallel to time axis then_____?
A. Acceleration is constant
C. velocity is zero
B. Acceleration is variable
D. acceleration is zero

38. A car initially travelling with a speed of $20\frac{m}{s}$ accelerates at a rate of $16\frac{m}{s}$ every 2seconds.what its speed at the end of 5 seconds?
A. $40\frac{m}{s}$ B. $60\frac{m}{s}$ C. $80\frac{m}{s}$ D. $100\frac{m}{s}$

39. When a body is in motion, _____ always changes
A. Its velocity
B. Its acceleration
B. Its position vector
D. Its momentum

40. Which one is **not true** about free falling object's motion?
A. In the absence of air resistance two different massive objects fall at different rate of acceleration
B. From maximum height back to the ground the initial velocity zero
C. The acceleration acquired for the object is acceleration due to gravity

41. The speedometer in an automobile measure_____ of the automobile
A. Instantaneous speed
C. Average speed
B. Instantaneous acceleration
D. Average acceleration

42. Which of the following pair of vectors are collinear?
A. $\begin{bmatrix}4\\2\end{bmatrix}, \begin{bmatrix}-4\\-2\end{bmatrix}$ B. $\begin{bmatrix}4\\2\end{bmatrix}, \begin{bmatrix}-4\\2\end{bmatrix}$ C. $\begin{bmatrix}4\\2\end{bmatrix}, \begin{bmatrix}4\\-2\end{bmatrix}$ D. $\begin{bmatrix}-4\\-2\end{bmatrix}, \begin{bmatrix}4\\-2\end{bmatrix}$

43. Which of the following statements is true about the motion of a particle in a circular path?
A. The centripetal acceleration is always in the direction perpendicular to the velocity vector of the particle.
B. The acceleration is always perpendicular to the velocity vector of the particle
C. The centripetal acceleration is constant if the particle's speed is constant
D. The tangential acceleration can be perpendicular to the velocity of the particle

44. The correct statement from the following is
A. A body having uniform speed can have only uniform acceleration
B. A body having zero velocity will necessarily have zero acceleration
C. A body having non-uniform velocity will have zero acceleration
D. A body having zero velocity will not necessarily have zero acceleration

45. Under what condition average and instantaneous velocity of the object becomes the same
A. If the object moves unequal distance with equal time interval

B. If the object moves in a uniform state of motion

C. If the object's acceleration is zero

D. If the object's initial velocity greater than its final velocity

46. A coin and a bag full of rocks are thrown in a gravity less environment with the same initial speed. Which one of the following statements is true about the situation?
    A. The bag will travel faster
    B. Both will travel with the same speed
    C. The coin will travel faster
    D. Bag will not move

47. A ball is thrown upwards from the top of a tower high with a velocity of 10 $^{m}/_{s}$ . find the time when it strikes the ground. (Take g = 10$\frac{m}{s^2}$ )
    A. 4sec B. 6sec C. 3sec D. 7sec

48. An athlete swings a hammer of mass 7kg in a circular path of radius 1. 50m.what is the speed of the hammer if it completes 3revolution per second?
    A. 28.3$^{m}/_{s}$ B. 50 $^{m}/_{s}$ C. 4$^{m}/_{s}$ D. 16 $^{m}/_{s}$

49. Instantaneous velocity is different from average velocity in that; instantaneous velocity is
    A. the velocity at a particular instant of time.
    B. in opposite direction to the displacement of the moving object.
    C. the total displacement to the time taken.
    D. the average velocity during the time of acceleration.

50. An engine is moving with velocity of 44 $\frac{m}{s}$ . after applying the brakes, it stops after covering a distance of 121m calculate the acceleration and time taken respectively by the engine to stop?
    A. $-4\frac{m}{s^2}$ and 1.5 sec B. $8\frac{m}{s^2}$ and 1.5 sec C. $-8\frac{m}{s^2}$ and 5.5 sec D. $4\frac{m}{s^2}$ and 1.5 sec

51. A vehicle travels half distance L with speed $v_1$ and the other half with speed $v_2$, the average speed of the vehicle is ___
    A. $\frac{v_1+v_2}{2}$ B. $\frac{2v_1+v_2}{v_1+v_2}$ C. $\frac{2(v_1+v_2)}{v_1v_2}$ D. $\frac{2v_1v_2}{v_1+v_2}$

52. A car accelerated from initial position and then returned at initial point, then
    A. Velocity is zero but speed increases
    B. Speed is zero but velocity increases
    C. Both speed and velocity increases
    D. both speed and velocity decreases

53. A student throws a ball vertically upward with a speed of$20\frac{m}{s}$. What the maximum height reached by the ball and its velocity after 3 seconds it was thrown are respectively?
    A. 20m and $10\frac{m}{s}$ downward
    B. 20m and $300\frac{m}{s}$ upward
    C. 15m and $10\frac{m}{s}$ downward
    D.105m and $50\frac{m}{s}$ upward

54. An object of mass M is set in a vertical circular motion. The tension T from the rope keeps the object in a circular path with speed V. where does the rope experience a maximum tension?
    A. At the top of the circle
    B. At the bottom of the circle
    C. When the object is at half of the circle
    D. When it is at $45^0$ to the circle

55. A body moves a distance of 15 m in a 15mins, with an initial velocity of 0m/min. What is the final velocity in m/min?

A. $2\frac{m}{min}$ B. $8\frac{m}{min}$ C. $5\frac{m}{min}$ D. $6\frac{m}{min}$

## II. Workout: show the necessary steps

56. The sum of magnitudes of two forces acting at a point is 16 and magnitude of their resultant is $8\sqrt{3}$. If the resultant is at $90^0$ with the force of smaller magnitude, then their magnitude is

57. If $\vec{A} = 6\hat{\imath} - 2\hat{\jmath}$ and $\vec{B} = 3\hat{\imath} + 5\hat{\jmath}$ then find the angle θ between the vectors. Round the answer to the nearest tenth of a degree, (show for both scalar and dot product of vectors)

58. If $A = -\hat{\imath} - 3\hat{\jmath}$ and $B = 9\hat{\imath} - 3\hat{\jmath}$ show that whether they are orthogonal or not.

59. If $\vec{A} = 6\,\hat{\imath} - 2\hat{\jmath}$ and $\vec{B} = = 3\,\hat{\imath} + 5\hat{\jmath}$ then find the angle θ between the vectors. Round the answer to the nearest tenth of a degree, if necessary. (use dot product)

60. Use the **dot product** to determine whether the vectors are parallel, orthogonal, or neither for a given two vectors $\vec{A} = 3\,\hat{\imath} - 4\hat{\jmath}$ and $\vec{B} = 4\,\hat{\imath} - 4\hat{\jmath}$

61. A ball is thrown vertically upwards with a velocity of 10m/s from the balcony of a tall building. balcony is 15m above the ground and gravitational acceleration is $10m/s^2$. Find
    a. the time required for the ball to hit the ground, and
    b. the velocity with which it hits the ground.

62. A boy throws a ball vertically upward in air and catches the ball after 8 seconds. (take $g=10ms^{-2}$) Calculate
    A. How high does the ball rise in the air?
    B. What is its velocity when it left the boy's hands?
    C. What is the velocity of the ball at the end of 7 seconds
    D. How high is the ball above the ground after 7 seconds?

63. A body moving along x-axis with a given position function of time $x(t)=3t^3-2t+3$. determine
    a. Average velocity the body between t=2 sec to t=3sec
    b. Instantaneous velocity of the body at t=2 sec and t=3sec (int use limit definition)
    c. Average acceleration of the body between t=2sec to t=2sec
    d. Instantaneous acceleration at t=2sec and t=3sec

64. Three forces each having equal magnitudes of 10N are applied to an object on a horizontal surface. a force $F_1$ makes an angle of $30^0$ above positive x-axis, $F_2$ makes $30^0$ above the negative x-axis and the third force $F_3$ is directed along the positive x-axis. calculate
    a. The magnitude of the resultant force
    b. The direction of the resultant force

65. Calculate the angle between two vectors $A=a\hat{\imath}+a\sqrt{3\hat{\jmath}}$ and $B=a\sqrt{3\hat{\imath}} + a\hat{\jmath}$ (using dot or scalar product)

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66. $\vec{A} = 7\hat{\imath} + 4\hat{\jmath} - 8\hat{k}$ and $\vec{B} = 3\hat{\imath} - 2\hat{\jmath} + 5\hat{k}$ then determine

   a. $\vec{A} \times \vec{B}$

   b. The angle between $\vec{A}$ and $\vec{B}$

   c. Show $\vec{A} \times \vec{B} \neq \vec{B} \times \vec{A}$

   d. The angle between $\vec{B}$ and $\vec{A}$

67. A particle moves in xy plane in such a way that its x and y coordinates vary with time according to $X(t) = t^3 - 32t$, $Y(t) = 5t^2 + 12$ then calculate the acceleration of the particle at t=3sec (int list your final answer in terms of $\vec{a} = a_x\hat{\imath} + a_y\hat{\jmath}$

68. Prove that the following vectors are coplanar or not for the given three vectors

   a. $\vec{A} = 2\hat{\imath} - \hat{\jmath} + \hat{k}$ , $\vec{B} = \hat{\imath} - 3\hat{\jmath} - \hat{k}$ and $\vec{C} = 3\hat{\imath} - 4\hat{\jmath} - 4\hat{k}$

   b. $\vec{A} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ , $\vec{B} = \hat{\imath} + \hat{\jmath} + \hat{k}$ and $\vec{C} = \hat{\imath} + 2\hat{\jmath} + \hat{k}$

   c. $\vec{A} = 5\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ , $\vec{B} = \hat{\imath} + 6\hat{\jmath} + 7\hat{k}$ and $\vec{C} = 4\hat{\imath} + 2\hat{\jmath} + 5\hat{k}$

   d. $\vec{A} = \hat{\jmath} - \hat{k}$ , $\vec{B} = 4\hat{\imath} + 3\hat{\jmath} + \hat{k}$ and $\vec{C} = 3\hat{\imath} + 2\hat{\jmath} + \hat{k}$

69. Prove that the following vectors are collinear or not for the given three vectors

   A. $\vec{A} = 2\hat{\imath} - 3\hat{\jmath} + 4\hat{k}$ , $\vec{B} = -4\hat{\imath} + 6\hat{\jmath} - 8\hat{k}$

70. The velocity-time graph of an object moving along a straight line is given

Calculate the are under the graph=_____

