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Part I	Part II					Total
	Q1	Q2	Q3	Q4	Q5	

PART I: choose the correct answer

1) The position of a particle is given by $x = at^2 + 5$, with x in (m) and t in (s). The units of the constant a is

- a) m b) m/s c) m/s^2 d) non of these

2) The unit of Newton (N) is equivalent to

- a) dyne b) kg.m/s c) kg.m d) $kg.m/s^2$

3) Which of the following quantities is a vector

- a) speed b) energy c) displacement d) time

4) The value of $i \cdot (k \times j)$

- a) 1 b) -1 c) $\sqrt{3}$ d) 0

5) The magnitude of the vector $A = -i + 3j - 2k$

- a) $\sqrt{14}$ b) $\sqrt{4}$ c) $\sqrt{6}$ d) $\sqrt{12}$

6) A particle travels 8 m east within 7 s and then 6 m north for 3 s. The average speed of the particle during the 10 s period is

- a) 1 m/s b) 1.25 m/s c) 1.4 m/s d) $(0.8i + 0.6j)$ m/s

7) The position of a particle is given by $x = 2t^3 + 4$, with x in (m) and t in (s). The initial velocity (at $t=0$) of the particle is

- a) 0 b) 4 m/s c) 6 m/s d) 10 m/s

8) Referring to the previous problem, the acceleration of the particle at $t=1$ s is

- a) 0 b) $6 m/s^2$ c) $16 m/s^2$ d) $12 m/s^2$

9) A car, initially at rest, travels 20 m in 4 s with constant acceleration. The acceleration of the car is

- a) 0.4 m/s^2 b) 1.3 m/s^2 c) 2.5 m/s^2 d) 4.9 m/s^2

10) A ball is thrown vertically upward with initial speed of 6 m/s. It hits the ground with a speed of 12 m/s. The time of flight of the ball is

- a) 1.8 s b) 0.6 s c) 2.4 s d) 1.2 s

11) A plane flies with a velocity of 500 km/hr north with respect to the wind. If the wind blows east with a speed of 200 km/hr, the speed of the plane relative to the earth is

- a) 700 km/hr b) 300 km/hr c) 539 km/hr d) 458 km/hr

12) A projectile is thrown with a speed of 25 m/s at an angle of 37° with the horizontal, the speed of the projectile at its maximum height is

- a) 0 b) 20 m/s c) 15 m/s d) 25 m/s

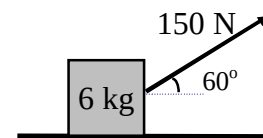
13) Acceleration is always in the direction of the

- a) displacement b) initial velocity c) final velocity d) the net force

14) The mass is a measure of

- a) weight b) force c) inertia d) acceleration

15) A block of mass $m=6 \text{ kg}$ rests on a smooth horizontal surface. It is pulled to the right by a force of 120 N that makes an angle of 60° with the horizontal, as shown. The force exerted on the block by the surface is

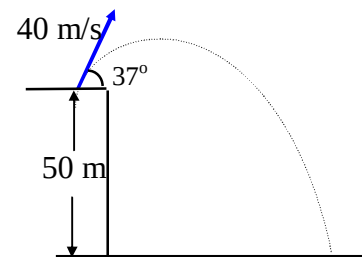


- a) 58.8 N b) 0 c) 16.2 N d) -16.2 N

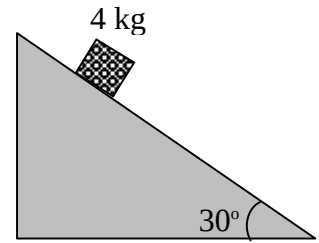
PART II: Solve the following problems

Q1) You are given $\mathbf{A} = 3\mathbf{i} - \mathbf{j} + 2\mathbf{k}$, and $\mathbf{B} = 3\mathbf{i} - 2\mathbf{j}$. Find $\mathbf{A} \times \mathbf{B}$

Q2) A particle is thrown from the top of a building 50 m in height with initial speed of 40 m/s that makes an angle of 37° above the horizontal. What is the velocity of the particle just before hitting the ground?



- Q3)** A block of mass $m=4$ kg is on an inclined, rough surface as shown in the figure. The angle of inclination is $\theta=30^\circ$ and the coefficients of frictions are $\mu_s = 0.7$ and $\mu_k = 0.3$. Find The frictional force f acting on the block.



- Q4)** Two blocks of masses 6 kg and 4 kg connected by a rope, rest on a horizontal surface. The blocks are pulled to the right by applying a force of 60 N to the 4-kg block as shown in the Figure. If the coefficients of friction between the blocks and the surface are $\mu_s = 0.6$ and $\mu_k = 0.4$. Calculate the tension in the rope.

