1. A bird is flying along a straight line with velocity $v = (6–2t)$ m/s. The distance travelled by the bird in $t_1 = 2$ s to $t_2 = 5$ s is

(1) 5 m

(2) Zero

(3) 4 m

(4) 6 m

2. A particle is moving on x-y plane so that its x coordinate varies with time as $x = \frac{t^2}{2}$, and y coordinate varies as $y = \frac{x^2}{2}$. The velocity of the particle at $t = 2$ s is

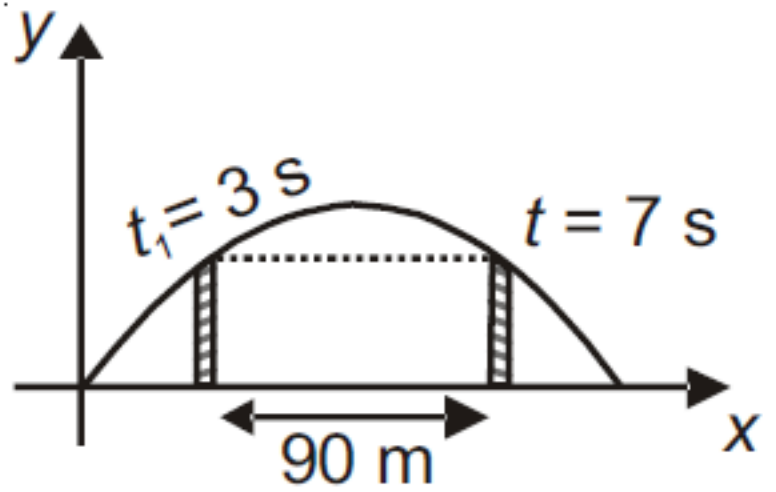
(1) $\vec{v} = (2\hat{i} + 3\hat{j})$ m/s

(2) $\vec{v} = (2\hat{i} + 2\hat{j})$ m/s

(3) $\vec{v} = (3\hat{i} + 4\hat{j})$ m/s

(4) $\vec{v} = (2\hat{i} + 4\hat{j})$ m/s

3. A projectile is thrown from the ground as shown. This distance between two vertical walls is 90 m. The range of projectile is



(1) 125 m

(2) 180 m

(3) 225 m

(4) 250 m

4. A man can swim in still water with speed v, speed of water in the river is u and the width of the river is d. Select the correct statement(s)

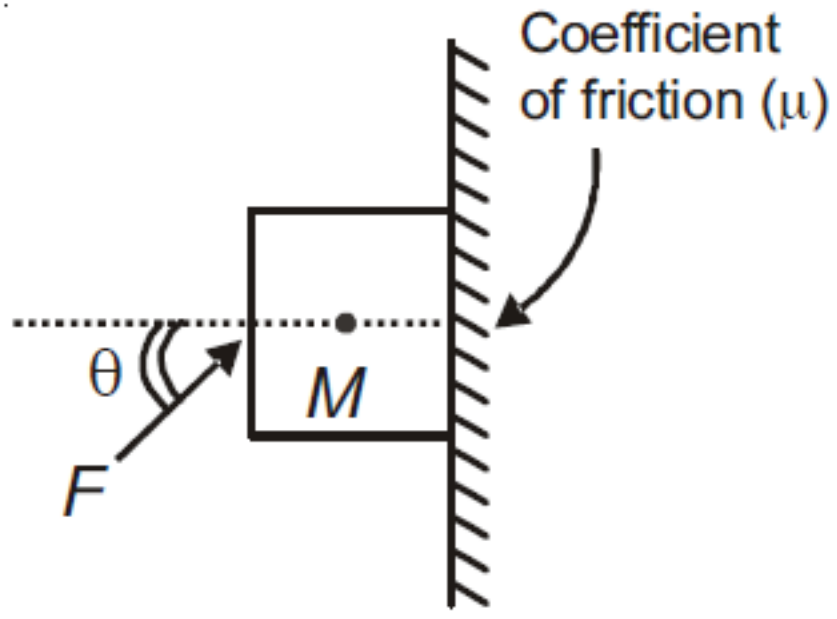
(1) Man cannot reach the point exactly opposite on the bank if $u > v$.

(2) Man can reach exactly opposite point on the bank in time $t = \frac{d}{\sqrt{v^2 - u^2}}$ if $u > v$

(3) The minimum time in which man can cross the river is $\frac{d}{v}$

(4) Both (1) & (3)

5. An external force F is applied on a block at angle θ from horizontal as shown. The minimum value of force required to keep the block stationary is



(1) $\dfrac{mg}{\mu \sin\theta}$

(2) $\dfrac{mg}{\sin\theta + \mu\cos\theta}$

(3) $\dfrac{mg}{\sin\theta - \mu\cos\theta}$

(4) $\dfrac{mg\ \mu\tan\theta}{\sqrt{\mu^2 + 1}}$

6. For the reaction of one mol zinc with two mol hydrochloric acid in a bomb calorimeter, ΔU and W correspond to

(1) $\Delta U < 0, W = 0$ (2) $\Delta U < 0, W < 0$

(3) $\Delta U > 0, W = 0$ (4) $\Delta U > 0, W > 0$

7. The correct order of dipole moment is given by

(1) $CHF_3 > CHCl_3$

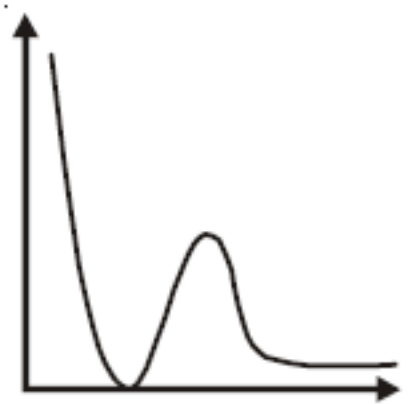
(2) $PCl_3Br_2 > PBr_3Cl_2$

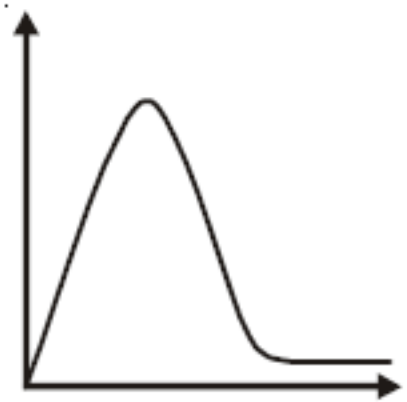
(3) $HI > HBr$

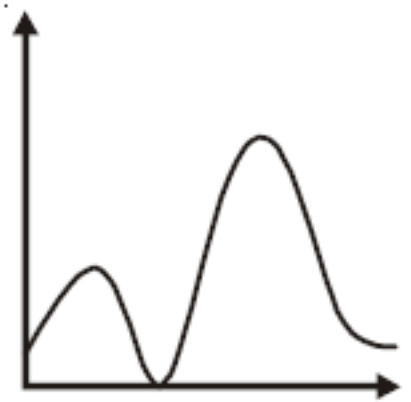
(4) All of these

8. Which is the correct graph between radial probability density vs radial distance for 2*s* orbital?

(1) 

(2) 

(3) 

(4) 

9. The ratio of wavelength of limiting line of Paschen series for Li^{+2} to that of Ist line of visible series for He^{+} will be

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

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

(3) $\frac{9}{5}$

(4) $\frac{5}{9}$

10. The equilibrium constant for the reaction

$$2HBr(g) \rightleftharpoons H_2(g) + Br_2(g)$$

If 15 ml of H_2 reacts with 20 ml of Br_2 in one litre vessel and at equilibrium 20 ml of HBr is formed

(1) 40 (2) 20

(3) 0.125 (4) ∞