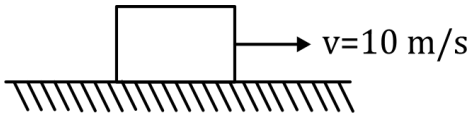
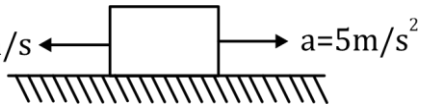
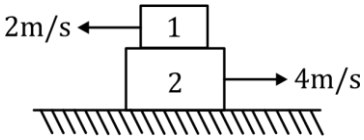
DPP - 1

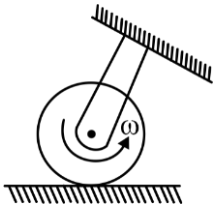
FRICTION

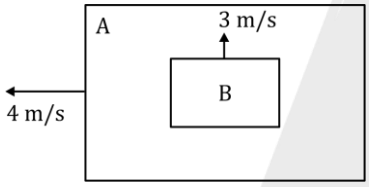
1. Find the direction of kinetic friction force in the following.

(A) 

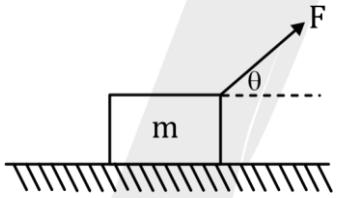
(B) 

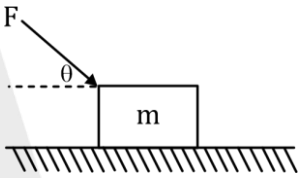
(C) 

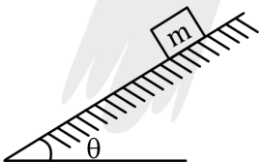
(D) 

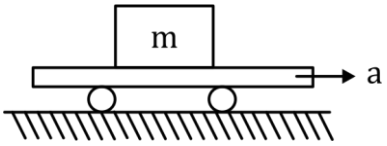
(E) 

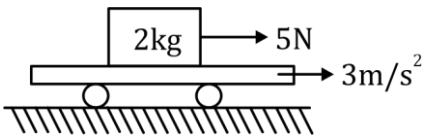
2. Find the direction of static friction force b/ω the contact surface. these is no relative motion b/ω the surfaces,

(A) 

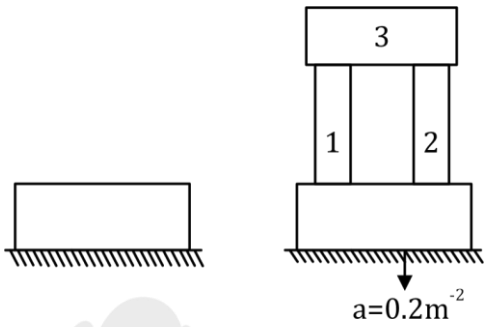
(B) 

(C) 

(D) rest with respect to trolly 

(E) 

3. A steel block of 10 kg rests on a horizontal floor as shown. When three iron cylinders are placed on it as shown, the block and cylinders go down with an acceleration 0.2 m s^{-2}. The normal reaction R′ by the floor if mass of the iron cylinders are equal and of 20 kg each, is _____ N. [Take g = 10 m s^{-2} and $\mu_s = 0.2$]



(A) 716 (B) 684 (C) 686 (D) 714

4. A bag is gently dropped on a conveyor belt moving at a speed of 2 m/s. The coefficient of friction between the conveyor belt and bag is 0.4 . Initially the bag slips on the belt before it stops due to friction. The distance travelled by the bag on the belt during slipping motion is [Take g = 10 m/s^{-2}]

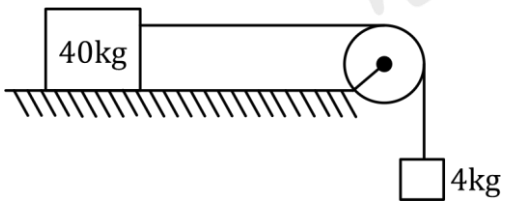
(A) 2 m (B) 0.5 m (C) 3.2 m (D) 0.8 m

5. A block of mass M slides down on a rough inclined plane with constant velocity. The angle made by the incline plane with horizontal is θ. The magnitude of the contact force will be

(A) Mg (B) Mgcos θ

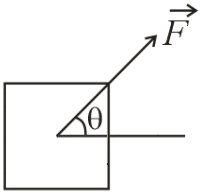
(C) $\sqrt{Mg\sin\theta + Mg\cos\theta}$ (D) Mgsin $\theta\sqrt{1+\mu}$

6. A block of mass 40 kg slides over a surface, when a mass of 4 kg is suspended through an inextensible massless string passing over frictionless pulley as shown below. The coefficient of kinetic friction between the surface and block is 0.02 . The acceleration of block is (Given g = 10 m s^{-2}.)



(A) 1 m s^{-2} (B) 1/5 m s^{-2} (C) 4/5 m s^{-2} (D) 8/11 m s^{-2}

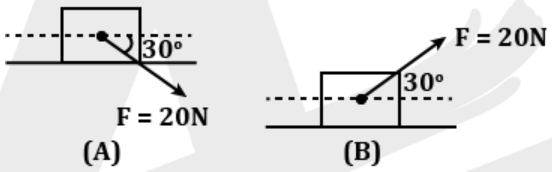
7. A block of mass m slides along a floor while a force of magnitude F is applied to it at an angle θ as shown in figure. The coefficient of kinetic friction is μ_K. Then, the block's acceleration ' a ' is given by (g is acceleration due to gravity)



(A) $\frac{F}{m}\cos\theta - \mu_K\left(g + \frac{F}{m}\sin\theta\right)$ (B) $\frac{F}{m}\cos\theta - \mu_K\left(g - \frac{F}{m}\sin\theta\right)$

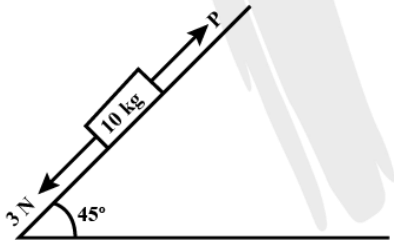
(C) $-\frac{F}{m}\cos\theta - \mu_K\left(g - \frac{F}{m}\sin\theta\right)$ (D) $\frac{F}{m}\cos\theta + \mu_K\left(g - \frac{F}{m}\sin\theta\right)$

8. A block of mass 5 kg is (i) pushed in case (A) and (ii) pulled in case (B), by a force F = 20 N, making an angle of 30° with the horizontal, as shown in the figures. The coefficient of friction between the block and floor μ = 0.2. The difference between the accelerations of the block, in case (B) and case (A) will be ($g = 10\ m\ s^{-2}$)



(A) 0.4 m s^{-2} (C) 0 m s^{-2} (B) 0.8 m s^{-2} (D) 3.2 m s^{-2}

9. A block of mass 10 kg is kept on a rough inclined plane as shown in the figure. A force of 3 N is applied on the block. The coefficient of static friction between the plane and the block is 0.6 . What should be the minimum value of force P, such that the block does not move downward? (Take $g = 10\ m\ s^{-2}$)



(A) 25 N (B) 23 N (C) 18 N (D) 32 N

ANSWER KEY

1. () **2.** () **3.** (C) **4.** (B) **5.** (A) **6.** (D) **7.** (B)
8. (B) **9.** (D)