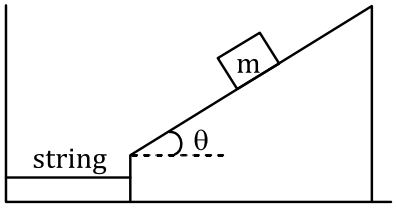
DPP - 5

Q.1 Refer the system shown in the figure. Block is sliding down the wedge. All surfaces are frictionless. Find correct statement(s)



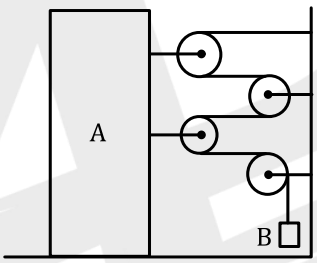
(A)Acceleration of block is gsin θ

(B) Acceleration block is gcos θ

(C) Tension in the string is $mg\cos^2\theta$

(D) Tension in the string is $mg\sin\theta \cdot \cos\theta$

Q.2 Block A is moving away from the wall at a speed v and acceleration a.



(A) Velocity of B is v with respect to A.

(B) Acceleration of B is a with respect to A.

(C) Acceleration of B is 4a with respect to A.

(D) Acceleration of B is $\sqrt{17}$a with respect to A.

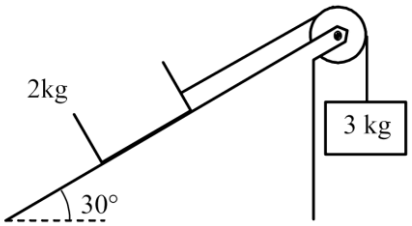
Q.3 In the arrangement shown, the 2 kg block is held to keep the system at rest. The string and pulley are ideal. When the 2 kg block is set free, by what amount the tension in the string changes? [$g = 10\ m/s^2$]

(A) Increase of 12 N

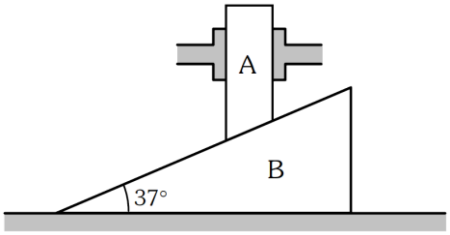
(B) Decrease of 12 N

(C) Increase of 18 N

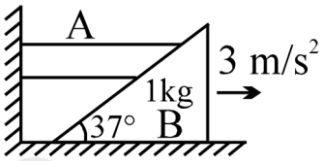
(D) Decrease of 18 N



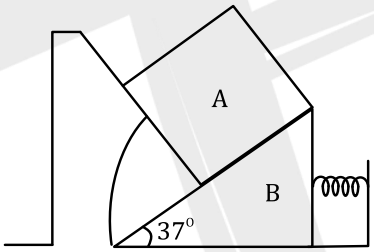
Q.4 Rod A can slide in vertical direction pushing the triangular wedge B towards right. The wedge is moving toward right with uniform acceleration a_B. Find acceleration of the rod A.



Q.5 Find force in newton which mass A exerts on mass B if B is moving towards right with 3 m/s^2. Also find mass of A. (All surfaces are smooth)



Q.6 In the figure shown, all surfaces are smooth and block A and wedge B have mass 10 kg and 20 kg respectively. Find normal reaction between block A&B, spring force and normal reaction of ground on block B. ($g = 10\ m/s^2$).



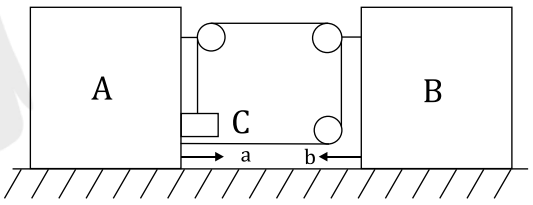
Q.7 Find the acceleration of C w.r.t. ground.

(A) $a\hat{i} - (2a + 2b)\hat{j}$

(B) $a\hat{i} - (2a + b)\hat{j}$

(C) $a\hat{i} - (a + 2b)\hat{j}$

(D) $b\hat{i} - (2a + 2b)\hat{j}$



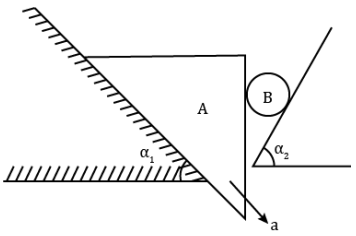
Q.8 Find the acceleration of B if the acceleration of A is 'a' as shown.

(A) $\frac{a\cos\alpha_1}{\cos\alpha_2}$

(B) $\frac{a\sin\alpha_1}{\cos\alpha_2}$

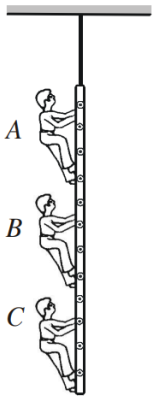
(C) $\frac{a\cos\alpha_2}{\cos\alpha_1}$

(D) $\frac{\cos\alpha_1}{\cos\alpha_2}$

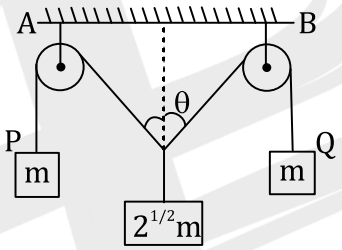


Q.9 A ladder is hanging from ceiling as shown in figure. Three men A, B and C of masses 40 kg, 60 kg, and 50 kg are climbing the ladder. Man A is going up with retardation 2 m/s^2, C is going up with

an acceleration of 1 m/s^2 and man B is going up with a constant speed of 0.5 m/s. Find the tension in the string supporting the ladder. [$g = 9.8\ m/s^2$]



Q.10 The pulleys and strings shown in the figure are smooth and of negligible mass. For the system to remain in equilibrium, the angle θ should be



(A) 0°

(B) 30°

(C) 45°

(D) 60°

ANSWER KEY

1. (A,D) **2.** (D) **3.** (B) **4.** $3a_B/4$ **5.** 5N, 16/31kg

6. 80 N, 48 N, 264 N **7.** (A) **8.** (A) **9.** 1440 N **10.** (C)