

(題 1 至 13 為單選題，答錯倒扣題分 1/4 !!)

The slotted arm OA oscillates about O and drives the crank CP as shown in **Fig. 1**. Assume $\dot{\theta} = K = \text{constant}$.

1. (9%) The magnitude of the velocity of P is (A) $bK/2$ (B) bK (C) $2bK$ (D) $4bK$.
2. (8%) The magnitude of the acceleration of P is (A) $4bK^2$ (B) $4bK$ (C) $2bK$ (D) $2b^2K$.

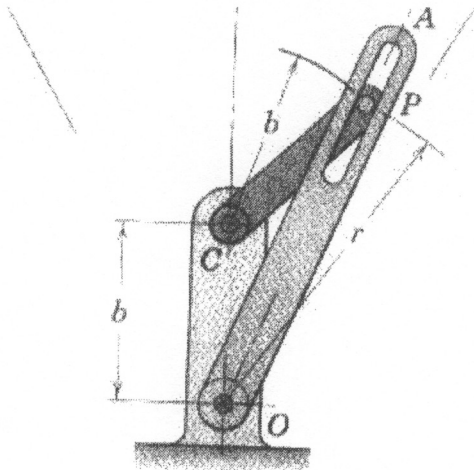


Fig. 1

3. (8%) As shown in **Fig. 2**, under the action of force P , the constant acceleration of block B is 2 m/s^2 up the incline. For the instant when the velocity of B is 1.2 m/s up, the acceleration of B relative to A is (A) 0.8 m/s (B) 2 m/s (C) 0.4 m/s (D) 1 m/s .

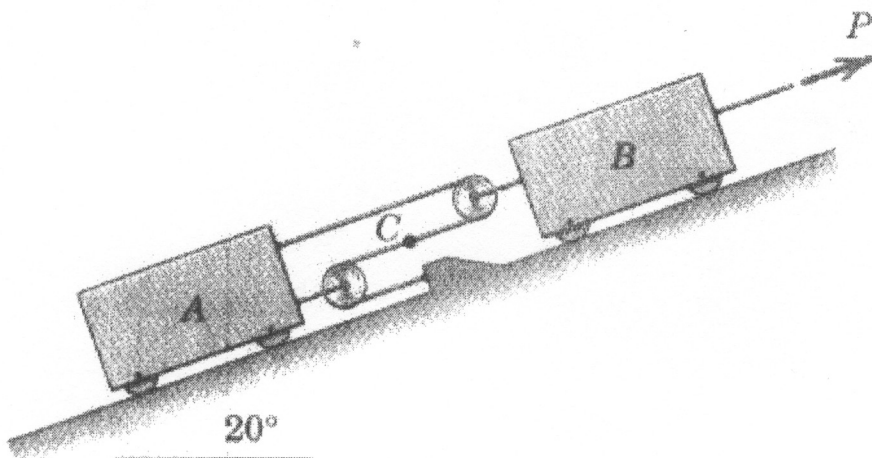


Fig. 2

4. (4%) When the velocity of a particle is constant, its acceleration is (A) constant; (B) zero; (C) time varying; (D) none of the above.
5. (4%) For free-flight motion of a projectile, when air resistance is neglected, the only force acting on the projectile is (A) its weight; (B) the vertical component of initial throwing force; (C) the horizontal component of initial throwing force; (D) all of the above.
6. (7%) A ball is thrown from a position 5 ft above the ground to the roof of a 40-ft-high building, as shown in **Fig. 3**. If the initial velocity of the ball is 70 ft/s, inclined at an angle of 60° from the horizontal, which of R' (the range from the point where the ball is thrown to where it strikes the roof) and h (the maximum height the ball can reach) is larger?
 (A) $R' > h$; (B) $R' = h$; (C) $R' < h$; (D) It may be $R' > h$ or $R' < h$ dependent on different conditions.

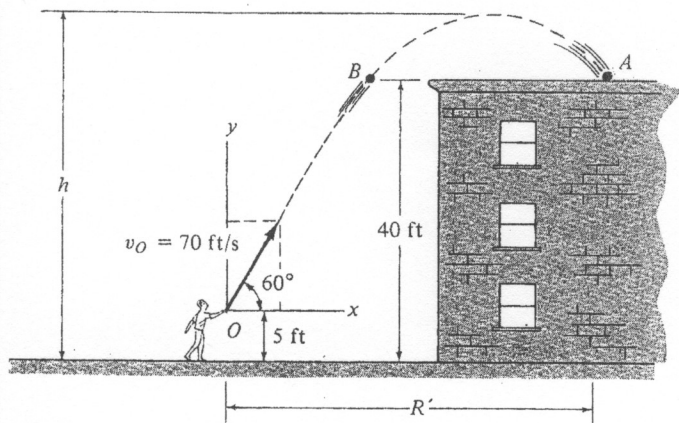


Fig. 3

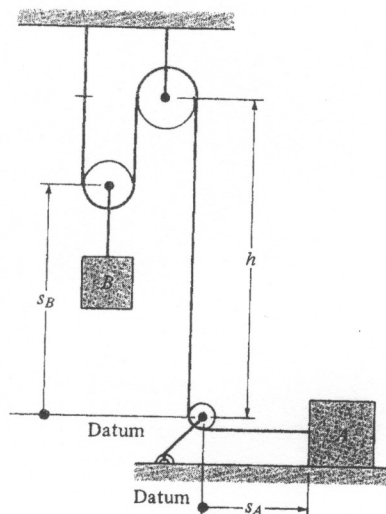


Fig. 4

A dependent motion of two blocks is shown in **Fig. 4**. In this case, the position of block A is specified by s_A , and the position of block B from the center of the bottom pulley (a fixed point) is defined as s_B .

7. (5%) Which one of the following equations can be set based upon the above description?
 (A) $3h - 2s_B + s_A = l$; (B) $h + 2s_B + s_A = l$; (C) $h + 3s_B + s_A = l$; (D) $3h - 3s_B + s_A = l$.
8. (5%) Which relationship between the acceleration of block A and B, i.e. a_A and a_B , is correct?
 (A) $2a_B = a_A$; (B) $2a_B + a_A = 0$; (C) $3a_B + a_A = 0$; (D) $3a_B = a_A$.

9. (5%) **Fig. 5** 中， B 以等速度 18 in/sec 向右移動， A 的速度應為多少？

- (A) 9 (B) 18 (C) 27 (D) 36 in/sec。

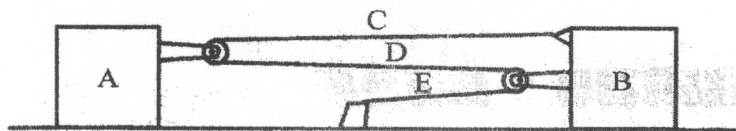


Fig. 5

10. (5%) 一汽車速率為 108 km/h，剎車滑行 75 m 後靜止，該汽車停止

- 所費時間為 (A) 5 (B) 6 (C) 7 (D) 8 sec。

11. (5%) 續上題，輪胎與地面之摩擦係數為 (A) 0.416 (B) 0.612 (C)

- 0.543 (D) 0.725。

12. (5%) **Fig. 6** 中一鐵絲 ACB 穿過 C 球， C 球質量 5 kg 以定速率在圖示

水平圓上轉動，已知鐵絲之張力皆相同，則其速率為 (A) 3.47 (B)

- 4.47 (C) 5.46 (D) 6.46 m/sec。

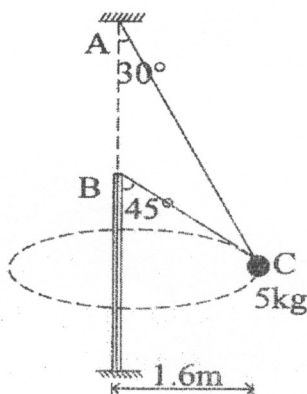


Fig. 6

13. (5%) 續上題，若其速率為 V ，則鐵絲之張力為 (A) $1.563 V^2$ (B)

- $2.589 V^2$ (C) $3.125 V^2$ (D) $4.419 V^2$ N。

(題 14 至 18 為單複選混合，答錯不倒扣 !!)

14. (5%) 當重力加速度 g 值改變時，下列何者會改變？ (A) 物體之重量；(B) 物體之重力位能；(C) 物體之重心；(D) 物體之質心。
15. (5%) 在質點-彈簧系統中，系統之總機械能 E ($E=T+V_e+V_g$) 的變化量 ΔE ，等於下列何者？ (A) 所有外力對系統所作之功；(B) 所有保守力對系統所作之功；(C) 所有非保守力對系統所作之功；(D) 以上皆非。
16. (5%) 三個質量相同且半徑相同的圓柱、圓球及圓環自等高之斜面滾下來，則何者會先滾至地面？ (A) 圓柱；(B) 圓球；(C) 圓環；(D) 同時。
17. (5%) 質點在完全彈性的碰撞下，下列何者不變？ (A) 質點系統之動量；(B) 質點系統之角動量；(C) 質點系統之角衝量；(D) 質點系統之動能。
18. (5%) 在固定座標及等速運動座標(relative coordinate)觀察一質點之運動，則下列何者不正確？ (A) $dU=dU_{rel}$ ；(B) $\sum \overline{M}_B = \overline{(H_B)_{rel}}$ ；(C) $T=T_{rel}$ ；(D) $\sum \overline{F} = \overline{G}_{rel}$ ；(E) $\overline{G} = \overline{G}_{rel}$ (式中 U 為功， M_B 為力矩， H_B 為角動量， T 為動能， G 為線衝量)。