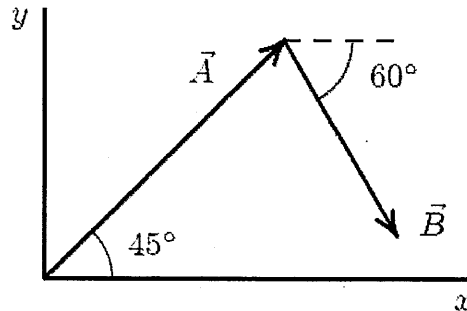※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

靜力學部分

注意: 靜力學共有五題，批改人員將核對每題的最後答案，計算或誘導過程不必詳列。請考生將每題的答案 (若有單位請包含單位) 以方框標註出來，以利批改考卷。

1. (3%) In the diagram, $\vec{A}$ has magnitude 10 m and $\vec{B}$ has magnitude 6 m. Determine the x component of $\vec{A}+\vec{B}$.


2. (3%) A crate with a weight of 50N rests on a horizontal surface. A person pulls horizontally on it with a force of 8 N and it does not move. To start it moving, a second person pulls vertically upward on the crate. If the coefficient of static friction is 0.4, determine the smallest vertical force F for which the crate moves.
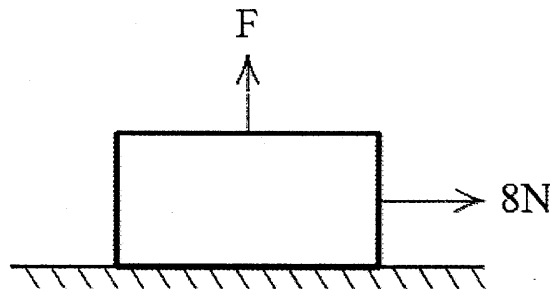

3. (4%) Let $\vec{R}=\vec{S}\times\vec{T}$ and $\theta \neq 90°$, where θ is the angle between $\vec{S}$ and $\vec{T}$ when they are drawn with their tails at the same point. Which of the following is NOT true?

(A) $|\vec{R}|=|\vec{S}||\vec{T}|sin\theta$　(B) $-\vec{R}=\vec{T}\times\vec{S}$　(C) $\vec{R}\cdot\vec{S}=0$　(D) $\vec{R}\cdot\vec{T}=0$　(E) $\vec{S}\cdot\vec{T}=0$

4. (20%) Two identical uniform boards, each of weight 16.3kg, are temporarily leaned against each other as shown. Knowing that the coefficient of static friction between all surfaces is 0.4, determine the largest magnitude of the force P for which equilibrium will be maintained.
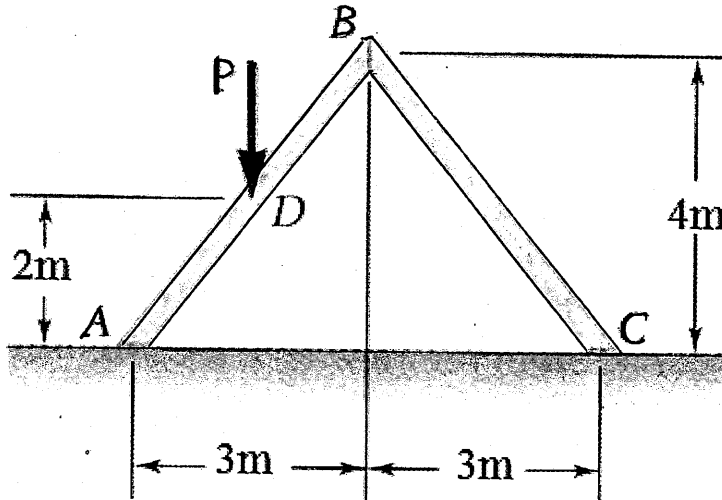

5. (20%) Knowing that the constant of spring CD is k and that the spring is unstretched when rod ABC is horizontal, derive an equation in $P, k, l,$ and θ that must be satisfied when the system is in equilibrium.
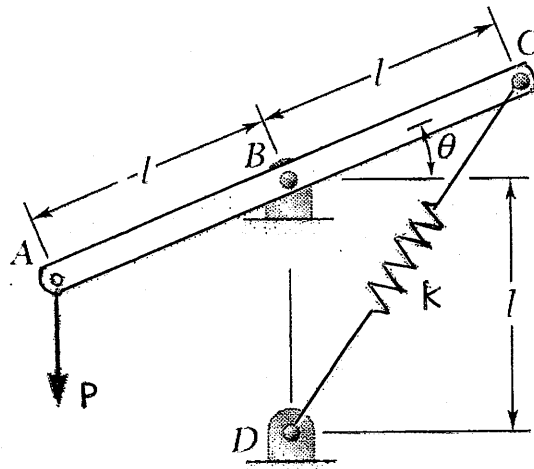
動力學部分

注意:動力學共有五題，批改人員將核對每題的最後答案，計算或誘導過程不必詳列。請考生將每題的答案 (若有單位請包含單位) 以方框標註出來，以利批改考卷。

6. (3%) A 1000-kg elevator is rising and its speed is increasing at $2.5 m/s^2$. Determine the tension force of the cable on the elevator.

7. (3%) Sphere A has mass m and is moving with velocity v. It makes a head-on elastic collision with a stationary sphere B of mass 1.5m. Determine their speeds (v_A and v_B) after the collision.

8. (4%) A 6.0kg particle moves to the right at $2.0 m/s$ as shown. Determine the magnitude of its angular momentum about the point O.
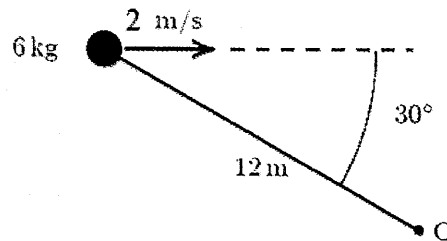
9. (20%) A wheel rolls to the right on the plane H_1. At the instant shown in the figure, the wheel has angular velocity $\omega_1 = 1.5\, rad/s$ (clockwise). A rod of length $1.3m$ is pinned to the wheel at A, and the other end of the rod (point B) slides along a plane H_2 parallel to H_1. Determine the velocity of B at the given instant.
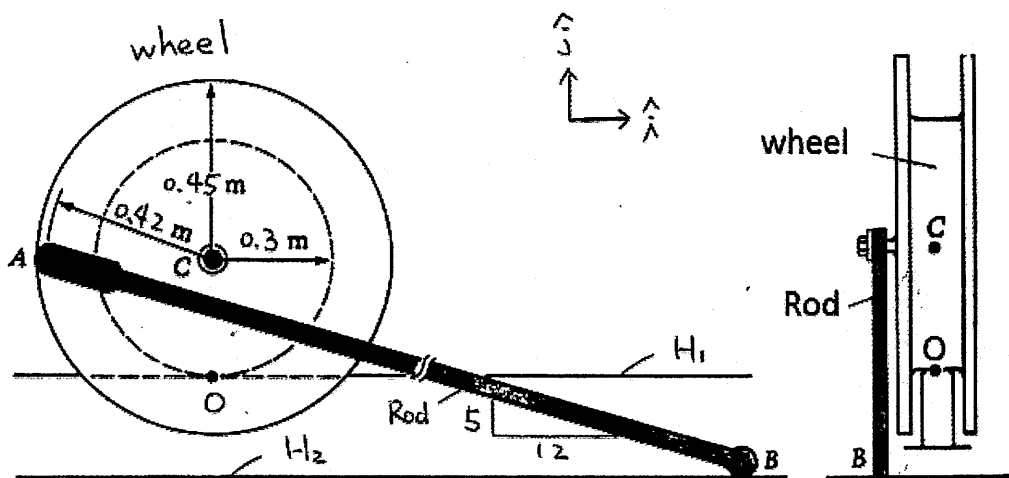
10. (20%) At the instant shown, the 6 m long, uniform 50-kg pole ABC has an angular velocity of 1 rad/s counterclockwise and point C is sliding to the right. A 500 N horizontal force **P** acts at B. Knowing the coefficient of kinetic friction between the pole and the ground is 0.3, determine at this instant (a) the acceleration of the center of gravity, (b) the normal force between the pole and the ground.