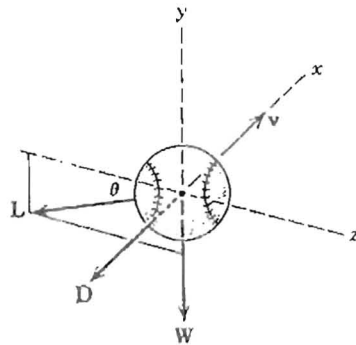系所組別： 航空太空工程學系乙組

考試科目： 工程力學

※ 考生請注意：本試題 ☑可　□不可 使用計算機

(1) (15%) A baseball is thrown with spin so that three concurrent forces act on it as shown in the following figure. The weight $W$ is 1.4 N, the drag $D$ is 0.45 N, and the lift $L$ is perpendicular to the velocity $\mathbf{v}$ of the ball. If it is known that the $y$-component of the resultant is $-1.5$ N and the $z$-component is $-0.24$ N, determine $L$, $\theta$ and $R$.



(2) (10%) The roof truss is composed of 30° - 60° right triangles and is loaded as shown below. Compute the forces in members $BH$ and $HG$.
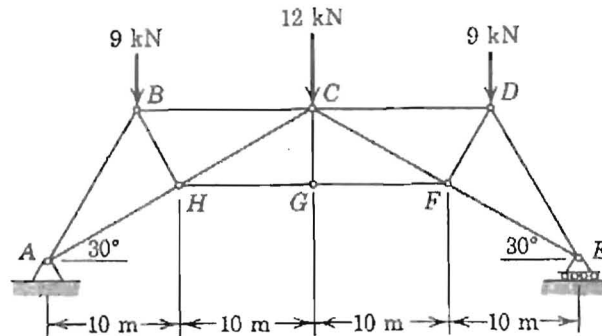


(3) (15%) The beam is subjected to the two similar loadings shown below where the maximum intensity of loading, in force per unit length, is $w_0$. Derive expressions for the shear $V$ and moment $M$ in the beam in terms of the distance $x$ measured from the center of the beam.
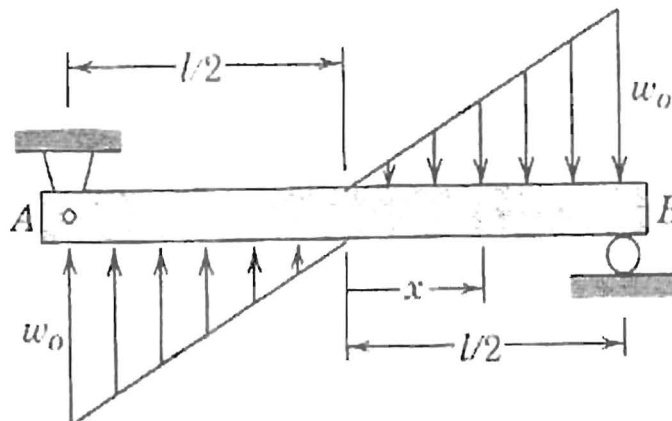


(背面仍有題目,請繼續作答)

※ 考生請注意：本試題 ☑可 □不可 使用計算機

(4) (20%) Crank $CB$ oscillates about $C$ through a limited arc, causing crank $OA$ to oscillate about $O$. When the linkage passes the position shown with $CB$ horizontal and $OA$ vertical, the angular velocity of $CB$ is 2 rad/s counterclockwise. For this instant, determine the angular velocities and angular accelerations of $OA$ and $AB$.
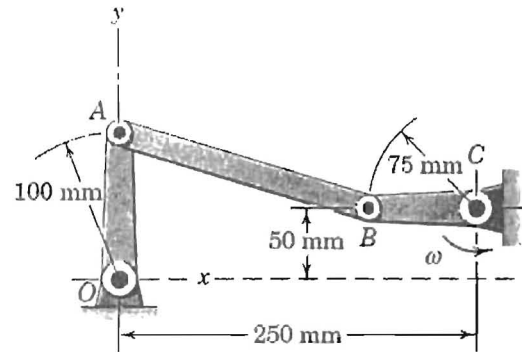


(5) (20%) The chain is released from rest with the length $b$ of overhanging links just sufficient to initiate motion. The coefficients of static and kinetic friction between the links and the horizontal surface have essentially the same value $\mu$. Neglect any friction at the corner.

(1) Determine the velocity $\upsilon$ of the chain when the last link leaves the edge by using Newton's Law of motion.

(2) Determine the velocity $\upsilon$ of the chain when the last link leaves the edge by using conservation of mechanical energy.

(3) How much time does it take?
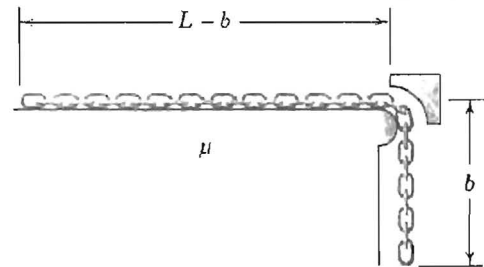


(6) (20%) The uniform 12-kg square panel is suspended from point $C$ by the two wires at $A$ and $B$. If the wire at $B$ suddenly breaks, calculate the tension $T$ in the wire at $A$ an instant after the break occurs.