إسئلة سابقة ..

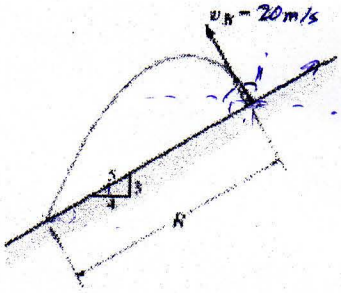
ديناميكا

Al Balqa Applied University

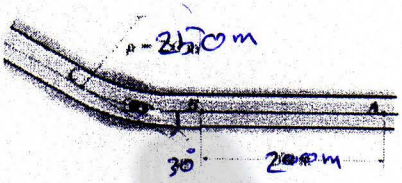
Faculty of Engineering Technology

Dynamics **First Exam**

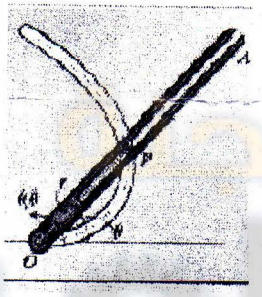
Q1:- Water is sprayed at an angle of **90°** from the slope at **20**m/s. Determine the range ***R***.



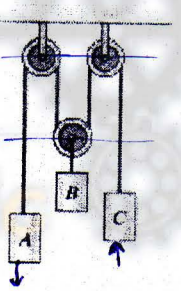
Q2:- When the car reaches point ***A***, it has a speed of 25m/s.If the brakes are applied, it is speed is reduced by $a_t = (0,oo1s - 1)\text{m}/s^2$.Determine the magnitude of acceleration just before it reaches point ***C***



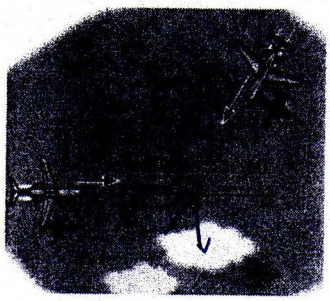
Q3:- The pin follows the path described by the equation $r = (0.2 + 0.15\cos\theta)$ m. At the instant $\dot{\theta}$=0.7 rad/s a $\ddot{\theta}$=**0.5** rad/ s^2. Determine the magnitude of the pin s velocity and acceleration at this instant. $\theta = 30°$



Q4:- If block ***A*** of the pulley system is moving downward with a speed of 2m/s while block ***C*** is moving up at **0.8** m/s. Determine the speed of block ***B***.



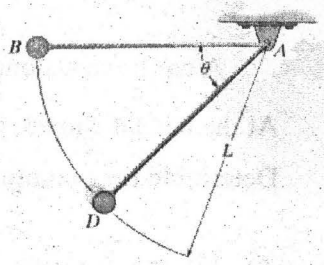
Q5:- Two planes, ***A*** and B, are flying at the same altitude. With constant velocities shown,, determine the velocity of plane ***B*** relative to plane ***A***.



BAU-FE-MED
Dynamics-First-19/11/2011

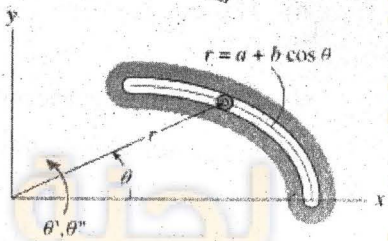
Dr. N. Jubeh **** Dr. S.Al- Lubani **** Dr. K. Khasawneh

1- The pendulum bob B of mass $M = 5$kg, is released from rest when $\theta = 0°$. If $L = 2$ m, and $v = 6.156536$ m/s at point D, determine the tension in the cord at the instant the bob reaches point D, $\theta = 75°$.



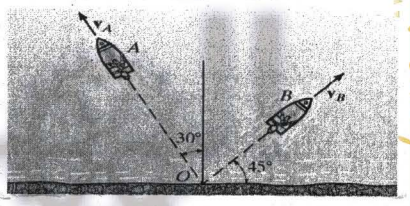
a) 142.136 N b) 120.5382 N c) 104.0508 N d) 133.5382 N

2- The pin follows the path described by the equation $r = 0.2 + 0.15\cos\theta$. At the instant $\theta = 75$ the angular velocity is 0.7 rad/s, and angular acceleration is 0.5 rad/s^2. Determine the magnitudes of the pin's velocity at this instant. Neglect the size of the pin.



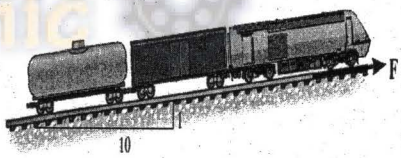
a) 0.226746 m/s b) 0.212897 m/s c) 0.236825 m/s d) 0.195536 m/s

3- Two boats leave the shore at the same time and travel in the direction shown. If $V_A = 60$ m/s and $V_B = 45$ m/s determine the velocity of boat A with respect to boat B.



a). 21.7 m/s b). 43.34 m/s c). 10.83 m/s d). 65 m/s

4- The 160 Mg start from rest and begins to climb the slope as shown, if the engine exerts a traction force **F of 400 KN,** determine the speed of the train in m/s when it has traveled up the slope a distance 1 km. neglect the rolling resistance.



a). 23.4m/s b). 34.24 m/s c). 42.4 m/s d). 55.20 m/s

5- When designing a highway curve it is required that the cars traveling at a constant speed of 25 m/s must not have an acceleration that exceeds 6 m/s^2. Determine the minimum radius of curvature of the curve.

a) 108.33 m b) 308.33 m c) 104.167 m d) 208.33 m

6- The path of motion of a 20-kg particle in the horizontal plane is described in terms of polar coordinate as $r = (2t + 10)m$ and $\theta = (1.5t^2 - 6t)$ rad, where t is in seconds. Determine the magnitude of the resultant force acting on the particle when t = 1 s.

a) 553.17 N b) 1106.34 N c) 1659.5 N d) 2212.6 N

Student Name:.. ...Time of Lecture : .....

Al-Balqa' Applied University
Faculty of Engineering Technology
Mechanical Engineering Department

2-nd semester*	2013-2014*	First Exam*	For all Groups*	Dynamics
Dr. Suleiman Al-lubani	**	Dr. Sael Al-Fayad		

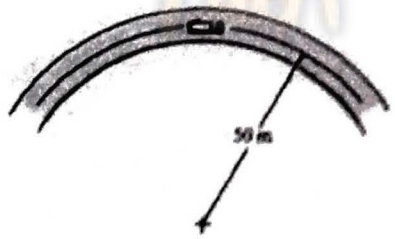
Q 1- A particle starts from rest and travels along a straight line with an acceleration $a = (30 - 0.2v)\,m/s^2$, where v is in m/s. Determine the time when the velocity of the particle is $v = 30\,m/s$.

a) 1.3s b)1.12s c) 2.12s d) 1s e)...

Q2- A car travels along a horizontal circular curved road that has a radius of 600 m. If the speed is uniformly increased at a rate of 2000 km/h^2, determine the magnitude of the acceleration at the instant the speed of the car is 60 km/h.

a) 0.88 b)0.22 m/s^2 c) 0.488 d) 1 e)....

Q3- The truck travels along a circular road that has a radius of 50 m at a speed of 4 m/s. For a short distance when $t = 0$, its speed is then increased by $a_t = (0.4t)\,m/s^2$, where t is in seconds. Determine the speed and the magnitude of the truck's acceleration when $t = 4$ s.



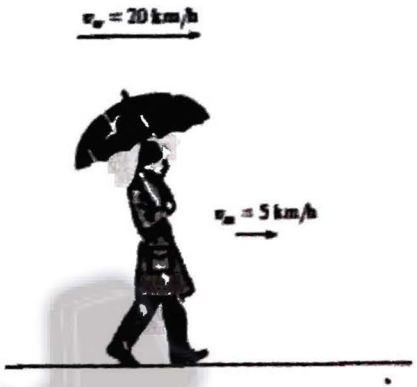
a) 4.2m/s,3m/s^2 b)6.2 m/s, 2 c) 5.2 , 1.44 d) 7.2, 1.9 e)...

Q4- A particle moves along a circular path of radius 300 mm. If its angular velocity is $\dot{\theta} = (2t^2)$ rad/s, where t is in seconds, determine the magnitude of the particle's acceleration when $t = 2$ s.

a) 19.3m/s^2 b)17.3 c) 18.2 d) 16.3 e).....

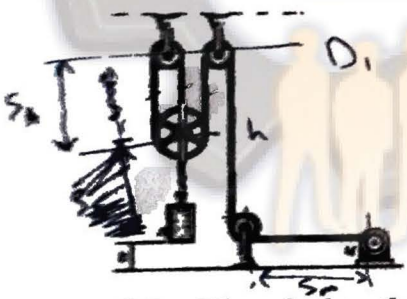
Q5- A man walks at 5 km/h in the direction of a 20-km/h wind. If raindrops fall vertically at 7 km/h in *still air*, determine the **magnitude of the relative velocity with** respect to the man. Assume the horizontal speed of the raindrops is equal to that of the wind.

a) 20.2 km/h b)16.6 c) 14.6 d) 18.6 e)....



Q6- If the rope is drawn towards the motor *M* at a speed of $v_M = (5t^{3/2})$ m/s, where *t* is in seconds, determine the speed of cylinder *A* when $t = 1$ s.

a) 3.2 m/s b)2 c) 1.67 d) 2.67 e)....



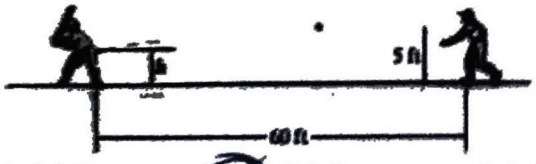
$3s_A + s_m = L$

$3v_A + v_m = 0$

$3v_A + 5 = 0 \rightarrow v_A = -\frac{5}{3} = -1.667$ m/s ↓

$v_m = 5$ m/s

Q7 – The pitcher throws the baseball horizontally with a speed of 140 ft/s from a height of 5 ft. If the batter is 60 ft away, determine the time for the ball to arrive at the batter and the height *h* at which it passes the batter.



a) 2.44 ft b) 2.04 ft c) 1.92 ft d) 1.5 ft e)...

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Good Luck

Q1: $a = \frac{dv}{dt}$. $[a = 30 - 0.2V]\ m/s^2$ $V = 30\ m/s$

$\frac{dv}{dt} = 30 - 0.2V$

$\frac{-0.2}{-0.2}\int_{V_0=0}^{V} \frac{dv}{30 - 0.2V} = \int_0^t \frac{(30 - 0.2V)\, dt}{(30 - 0.2V)}$] $-\frac{1}{0.2}\int_{V_0=0}^{V} \frac{-0.2}{30 - 0.2V} dv = \int_0^t \frac{(30 - 0.2V)}{(30 - 0.2V)} dt$

$\frac{1}{0.2} * Ln[30 - 0.2V] - \frac{1}{0.2} Ln(30 - 0) = t \Rightarrow t = 1.115 \approx 1.12\ s$

Q2: $r = 600\ m,\ a_t = 2000\ Km/h^2,\ a = ??\ ,\ V = 60\ Km/h$

$a_n = \frac{V^2}{\rho} = \frac{(60)^2}{600} = 6000\ Km/h^2$.

$a = \sqrt{a_t^2 + a_n^2} = \sqrt{(2000)^2 + (6000)^2} = 6324.5\ Km/h^2$

$\frac{6324.5 * 1000}{60*60*60*60} = 0.488\ m/s^2$

Q3: $a_t = 0.4\ t \Rightarrow \frac{dv}{dt} = 0.4\ t \Rightarrow \int_4^V dv = \int_0^t 0.4t\ dt$

$V - 4 = \frac{0.4}{2}t^2 \Rightarrow V = 0.2\ t^2 + 4 \rightarrow V|_{t=4} = 0.2(4)^2 + 4 = 7.2\ m/s$

$a_n = \frac{V^2}{\rho} = \frac{(4)^2}{50} = \frac{(7.2)^2}{50} = 1.0368\ m/s^2$ | $a_t = 0.4t \rightarrow a_t = 0.4*4 = 1.6\ m/s^2$

$a = \sqrt{a_t^2 + a_n^2} = \sqrt{(1.6)^2 + (1.04)^2} = 1.906 \approx 1.91\ m/s^2$

Q4) $\theta = 2t^2$, $a = ??$ at $t = 2s$, $r = 0.3\ m$

$\dot{\theta} = 4t$, $\ddot{\theta} = 4$, $\dot{r} = 0$, $\ddot{r} = 0$

$a = \sqrt{a_r^2 + a_\theta^2}$

$a_r = \ddot{r} - r\dot{\theta}^2$

$a_\theta = r\ddot{\theta} - 2\dot{r}\dot{\theta}$

$a_r = 0 - (0.3)(4t)^2 \rightarrow a_r = -19.2\ m/s^2$

$a_\theta = (0.3)(4)(2) - 2(0)(2)(2)^{2^0}$

$a_\theta = 2.4\ m/s^2$

$a = \sqrt{(-19.2)^2 + (2.4)^2} = 19.3\ m/s^2$

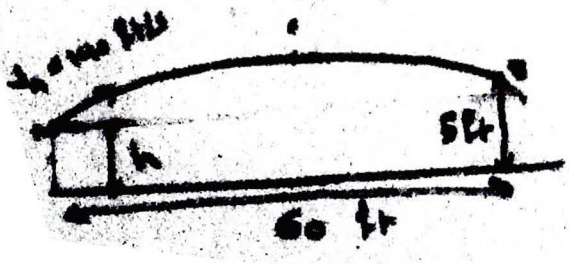
Q5) $V_w = V_m + V_{w/m}$

$-20\ km/h\,\hat{j} = 5\ km/h\,\hat{i} + V_{w/m}$

$V_{w/m} = 5\hat{i} - 20\hat{j} \Rightarrow V_{w/m} = \sqrt{5^2 + (-20)^2}$

$= 20.6\ km/h$

Q7)



$x_B = x_A + (v_0)_x t_{AB}$

$60 = 0 + v_0 \cos\theta \times t_{AB}$ ——(1)

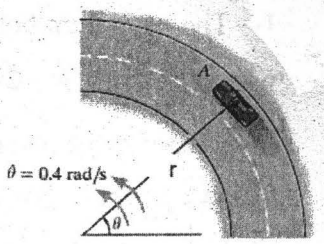
$y_B = y_A + (v_0)_y t_{AB} - \frac{1}{2} g t_{AB}^2$

$5 = h + v_0 \sin\theta\, t_{AB} - \frac{1}{2}(9.81) t_{AB}^2$

7- A particle starts from rest and travels along a straight line with an acceleration $a = (30 - 0.2v)\ ft/s^2$, where v is in ft/s. Determine the time when the velocity of the particle is v = 60 ft/s.

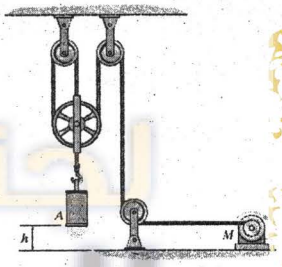
a)1.1157 ft/s b)2.1157 ft/s c) 3.1157 ft/s d) 2.554 ft/s

8- A car travels along the circular curve of radius r = 450 m. At the instant shown, its angular rate $\dot{\theta}$ = 0.4 rad/s. Determine the magnitude of the car's velocity.



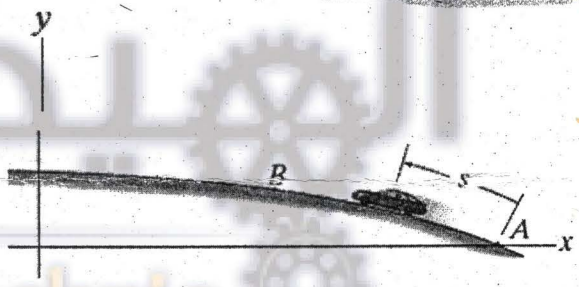
a) 180 m/s b)155 m/s c) 120 m/s d) 95 m/s

9- Determine the speed of cylinder *A*, if the rope is drawn towards the motor *M* at a constant rate of 25 m/s.



a) -4.5 b) 6.44 c) -8.3 m/s d)-3.333

10- The car passes point A with a speed of 25m/s after which its speed is defined by v = (25- 0.15s) m/s. Determine the magnitude of a car's speed (velocity) when it reaches point B, where s = 21.5 m.



a) 17.28 m/s b)19.55 m/s c) 16.22 d) 21.775 m/s

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$$a_r = \ddot{r} - r\dot{\theta}^2$$

$$a_\theta = r\ddot{\theta} + 2\dot{r}\dot{\theta}$$

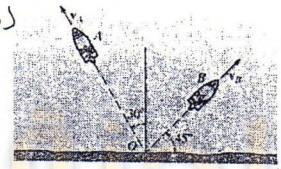
$$\rho = \frac{[1 + (dy/dx)^2]^{3/2}}{[d^2y/dx^2]}$$

BAU-FET-MED- 1st/2012-2013- first exam-Dynamics / A

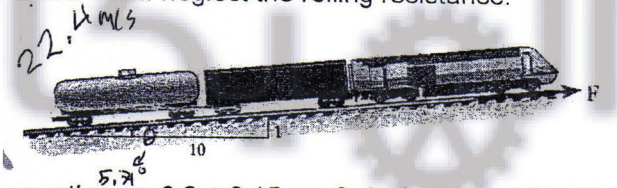
Instructor: student:

1- The pendulum bob *B* of mass *M* = 5kg, is released from rest when $\theta = 0°$. If $L = 2\,m$, and *v* = 5.26753 m/s at point D, determine the tension in the cord at the instant the bob reaches point *D*, $\theta = 45°$.

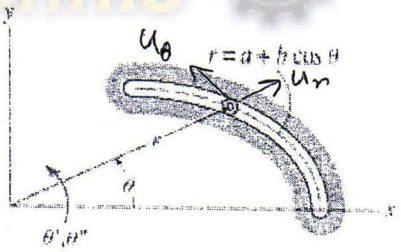
2- Two boats leave the shore at the same time and travel in the direction shown. If V_A = 10 m/s and V_B = 7.5 m/s determine the velocity of boat A with respect to boat B.



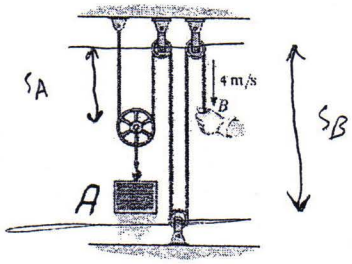
3- The 160 Mg train starts from rest and begins to climb the slope as shown, if the engine exerts traction force **F** of 1/8 of the weight of the train, determine the speed of the train in m/s when it has traveled up the slope distance 1 km. neglect the rolling resistance.



4-The pin follows the path described by the equation $r = 0.2 + 0.15\cos\theta$. At the instant $\theta = 60$ the angular velocity is 0.7 rad/s, and angular acceleration is 0.5 rad/s^2. Determine the magnitudes of the pin's velocity at this instant. Neglect the size of the pin.



5-Determine the speed of cylinder *A*, if the rope is drawn towards ~~the motor *M* at a constant rate of 4 m/s.~~

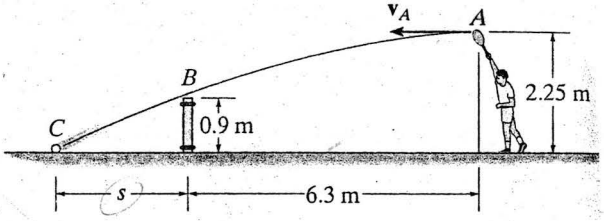


Al Balqa Applied University
Faculty of Engineering Technology

Dynamics - First Exam

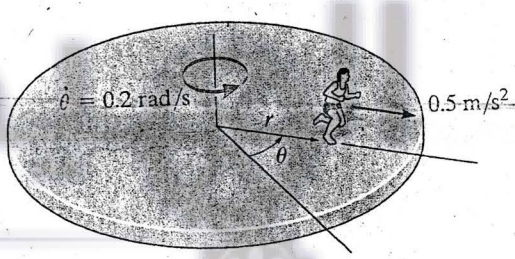
الاسم:-

Q1:- Determine the horizontal velocity v_A of tennis ball at A so that it just clears the net at B. Also find the distance s where the ball strikes the ground.



10

Q2:- Starting from rest, the boy runs outward in the radial direction from the center of the platform with a constant acceleration of $0.5m/s^2$. If the platform is rotating at constant rate $\dot{\theta} = 0.2rad/s$, determine the radial and transverse components of the velocity and acceleration of the boy when $t = 3s$. Neglect his size.



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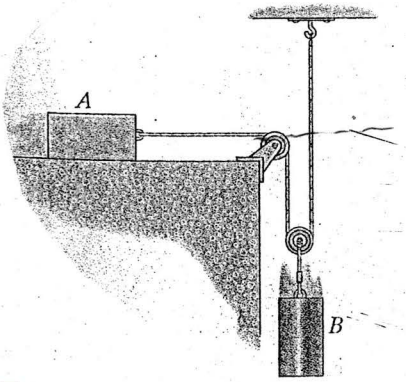
Q3:- The 5-kg block A travels to the right at $v_A' = 0.6m/s$ at the instant shown. If The coefficient of kinetic friction is $\mu_k = 0.2$ between the surface and A, determine The velocity of A when it has moved 1.2 m. Block B has a weight of 100 N.

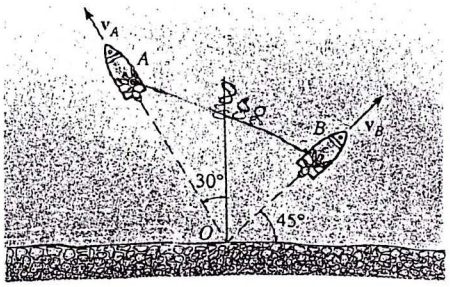


AL-Balqa Applied University
Faculty of Engineering Technology

Mechanical department
First exam – Dynamics
2008-2009
Dr. Salameh Swalha

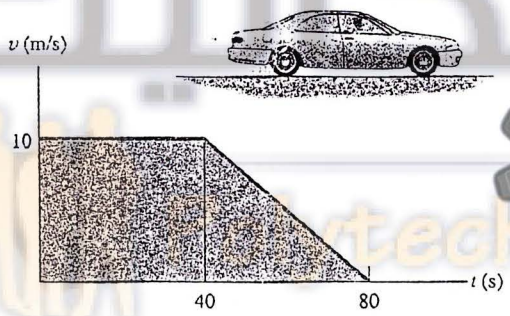
Q1 (7 point)

Two boats leave the shore at the same time and travel in the directions shown. If $v_A = 20$ ft/s and $v_B = 15$ ft/s, determine the speed of boat A with respect to boat B. How long after leaving the shore will the boats be 800 ft apart?



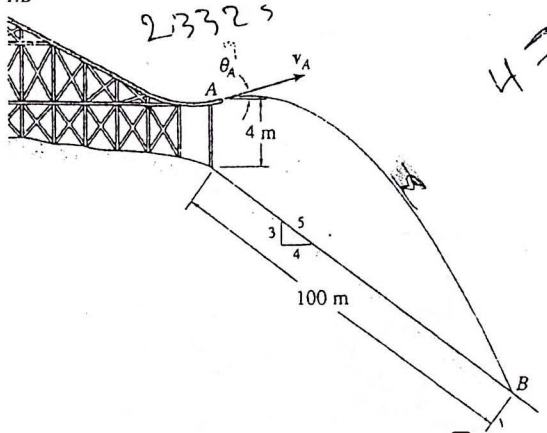
Q2(7 point)

The velocity of a car is plotted as shown. Determine the total distance the car moves until it stops ($t = 80$ s). Construct the a–t graph.



Q3 (6 point)

It is observed that the skier leaves the ramp A at an angle $\theta_A = 25°$ with the horizontal. If he strikes the ground at B, determine his initial speed v_A and the time of flight t_{AB}.



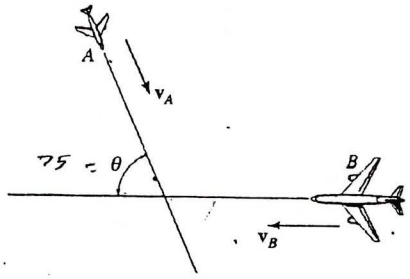
AL-Balqa Applied University
Faculty of Engineering Technology

Mechanical department
First exam -- Dynamics

Instructor Dr. Salameh Swalha

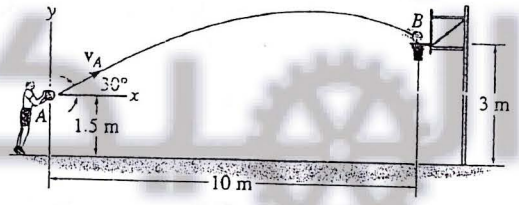
Q1 (6 point)

Two planes, A and B, are flying at the same altitude. If their velocities are $v_A = 600$ km/h and $v_B = 500$ km/h such that the angle between their straight-line courses is $\theta = 75°$, determine the velocity of plane B with respect to plane A.



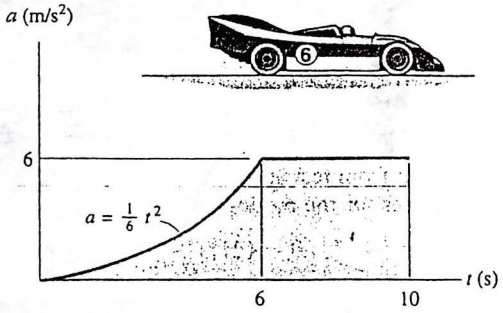
Q2(6 point)

Determine the speed at which the basketball at A must be thrown at the angle of 30° so that it makes it to the basket at B.



Q3 (8 point)

A race cars starting from rest travels along a straight road and for 10 s has the acceleration shown. Construct the v–t graph that describes the motion and find the distance traveled in 10 s.



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Faculty of Engineering
Mechanical Engineering Department

Course: Dynamics 1st Exam Time: 50 mins

Q1. The acceleration of a hocky puck sliding over a thin film of water on horizontal surface is defined by the rule $a(v) = -kv(in/s^2)$, where the velocity v is measured in inches per second and $k = 0.5s^{-1}$. Assume that the puck has a velocity of 30 in/s when t=0.

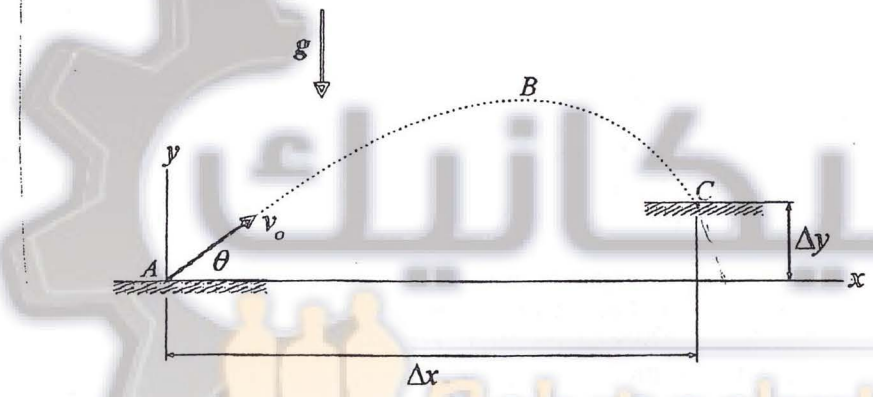
A) Determine the distance of the particle will travel before coming to rest.

B) Determine the time required for the particle to come to rest.

Q.2

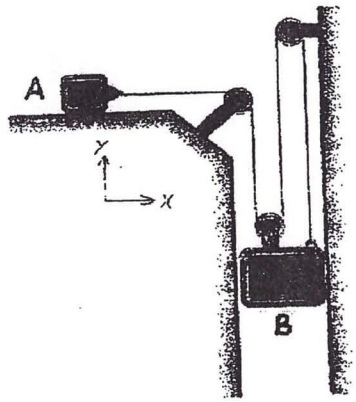
A projectile is fired with an initial velocity $v_o = 20m/s$ at an angle $\theta = 25°$ above the horizontal, as shown below. Determine the radius of curvature ρ of the particle trajectory at:

a) point A (where $x = 0$ and $y = 0$),
b) point B (the highest point of the trajectory), and
c) point C (assuming $\Delta x = 20m$).



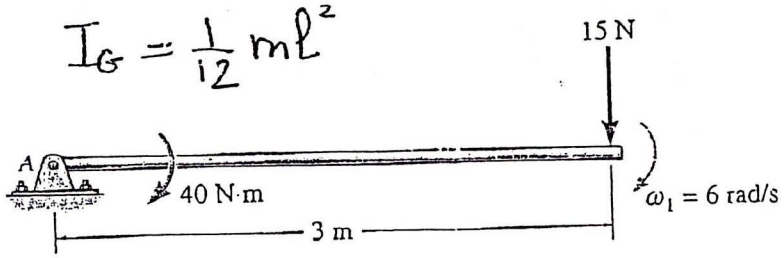
Q.3 The two blocks shown have identical weights and are originally at rest. Neglecting the masses of the pulleys and the effect of friction in the pulleys, determine the magnitude of the acceleration of A relative to B. Assume slip and that the coefficient of kinetic friction between block A and the horizontal surface is 0.25.

Note: You do not need to know the mass of each block to solve this problem.

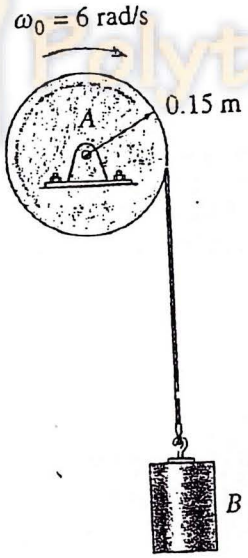


Q3 (13 point) The 4-kg slender rod is subjected to the force and couple moment. When the rod is in the position shown it has a angular velocity $\omega_1 = 6$ rad/s. Determine its angular velocity at the instant it has rotated 360°. The force is always applied perpendicular to the axis of the rod and motion occurs in the vertical plane.

$I_G = \frac{1}{12} m l^2$



Q4(12 point) A motor gives disk A an angular acceleration of $\alpha_A = (0.6t^2 + 0.75)$ rad/s^2, where t is in seconds. If the initial angular velocity of the disk is $\omega_0 = 6$ rad/s, determine the magnitudes of the velocity and acceleration of block B when $t = 2$ s.



Good Luck