بسم الله الرحمن الرحيم

لجنتكم الأكاديمية Mech-Family تقدم لكم:

Dynamics First Exam 10/2013

وتتمنى لكم دوام التوفيق والنجاح

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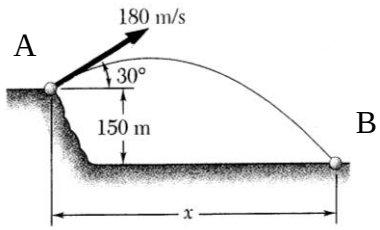
|---|---|
| A projectile is fired from the edge of a 150 $m$ cliff with an initial velocity $V_0 = 180\ m/s$ at an angle $\theta = 30^\circ$ with the horizontal. Neglect air resistance |   |

**Question (1):**
The velocity of the projectile at point B, i.e. the point at which the projectile strikes the ground, in (m/s) is;

(a) 172.363 (b) 187.997 (c) 191.939 (d) 169.946 (e) None of the above

**Question (2):**
The radius of curvature at point A, in (m) is;

(a) 3813.7 (b) 3644.2 (c) 4031.9 (d) 4311.4 (e) None of the above

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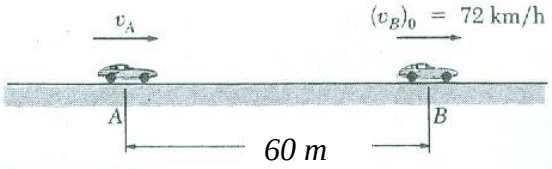
|---|---|
| Car A is traveling east at a constant speed $v_A$ and Car B is traveling in the same direction at a constant speed of 72 km/h. The driver of car B notices car A when it is still 60 m behind him then he accelerates at a constant rate of $0.75\ m/s^2$ to avoid being passed by car A. Knowing that the closest that A comes to B is 6m, determine the speed $v_A$ of car A. |   |

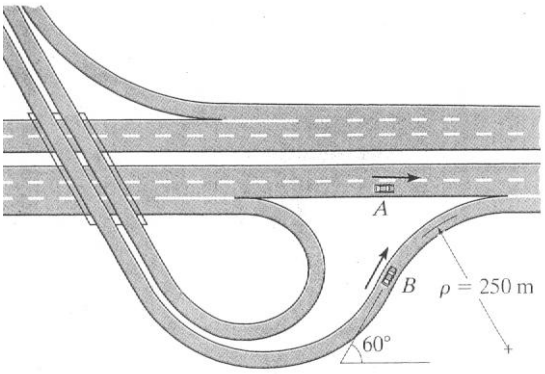
**Question (3):**
The speed $v_A$ of car A, in (m/s) is;

(a) 33.601 (b) 26.633 (c) 29.0 (d) 31.313 (e) None of the above

**Question (4):**
The distance traveled by car B, in (m) is

(a) 309.33 (b) 299.161 (c) 291.62 (d) 294.0 (e) None of the above

At the instant shown car A is traveling with a velocity of 30 m/s and has an acceleration of 2 $m/s^2$ along the highway. At the same instant car B is traveling on the shown curved road with a speed of 15 m/s, which is decreasing at 0.8 $m/s^2$.




**Question (5):**
The velocity of B relative to A, in (m/s) is;

(a) 25.98 (b) 35.0 (c) 48.22 (d) 54.08 (e) None of the above

**Question (6):**
The acceleration of A relative to B, in ($m/s^2$) is;

(a) 2.192 (b) 5.185 (c) 4.186 (d) 3.188 (e) None of the above

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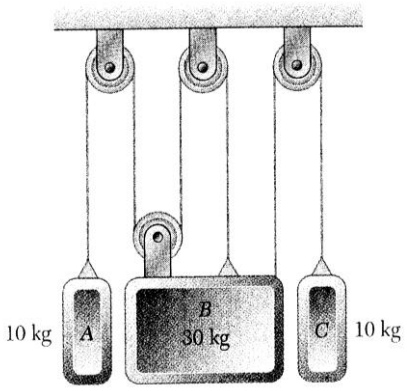
The system shown is released from rest. Neglecting the masses of the pulleys and the effect of friction in the pulleys.

U ➔ Up
D ➔ Down




**Question (7):**
The acceleration of block A in ($m/s^2$) is

(a) 2.2638 U (b) 0.7546 D (c) 2.2638 D (d) 0.7546 U (e) None of the above

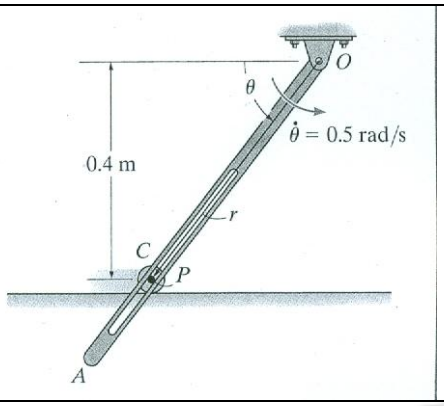
**Question (8):**
The acceleration of block C in ($m/s^2$) is

(a) 0.7546 U (b) 2.2638 D (c) 0.7546 D (d) 2.2638 U (e) None of the above

**Question (9):**
The tensions developed in the left cable in (N) is

(a) 90.554 (b) 75.462 (c) 120.738 (d) 74.092 (e) None of the above

The smooth 2 kg cylinder C has a pin P through its center which passes the slot in arm OA. If the arm is forced to rotate at a constant rate $\dot{\theta} = 0.5$ rad/s
At the instant $\theta = 30^{\circ}$



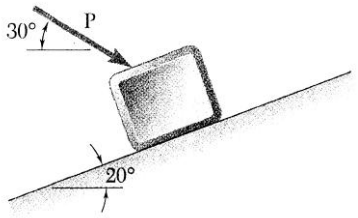

**Question (10):**
The Force that the arm exerts on the cylinder in (N) is

(a) 11.364 (b) 5.542 (c) 27.468 (d) 3.027 (e) None of the above

**Question (11):**
The magnitude of the acceleration of the pin P in ($m/s^2$) is

(a) 2.4013 (b) 4.6974 (c) 0.8682 (d) 1.3856 (e) None of the above

A 40 kg block is at rest on the incline when force P is applied to it. If 4 s is required for the block to travel 10 m up the incline, knowing that the coefficient of kinetic friction is 0.25.




**Question (12):**

The acceleration of the block in ($m/s^2$) is

(a) 1.25 (b) 2.66 (c) 0.50 (d) 0.64 (e) None of the above

**Question (13):**

The magnitude of the force P in (N) is

(a) 545.990 (b) 558.399 (c) 612.468 (d) 738.038 (e) None of the above