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The University of Jordan / Department of Physics
First Semester 2015/2016
Physics 101/ Second Exam

Section number : 10-11
Lecturer name : د. رياض شاطف

Student name (بالعربية): رعد محمد راجد ابو السعود
Student number : 0156387

Some helpful information: gravitational acceleration $g = 9.8 \text{ m/s}^2$

Notes: Turn off your cell phone and put it out of sight. Keep your calculator on your own desk. Calculators cannot be shared. You have 75 minutes to complete your exam. Be sure to fill the box below with your final answers before the end of the exam.

	A	B	C	D	E		A	B	C	D	E
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2				<input checked="" type="checkbox"/>		8		<input checked="" type="checkbox"/>			
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- A particle of mass (20 kg) is subject to two forces such that one force has a magnitude of 21 N directed east, and the other force has a magnitude of 39 N directed east-north, what is the magnitude of the particle's acceleration (in m/s^2)?
(A) 2.8 (B) 5.1 (C) 7.5 (D) 3.7 (E) 12
- An object of mass 4.0-kg is placed on top of an elevator floor. If the force exerted by the floor on the object is equal to 34 N. What is the acceleration of the elevator (in m/s^2)?
(A) 0.8 upward (B) 0.8 downward (C) 1.3 upward (D) 1.3 downward (E) 0.3 downward
- A force of magnitude 20N directed in the positive x direction is acting on a particle and displacing it from the point (2m, -1m) to the point (6m, -3m). What is the work done by the force (in J)?
(A) 60 (B) 40 (C) 30 (D) 80 (E) 70
- A certain pendulum consists of a 1.7-kg mass swinging at the end of a string (length = 2.0 m). At the lowest point in the swing the tension in the string is equal to 20 N. To what maximum height (in cm) above this lowest point will the mass rise during its oscillation?
(A) 36 (B) 20 (C) 30 (D) 28 (E) 17
- A spring ($k = 600 \text{ N/m}$) is placed in a vertical position with its lower end supported by a horizontal surface. The upper end is compressed 20 cm, and a 6.0 kg block is placed on the compressed (مضغوط) spring. The system is then released from rest. How far above the point of release will the block rise (in cm)?
(A) 20 (B) 31 (C) 10 (D) 15 (E) 25

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6. A potential energy function for a two-dimensional force is of the form $U = 3x^2y$. Find the force that acts at the point (1, 2).

- (A) $\vec{F} = -12\hat{i} - 3\hat{j}$ (B) $\vec{F} = -6\hat{j}$ (C) $\vec{F} = -24\hat{i} - 12\hat{j}$ (D) $\vec{F} = -6\hat{i} - 3\hat{j}$ (E) $\vec{F} = -6\hat{i}$

7. An 8.0-kg block slides along a horizontal surface. If $\mu_s = 0.20$ for the block and surface, at what rate is the friction force doing work on the block (in W) at an instant when its speed is 4.0 m/s?

- (A) -63 (B) -47 (C) +50 (D) +25 (E) -55

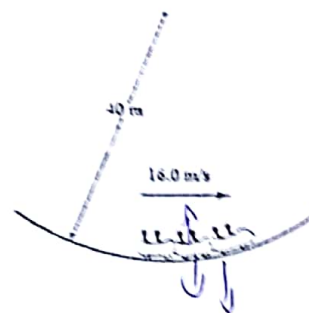
8. A particle of mass (1.5 kg) is moving on the x-axis with an acceleration given as $a = (6.0x - 5.0) \text{ m/s}^2$. What is the speed of the particle in (m/s) at the moment it reaches $x = 4.0 \text{ m}$, given that the particle started motion from origin with initial velocity 9.0 m/s?

- (A) 10.1 (B) 14.7 (C) 11.8 (D) 13.1 (E) 9.5

9. An airplane moves at constant speed of 130 m/s as it travels around a vertical circular loop which has a 1.0-km radius. What is the magnitude of the net force causing the centripetal acceleration on the 71-kg pilot (in N)?

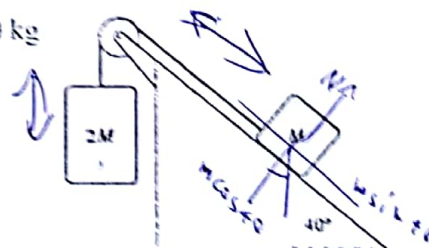
- (A) 1000 (B) 1392 (C) 1200 (D) 1310 (E) 1022

10. A roller-coaster car has a mass of 600 kg when fully loaded with passengers (الركاب). At the bottom of a circular dip of radius 40 m (as shown in the figure) the car has a speed of 16 m/s. What is the magnitude of the force the track exerts on the car at the bottom of the dip (in kN)?



- (A) 10.1 (B) 9.7 (C) 8.1 (D) 13.1 (E) 6.5

11. What is the magnitude of the tension in the string (in N) if $M = 4.0 \text{ kg}$ in the figure shown? Assume the surface is frictionless.



- (A) 21.5 (B) 19.7 (C) 32.2 (D) 42.9 (E) 56.5

12. A box of mass (42 kg) is placed on top of a rough horizontal surface whose coefficients of friction are ($\mu_s = 0.6, \mu_k = 0.4$). If a man tried to push the box by applying a force of (230 N), what would be the magnitude of the friction force (in N)?

- (A) 210 (B) 247 (C) 220 (D) 165 (E) 230