The University Of Jordan
Physics Department
General Physics-I (0302101) / First Exam / November 8th 2018
First Semester 2018/2019

اسم الطالب:
اسم المدرس:

الرقم الجامعي:
رقم الشعبة:

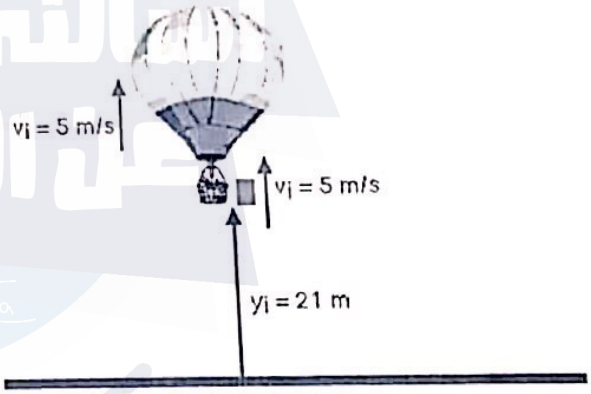
	A	B	C	D	E		A	B	C	D	E
Q1						Q8					
Q2						Q9					
Q3						Q10					
Q4						Q11					
Q5						Q12					
Q6						Q13					
Q7						Q14					

Useful Information:

Some of the results are rounded; $g = 9.8\ m/s^2$; $G = 6.67 \times 10^{-11}\ N \cdot m^2 / kg^2$

1. A hot air balloon is traveling vertically upward at a constant speed of 5.00 m/s. When it is 21.0 m above the ground, a package is released from the balloon. After it is released, for how long is the package in the air?

A) t = 2.64 s B) t=5 s C) t=1.6 s D) t=3.8 s E) None



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2. Two vectors $\mathbf{A} = 2\mathbf{i} + 7\mathbf{j} - 3\mathbf{k}$ and $\mathbf{B} = -3\mathbf{i} + 4\mathbf{j} + 11\mathbf{k}$, then the angle (in degrees) enclosed between the two vectors (A and B) is:

a) 97 b) Zero c) $AB\sin\theta$ d) 83 e) $-\mathbf{i} + 11\mathbf{j} + 8\mathbf{k}$

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3. If $\mathbf{A} + 2\mathbf{B} = 3\mathbf{i} + 3\mathbf{j}$ and $\mathbf{A} - 2\mathbf{B} = -7\mathbf{i} + 5\mathbf{j}$, Then $\mathbf{A} \times \mathbf{B}$ is:

a) $36\mathbf{k}$ b) $18\mathbf{k}$ c) 36 d) 9 e) $-9\mathbf{k}$

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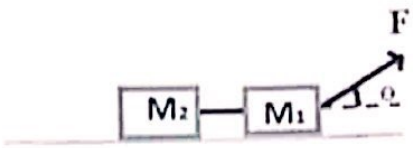
4. Two masses, M1 = 20 kg and M2 = 30 kg are connected by a wire. A force F = 50 N acts on M1 as shown in the adjacent figure. If the surface is smooth and the mass of the wire is negligible, the tension in



the wire is:

A) 3.5 N B) 9.8 N C) 15.3 N D) 18.7 N E) 21.2 N

---

5. The only two forces acting on a body have magnitudes of 20 N and 15 N and directions that differ by 80°. The resulting acceleration has a magnitude of 20 m/s^2. The mass (in kg) of the body is:

a) 2.6 b) 2.4 c) 3.3 d)1.35 e) 1.7

---

6. A fireman 50 m away from a burning building directs a stream of water from a ground-level fire hose at an angle 30^0 above the horizontal. If the speed of the stream as it leaves the hose is 40 m/s, the height (in m) at which the stream of the water will strike the building is:

a) 9.8 b) 12.3 c) 28.7 d) 24.1 e)18.7

---

7. A net force F acts on a mass m and produces an acceleration a. What acceleration results if a net force 2F acts on mass 4m?

A) a/2 B) 8a C) 4a D) 2a E) a

---

8. At $t = 0$, a particle leaves the origin with a velocity of 6.0 m/s in the positive y direction. Its acceleration is given by $\mathbf{a} = (3.0\mathbf{i} - 2.0\mathbf{j})$ m/s^2. At the instant the particle reaches its maximum y coordinate how far (in meters) is the particle from the origin?

a) 15 b) 28 c)20 d) 16 e) 12

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9. A ball is thrown horizontally from the top of a building 0.12 km high. The ball strikes the ground at a point 65 m horizontally away from and below the point of release. The speed (in m/s) of the ball just before it strikes the ground is:

a)50 b)42 c)31 d)27 e)17

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10. If an object was thrown vertically from the ground level with initial speed 25 m/s and return to the same ground level after 5.1 seconds. What is the average velocity (in m/s) of the object when reaching the ground?

a) 12 b) 24 c) 6d) 0e) -12

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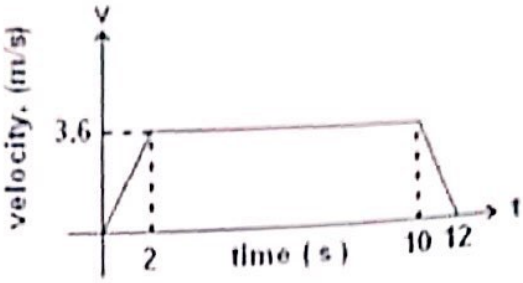
11. A lift is going up. The variation in the speed of the lift is as given in the graph. What is the height to which the lift takes the passengers ?



A) 3.6mB) 28.8m C) 36 m D) cannot be calculated from the above graph E) ZERO

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12. The speed of a particle moving in a circle 2.0 m in radius increases at the constant rate of 4.4 m/s^2. At an instant when the magnitude of the total acceleration (in m/s^2) is 6.0 m/s^2, what is the speed of the particle?

a) 3.9 b) 2.9 c) 3.5
d) 3.0 e) 1.4

THE UNIVERSITY OF JORDAN
PHYSICS DEPARTMENT
GENERAL PHYSICS-I (0302101) / FIRST EXAM / NOVEMBER 8th 2018
FIRST SEMESTER 2018/2019

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الرقم الجامعي:
رقم الشعبة:

	A	B	C	D	E		A	B	C	D	E
Q1						Q8					
Q2						Q9					
Q3						Q10					
Q4						Q11					
Q5						Q12					
Q6						Q13					
Q7						Q14					

Useful Information:
Some of the results are rounded; $g = 9.8\ m/s^2$.

1. A particle moving along the x-axis has a position given by $x = 24t - 2t^3$ m, where t is measured in s. What is the magnitude of the acceleration (in m/s^2) of the particle at the instant when its velocity is zero?

a) Zero b) 24 c) 48 d) 12 e) 36

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2. Two vectors $\mathbf{A} = 2\mathbf{i} + 7\mathbf{j} - 3\mathbf{k}$ and $\mathbf{B} = -3\mathbf{i} + 4\mathbf{j} + 11\mathbf{k}$. Then the magnitude of $\mathbf{B}\times\mathbf{A}$ is:

a) 49 b) $-\mathbf{i} + 11\mathbf{j} + 8\mathbf{k}$ c) $BA\cos\emptyset$ d) 72 e) 95

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3. If $\mathbf{A} + 2\mathbf{B} = 3\mathbf{i} + 3\mathbf{j}$ and $\mathbf{A} - 2\mathbf{B} = -7\mathbf{i} + 5\mathbf{j}$, then the angle (in degrees) enclosed between the two vectors ($\mathbf{A}$ and $\mathbf{B}$) is:

a) 52 b) 128 c) Zero d) 90 e) 232

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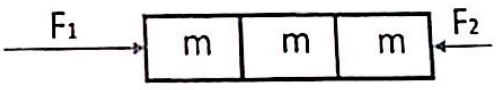
4. Three equal mass blocks each of mass m =2.0 kg can move together over a horizontal frictionless surface. Two forces, $F_1 = 40$ N and $F_2 = 10$ N are applied on the three masses system as shown in the figure. The magnitude of the net force on the middle mass (in N) is:

A) 3.3 B) 10 C) 30 D) 6.7 E)0



5. If the only forces acting on a 3.0 kg mass are $\mathbf{F}_1 = (4\mathbf{i} - 9\mathbf{j})$ N and $\mathbf{F}_2 = (5\mathbf{i} + 3\mathbf{j})$ N, what is the magnitude of the acceleration (in m/s^2) of the particle?

a) zero b)5.0 c)25 d)3.6 e) 6.3

6.A fireman 50 m away from a burning building directs a stream of water from a ground-level fire hose at an angle 300 above the horizontal. If the speed of the stream as it leaves the hose is 40 m/s, the height (in m) at which the stream of the water will strike the building is:

a) 9.8 b) 12.3 c) 28.7 d) 24.1 e)18.7

---

7. If all of the forces acting on an object balance so that the net force is zero, then

A. the object must be at rest

B. the object's speed will decrease

C. the object will follow a parabolic trajectory

D. the object's direction of motion can change, but not its speed

E. None of the above

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8. At $t = 0$, a particle leaves the origin with a velocity of 6.3 m/s in the positive y direction and moves in the xy plane with a constant acceleration of $(2.0\mathbf{i} - 4.0\mathbf{j})$ m/s^2. At the instant the x coordinate of the particle is 15 m, the speed (in m/s) of the particle is:

a) 26 b) 14 c)10 d) 12 e) 16

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9. A rock is thrown from the edge of the top of a building with an initial velocity of 12.2 m/s at an angle of 53° above the horizontal. The rock strikes the ground a horizontal distance of 35 m from the base of the building. Assume that the ground is level and that the side of the building is vertical. How tall (in meters) is the building?

a)43.6 b) 53.1 c)64.5 d)61.1 e)57.8

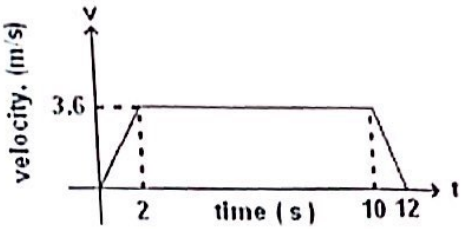
---

10. A particle confined to motion along the x axis moves with constant acceleration from $x = 2.0$ m to $x = 8.0$ m during a 2.5 second time interval. The velocity of the particle at $x = 8.0$ m is 2.8 m/s. What is the acceleration during this time interval?

a) 0.80 b) 0.32 c) 0.48 d) 0.57 e) 0.64

---

11. A lift is going up. The variation in the speed of the lift is as given in the graph. What will be the average velocity of the lift ?



A) 1 m/s B) 2.88 m/s C) 3.24 m/s D) 3 m/s E) none

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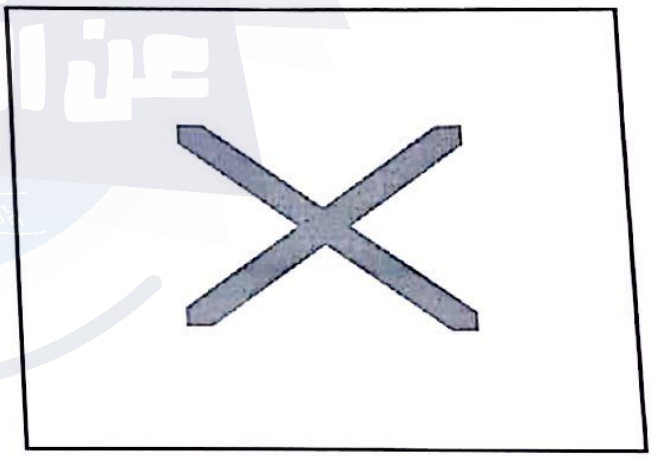
12. A car travels counterclockwise around a flat circle of radius 0.25 km at a constant speed of 20 m/s. When the car is at point A as shown in the figure, what is the car's acceleration? *[Hint: magnitude and direction]*



Answer: 1.6 m/s^2, west

a. **1.6 m/s2, east**
b. **Zero**
c. **1.6 m/s2, east**
d. **1.6 m/s2, north**
e. 1.6 m/s2, west

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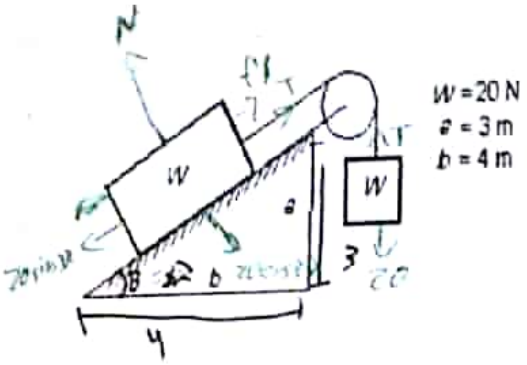
8. The system shown remains at rest. The force of friction (in N) on the block on the incline is:



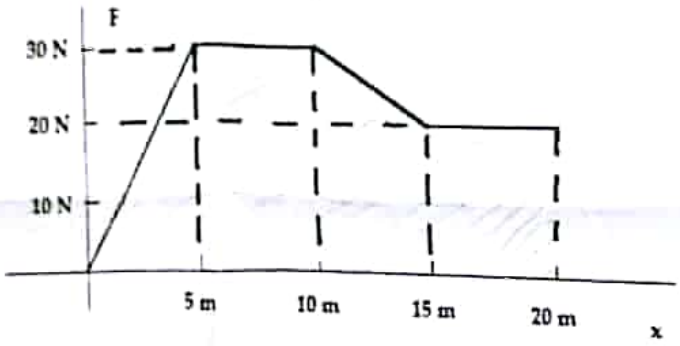
A) 4 B) 20 C) 12

D) 16 E) 8

9. As a 2.0-kg object moves from $\left(2\hat{i} + 5\hat{j}\right)$ m to $\left(6\hat{i} - 2\hat{j}\right)$ m, the constant resultant force acting on it is equal to $\left(4\hat{i} - 3\hat{j}\right)$ N. If the speed of the object at the initial position is 4.0 m/s, its kinetic energy (in J) at the final position is:

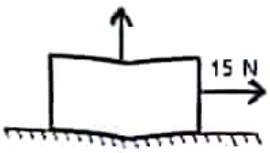
A) 86 B) 62 C) 73 D) 53 E) 24

10. The plot below shows the force on an object as it moves along the x axis. The work (in J) done on the object as it moves from $x = 0$ m to $x = 20$ m is:



A) 450 B) 90 C) 40 D) 200 E) 750

11. A box with a weight of 50 N rests on a horizontal surface. A person pulls horizontally on it with a force of 15 N and it does not move. To start it moving, a second person pulls vertically upward on the box. If the coefficient of static friction is 0.4, the smallest vertical force (in N) for which the box moves is:



A) 25.5 B) 5.5 C) 20.5 D) 12.5 E) 35.5

12. A 0.50-kg object moves on a horizontal frictionless circular track with a radius of 2.5 m. An external constant force of 3.0 N, always tangent to the track, causes the object to speed up as it goes around. If the object starts from rest, then at the end of one revolution (دورة) the radial component of the force (in N) of the track on it is:

A) 19 B) 96 C) 38 D) 75 E) 47

✓ **Helpful information:** g = 9.8 m/s²; some answers are rounded.

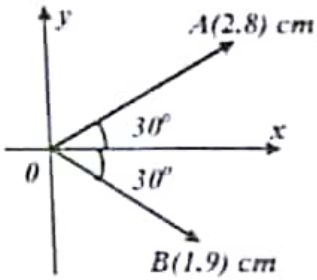
Choose the correct answer and fill the Answer Table below:

(Q1) Find the magnitude and direction (with respect to the positive x-axis) of the vector A represented by the following pair of components: $A_x = -8.6$ m and $A_y = 5.2$ m.
(A) 7.5 m, 25.2° ; (B) 3.3 m, 35.4° ; (C) 4.6 m, 126° ;
(D) 10.0 m, 149° ; (E) 5.6 m, 325° ;

(Q2) Given the two vectors: $\vec{A} = -2.0\hat{i} + 3.0\hat{j} + 4.0\hat{k}$ and $\vec{B} = 3.0\hat{i} + 1.0\hat{j} - 3.0\hat{k}$. The angle between these two vectors is:
(A) 95.2° ; (B) 63.5° ; (C) 17.4° ; (D) 73.1° ; (E) 130° ;

(Q3) Given the two vectors $\vec{A} = 3.0\hat{i} - 6.0\hat{j}$ and $\vec{B} = -2.0\hat{i} + 5.0\hat{j}$, what is the magnitude of the vector $\vec{C} = 3\vec{A} - 2\vec{B}$?
(A) 31 ; (B) 7.3 ; (C) 4.0 ; (D) 90 ; (E) 64 ;

(Q4) The magnitude and direction of $\vec{A} \times \vec{B}$ (two vectors shown in the figure) are:
(A) 3.13 cm^2 along the positive z-axis ;
(B) 4.61 cm^2 along the negative z-Axis;
(C) 6.37 cm^2 along the negative z-axis ;
(D) 9.29 cm^2 along the negative z-axis ;
(E) 13.7 cm^2 along the positive z-axis;



(Q5) The position of a particle moving along the x axis is given by: $x = (21 - 22t - 6.0t^2)$ m, where t is in s. What is the average velocity (in m/s) during the time interval $t = 1.0$ s to $t = 3.0$ s ?
(A) − 8.0 ; (B) 8.0 ; (C) − 4.0 ; (D) − 2.0 ; (E) − 6.0 ;

(Q6) The position of a particle moving along the x axis is given by: $x = 6.0t^2 - 1.0t^3$, where x is in meters and t in seconds. What is the position (in m) of the particle when it achieves its maximum speed in the positive x direction?
(A) 12 ; (B) 32 ; (C) 16 ; (D) 4.0 ; (E) 1.0 ;

Lecturer's Name: أ. د. هشام عطيب Time: 16:00–17:00.

* Take the value of the gravitational acceleration, $g = 9.8\ m/s^2$.

** Fill in the Table at the END with your answers, using CAPITAL letters ONLY.

Q1) Given that $\mathbf{A} = (15, 80^0)$ [in (plane) polar coordinates] and $\mathbf{B} = 12\mathbf{i} - 16\mathbf{j}$. What is the magnitude of $\mathbf{A} - \mathbf{B}$?

(A) 23 (B) 32 (C) 5.0 (D) 15 (E) 35

Q2) If $\mathbf{A} = 12\mathbf{i} - 16\mathbf{j}$ and $\mathbf{B} = -24\mathbf{i} + 10\mathbf{j}$, what is the direction of the vector $\mathbf{C} = 2\mathbf{A} - \mathbf{B}$?

(A) -41^0 (B) -49^0 (C) $+49^0$ (D) -90^0 (E) $+21^0$

Q3) The product $2(\mathbf{i} \times \mathbf{k}).3(\mathbf{i} \times \mathbf{j})$ is:

(A) 0 (B) −6 (C) 6 (D) −i (E) j

Q4) A car travels *north* at 30 m/s for 30 minutes. It then travels *south* at 40 m/s for 15 minutes. The *total distance* the car has traveled and its *displacement* (both in km) are:

(A) 18; 18 S (B) 36; 36 S (C) 36; 36 N (D) 90; 18 N (E) 90; 36 N

Q5) The position of a particle moving along the x-axis is given by $x = (24t - 2.0t^3)$ m, where t is measured in s. How far (in m) is the particle from the origin when it is not moving?

(A) 40 (B) 23 (C) 32 (D) 17 (E) 0

Q6) An object is thrown vertically downward from a height h (m) above the ground with an initial speed of 10 m/s. It strikes the ground 3.0 s later. The height h is:

(A) 14 (B) 44 (C) 74 (D) 30 (E) 60

Q7) A particle starts from the origin at t = 0 with a velocity of $(16\mathbf{i} - 12\mathbf{j})$ m/s and moves in the xy-plane with a *constant* acceleration of $(3.0\mathbf{i} - 6.0\mathbf{j})$ m/s^2. The particle's *speed* (in m/s) at t = 2.0 s is:

(A) 52 (B) 46 (C) 43 (D) 39 (E) 33

Q8) A projectile is fired (أطلق) from a height of 30 m above the ground with an initial velocity of 30 m/s in the horizontal direction. The projectile's *speed* (in m/s) just before it strikes the ground is:

(A) 54 (B) 35 (C) 31 (D) 43 (E) 39

Q9) A particle moves at a *constant speed* in a circular path with a radius of 2.0 *cm*. The particle makes *four* revolutions each second. The magnitude of its (radial) acceleration (in m/s^2) is:

(A) 24 (B) 20 (C) 15 (D) 13 (E) 18

Q10) A particle moves along a circular path of radius 1.0 m. At an instant when the speed of the particle is 2.0 m/s and changing at the rate of 3.0 m/s^2, what is the magnitude of its total acceleration (in m/s^2)?

(A) 2.0 (B) 5.0 (C) 4.0 (D) 3.0 (E) 6.0

Fill in the Table below with your answers, using CAPITAL letters ONLY:

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	
B	A	B	D	C	A	E	E	D	
✓	✓	X	✓	✓	X	✓	✓	✓	✓

The University of Jordan **Department of Physics**
General Physics 101 **First Exam** **(4:00 – 5:00) pm** **2/4/2017**

الاسم:

الرقم الجامعي:

Consider $g = 9.8\ m/s^2$

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
E	B	B	E	A	D	C	E	A	E

2/100

Q1 A particle moves at a constant speed in a circular path with a radius of 2.06 cm. If the particle makes four revolutions each second, the magnitude of its acceleration (in m/s^2) is:

A) 20 B) 18 C) 13 D) 15 ✓E) 0

Q2 If $\vec{A}\cdot\vec{C} = -7.5$, $\vec{A} = 3\hat{i} - 4\hat{j}$ and $|\vec{C}| = 6.5$, the angle between the two vectors when they are drawn starting from the same point is:

A) 118° B) 107° C) 112° D) 103° E) 77°

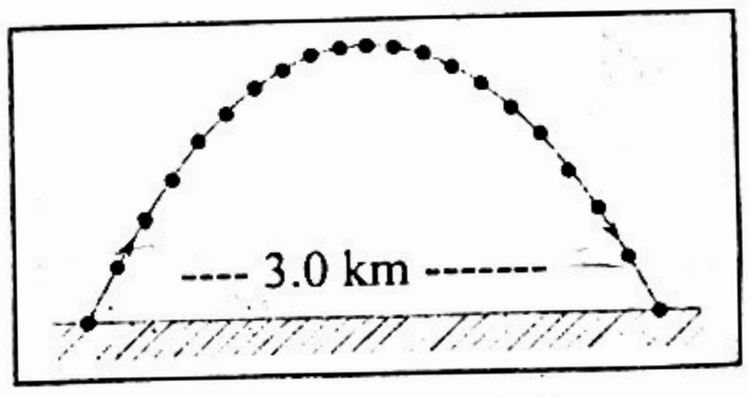
Q3 A car moving along a straight road changes its velocity from 40 m/s to 80 m/s in a distance of 200 m. Its constant acceleration (in m/s^2) during this time is:

A) 8.0 ✓B) 12.0 C) 0.20 D) 6.9 E) 9.6

Q4 A car travels north (N) at 30 m/s for 30 minutes. It then travels south (S) at 40 m/s for 15 minutes. The total distance the car has traveled and its displacement are:

A) 18 km; 18 km S. B) 36 km; 36 km S. C) 36 km; 36 km N. D) 90 km; 18 km N.
✓E) 90 km; 36 km N.

Q5 The initial speed of a cannon ball is 0.20 km/s. If the ball is to strike a target that is at a horizontal distance of 3.0 km from the cannon as shown in the figure, the minimum time (in s) of flight for the ball is:



✓A) 16 B) 21 C) 24 D) 11 E) 19

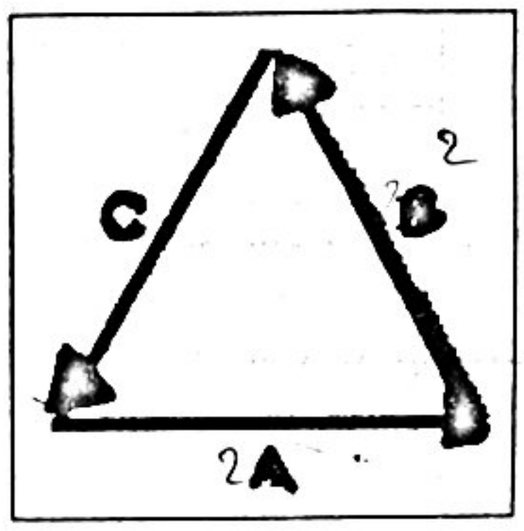
Q6 Two vectors lying in the xy plane are given by the equations $\vec{A} = 5\hat{i} + 2\hat{j}$ and $\vec{B} = 2\hat{i} - 3\hat{j}$. The cross product $\vec{A}\times\vec{B}$ is:

A) $+19\hat{k}$ B) $-11\hat{k}$ C) $-19\hat{k}$ ✓D) $+11\hat{k}$ E) $10\hat{i} - \hat{j}$

Q7 A rock is thrown downward from an unknown height above the ground with an initial speed of 10 m/s. It strikes the ground 3.0 s later. The initial height (in m) of the rock above the ground is:

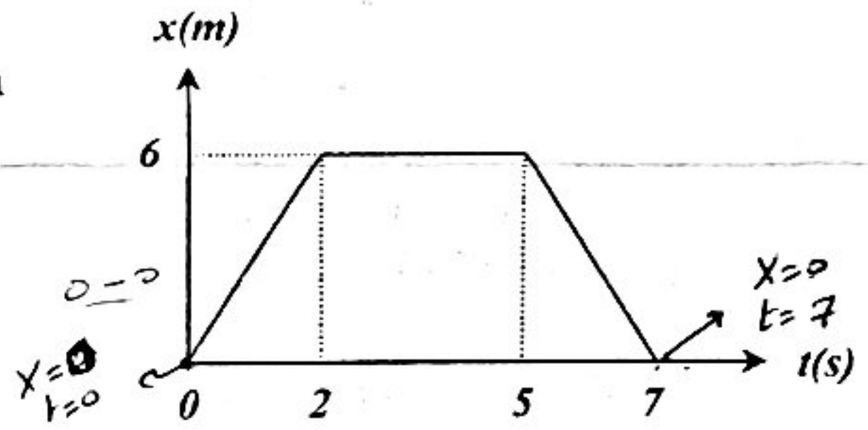
A) 44 B) 14 C) 74 D) 30 E) 60

Q8 The diagram to the right shows 3 vectors which sum to zero, all of equal length. The only true statement among the following is:



A) $\vec{A}+\vec{B}=\vec{A}-\vec{C}$
B) $\vec{A}+\vec{B}=\vec{B}-\vec{C}$
C) $\vec{A}-\vec{B}=2\vec{A}-\vec{C}$
D) $\vec{A}-\vec{B}=2\vec{A}+\vec{C}$
E) $2\vec{A}+2\vec{B}=2\vec{C}$

Q9 In the graph, the average speed (in m/s) between t = 0 s and t = 7 s is:



A) 0 B) 4.3 C) 1.7
D) 6.0 E) 3.3

Q10 At t = 0, a particle leaves the origin with a velocity of 12 m/s in the positive x-direction and moves in the xy-plane with a constant acceleration of $\left(-2.0\hat{\mathbf{i}}+4.0\hat{\mathbf{j}}\right)\text{m/s}^2$. At the instant the y-coordinate of the particle is 32 m, its x-coordinate (in m) is:

A) 24 B) 27 C) 45 D) 36 E) 32

16/20

اسم مدرس المادة:

رقم الشعبة: 30 الرقم المتسلسل: 21/30

The University of Jordan
Faculty of Science
Physics Department

General Physics (1) (302101)
First Exam
First Semester 2016/2017

Student's Name: [illegible] **Student's ID:** 0162842

Note 1: Following are 10 multiple-choice questions. Write the symbol of correct answer in the answers' table. ***Only*** the answers in the table will be graded.
Note 2: Ignore air resistance in all problems and take $|g| = 9.8\ m/s^2$ at the Earth's surface.
Note 3: The significant digit notation is not taken into account throughout the given answers.

Answers' Table

Question Number	1	2	3	4	5	6	7	8	9	10
Symbol of Correct Answer	d	e	a	b	d	e	b	a	e	a

Q.1: A particle moves along the x-axis. Its position varies with time according to the expression: $X(t) = 3t^3 - 4t^2 + 2t - 5$, where X is in meters and t is in seconds. The acceleration (in m/s^2) of this particle at t = 1 sec is:

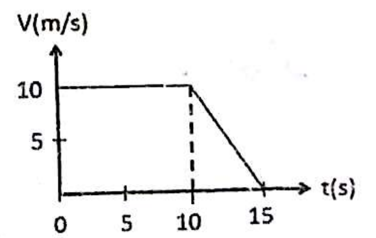
a. 5.0 b. -4.0 c. 3.0 d. 10 e. zero

Q.2: If $\vec{A} = \hat{i} + \hat{j} - \hat{k}$ and $\vec{B} = 2\hat{i} - 3\hat{j} + \hat{k}$, Then, $|\ 3\vec{A} - 2\vec{B}\ |$ is:

a. 2.02 b. 5.02 c. 7.14 d. 3.61 e. 10.3

Q.3: A particle moves along the X-axis. Its velocity varies with time as shown in the adjacent figure. The distance (in m) moved by this particle during the time interval $t_i = 0$ to $t_f = 15$ sec is:

a. 125 b. 100 c. 25 d. 150 e. 200



Q.4: A ball is fired with an initial velocity of 20 m/s that makes an angle of 60^0 above the horizontal direction. The speed (in m/s) of the ball after 1 sec of its launch is:

a. 9.8 b. 12.5 c. 20.0 d. 26.3 e. zero

Q.5: The height (in m) from which an object must be released from rest such that it hits the ground at a speed of 30 m/s is:

a. 19.60 b. 9.80 c. 30.40 d. 45.92 e. 65.17

Back

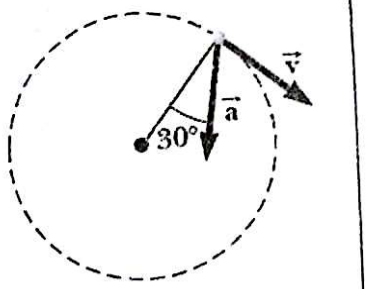
Q.6: A fireman 50 m away from a burning building directs a stream of water from a ground-level fire hose at an angle of 30^0 above the horizontal. If the speed of the stream as it leaves the hose is 40 m/s. The height (in m) at which the stream of water strike the building is:

a. 11.86 b. 9.80 c. 18.64 d. 25.30 e. 7.63

back

Q.7: The adjacent figure shows a particle moving clockwise in a circular path of radius 2.50 m. If the total acceleration vector of the particle at the shown instant has a magnitude of 15.0 m/s^2 and makes an angle of 30^0 with the radius (as shown in the figure). For that instant, the speed (in m/s) of the particle is:

a. 65.69 b. 5.69 c. 7.50
d. 12.99 e. 9.80



Q.8: A particle initially located at the origin has an acceleration of $\vec{a} = 3\hat{j}$ m/s^2 and an initial velocity of $\vec{V}_i = 5\hat{i}$ m/s. The speed (in m/s) of this particle at t=2 sec is:

a. 7.81 b. 9.80 c. 3.21 d. 10.29 e. Zero

Q.9: The angle enclosed between vector $\vec{A} = 3\hat{i} + 2\hat{j} - \hat{k}$ and the negative Y-axis is:

a. 180^0 b. 75.4^0 c. 37.2^0 d. 90^0 e. 122.3^0

back

Q.10: The earth has a radius of 6380 km and turns around once on its axis in 24 h. The magnitude (in m/s^2) of the radial acceleration of an object at the earth's equator is:

a. 9.80 b. 0.205 c. 0.034 d. 4.90 e. Zero

Good Luck!!!

12/20

The University of Jordan / Department of Physics/ Summer Semester

First Exam / Saturday 16/7/2016

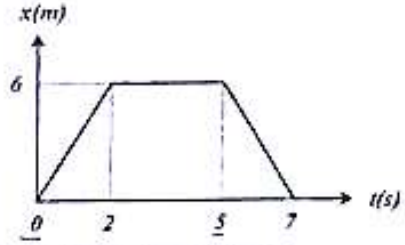
Student's Name: [illegible] Student's Number: 0156024

Lecturer's Name: [illegible] Time: 10:30 – 11:30

* Take the value of the gravitational acceleration g = 9.8 m/s².

** Fill in the Table at the END with your answers, using CAPITAL letters ONLY.

Q1) In the graph shown, the *average velocity* (in m/s) between t = 0 s and t = 5 s is:



A) 0 B) 4.3 C) 1.2
D) 6.0 E) 3.3

Q2) An object is thrown *vertically downward* from a height *h* above the ground, with an initial speed of 20 m/s. It strikes the ground 2.0 s later. The height *h* (in m) is:

A) 90 B) 74 C) 60 D) 20 E) 30

Q3) Starting from Point A, a girl walks 20 m in a direction 30° south of west. She then walks 30 m towards the north to Point B. What is the distance AB (in m)?

A) 53 B) 55 C) 48 D) 26 E) 28

Q4) If A = (12 m, 30°) and B = (25 m, 130°), then the *direction* of vector C = A + B is:

A) 17° B) 107° C) 73° D) 163° E) 103°

Q5) Given three vectors: A = i – 2j + 3k; B = 2i – 3j; C = j + 5i. Then A .(B × C) is:

A) 0 B) i – 2j + 10k C) 7k D) 69 E) 51

Q6) The position of a particle moving in the xy-plane is given by

$\mathbf{r} = -(4t^2 + 28)\mathbf{i} + (2t^4 + 5)\mathbf{j}$,

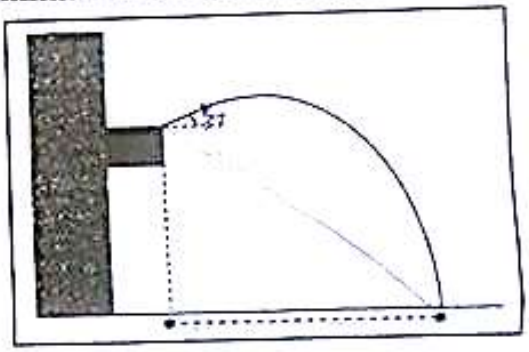
where r is in meters and t is seconds. The magnitude of the acceleration (in m/s^2) at t = 2 s is:

A) 10 B) 15 C) 20 D) 25 E) 96

Q7) A particle starts moving from the origin with a velocity of 10.0j m/s and an acceleration of $(5.00\mathbf{i} - 8.00\mathbf{j})$ m/s^2. The particle's *speed* (in m/s) at t = 1.00 s is:

A) 5.40 B) 21.6 C) 39.1 D) 27.8 E) 19.3

Q8) A ball is thrown from a height of 7.0 m above the ground. The ball is thrown with an initial velocity of 12 m/s at an angle of 37° above the horizontal. How far from the building (in m) does it strike the ground?



A) 34.6 B) 20.5 C) 15.6
D) 11.8 E) 5.30

Q9) A particle moves along a circular path of radius 2.0 m. At an instant when the speed of the particle is 3.0 m/s and changing at the rate of 2.0 m/s^2, what is the magnitude of its total acceleration (in m/s^2)?

A) 7.5 B) 6.7 C) 5.4 D) 4.9 E) 2.5

Q10) Which of the following statements is correct for a particle moving in a uniform circular motion?

A) Its acceleration is zero.
B) Its velocity is constant.
C) Its speed is constant.
D) its acceleration is constant.
E) None of the above.

Fill in the Table below with your answers, using CAPITAL letters ONLY:

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
C	D	D	E	E	E	A	B	D	C

✓ X ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

2

The University of Jordan / Department of Physics
General Physics (0302101) / First Exam 17/3/2016

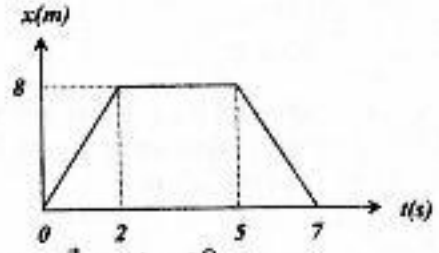
Student's Name: **Student's Number:**
Lecturer's Name: **Time: One Hour**

Take the value of the gravitational acceleration $g = 9.8\ m/s^2$.
Fill in the Table at the END with the letters corresponding to your answers.

Q1) A car moving along a *straight* road changes its velocity from 40 m/s to 80 m/s in a distance of 300 m. Its (constant) acceleration (in m/s^2) during this time is:

A) 8.0 B) 12.0 C) 0.20 D) 6.9 E) 9.6

Q2) In the graph, the *average* speed (in m/s) between $t = 0\ s$ and $t = 7\ s$ is:

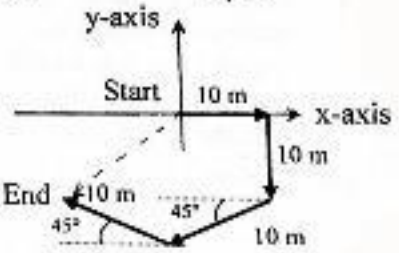


A) 0 B) 4.3 C) 1.7
D) 6.0 E) 2.3

Q3) Given three vectors: $\vec{A} = 2\hat{\imath} - 4\hat{\jmath} + 6\hat{k}$, $\vec{B} = 3\hat{\imath} + 8\hat{k}$ and $\vec{C} = 8\hat{\jmath} - 2\hat{k}$, Then $\vec{A} \cdot (\vec{B} + \vec{C})$ is:

A) $3\hat{\imath} + 6\hat{k}$ B) 2 C) 10 D) $18\hat{k}$ E) -2

Q4) A person travels as shown. The angle (in degrees) of his displacement measured from the positive x-axis is closest to:

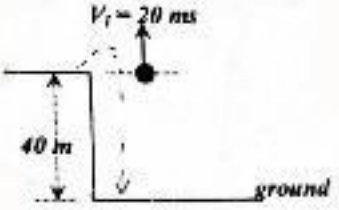


A) 60 B) 90 C) 248
D) 132 E) 0

Q5) At t = 0, a particle leaves the origin with a velocity of 12 m/s in the positive x-direction. It then moves in the xy-plane with a *constant* acceleration of $\vec{a} = -2\hat{\imath} + 4\hat{\jmath}$ m/s^2. At the instant the y-coordinate of the particle is 50 m, what is its x-coordinate (in m)?

A) 24 B) 27 C) 45 D) 35 E) 32

Q6) A stone is thrown vertically upward, as shown in the figure. The time (in s) needed for the stone to reach the ground is:



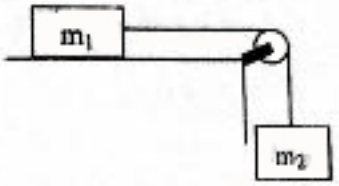
A) 5.2 B) 5.6 C) 1.2
D) 4.3 E) 2.1

Q7) A particle moves along a circular path whose radius is 3.0 m. At the instant when the speed of the particle is 3.0 m/s and is changing at the rate of 5.0 m/s², the magnitude of its *total* acceleration (in m/s²) is:

A) 4.5 B) 5.8 C) 6.0 D) 6.7 E) 7.5

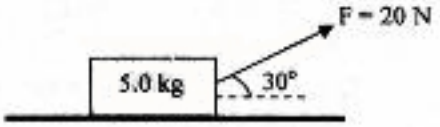
Q8) In the figure, all surfaces are frictionless. The masses are $m_1 = 6.0$ kg, $m_2 = 3.0$ kg; and the system is released form rest. The acceleration of the system (in m/s²) is:

A) 2.45 B) 0 C) 3.3
D) 9.80 E) 6.7



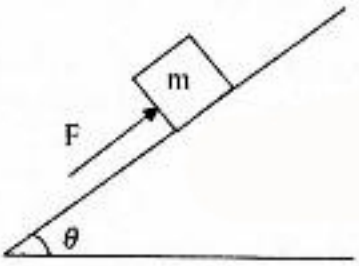
Q9) A 5.0 kg box is pulled across a rough surface at *constant speed* by a force F = 20 N that makes an angle of 30° with the horizontal, as shown. The coefficient of kinetic friction μ_k is:

A) 0.29 B) 0.35 C) 0.31
D) 0.22 E) 0.44



Q10) A block of mass m = 4.0 kg *slides down* a 35° incline when a force of F = 10 N is applied *upward* parallel to the incline. If the coefficient of kinetic friction between the block and the incline is $\mu_k = 0.2$, find the acceleration (in m/s²) of the block:

A) 4.0 B) 2.7 C) 3.1
D) 1.5 E) 0.41



Fill in the Table below with the letters corresponding to your answers:

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10

The University of Jordan / Department of Physics
General Physics (0302101) / First Exam 17/3/2016

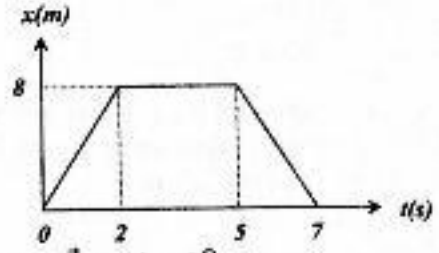
Student's Name: **Student's Number:**
Lecturer's Name: **Time: One Hour**

Take the value of the gravitational acceleration $g = 9.8\ m/s^2$.
Fill in the Table at the END with the letters corresponding to your answers.

Q1) A car moving along a *straight* road changes its velocity from 40 m/s to 80 m/s in a distance of 300 m. Its (constant) acceleration (in m/s^2) during this time is:

A) 8.0 B) 12.0 C) 0.20 D) 6.9 E) 9.6

Q2) In the graph, the *average* speed (in m/s) between $t = 0\ s$ and $t = 7\ s$ is:



A) 0 B) 4.3 C) 1.7
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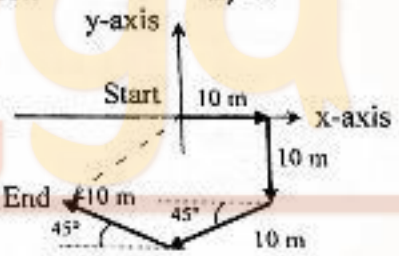

A) 60 B) 90 C) 248
D) 132 E) 0

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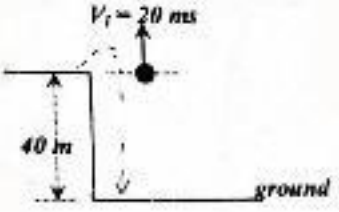

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D) 4.3 E) 2.1

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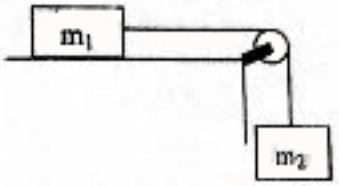
A) 4.5 B) 5.8 C) 6.0 D) 6.7 E) 7.5

Q8) In the figure, all surfaces are frictionless. The masses are m_1 = 6.0 kg, m_2 = 3.0 kg; and the system is released form rest. The acceleration of the system (in m/s²) is:

A) 2.45 B) 0 C) 3.3
D) 9.80 E) 6.7



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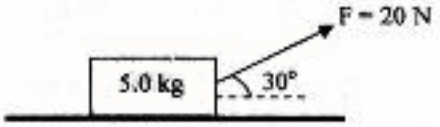
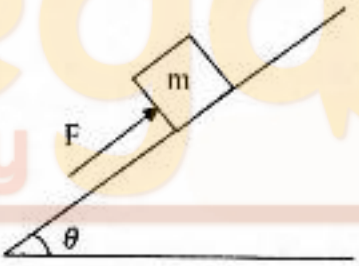


Q10) A block of mass m = 4.0 kg *slides down* a 35° incline when a force of F = 10 N is applied *upward* parallel to the incline. If the coefficient of kinetic friction between the block and the incline is μ_k = 0.2, find the acceleration (in m/s²) of the block:

A) 4.0 B) 2.7 C) 3.1
D) 1.5 E) 0.41



Fill in the Table below with the letters corresponding to your answers:

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10

كل الشكر
للطالبة ملاك العناتي
على حل الاسئله

[1] straight road ⟹ 1-D

$V_i = 40$
$V_f = 80$
$\Delta x = 300$
$a = ?$

$V_f^2 - V_i^2 = 2a(\Delta x)$
$80^2 - 40^2 = 2(300)\,a$
$a = \frac{4800}{600} = 8\ m/s^2$

---

[2] average speed $= \frac{\text{total distance}}{\Delta t} = \frac{8+8}{7} = 2.3$

---

[3] $\vec{A} = 2\hat{i} - 4\hat{j} + 6\hat{k}$
$\vec{B} = 3\hat{i} + 8\hat{k}$
$\vec{C} = 8\hat{j} - 2\hat{k}$

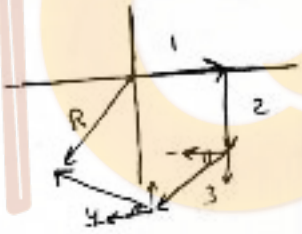
$\vec{A}.(\vec{B}+\vec{C}) = ?$

$\vec{B}+\vec{C} = 3\hat{i} + 8\hat{j} + 6\hat{k}$

$\vec{A}.(\vec{B}+\vec{C})$
$(2\hat{i} - 4\hat{j} + 6\hat{k}).(3\hat{i} + 8\hat{j} + 6\hat{k})$
$= 6 - 32 + 36 = 10$

---

[4] R : المحصلة $= 1 + 2 + 3 + 4$

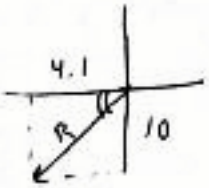


$1 = 10\hat{i}$
$2 = -10\hat{j}$
$3 = -10\cos(45)\hat{i} - 10\sin(45)\hat{j}$
$4 = -10\cos(45)\hat{i} + 10\sin(45)\hat{j}$

$R = (10 - 10\cos(45) - 10\cos(45))\hat{i} + (-10 - 10\sin(45) + 10\sin(45))\hat{j}$

$= -4.1\hat{i} - 10\hat{j}$

$\tan\theta = \frac{10}{4.1} \Rightarrow \theta = 67.7$
$+ 180 \rightarrow$ with +ve x-axis
$= 247.7 \approx 248$



ممكن حل أسرع ؟ واضح ان الزاوية
بالربع الثالث، وما في إلا خيار واحد
الزاوية فيه أكبر من 180 = θ

5) $v_i = 12\hat{i}$

$a = -2\hat{i} + 4\hat{j}$

$r_i = 0$

$y = 50$

$\vec{r}_f - \vec{r}_i = \vec{v}_i t + \frac{1}{2} a t^2$

$r - 0 = 12t\hat{i} + \frac{1}{2}(-2\hat{i} + 4\hat{j})t^2$

$r = (12t - t^2)\hat{i} + (2t^2)\hat{j}$

① ②

$y = 2t^2 = 50$

$t^2 = 25$

$t = 5$

$x = 12t - t^2$

$= 12(5) - 25$

$= 35$

---

6)

$y_f - y_i = v_i t - \frac{1}{2} g t^2$

$-40 - 0 = 20t - \frac{1}{2}(9.8)t^2$

$-40 = 20t - 4.9t^2$

على القانون العام أو الآلة الحاسبة

$t = 5.55 \simeq 5.6$

---

7)

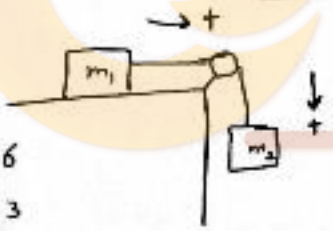
$a_t = 5$

$v = 3 \Rightarrow a_c = \frac{v^2}{r} = \frac{9}{3} = 3$

$a_{total} = \sqrt{a_t^2 + a_c^2} = \sqrt{25 + 9} = 5.8$

---

8)



$m_1 = 6$

$m_2 = 3$

No friction

$\Sigma F = ma$

$T = m_1 a$

$m_2 g - T = m_2 a$

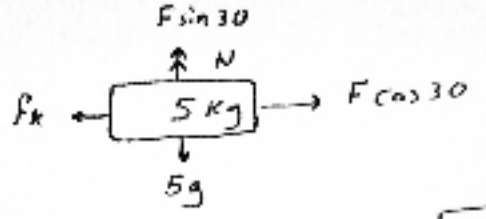
$m_2 g - m_1 a = m_2 a$

$m_2 g = (m_1 + m_2) a$

$a = \frac{m_2 g}{m_1 + m_2} = \frac{3(9.8)}{6 + 3}$

$= 3.26 \simeq 3.3$

9



Constan speed $\Rightarrow a = 0$

$\sum F = m(a)$

$F\cos 30 - f_k = zero$

$20(\cos 30) - N(\mu_k) = 0$

$N(\mu_k) = 17.3$

$\mu_k = \frac{17.3}{39} = 0.44$

$\rightarrow +$

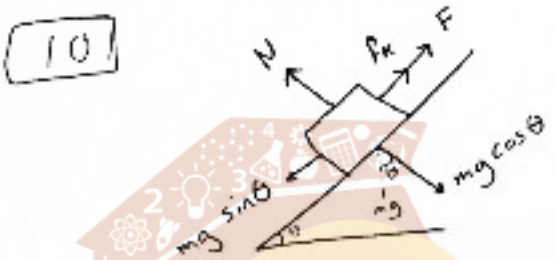
$F\sin 30 + N = 5g$ $\quad +\uparrow$

$\Leftrightarrow N = 5g - F\sin 30$

$= 49 - 10 = 39$

10

slides down



$\theta = 35°$

$\mu_k = 0.2$

$F = 10$

$m = 4$

$x \swarrow$

$mg\sin\theta - f_k - F = m(a)$

$22.5 - N(\mu_k) - 10 = 4(a)$

$N = mg\cos\theta$

$= 32.1$

$\frac{22.5 - 32.1 \cdot 0.2 - 10}{4} = a$

$a = 1.5\ m/s^2$

The University of Jordan
Faculty of Science
Department of Physics

First Semester 2014/2015
Date: 27/10/2014
Time: 5:00-6:00

General Physics I (0302101)
First Exam

Name:---------KEY
Number:----------
Instructor:----------

Constants: $g = 9.8\ m/s^2$.

Answer Sheet

List your final answer in this table. Only the answer in this table will be graded.

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Answer	e	a	b	c	d	e	a	d	a	c

1. If vector $\vec{\mathbf{B}}$ is added to vector $\vec{\mathbf{A}}$, the result is $6\hat{\mathbf{i}} + \hat{\mathbf{j}}$. If $\vec{\mathbf{B}}$ is subtracted from $\vec{\mathbf{A}}$, the result is $-4\hat{\mathbf{i}} + 7\hat{\mathbf{j}}$. What is the magnitude of $\vec{\mathbf{A}}$?

   (a) 1.4 (b) 4.6 (c) 6.1 (d) 5.1 (e) 4.1

2. At $t = 0$, a particle leaves the origin with a velocity of 12 m/s in the positive x direction and moves in the xy plane with a constant acceleration of $\left(-2.0\hat{\mathbf{i}} + 4.0\hat{\mathbf{j}}\right) m/s^2$. At the instant the y coordinate of the particle is 18 m, what is the x coordinate of the particle?

   (a) 27 m (b) zero (c) 23 m (d) 38 m (e) 48 m

3. Two forces are the only forces acting on a 3.0 kg object which moves with an acceleration of 3.0 m/s^2 in the positive y direction. If one of the forces acts in the positive x direction and has a magnitude of 8.0 N, what is the magnitude of the other force?

   (a) 14 N (b) 12 N (c) 11 N (d) 10 N (e) 16 N

4. Two vectors $\vec{\mathbf{A}} = 6\hat{\mathbf{i}} - 5\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$ and $\vec{\mathbf{B}} = 3\hat{\mathbf{i}} - 8\hat{\mathbf{j}}$. The scalar (Dot) product of these two vectors is:

(a) 44 (b) 48 (c) 58 (d) 63 (e) 68

5. The position of a particle moving along the x axis is given by $x = (21 + 22t - 6.0t^2)\,\text{m}$, where t is in s. What is the average velocity (in units of m/s) during the time interval $t = 1.0$ s to $t = 3.0$ s?

(a) -14 (b) 8.0 (c) 14 (d) -2.0 (e) -8.0

6. Two vectors lying in the xz plane are given by the equations $\vec{\mathbf{A}} = 2\hat{\mathbf{i}} + 3\hat{\mathbf{k}}$ and $\vec{\mathbf{B}} = -\hat{\mathbf{i}} + 2\hat{\mathbf{k}}$. The value of $\vec{\mathbf{A}} \times \vec{\mathbf{B}}$ is:

(a) $7\hat{\mathbf{j}}$ (b) $\hat{\mathbf{j}}$ (c) $\hat{\mathbf{i}} + 5\hat{\mathbf{k}}$ (d) $-7\hat{\mathbf{k}}$ (e) $-7\hat{\mathbf{j}}$

7. A 1.8 kg block is released from rest at the top of a rough (خشن) 30° inclined plane. As the block slides down the incline, its acceleration is 3.0 m/s^2 down the incline. Determine the magnitude of the force of friction acting on the block.

(a) 3.4 N (b) 7.0 N (c) 5.2 N (d) 2.1 N (e) 1.2 N

8. Starting from rest, a car travels 1,350 meters in 1.00 minute. It accelerated at 1.0 m/s^2 until it reached its cruising speed (السرعة القصوى). Then it drove the remaining distance at constant velocity. What was its cruising speed (in units of m/s)?

(a) 44 (b) 48 (c) 58 (d) 30 (e) 90

9. A ball leaves the ground at an angle of 30° above the horizontal and at a speed of 10 m/s. What is the maximum height reached?

(a) 1.3 m (b) 6.8 m (c) 7.9 m (d) 5.1 m (e) 2.9 m

10. A force accelerates a body of mass M. The same force applied to a second body produces nine times the acceleration. What is the mass of the second body?

(a) 18M (b) 9M (c) M/9 (d) 2M/9 (e) 2M

University of Jordan
Faculty of Science
Department of Physics

Fall Semester 2013/2014
Date: 3/11/2013
Time: 1:00-2:00

General Physics I (0302101)
First Exam

Name:--------KEY ANSWER-------
Number:----------
Instructor:----------

-Answer Sheet

List your final answer in this table. Only the answer in this table will be graded.

Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Answer										

1.If $\vec{\mathbf{A}} = 2\hat{\mathbf{i}} - 6\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$, what is the angle (in degrees) the vector $\vec{\mathbf{A}}$ makes with the z-axis?

(a) 56 (b) 65 (c) 90 (d) 149 (e) 73

2. A particle moving along the *x* axis has a position given by $x = \left(24t - 2.0t^3\right)$ m, where *t* is measured in s. What is the magnitude of the acceleration (in units of m/s^2) of the particle at the instant when its velocity is zero?

(a) 24 (b) zero (c) 12 (d) 36 (e) 48

3. If the only forces acting on a 2.0 kg mass are $\vec{\mathbf{F}}_1 = (3.0\hat{\mathbf{i}} - 8.0\hat{\mathbf{j}})N$ and $\vec{\mathbf{F}}_2 = (5.0\hat{\mathbf{i}} + 3.0\hat{\mathbf{j}})N$, what is the magnitude of the acceleration (in units of m/s^2) of the particle?

(a) 8.7 (b) 6.6 (c) 2.4 (d) 3.1 (e) 4.7

4. If $\vec{\mathbf{A}} = 7\hat{\mathbf{i}} - 6\hat{\mathbf{j}} + 5\hat{\mathbf{k}}$, $|\vec{\mathbf{B}}| = 7$, and the angle between $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ (when the two are drawn starting from the same point) is 60°, what is the scalar product of these two vectors?

(a) 37 (b) 26 (c) 82 (d) 16 (e) 61

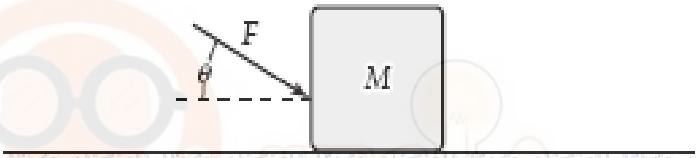
5. A particle starts from the origin at $t = 0$ with a velocity of $(16\,\hat{\mathbf{i}} - 12\,\hat{\mathbf{j}})$ m/s and moves in the *xy* plane with a constant acceleration of $\vec{\mathbf{a}} = (3.0\,\hat{\mathbf{i}} - 6.0\,\hat{\mathbf{j}})$ m/s^2. What is the speed of the particle at $t = 2.0$ s?

(a) 68 m/s (b) 22 m/s (c) 33 m/s (d) 48 m/s (e) 59 m/s

6. A projectile is thrown from the top of a building with an initial velocity of 30 m/s in the horizontal direction. The top of the building is 30 m above the ground. What is the speed of the projectile just before it strikes the ground?

(a) 31 m/s (b) 52 m/s (c) 83 m/s (d) 39 m/s (e) 26 m/s

7. A block is pushed across a horizontal surface by the force shown. If the coefficient of kinetic friction between the block and the surface is 0.30, $F = 20$ N, $\theta = 30°$, and $M = 3.0$ kg, what is the magnitude of the acceleration of the block (in units of m/s^2)?



(a) 3.1 (b) 6.6 (c) 4.5 (d) 1.8 (e) 7.7

8. If $\vec{\mathbf{C}}$ = [10 m, 30°], what is the Cartesian coordinates of this vector?

(a) (2.2, 4.4) m (b) (4.3, 2.5) m (c) (8.7, 5.0) m
(d) (13, 7.5) m (e) (1.0, 10) m

9. A car travels north at 30 m/s for 30 minutes. It then travels south at 40 m/s for 15 minutes. The total distance the car has traveled and its displacement are:

(a) 18 km; 18 km South (b) 36 km; 36 km South
(c) 36 km; 36 km North (d) 90 km; 18 km North
(e) 90 km; 36 km North

10. A 80 kg block sits on a rough horizontal surface. A force of magnitude 2.0 N acting parallel to the surface is applied to the block. The coefficient of static and kinetic friction between the block and the surface are $\mu_s = 0.40$ and $\mu_k = 0.30$ respectively. What is the magnitude of the force of friction acting on the block?

(a) 235 N (b) 314 N (c) 2.0 N (d) 6.0 N (e) 4.0 N

-

Physics 101 – Make-up Exam – 19/11/2013 – 3:00-4:00 pm

Student's Name (In Arabic): …**KEY ANSWER**…… Registration #: ……

Instructor's Name (In Arabic): …… (The value of g=9.8 m/s^2).

ضَعِ الإجابةَ داخلَ الصّندوق المُثْبَت أسفلَ كلّ سؤال. اعلمْ أنّه لنْ تُقَيَّمَ أيّة إجابة خارجَ الصّندوق مُطْلَقاً.

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1. A proton moving along the x axis has an initial speed of 4.0×10^6 m/s and a constant acceleration of 6.0×10^{12} m/s^2. What is the speed (in m/s) of the proton after it has traveled a distance of 80 cm?

5.06×10^6 m/s

2. An object is thrown vertically and has an upward velocity of 18 m/s when it reaches one fourth of its maximum height above its launch point.
What is the initial launch speed (in m/s) of the object?

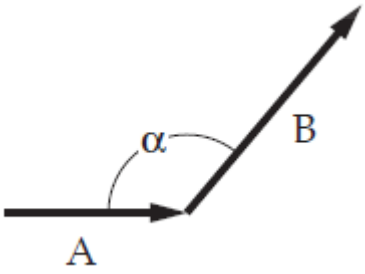
20.78 m/s

3. A long jumper left the ground at an angle 10 degrees and made a horizontal range of 10 meters. The maximum height he achieved was (in m):

0.44 m

4. If $|\vec{A}| = 10$, $|\vec{B}| = 15$, and $\alpha = 130°$, determine the scalar product of the two vectors shown.

96.42



5. The tension in a string from which a 4.0-kg object is suspended in an elevator is equal to 44 N.
What is the acceleration (magnitude and direction) of the elevator (in m/s^2)?

1.2 m/s^2, upward

6. A 1.5-kg mass has an acceleration of (4.0**i** – 3.0**j**) m/s^2. Only two forces act on the mass. If one of the forces is (2.0**i** – 1.4**j**) N, what is the magnitude of the other force (in N)?

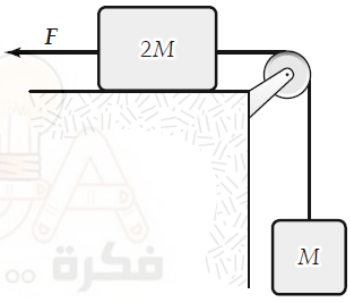
5.06 N

7. An object with initial speed of 16.0 m/s slides a distance of 20.0 m before coming to rest on a rough horizontal surface.
The coefficient of kinetic friction is:

0.65

8. Given F = 40 N and M = 1.5 kg. What is the tension in the string connecting M and 2M (in N)? Assume that all surfaces are frictionless.

23.13 N



9. Given $(\vec{A} = 2\hat{\imath} - 3\hat{\jmath} + 1\hat{k})$ and $(\vec{B} = 4\hat{\imath} + 5\hat{\jmath} - 2\hat{k})$. What is the product $\vec{A} \times \vec{B}$?

$\hat{\imath} + 8\hat{\jmath} + 22\hat{k}$

10. A ball is thrown horizontally from the top of a building 100 m high.
The ball strikes the ground at a point 65 m horizontally away from and below the point of release.
What is the speed (in m/s) of the ball just before it strikes the ground?

46.55 m/s

Student number

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

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
1						7					
2						8					
3						9					
4						10					
5						11					
6						12					

1. A particle of mass (11 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

2. 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 38 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

3. 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 (4m, -3m). What is the work done by the force (in J)?

   (A) 60 (B) 40 (C) 30 (D) 80 (E) 70

4. A certain pendulum consists of a 1.5-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

5. A spring (k = 600 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 4.0 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

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, 1).

(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. A 6.0-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 $a = (6.0x + 5.0)\ m/s^2$, What is the speed of the particle in (m/s) at the moment it reaches $x = 4.0$ m, given that the particle started motion from origin with initial velocity 2.0 m/s?

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

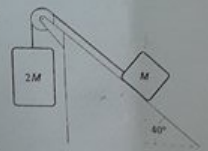
9. An airplane moves at constant speed of 140 m/s as it travels around a vertical circular loop which has a 1.0-km radius. What is the magnitude of the net force causing the centripetal acceleration on the 71-kg pilot (in N)?

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

10. A roller-coaster car has a mass of 400 kg when fully loaded with passengers ($-5\hat{j}$). 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= 2.0 kg in the figure shown? Assume the surface is frictionless.



(A) 21 (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 (210 N), what would be the magnitude of the friction force (in N)?

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