

2014 FRESH HANDOUTS

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ARBA MINCH UNIVERSITY
COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES
DEPARTMENT OF PHYSICS

General Physics (Phys-1011) Mid Examination for First Year Natural Science Stream Students

Year: I /Semester I — Total Load: 25%
Date: August 17/2013 E.C — Time Allowed: 2:00

Name _____ **ID No** _____ **Campus & Section** _____

Part I:-Write "true" if the statement is correct and "false" otherwise in the answer sheet provided. (0.5 point each)

1. If an object is pushed against the surface, then the frictional force will be increased and becomes more than the weight of the object.
2. If the acceleration of an object is zero, then that object cannot be moving.
3. If a system is in equilibrium, then the sum of all forces acting on the system must be zero.
4. The horizontal velocity of a projectile is 0 m/s at the peak of its trajectory.
5. The horizontal velocity of a projectile changes by 9.8 m/s each second.

Part II:- Match column 'A' with column 'B' according to the expression given below. (0.5 point eac

'A'	'B'
1. All planets move in elliptical orbits with the sun at one focus.	A. Newton's first law
2. A single isolated force cannot exist by itself. Forces always occur in pairs.	B. Kepler's second law
3. When no force acts on an object, the acceleration of the object is zero.	C. Newton's law of universal gra
4. Every particle in the universe attracts every other particle with a force along a line joining them.	D. Newton' third law
5. The radius vector from the sun to any planet sweeps out equal areas in equal length.	E. Kepler's third law
	F. Hook's law
	G. Kepler's first law
	H. Newton's second law

Part III: Fill the blank space for the following. (1 point each)

1. _____ is the energy that is stored in an object due to its position.
2. _____ is the force generated by two surfaces that are in contact and either at against each other.
3. Vector that has magnitude of one and it is dimensionless _____.
4. _____ are quantities that can be expressed in terms of fundament
5. A motion in a curved path in a gravitational field is _____.

Part IV:-Choose the best answer for the following questions from the given alternat

1. Let $\vec{A} = (2m)\hat{i} + (6m)\hat{j} - (3m)\hat{k}$ & $\vec{B} = (4m)\hat{i} + (2m)\hat{j} + (1m)\hat{k}$. The vec
   A. $(6m)\hat{i} + (8m)\hat{j} - (2m)\hat{k}$
   B. $(-2m)\hat{i} + (4m)\hat{j} - (4m)\hat{k}$
   C. $(2m)\hat{i} - (4m)\hat{j} + (4m)\hat{k}$
   D. $(8m)\hat{i} + (12m)\hat{j} - (3m)\hat{k}$
2. A ball is thrown at an angle of 37° to the horizontal. What happens to the ma vertical acceleration during the total time interval that the ball is in the air?
   A. Acceleration decreases, then increases
   B. Acceleration
   D. Acceleration

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3. Which of the following statement is **NOT true**?
   A. When acceleration is constant, the instantaneous and average acceleration are equal.
   B. When the velocity and acceleration have different sign, the speed of the object increases.
   C. Free fall is the motion of an object only to the influence of gravity.
   D. Instantaneous velocity is the average velocity measured over an infinitesimally small time.
4. Shortest distance between two points which also has direction and magnitude is termed as
   A. Position B. Velocity C. Displacement D. Distance
5. One of the following is very long-range and non-contact, but relatively weak fundamental force
   A. Electromagnetic force C. Strong nuclear force
   B. Gravitational force D. Weak nuclear force
6. Using a metric ruler with 1 mm divisions, you find the sides of a rectangular piece of plywood are 3.7 cm and 4.85 cm. You calculate that the area is 17.945 cm^2. The correct number of significant figures the result should be expressed as
   A. 17.95 cm^2 B. 17.945 cm^2 C. 18 cm^2 D. 17.9 cm^2
7. Which one of the following is wrong about work in physics?
   A. Work is a scalar - it has magnitude but no direction C. Work has units: Newton-meter = Joule (J)
   B. Work has dimensions: $M(LT^{-2})L = ML^2T^{-2}$ D. Work is always either zero or positive

Part V:- Workout questions (write each step clearly and neatly). (8 points total)

1. A particle moves along the x-axis according to $x(t) = 10t^2 - 2t^3$ m. (a) What is the instantaneous velocity and acceleration at t = 2 s and t = 3 s? (b) What is the average speed, velocity and acceleration between t = 2 s and t = 3 s? **(1 point)**
2. A projectile is fired in such a way that its horizontal range is equal to three times its maximum height. What is the angle of projection? **(1 point)**
3. Find a unit vector in the direction of the resultant of vectors **(2 points)**
   a. $\vec{A} = 2\hat{i} - 3\hat{j} + 1\hat{k}$, b. $\vec{B} = \hat{i} + \hat{j} + 2\hat{k}$ c. $\vec{C} = 3\hat{i} - 2\hat{j} + 3\hat{k}$
4. As shown in figure below, a block which slides down a frictionless plane have an inclination of $\theta = 15^0$. The block starts from rest at the top and the length of the incline is 2.00 m. **(2 points)**
   a. Draw a free-body diagram
   b. Find the acceleration of the block
   c. Its speed when it reaches the bottom of the incline



5. Two objects of masses m_1 and m_2, with $m_2 > m_1$, are connected by a light inextensible cord and hung over a frictionless pulley, as shown in the figure below. Both cord and pulley have negligible mass. Find the magnitude of the acceleration of the system and the tension in the cord. **(2 points)**



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