WOLAITA SODO UNIVERSITY
COLLEGE OF NATRURAL AND COMPUTATIONAL SCINCES
DEPARTMENT OF PHYSICS

General Physics (Phys 1011) Mid. Term Exam for fresh man students (Natural science stream)

Course Code: Phys1011;
Date of exam 21/04/2012E.C.
Semester: I

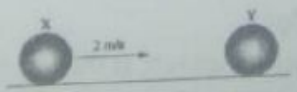
Time Allotted: 2:00 Hours
Max Marks: 30%
Program: Regular

Name _____ Id.No._____ Section_____

Part I- Multiple Choice 15% (1.5 pt. each)

Choose the correct answer from the given alternatives and write your appropriate answer on the answer sheet)

1. In which of the following types collision the two object stick together after collision
   A. Elastic B) Inelastic C) Perfectly inelastic D) None
2. One of the following exists between an object and a surface as long as the object starts moving on the surface.
   A. Static force of friction C. Kinetic force of friction
   B. coefficient of static friction D. coefficient of Kinetic friction
3. For which of the following condition the range of the projectile motion become maximum
   A. $\theta = 90^0$ B. $\theta = 45^0$ C. $\theta = 180^0$ D. $\theta = 60^0$
4. Consider two cars A and B of equal mass , if car A has a velocity v and car B has $\frac{1}{2}v$ then which of the following kinetic energy relation is true
   A) $K_A = 2K_B$ B) $K_A = 4K_B$ C) $K_A = \frac{1}{2}K_B$ D) $K_A = \frac{1}{4}K_B$
5. Which one of the following is **Not True** about uniform circular motion?
   A. Velocity is always tangent to the circular path
   B. Velocity is perpendicular to the radius of the circular path.
   C. Acceleration is always perpendicular to the circular path,
   D. Acceleration points out ward from the center of the circle.
6. The diagram below shows two balls of equal mass. Ball X is moving toward ball Y at 2 m/s. Ball Y is at rest.



When ball X collides with ball Y, ball X stops moving. Which of the following best describes the motion of ball Y after the collision?

A. It will remain at rest.
B. It will move to the right at 2 m/s.
C. It will move to the right at 5 m/s.
D. It will move to the right at 10 m/s

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7. "The square of the orbital period of a planet is proportional to the cube of the average distance between the centers of the planet and the sun." This law is known as
   A. The Law of Harmony
   B. Kepler's First Law
   C. Kepler's second Laws
   D. The Law of Areas
8. There are three forces acting on an object: 6 N to the left, 5 N to the right, and 3 N to the left. What is the net force acting on the object?
   A. 2N left B. 4 N left C. 4 N right D. 8 N left
9. If the velocity of the particle changes at the same rate, then which of the following will be not true
   A) Acceleration is constant
   B) Acceleration is equal to zero
   C) Average acceleration is equal to the instantaneous acceleration
   D) All
10. In an isolated system, which of the following is a correct statement of the quantity that is conserved?
   A) Kinetic energy
   B) Potential energy
   C) Kinetic energy plus potential energy
   D) Both kinetic energy and potential energy.

Part II- Fill in the blank space 6% (2pt.each)

Write the correct answer on the space provided on the answer sheet

1. [redacted] is a vector that has magnitude of one. It is dimensionless and is used to point a given vector in specified direction.
2. [redacted] is the point at which all the mass can be considered to be "concentrated"..
3. [redacted] is a part of mechanics that study the motion of objects without considering the agents that cause the motion?

Part III work out (9%)

Show all the necessary steps neatly and clearly

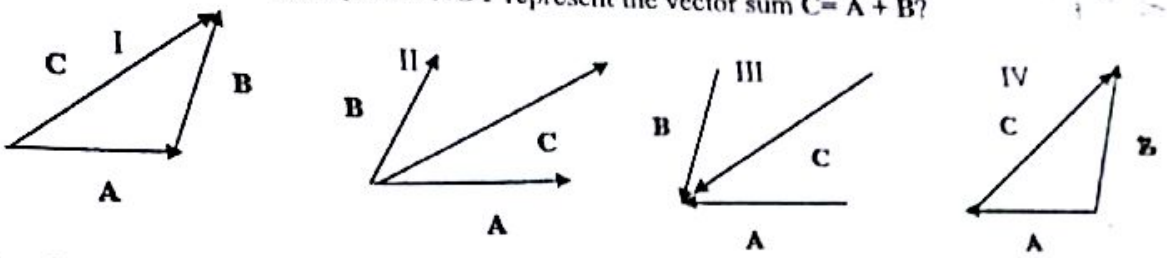
1. A projectile is fired in such a way that its horizontal range is equal to four times its maximum height. What is the angle of projection?**(2pt.)**
2. If $\vec{A} = 6\hat{\imath} - 8\hat{\jmath}$, $\vec{B} = -8\hat{\imath} + 3\hat{\jmath}$ *and* $\vec{C} = 26\hat{\imath} + 19\hat{\jmath}$. Find *n and m* such that $m\vec{A} + n\vec{B} = -\vec{C}$ **(3pt.)**
3. A 3.00-kg block starts from rest at the top of a 30.0° incline and slides a distance of 2.00 m down the incline in 1.50 s. Find (a) the magnitude of the acceleration of the block, (b) the coefficient of kinetic friction between block and plane, (c) the friction force acting on the block, and (d) the speed of the block after it has slid 2.00 m.**(4pt.)**

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DIRECTION I: Choose the correct answer from the given alternatives and write the letter of your choice in CAPITAL LETTER on the space provided in the answer sheet attached at the end of the questions. (1 pt. each)

1. Which of the following graphs do **NOT** represent the vector sum C= A + B?



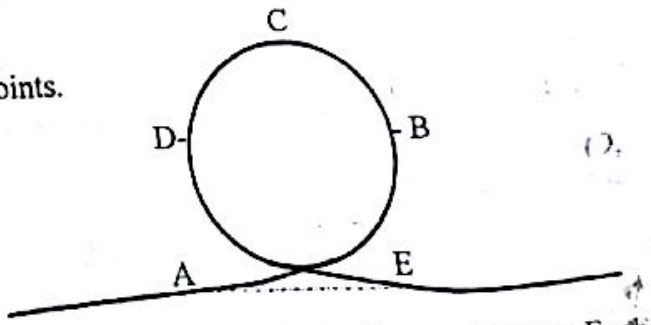
A. I and III B. II and IV C. III only D. IV only

2. A system of four objects, $m_1 = m_2 = m_3$ and $m_4 = 3m_1$, located at *(0,0), (0, D), (2D, D)* and *(D, 2D)* respectively. What is the location of the center of mass with respect to (0, 0)?

A. $D\hat{\imath} + \frac{3}{4}D\hat{\jmath}$ B. $\frac{5}{6}D\hat{\imath} + \frac{7}{4}D\hat{\jmath}$ C. $\frac{5}{6}D\hat{\imath} + \frac{4}{3}D\hat{\jmath}$ D. $D\hat{\imath} + D\hat{\jmath}$

3. Let a body is moving along the loop ABCDE, where points A and E are at zero GPE level. If the loop is frictionless, which of the following is TRUE?

A. ME at A = PE at C.
B. ME at C is maximum relative to other points.
C. PE at A = ME at C.
D. KE at B = PE at D.



4. A planet '**X**' is revolving around the Sun at a distance ***nine*** times the distance between Earth and Sun. What is the orbital period of this planet?

A. 41 yrs. B. 27 yrs. C. 4.3 yrs. D. 9 yrs.

5. A bullet is fired vertically and covered a maximum displacement of ***45m***. What would be the maximum horizontal displacement of the bullet if it is fired from the same gun on the same level field?

A. 45m B. 22.5 m C. 90m D. 15m

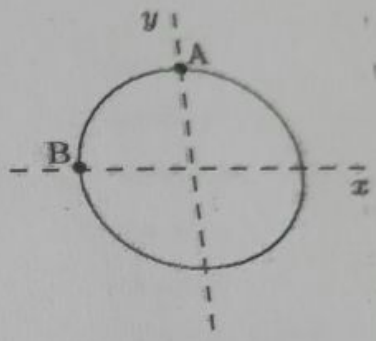
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Two trains are moving at 30 m/s in opposite directions on the same track. The engineers see simultaneously that they are on a collision course and apply the brakes when they are 1000 m apart. Assuming both trains have the same acceleration, what must this acceleration be if the trains are to stop just before colliding?

A. -1.0 m/s^2 **B.** -0.9 m/s^2 **C.** -30.0 m/s^2 **D.** -0.03 m/s^2

7. A particle is moving around a circular path with a constant speed as shown below. The coordinates of the particle when it is at point **B** are $x = 5m, y = 0m$ and its velocity is $(10\ m/s)\hat{j}$. What will be the particle's velocity and acceleration when it is at point **A** respectively?

A. *(10 m/s)i and (-20 m/s^2)j*
B. *(6 m/s)i and (-12 m/s^2)j*
C. *(6 m/s)j and (12 m/s^2)i*
D. *(10 m/s)j and (20 m/s^2)i*



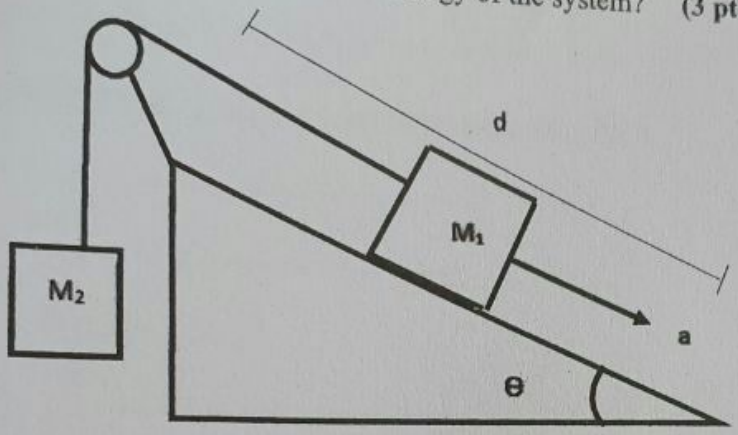
DIRECTION II. Give short answers that best fill the blank spaces following each question and give your answers on the answer sheet.

1. A unit vector in the direction of the momentum vector $P = (3i - 5j + 4k)\ kgm/s$ is _____. **(2 pts.)**
2. A missile is fired towards an enemy target with a velocity of 120m/s at an angle of 53^0 from the horizontal. Find the values for the following questions based on this information.
   a) The velocity of the missile at 4s: V(t = 4s) =____ i + ____ j **(2 pts.)**
   b) If the enemy target is at horizontal distance of 500m, will the missile hit the target? _____ justify _____ **(2 pts.)**
3. A boy is about to cross over a rail way but unfortunately a 300m long train arrived and passes by him. How long does he need to wait to cross? _____ **(2 pts.)**

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IRECTION III: Workout the following problems and questions showing the necessary steps and giving best arguments (incomplete answers may not have a mark!).

1. Two planets with mases M_1 and M_2 are at a distance R each other. A meteor with mass m entered to their gravitational field. At what distance from the larger planet on the line joining the planets will the net gravitational force on the third mass m be zero? **(3 pts.)**
2. Let we have a system of two objects connected by a weightless string and frictionless pulley as shown in the figure below. If the coefficient of kinetic friction between the block and the inclined plane is μ_k, then what will be:
   A) the acceleration (a) of the system? **(3 pts.)**
   B) The change in kinetic energy of the system? **(3 pts.)**



Given:
$M_1 = 50$ kg
$M_2 = 100$ kg
$\theta = 37°$
$d = 30$ m
$\mu_k = 0.3$

3. Birtukan buys a silver bracelet from a flea market. She wants to know whether the bracelet is made of silver or not and made some experiment. She hangs the bracelet with a weightless string and measure ***10g*** and ***9g*** on air and in water respectively.
   a) Is the bracelet made of pure silver? **(3 pts.)**
   b) Find the Young's Modulus on the bracelet, if ***0.03cm*** is extended from its original length of ***15cm*** applying ***20N*** forces on both ends (assume the bracelet as a rod). The diameter of the bracelet is ***4mm***. **(3 pts.)**

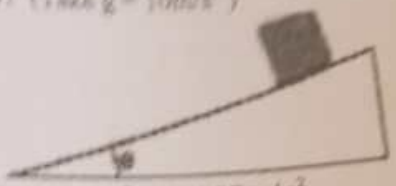
GOOD LUCK!!!

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derba Markos

I. Choose the letter of the correct answer. (1 pt each)

1. A car moves with a speed of 100m/s and slows down at a rate of $5m/s^2$ as it comes to rest. a) What is the time interval needed by the car to come rest?
   A) 10 sec B) 20 sec C) 40 sec D) none
2. A block of 1.0 kg mass slides down an inclined plane at an angle of 30° as shown in the figure below. What is the acceleration of the block, if the inclined plane has coefficient of kinetic friction 0.15? (Take $g = 10m/s^2$)



   A) $-3.7m/s^2$ B) $3.7m/s^2$ C) $4.99m/s^2$ D) $1.27m/s^2$
3. Two projectiles are thrown with the same initial velocity v_0, one at an angle of 30° and the other at an angle of 60°. Then which one of the following statements is **true?**
   A. Both projectiles **can** strike the ground at the same distance.
   B. Both projectiles **cannot** strike the ground at the same distance?
   C. Both projectiles can be in air at the same time.
   D. None.
4. Which one of the following statements is **true** according to **Newton's third law?**
   A) Action and reaction forces are exerted on two different bodies.
   B) Action and reaction forces are exerted on same body.
   C) Action and reaction forces are the same in direction.
   D) None of the above statements is true.
5. Meron does 500J of work in 2 sec and Kebede does 500J of work in 5 sec. Which one is **true** about Meron and Kebede?
   A) Meron is more powerful.
   B) Kebede is more powerful.
   C) Meron does more work.
   D) Kebede does more work.
6. A planet of mass m orbits a star of mass M, where $m << M$. The orbit is circular, its radius is r, and its period is T. The true statements about the planet's orbit include which of the following?
   A) The orbital speed equals $\frac{2\pi r}{T}$.
   B) The gravitational force equals $\frac{GMm}{r^2}$.
   C) If the orbital radius r where greater, T would also be greater.
   D) All

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7. Which one of the following statements is not correct about significant figures?
   A. Zeros that do nothing but set the decimal point are significant.
   B. Zeros between non-zero numbers are always significant.
   C. Zeros that aren't needed to hold the decimal point are significant.
   D. All non-zero numbers are significant.

8. Two athletes jump straight up. Upon leaving the ground, **Adam** has half the initial speed of **Bob**. (**Assume free-fall motion**). Compared to **Adam**, **Bob** is in the air
   A. 0.50 times as long.
   B. 1.41 times as long.
   C. twice as long.
   D. four times as long.

9. Which one of the following is **true** about uniform circular motion.
   A. The acceleration arises because of the change in direction of the velocity.
   B. The acceleration arises because of the change in speed.
   C. The velocity is perpendicular to circular path and points towards the center of the circle.
   D. Acceleration is tangent to the circular path and perpendicular to the radius of the circular path.

10. A 4.0-kg block initially at rest is pulled to the right along a horizontal surface by a constant horizontal force of 10 N. Find the speed of the block after it has moved 2.0 m if the surfaces in contact have a coefficient of kinetic friction of 0.13. (Take $g = 10m/s^2$ necessary.)
    A) $2\sqrt{6/5}\ m/s$ B) $2\sqrt{3/5}\ m/s$ C) $2\sqrt{7/5}\ m/s$ D) $3\sqrt{6/5}\ m/s$

11. An ape jumps from a height of 45 m tree horizontally with a speed of 8m/s and lands a distance d from the base of the tree. How far from the base of the tree will the ape land? (Take $g = 10m/s^2$.) Simply d = _____
    A) 24m B) 12m C) 16m D) 8m

12. Four objects are situated along the ***y* axis** as follows: a 2.00 kg object is at +3.00 m, a 3.00-kg object is at +2.0 m, a 2.0 kg object is at the origin, and a 4.00-kg object is at -4.0 m. Where is the center of mass of these objects?
    A) $\frac{8}{11}m$ B) $\frac{11}{8}m$ C) $\frac{16}{11}m$ D) $\frac{5}{11}m$

II. Fill the blank spaces.

13. A projectile is fired in such a way that its **horizontal range** is equal to **four times** its **maximum height**. What is the angle of projection? θ = _____ (1Pt)

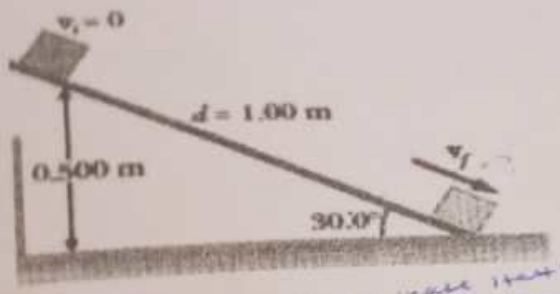
14. A car of mass ***m*** traveling at speed u crashes into the rear of a truck of mass **2*m*** that is at rest and in neutral at an intersection. If the collision is **perfectly inelastic**, the speed of the combined car and truck after collision is _____ **(1Pt)**

15. The position of an object moving along the x axis is given by $x(t) = At^2 - Bt + C$. At what time t does the object come to rest? _____ **(1 Pt)**

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III. Answer the following questions by showing the necessary steps.

16. A 3.00-kg crate slides down a ramp. The ramp is 1.00m in length and inclined at an angle of 30.0°, as shown in the figure below. The crate starts from rest at the top, experiences a constant friction force of magnitude 5.00 N, and continues to move a short distance on the horizontal floor after it leaves the ramp. **Use energy methods** to determine the **speed** of the crate at the bottom of the ramp. **(2.5Pt)**



$d = 1m$, $\theta = 30°$
$m = 3kg$
$V_i = 0$
$f_k = 5.00N$
h_i

$-f_k d = \Delta KE + \Delta PE$
$-f_k d = \frac{1}{2}mV_f^2 - \frac{1}{2}mV_i^2 + mgh_f - mgh_i$, but $V_i = 0$
$-f_k d = \frac{1}{2}mV_f^2 + mgh_f - mgh_i$, but at the bottom $h_f = 0$
$-f_k d = \frac{1}{2}mV_f^2 + mg(0) - mgh_i$
$-f_k d = \frac{1}{2}mV_f^2 - mgh_i$
$-(5N)(1) = \frac{1}{2} * 3 * V_f^2 - 3 * 9.8 * 0.5$
$-5N = \frac{3}{2}V_f^2 - 14.7$
$-5 + 14.7 = \frac{3}{2}V_f^2$
$\frac{2}{3} \times 9.7 = \frac{3}{2}V_f^2 * \frac{2}{3}$
$V_f^2 = 6.467$
$V_f = 2.54 m/s$

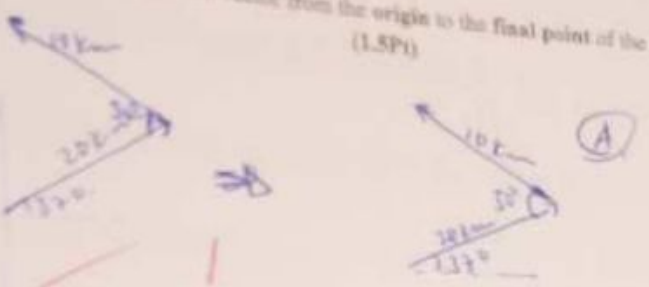
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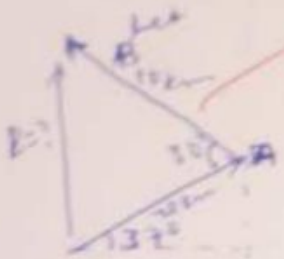
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17. A car travels 20km in a direction of 37° North of East from the origin and then 10km in a direction of 30° West of north.

A) Draw the diagram showing the motion of the car. (1Pt)

B) Find the magnitude of the resultant vector from the **origin** to the **final point** of the car. (1.5Pt)





$R_{NE} = (10\cos 37^\circ)\bar{i} + (20\sin 37^\circ)\bar{j}$

$R_{NE} = 15.97\bar{i} + 12.03\bar{j}$ → North & East ①

$R_{NE} = 16\bar{i} + 12\bar{j}$ → Actual Answer

$R_{WE} = (10\cos 30^\circ)\bar{i} + (10\sin 30^\circ)\bar{j}$

$R_{WE} = 8.66\bar{i} + 5\bar{j}$ → West & North ②

To combine the first & the second eqn

$R = (15.97 + 8.6)\bar{i} + (12.03 + 5)\bar{j} \Rightarrow (16 + 8.66)\bar{i} + (12 + 5)$

$R = 24.57\bar{i} + 17.03\bar{j}$ ..③ $\Rightarrow R = 24.66\bar{i} + 17\bar{j}$

to find the magnitude & resultant vector

$|R| = \sqrt{R_x^2 + R_y^2} \Rightarrow \sqrt{(24.47)^2 + (17.03)^2}$

$\Rightarrow \sqrt{598.78 + 290.02}$

$\Rightarrow \sqrt{888.8}$

$|R| = 29.8\text{km} \simeq 30\text{km}$

To the resultant

$R = 24.66\bar{i} + 17\bar{j}$

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$|R| = \sqrt{R_x^2 + R_y^2} = \sqrt{24.66^2 + 17^2}$

$= \sqrt{1608.1156 + 289}$

$= \sqrt{897.1} \simeq 29.9 \simeq$

↳ Actual a

(1)

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University of Gondar

College of Natural and Computational sciences

Department of Physics

General physics (phys1011) Mid-Exam, 2019 G.C. Total weight = 30 mark.

(Use g = 9.8 m/s^2, if necessary), Time allowed: 1:30 hrs.

Part I Multiple Choice

Choose the correct answer from the given alternatives. (1pt. each)

1. An error caused due to faulty instrument is called _____ error.

   A. Constant B. Personal C. Random D. Systematic

2. The sum of the numbers 436.32, 227.2 and 0.301 in appropriate significant figures is

   A. 663.821 B. 664 C. 663.8 D. 663.82

3. If A = 3.56 ± 0.05 and B = 3.25 ± 0.04, the values of A + B are

   A. $6.81 \leq A + B \leq 6.90$

   B. $6.72 \leq A + B \leq 6.90$

   C. $6.81 \leq A + B \leq 6.916$

   D. $6.71 \leq A + B \leq 6.91$

4. For which of the following motions of an object must the acceleration always be zero?

   A. An object moving with constant speed.

   B. An object moving with constant velocity.

   C. An object moving on a curve.

   D. All

5. An object moves 20 m east in 30 s and then returns to its starting point taking an additional 50 s. which of the following is true about the motion of the object?

   A. the average speed of the object is zero.

   B. the average speed is 1.07m/s.

   C. the average velocity of the object is 0.5m/s

   D. none of the above is true.

6. Two objects, one less massive than the other, collide elastically and bounce back after the collision. If the two objects originally had velocities that were equal in magnitude but opposite in direction, then which one will be moving faster after the collision?

   A. The less massive one.

   B. The speeds will be the same after the collision.

   C. The more massive one.

   D. No way to be sure without the actual masses.

7. A golf ball hits a wall and bounces back at 3/4 times the original speed. What part of the original kinetic energy of the ball would be lost in the collision?

   A. 0.25 B. 0.375 C. 0.5625 D. 0.4375

8. What power is required to pull a 5kg block on a rough horizontal plane at a steady speed of 1.25m/s? The coefficient of friction between the plane and the block is 0.30.

   A. 25.5W B. 12.8W C. 18.4 W D. 32.5W

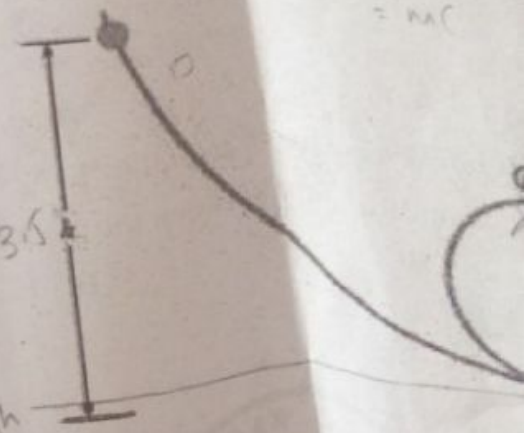
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9. A rock is dropped from the top of a tall tower. Half a second later another rock, twice as massive as the first, is dropped. Ignoring air resistance,
   A. The distance between the rocks increases while both are falling.
   B. The acceleration is greater for the more massive rock.
   C. They strike the ground more than half a second apart.
   D. They strike the ground with the same kinetic energy.
10. Which of the following statements is **correct**?
   A. Gravitational force is a universal property of matter acquired due to mass.
   B. In equal interval of time a planet covers larger distance when it is farther from the sun than when it is closer.
   C. If two satellites having different masses are placed at the same orbit, then the heavier satellite will have longer period than the lighter one.
   D. All are true statements.

Part II Problems (20%)

Show All the Necessary Steps clearly and neatly.

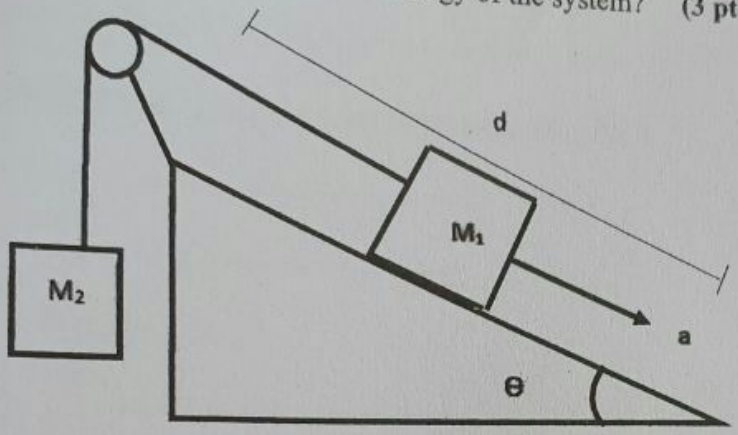
1. If vector **B** is added to vector **A**, the result is 6i+j. If **B** is subtracted from **A**, the result is -4i+7j. What is vector **A** and vector **B**? **(5pts)**
2. A ball is projected so as to pass a wall at a distance **A** from the point of projection at angle of 45^0. If it falls at a distance **B** on the other side of the wall, find the height of the wall. **(5pts)**
3. A tennis player receives a shot with the ball (0.0600 kg) traveling horizontally at 50.0 m/s and returns the shot with the ball traveling horizontally at 40.0 m/s in the opposite direction.
   A. What is the impulse delivered to the ball by the racquet? **(2.5 pts)**
   B. What work does the racquet do on the ball? **(2.5 pts)**
4. A bead slides without friction around a loop as in the figure. The bead is released from a height $h = 3.5R$.
   A. What is its speed at point A? **(2.5 pts)**
   B. How large is the normal force on it at point A, if its mass is 5g? **(2.5 pts)**



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IRECTION III: Workout the following problems and questions showing the necessary steps and giving best arguments (incomplete answers may not have a mark!).

1. Two planets with mases M_1 and M_2 are at a distance R each other. A meteor with mass m entered to their gravitational field. At what distance from the larger planet on the line joining the planets will the net gravitational force on the third mass m be zero? **(3 pts.)**
2. Let we have a system of two objects connected by a weightless string and frictionless pulley as shown in the figure below. If the coefficient of kinetic friction between the block and the inclined plane is μ_k, then what will be:
   A) the acceleration (a) of the system? **(3 pts.)**
   B) The change in kinetic energy of the system? **(3 pts.)**



Given:
$M_1 = 50$ kg
$M_2 = 100$ kg
$\theta = 37°$
$d = 30$ m
$\mu_k = 0.3$

3. Birtukan buys a silver bracelet from a flea market. She wants to know whether the bracelet is made of silver or not and made some experiment. She hangs the bracelet with a weightless string and measure ***10g*** and ***9g*** on air and in water respectively.
   a) Is the bracelet made of pure silver? **(3 pts.)**
   b) Find the Young's Modulus on the bracelet, if ***0.03cm*** is extended from its original length of ***15cm*** applying ***20N*** forces on both ends (assume the bracelet as a rod). The diameter of the bracelet is ***4mm***. **(3 pts.)**

GOOD LUCK!!!

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Aksum University

AKSUM UNIVERSITY
College of Natural and Computational Sciences
Department of Physics
General Physics Mid Exam for Freshman Students Total mark 30%
Time allowed 3:00 hrs Date: December 30, 2019
Name [redacted] ID No 1203106 Section 719

Instruction

- Show all the necessary steps neatly
- Make sure there are 7 problems
- Any form of cheating shall result in a series penalty
- Switch off your mobile during the exam time

1. Consider the three displacement vectors $\vec{A} = 3\hat{i} + 3\hat{j} + 2\hat{k}$ m, $\vec{B} = \hat{i} + 4\hat{j} - 3\hat{k}$m and $\vec{C} = 2\hat{i} + 5\hat{j} + \hat{k}$m. Use the component method to determine
   (a) the magnitude and direction of the vector $\vec{D} = \vec{A} + \vec{B} + \vec{C}$
   (b) the magnitude and direction of $\vec{E} = \vec{A} - \vec{B} - \vec{C}$
2. An object moves along the x axis according to the equation $x(t) = 3t^3 + 2t^2 + 3$, Where x is in meter and time is in second. Determine
   (a) the average speed between t =1.00 s and t = 2.00 s,
   (b) the instantaneous speed at t =2.00 s,
   (c) the average acceleration between t =1.00 s and t =2.00 s,
3. A stone is thrown from the top of a building upward at an angle of 30^0 to the horizontal with an initial speed of 20 m/s. The height from which the stone is thrown is 45 m above the ground. [use $\sin 30^0 = 0.5, \cos 30 = 0.86$]
   (a) How long does it take the stone to reach the ground?
   (b) What is the speed of the stone just before it strikes the ground?

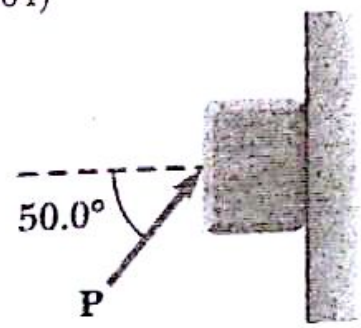
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Department of Physics
Aksum University

4. A pendulum consists of a 2.0 kg stone on a 4.0 m string of negligible mass. The stone has a speed of 8.0 m/s when it passes its lowest point.
   (a) What is the speed when the string is at 60^0 to the vertical?
   (b) What is the greatest angle with the vertical that the string will reach during the stone's motion?
   (c) If the potential energy of the pendulum-Earth system is taken to be zero at the stone's lowest point, what is the total mechanical energy of the system?

5. A cart with mass 3 kg moving at 8.0 m/s to the right collides head-on and elastically with a cart with mass 6.0 kg moving at 8.0 m/s to the left. After the collision, find their velocities.

6. A block of mass 3.00 kg is pushed up against a wall by a force $\vec{P}$ that makes a 50.0^0 angle with the horizontal as shown in Figure below. The coefficient of static friction between the block and the wall is 0.250. Determine the possible values for the magnitude of $\vec{P}$ that allow the block to remain stationary. ($Hint: Use \sin 50^0 = 0.77$ and $\cos 50^0 = 0.64$)



7. Water enters a house through a pipe with an inside diameter of 2.0 cm at a [redacted] pressure of $4 \times 10^5 Pa$. The cold water pipe leading to the second floor bathroom 5.0 m above is 1.0 cm in diameter. Find the flow speed and gauge pressure in the bathroom when the flow speed at the inlet pipe is 2m/s. How much time would be required to fill a 100 L bathtub?

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Part I: From the given alternatives choose the best answer for the following Questions. (Each 1 Pt)

1. Which of the following rule is not true in determining significant digits in a given number
   B. All non-zero numbers are significant
   C. Zeros within a number are always significant
   D. Zeros that follow a number may be significant
   E. Zeros that do nothing but set the decimal point are significant
2. Vector **A** has x and y components of -8.7 cm and 15.0 cm respectively; vector **B** has x and y components of 13.2 cm and -6.6 cm respectively. If $\mathbf{A}-\mathbf{B}+3\mathbf{C}=\mathbf{0}$, what are the components of **C**?
   A. $(7\hat{i}-8\hat{j})$ cm B. $(7.2\hat{i}+7.3\hat{j})$ cm C. $(7.3\hat{i}-7.2\hat{j})$ cm D. $(8\hat{i}-7\hat{j})$ cm
3. One of the following is not unit of density
   A. kg/Litre B. (gram)/(mm)^3 C. Newton/(km)^3 D. Pascal/(m^3/s^2)
4. Which of the following is not true about gravitational force between two bodies?
   A. It is always an attractive force
   B. It is a force exerted by small sized particles
   C. The magnitude of the force is the same on each bodies
   D. It is along a line joining the centers of mass of these two bodies
5. For objects moving in a circular path with a constant speed, acceleration arises because of
   A. The change in direction of the velocity
   B. The change in magnitude of the velocity
   C. The frictional force of the velocity
   D. The center of mass of the moving object
6. The coefficient of static friction between 40kg of table and the ground is 0.5. What is the greatest horizontal force that could be exerted on the table while it remains stationary?
   A. 170N B. 176N C. 186N D. 196N
7. Two balls of the same mass are moving with the speeds one twice the other. What is the ratio of their kinetic energies?
   A. 1/3 B. ½ C. 4 D. 6
8. The upward force acting on an object submerged in a fluid is called
   A. Drag B. Weight C. Pressure D. Buoyant force
9. Which one of the following is not correct about fluid pressure?
   A. All points at same level in a fluid have same pressure
   B. Fluid pressure increases with increase in the depth of the fluid
   C. Fluid pressure does not depend on the shape of the container
   D. All points at same level in a fluid have different pressure
   E. None of the above

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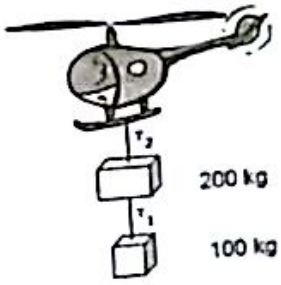
10. The Bernoulli's equation in fluid dynamics is valid for _____
    A. Compressible flows
    B. Unsteady flows
    C. Irrotational flows
    D. Viscous flows

Part II: Give short and clear answers for the following questions.

11. Write the dimensions /units of power in terms of the product of mass, acceleration, and speed. [2pt]
12. State and briefly discuss the three Kepler's laws of planetary motion. [3pt]
13. Define the following terms [3pt]
    A. Elastic material
    B. Plastic material
    C. Elasticity modulus
14. State the continuity equation in a fluid. [2pt]

Part III: Solve the following problems with the necessary steps.

15. Find the force needed to accelerate a mass of 40kg from velocity $\vec{v}_i = (4\hat{\imath} - 5\hat{\jmath} + 3\hat{k})m/s$ to $\vec{v}_f = (8\hat{\imath} + 3\hat{\jmath} - 5\hat{k})m/s$ in 10s [2pt]
16. A fish swimming in a horizontal plane has a velocity $v_0 = (4.0\mathrm{i} + 1.0\mathrm{j})$ m/s at a point in the ocean whose position vector is $r_0 = (10.0\mathrm{i} - 4.0\mathrm{j})$ m relative to a stationary rock at the shore. After the fish swims with constant acceleration for 20.0 s, its velocity is $v = (20.0\mathrm{i} - 5.0\mathrm{j})$ m/s. (a) what are the components of the acceleration? (b) What is the direction of the acceleration with respect to the fixed x axis? (c) Where is the fish at $t = 25$ s and in what direction is it moving? [5pt]
17. A helicopter accelerates vertically upwards at $2m/s^2$. Two crates are hanging from the helicopter. Two different cables are used; one cable connect the crates while the other attaches the 200 kg crate to the helicopter as shown in the diagram below. Calculate the tensions T_1 and T_2 in each cable. [3pt]



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Collage of Natural and Computational Science Department of Physics

General Physics (Phys 1011) Mid exam.

For computer Science [redacted] extension program 2012ec.

Name [redacted] ID No [redacted] allowed 30'

1. If you multiply 0.25 and 0.1098 your approximate answer is

   A. 0.03 B. 0.027 C.0.028 D. 0.0275 E. ~~0.028~~ none

2. The time interval needed by the jet, if a jet plane lands with a speed of 100m/s and slows down at a rate of $4m/s^2$ as it comes to rest is?

   A. 20 sec B. 22 Sec C 25 sec D 400 sec E. none

3. If a boy reels a stone and a piece of paper from the building simultaneously neglecting air resistance which one is arrived first to the surface of earth.

   A. a piece of paper B. both are arrived at the same time C. a stone D. both are note arrived E. none

4. which of the following is true about projectile motion.

   A. The horizontal distance is always constant. .

   B. The vertical and horizontal component of velocity is constant.

   C. The horizontal component of velocity is zero.

   D. The particle on The trajectory do not accelerate horizontally.

   E. none

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Short answer

5. write some examples of contact and none contact force.

Contact force | Non- contact force

frictionalforce | magneticforce

Work out problems show all necessary steps clearly.

6. A track covers 100m in 10s while smoothly slowing down to a final speed of 2m/s.

Find

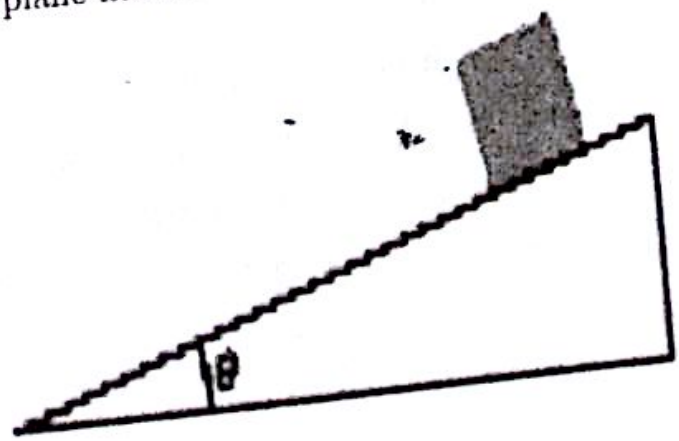
a. Its original speed

b. Its acceleration

7. Given three Vectors $\vec{A}$= 2i-6j-k , $\vec{B}$ = -i+2j+6k and $\vec{C}$ = -3i+j+2k find a unit vector in the direction of $(\vec{A} + 2\vec{B} - \vec{C})$

8. 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?

9. A block of mass m slides down an inclined plane with $\theta = 45^0$as shown in the figure below. Find the acceleration of the block. (a)If the inclined plane is frictionless. (b)If the inclined plane has coefficient of kinetic friction μ_k= 0.3



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debra berhani

9 A body starts from the orgin with an acceleration of $3\frac{m}{s^2}$ along x- axis and $4\frac{m}{s^2}$ along the y-axis, Its distance from the orgin after 4 second will be _____

A) 80 m

B) 22 m

C) 102 m

D) None

10. A projectile is projected with intial velocity $6\hat{i} + 8\hat{j}$ m/s. if $g = 10m/s^2$ then The maximum height attained by projectile is _____

A) 4.8 m

B) 9.6 m

C) 19.2 m D)3.2m

11 Two balls are thrown simultaneously,horizontally and with different speeds from the same place Which balls will hit the ground first?

A) The slower one

B) The fastest one

C) Depends on their masses

D) Both will reach simultaneously

12. In projectile motion,the velocity at the maximum height is—

A) $v_0 cos\theta$

B) $\frac{v_0 cos\theta}{2}$

C) $\frac{v_0 sin\theta}{2}$

D) $v_0 sin\theta$

13. If two bodies are projected at 30^0 and60^0 respectively,with the same velocity,then which of the following is **true**?

A) Their ranges are the same

B) Their times of flight are the same

C) Their height are the same

D) All

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11 A body is projected from the ground at some angle to the horizontal,what happens to the vertical speed of the body in this motion?

A) increases

B) Decreases

C) Remains the same

D) First decreases and then increases

INSTRUCTIONS-II Say true or false accordingly and write your answer in your answersheet.

1. Random errors are also called accidental

2. Acceleration due to gravity is greater at the mountains than the sealevel

3. The sope of a line in s-t diagram for uniform motion gives the velocity

INSTRUCTIONS-III Give short answer for the following questions and write your answer in your answersheet

1. If $\vec{A} = 6\hat{i} + c\hat{j} + 3\hat{k}$,$\vec{B} = 3\hat{i} + 4\hat{j} + 2\hat{k}$ and $\vec{A} + 3\vec{B} = 0$ then the value of c is

2. A particle moves along the x axis. Its position varies with time according to the expression$x = -4t + 2t^2$where x is in meters and t is in seconds

   a) The velocity of the particle at $t = 2.5s$ is

   b) The average velocity of the particle in the time intervals $t = 1s$ to $t = 3s$.

3.0 For what angle of projection, the range oof projectilel equals the maximum height.

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