## PHYSICS DEPARTMENT

PHY 1033
Exam 1
January 29, 2009
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Name (print):
On my honor, I have neither given nor received unauthorized aid on this examination.
Signature: $\qquad$

## YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE. DIRECTIONS

(1) Code your test number on your pink answer sheet (use $\mathbf{7 6 - 8 0}$ for the 5 -digit number). Code your name on your answer sheet. Darken circles completely (errors can occur if too light). Code your UFID on your answer sheet.
(2) Print your name on this sheet and sign it also.
(3) You may use a calculator and 1 side of handwritten $8 \frac{1}{2} \times 11$ formula sheet. No other materials allowed.
(4) Do all scratch work anywhere on this exam that you like. At the end of the test, this exam printout and the formula sheet are to be turned in. No credit will be given without both answer sheet and printout with scratch work most questions demand.
(5) Work the questions in any order. Incorrect answers are not taken into account in any way; you may guess at answers you don't know if you feel that a correct answer is listed. Guessing on all questions will most likely result in failure.
(6) It is not our intention to omit the right answer, but if you believe that none of the answers is correct, please mark the answer closest to your answer.
(7) Blacken the circle of your intended answer completely, using a number 2 pencil. Do not make any stray marks or the answer sheet may not read properly.
(8) As an aid to the examiner (and yourself), in case of poorly marked answer sheets, please circle your selected answer on the examination sheet.
(9) Take $\mathbf{g}=\mathbf{1 0} \mathbf{~ m} / \mathbf{s}^{2}$ and $c=3 \times 10^{8} \mathbf{~ m} / \mathrm{s}$ throughout this test.
(10) Good luck!!!
$\ggg \ggg \gg$ WHEN YOU FINISH $\lll \lll \lll$
Hand in the pink answer sheet separately.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1. A sheet of paper can be withdrawn from under a container of milk without toppling it if the paper is jerked quickly. This best demonstrates that
(1) the milk carton has inertia.
(2) gravity tends to hold the milk carton secure.
(3) there is an action-reaction pair of forces.
(4) the milk carton has no acceleration.
(5) none of these
2. According to Newton's law of inertia, a rail road train in motion should continue going forever even if its engine is turned off. We never observe this because railroad trains
(1) always have forces that oppose their motion.
(2) must go up and down hills.
(3) are much too heavy.
(4) move too slowly.
(5) -
3. When a rocket ship accelerating in outer space runs out of fuel it
(1) no longer accelerates.
(2) accelerates for a short time, then slows down to a constant velocity.
(3) accelerates for a short time, slows down, and eventually stops.
(4) -
(5) -
4. Whirl a rock at the end of a string and it follows a circular path. If the string breaks, the tendency of the rock is to
(1) follow a straight-line path.
(2) increase its speed
(3) continue to follow a circular path.
(4) revolve in a smaller circle
(5) -
5. While an object near the earth's surface is in free fall, its
(1) velocity increases.
(2) acceleration increases.
(3) mass increases.
(4) mass decreases.
(5) -
6. If an object falling freely were somehow equipped with an odometer to measure the distance it travels, then the amount of distance it travels each succeeding second would be
(1) greater than the second before.
(2) constant.
(3) doubled.
(4) less and less each second.
(5) -
7. If a rocket initially at rest accelerates at a rate of $50 \mathrm{~m} / \mathrm{s}^{2}$ for one minute, its speed will be
(1) $3000 \mathrm{~m} / \mathrm{s}$.
(2) $500 \mathrm{~m} / \mathrm{s}$.
(3) $50 \mathrm{~m} / \mathrm{s}$.
(4) $3600 \mathrm{~m} / \mathrm{s}$.
(5) -
8. An object falls freely from rest on a planet where the acceleration due to gravity is 20 meters per second squared. After 5 seconds, the object will have a speed of
(1) $100 \mathrm{~m} / \mathrm{s}$.
(2) $20 \mathrm{~m} / \mathrm{s}$.
(3) $50 \mathrm{~m} / \mathrm{s}$.
(4) $10 \mathrm{~m} / \mathrm{s}$.
(5) $5 \mathrm{~m} / \mathrm{s}$.
9. Consider drops of water that leak at a steady rate from a dripping faucet. As the drops fall they
(1) get farther apart. (2) remain at a relatively fixed distance from one another. (3) get closer together. (4) - (5) -
10. The muzzle velocity of a bullet fired from a new rifle is $100 \mathrm{~m} / \mathrm{s}$. Neglecting air resistance, at the end of one second a bullet fired straight up into the air will have traveled a distance of
(1) $(100-4.9) \mathrm{m}$.
(2) $(100+4.9) \mathrm{m}$.
(3) 4.9 m .
(4) 100 m .
(5) none of these
11. A man leans over the edge of a cliff and throws a rock upward at $4.9 \mathrm{~m} / \mathrm{s}$. Neglecting air resistance, one second later the rock's speed is
(1) $4.9 \mathrm{~m} / \mathrm{s}$.
(2) $14.7 \mathrm{~m} / \mathrm{s}$.
(3) zero.
(4) $9.8 \mathrm{~m} / \mathrm{s}$.
(5) none of these.
12. A ride on a roller-coaster car containing 6 passengers takes 3 minutes. Neglecting friction, a similar ride with 12 passengers aboard would take
(1) 3 minutes.
(2) 18 minutes.
(3) 6 minutes.
(4) 1.5 minutes.
(5) -
13. A $10-\mathrm{N}$ falling object encounters 4 N of air resistance. The net force on the object is
(1) 6 N .
(2) 4 N .
(3) 0 N .
(4) 10 N .
(5) 16 N
14. Which has zero acceleration? An object
(1) all of these
(2) at rest.
(3) moving at constant velocity.
(4) in mechanical equilibrium.
(5) none of these
15. A bag of groceries has a mass of 10 kilograms and a weight of
(1) about 100 N .
(2) about 1000 N .
(3) about 10 N .
(4) about 1 N .
(5) more than 1000 N .
16. A rock is thrown vertically into the air. At the very top of its trajectory the net force on it is
(1) almost equal to its weight.
(2) more than its weight.
(3) less than its weight.
(4) -
(5) -
17. A skydiver of mass 100 kg experiences air resistance of 500 N , and an acceleration of
(1) about 0.5 g .
(2) about 0.2 g .
(3) about 0.3 g .
(4) about 0.4 g .
(5) more than 0.5 g .
18. A person is attracted toward the center of the Earth by a $500-\mathrm{N}$ gravitational force. The Earth is attracted toward the person with a force of
(1) 500 N .
(2) 250 N .
(3) 1000 N .
(4) zero.
(5) -
19. A automobile and a baby carriage traveling at the same speed collide head-on. The impact force is
(1) the same for both.
(2) greater on the automobile.
(3) greater on the baby carriage.
(4)
(5) -
20. It is correct to say that impulse is equal to
(1) the change in momentum.
(2) the force multiplied by the distance the force acts.
(3) momentum.
(4) velocity multiplied by time
(5) -
21. When you jump from an elevated position you usually bend your knees upon reaching the ground. By doing this, you make the time of the impact about 10 times as great as for a stiff-legged landing. In this way the average force your body experiences is
(1) about $1 / 10$ as great.
(2) less than $1 / 10$ as great.
(3) more than $1 / 10$ as great.
(4) about 10 times as great.
(5) -
22. A $1-\mathrm{kg}$ chunk of putty moving at $1 \mathrm{~m} / \mathrm{s}$ collides with and sticks to a $5-\mathrm{kg}$ bowling ball initially at rest. The bowling ball and putty then move with a momentum of
(1) $1 \mathrm{~kg} \mathrm{~m} / \mathrm{s}$.
(2) $0 \mathrm{~kg} \mathrm{~m} / \mathrm{s}$.
(3) $5 \mathrm{~kg} \mathrm{~m} / \mathrm{s}$.
(4) $2 \mathrm{~kg} \mathrm{~m} / \mathrm{s}$.
(5) more than $5 \mathrm{~kg} \mathrm{~m} / \mathrm{s}$.
23. A 2 -kg mass is held 4 m above the ground. What is the approximate potential energy of the mass with respect to the ground?
(1) 80 J
(2) 32 J
(3) 8 J
(4) 6 J
(5) none of these
24. A pulley system raises a $1000-\mathrm{N}$ load 2 meters with 100 N of input force. The efficiency of the system is
(1) Not enough information is given.
(2) $100 \%$.
(3) $90 \%$.
(4) $10 \%$.
(5)
25. When a rifle is fired it recoils as the bullet is set in motion. The rifle and bullet ideally acquire equal
(1) but opposite amounts of momentum. (2) amounts of kinetic energy. (3) both of these (4) neither of these (5) -
