

Instructor(s): *N. Sullivan*PHYSICS DEPARTMENT
Midterm Exam 1

PHY 2004

February 4, 2015

Name (print, last first): _____ Signature: _____

*On my honor, I have neither given nor received unauthorized aid on this examination.***YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.**

- (1) **Code your test number on your answer sheet (use lines 76–80 on the answer sheet for the 5-digit number).** Code your name on your answer sheet. **DARKEN CIRCLES COMPLETELY.** Code your UFID number on your answer sheet.
- (2) Print your name on this sheet and sign it also.
- (3) Do all scratch work anywhere on this exam that you like. **Circle your answers on the test form.** At the end of the test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout.
- (4) **Blacken the circle of your intended answer completely, using a #2 pencil or blue or black ink.** Do not make any stray marks or some answers may be counted as incorrect.
- (5) **The answers are rounded off. Choose the closest to exact. There is no penalty for guessing. If you believe that no listed answer is correct, leave the form blank.**
- (6) Hand in the answer sheet separately.

$$g = 9.80 \text{ m/s}^2$$

Each question is worth 5 points.

1. Jane starts at the town center and drives 4 km due northeast, and then drives 5 km due south. How far is she from her starting point?
 - (1) 3.6 km
 - (2) 2.8 km
 - (3) 1.6 km
 - (4) 5.4 km
 - (5) 0 km
2. Joe drops a pebble from a bridge. If the pebble hits the water in 3 seconds after it is dropped, how far did the pebble fall?
 - (1) 44.1 m
 - (2) 22.1 m
 - (3) 14.7 m
 - (4) 88.3 m
 - (5) 34.5 m
3. Jack stands on scales in an elevator. When the elevator is at rest the scales read 99 N. When the elevator moves down, the scales read 50 N. What is the acceleration of the elevator?
 - (1) 4.9 m/s²
 - (2) 9.8 m/s²
 - (3) 2.5 m/s²
 - (4) 7.0 m/s²
 - (5) 6.3 m/s²
4. A horizontal force P pushes a 10 kg mass across a floor. What value of P is needed to move the block with an acceleration of 2 m/s² if the coefficient of kinetic friction is 0.4?
 - (1) 59 N
 - (2) 98 N
 - (3) 37 N
 - (4) 15 N
 - (5) 72 N
5. A car is initially moving backwards at a speed of 5 m/s and then suddenly accelerates in the forward direction with an acceleration $a = 5 \text{ m/s}^2$. What is the speed of the car after 4 seconds of acceleration?
 - (1) 15 m/s
 - (2) 25 m/s
 - (3) 18 m/s
 - (4) 7.5 m/s
 - (5) 36 m/s
6. A truck traveling at an unknown speed suddenly brakes with a deceleration of 5 m/s². If the truck leaves a skid mark of 30 m, what was the truck's initial velocity?
 - (1) 17.3 m/s
 - (2) 30 m/s
 - (3) 3.45 m/s
 - (4) 0 m/s
 - (5) 22 m/s

Instructor(s): *N. Sullivan*PHYSICS DEPARTMENT
Midterm Exam 2

PHY 2004

March 11, 2015

Name (print, last first): _____ Signature: _____

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$$g = 9.80 \text{ m/s}^2$$

1. (5 points) A 10 gram bullet is fired into a block of wood that has a mass of 1 kg. If the velocity of the block of wood is 10 m/s after the impact, what was the original velocity of the bullet?
 - (1) 100 m/s
 - (2) 52 m/s
 - (3) 25 m/s
 - (4) 15 m/s
 - (5) 5.2 m/s

2. (5 points) A rocket ship of mass 10,000 kg is moving with a velocity of 30 m/s through space. The crew fire their engines and burn 60 kg of fuel that is ejected with a speed of 15,000 m/s (opposite to the motion of the ship). What is the final velocity of the rocket?
 - (1) 120 m/s
 - (2) 75 m/s
 - (3) 1000 m/s
 - (4) 510 m/s
 - (5) 0.25 m/s

3. (5 points) A ramp inclined at 25 degrees to the horizontal is used to haul a load of 150 kg up the slope. What is the ideal mechanical advantage of this simple machine?
 - (1) 2.37
 - (2) 3.86
 - (3) 1.00
 - (4) 5.62
 - (5) 0.25

4. (5 points) An orange billiard ball of mass 4 grams and traveling with a velocity of 4 m/s collides with a stationary blue billiard ball of mass 5 gm. What is the speed of the blue ball after the collision, assuming the collision is elastic?
 - (1) 3.6 m/s
 - (2) 1.3 m/s
 - (3) 2.0 m/s
 - (4) 0.44 m/s
 - (5) 7.2 m/s

5. (5 points) A mosquito sits on a compact disc that is rotating at 1000 rpm. If the disc has a radius of 10 cm, what is the tangential speed of the mosquito at the edge of the disc?
 - (1) 10.5 m/s
 - (2) 105 m/s
 - (3) 0 m/s
 - (4) 21 m/s
 - (5) 52.5 m/s

6. (5 points) A wheel rotating at 2000 rpm is braked and comes to rest in 30 seconds. How many revolutions did the wheel rotate through before coming to rest?
 - (1) 500
 - (2) 333
 - (3) 210
 - (4) 51.0
 - (5) 33.3

Instructor(s): *N. Sullivan*PHYSICS DEPARTMENT
Midterm Exam 3

PHY 2004

April 8, 2015

Name (print, last first): _____ Signature: _____

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 $g = 9.80 \text{ m/s}^2$

$R = 8314 \text{ J/kmole K}$

1. (5 points) A log of wood that has a density of 980 kg/m^3 floats in a calm pool of water with density 1000 kg/m^3 . What percentage of the wood is submerged?
 - (1) 98%
 - (2) 20%
 - (3) 11%
 - (4) 89%
 - (5) 100%
2. (5 points) A gas mixture in a diesel engine is initially held at in a volume of 200 cm^3 at 27°C . The gas is compressed to a volume of 15 cm^3 . During the compression, the pressure increases from 1 atmosphere to 50 atmospheres. What is the final temperature?
 - (1) 852°C
 - (2) 477°C
 - (3) 957°C
 - (4) 300°C
 - (5) 173°C
3. (5 points) The weight of a piece of metal in air is 22 N. If the weight of the same piece when fully immersed in oil (of density 800 kg/m^3) is 12 N, what is the density of the metal?
 - (1) 1760 kg/m^3
 - (2) 364 kg/m^3
 - (3) 1250 kg/m^3
 - (4) 644 kg/m^3
 - (5) 1000 kg/m^3
4. (5 points) Water enters a hose with a speed of 10 m/s . The inlet diameter is 4 cm and the outlet diameter is 1 cm. What is the speed of the water as it leaves the hose?
 - (1) 160 m/s
 - (2) 10 m/s
 - (3) 40 m/s
 - (4) 2.5 m/s
 - (5) 0.63 m/s
5. (5 points) A 5 m length of strong steel with a cross-sectional area of 20 cm^2 is compressed with a force of 20,000 N. If the Young's modulus for this steel is 200 GPa, what is the change in length of the steel?
 - (1) 0.25 mm
 - (2) 25 mm
 - (3) 0.11 cm
 - (4) 12.5 mm
 - (5) 5.5 mm
6. (5 points) A 400 m length of an iron railway track changes in temperature by 20°C during a day. If the coefficient of thermal expansion of the iron is 12 ppm (parts per million), what is the change in length of the railway track?
 - (1) 9.6 cm
 - (2) 48 cm
 - (3) 12 cm
 - (4) 4.8 mm
 - (5) 4.8 m