

Instructor(s): *J. Ipsier*

## PHYSICS DEPARTMENT

PHY 2004

Exam 1

February 7, 2005

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 76–80 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 with scratch work most questions demand.
- (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.
- (6) **Hand in the answer sheet separately.**

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

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1. Ball A is dropped from a height of 4 m. At the same time, ball B is dropped from 12 m. Ball A hits the ground at time  $t_A$ , and ball B at  $t_B$ . What is the value of  $t_B - t_A$ ?
    - (1) 0.66 s
    - (2) 0.33 s
    - (3) 0.99 s
    - (4) 0.15 s
    - (5) 1.21 s
  2. A rock is dropped (zero speed) from a height of 30 m above the ground. At the same moment, another rock is thrown straight up with speed  $v$  from the ground. The rocks cross each other at a height of 15 m. What is the value of  $v$  in m/s?
    - (1) 17
    - (2) 12
    - (3) 8
    - (4) 4
    - (5) 26
  3. A baseball is batted into the air with an initial speed of 39 m/s, at an angle of  $60^\circ$  above the horizontal. Assume that the baseball is hit from ground level. What is its height after 3 s (neglecting air resistance, of course)?
    - (1) 57 m
    - (2) 49 m
    - (3) 38 m
    - (4) 27 m
    - (5) 16 m
  4. Autos A and B have a head-on collision in 1 dimension. At time  $t = 0$ , A is at rest and B is heading at A with a speed of 40 m/s. A accelerates at a constant rate of  $5 \text{ m/s}^2$ , while B maintains constant velocity. The autos collide at  $t = 6 \text{ s}$ . How far apart are the autos at  $t = 0$ ?
    - (1) 330 m
    - (2) 110 m
    - (3) 220 m
    - (4) 430 m
    - (5) 550 m
  5. An auto starts from rest and maintains a constant acceleration  $a = 5 \text{ m/s}^2$  for 5 s. It then stops accelerating suddenly ( $a = 0$ ) and maintains constant velocity for 5 s. How far does the auto travel during this 10 s trip?
    - (1) 187 m
    - (2) 111 m
    - (3) 95 m
    - (4) 84 m
    - (5) 27 m
  6. On Earth a cannon can shoot a cannonball a distance of 800 m if it is aimed at an angle of  $45^\circ$  above the horizontal. How far can the same cannon shoot a cannonball on the Moon if it is aimed at an angle of  $15^\circ$  above the horizontal? The acceleration of gravity on the Moon is  $1/6$  that on Earth.
    - (1) 2400 m
    - (2) 1000 m
    - (3) 3300 m
    - (4) 5400 m
    - (5) 9800 m

7. A hiker walks for 60 s at 1 m/s in the positive  $x$  direction (East), and then for 90 s at 1.5 m/s in the negative  $y$  direction (South). At what angle  $\theta$ , measured counterclockwise from the positive  $x$  direction, must the hiker walk in order to return directly to the starting point?
- (1)  $114^\circ$                       (2)  $211^\circ$                       (3)  $165^\circ$                       (4)  $84^\circ$                       (5)  $302^\circ$
8. An auto of mass  $2 \times 10^3$  kg is initially traveling at 40 m/s brakes at a constant rate of acceleration and requires a distance of 100 m to come to rest along a horizontal surface. What is the magnitude of the horizontal force that the auto exerts on the surface?
- (1)  $1.6 \times 10^4$  N                      (2)  $3.1 \times 10^3$  N                      (3)  $8.6 \times 10^4$  N                      (4)  $7.5 \times 10^3$  N                      (5)  $5.2 \times 10^3$  N