Instructor: *B. Whiting*

PHYSICS DEPARTMENT

PHY 2004 | Exam 1 | September 18, 2002

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.

DIRECTIONS

(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 student 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. 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 the answer sheet may not read properly.
(5) The answers are rounded off. Choose the closest to exact. There is no penalty for guessing.

>>>>>>>>**WHEN YOU FINISH** <<<<<<<<
Hand in the answer sheet separately.

1. A displacement vector at an angle of 65° has a y component equal to 10 m. What is the magnitude of the displacement vector (in m)?

(1) 11.03 (2) 10.29 (3) 9.07 (4) 8.45 (5) 13.17

2. A ball is thrown horizontally with a speed of 14 m/s at a point 3.0 m above the level ground. How far will it go before it hits the ground (in m)?

(1) 11 (2) 13 (3) 15 (4) 17 (5) 19

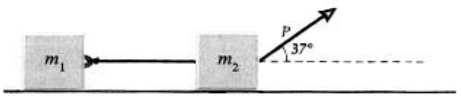
3. A boy throws a ball straight up alongside a building with speed 20 m/s. As the ball is coming back down, a girl watches out a window 8 m above the boy and catches it. How long a time went between the throwing and catching of the ball (in s)?

(1) 3.63 (2) 1.1 (3) 2.5 (4) 4.1 (5) 1.9

4. A 50 kg block is pushed along the floor by a horizontal force of 175 N. A friction force of 25 N opposes the motion. What is the acceleration of the block (in m/s^2)?

(1) 3 (2) 4 (3) 8 (4) 6 (5) 10

5. Consider the situation in the figure. If the pull, $P = 170$ N, $m_1 = m_2 = 12$ kg, and the friction forces are negligible, find the acceleration of the blocks (in m/s^2).



(1) 5.65 (2) 8.92 (3) 6.75 (4) 4.82 (5) 7.29

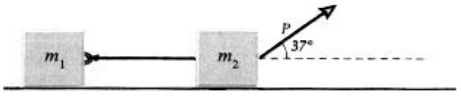
6. You are given two vectors, $\mathbf{A} = 6\text{m}$ in the $-y$ direction and $\mathbf{B} = 4\text{m}$ in the $+x$ direction. Find $\mathbf{A} - 2\mathbf{B}$.

(1) 10m, at 217° (2) 10m, at 143° (3) 10m, at −37° (4) 10 m, at −55° (5) 14m, at 232°

7. No matter how powerful a car's motor is, the car can accelerate no faster than the frictional force between the pavement and the wheels allow. For this reason, a typical car's maximum acceleration is about 8 m/s^2. What is the shortest time (in s) a car would require to accelerate from rest to 45 m/s?

(1) 5.63 (2) 1.42 (3) 25.31 (4) 14.22 (5) 6.00

8. Consider the situation in the figure. If the pull $P = 30$ N, $m_1 = m_2 = 4$ kg, and the friction forces are negligible, what is the tension in the connecting cord (in N)?



(1) 12.0 (2) 7.4 (3) 3.6 (4) 24.4 (5) 2.5

9. A block of mass 4 kg sits on an incline at an angle of 45°. It is attached by a massless string over a frictionless pulley to mass of 3 kg hanging vertically. What is the magnitude and direction of the frictional force required to hold the block in place?

(1) 1.7 N down incline (2) 5.9 N down incline (3) 5.9 N up incline (4) 3.1 N perpendicular to incline (5) 0.2 N up incline

10. A 20-kg box sitting on a level floor is pulled with a force of 50 N by a rope inclined at 37° above the horizontal. How large must the frictional force be (in N) if the box is not to move?

(1) 39.9 (2) 30.2 (3) 195.8 (4) 2.51 (5) 92.4

11. The dynamic (kinetic) coefficient of friction between a 4.0-kg box and the floor is 0.60. How large a horizontal force (in N) is required to give the box an acceleration of 2 m/s^2?

(1) 31.5 (2) 15.4 (3) 19.7 (4) 3.7 (5) 13.2