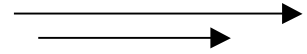


Fill in on the OPSCAN sheet:

- 1) Name
- 2) Student identification number
- 3) Exam number as 01
- 4) Sign the OPSCAN sheet



**Important:** This test consists of 10 multiple choice problems that are worth 15 points each.

**Instructions:** For each problem, choose the one answer that is correct or most nearly correct. Make a small mark, for your eyes only, near the letter of your choice. After you finish and check all the multiple-choice problems, transfer your answers to the computer sheet. Then, until you hand in the computer sheet, turn the sheet over and leave it face down.

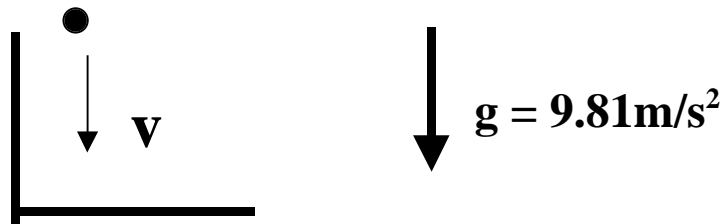
Only answers on the computer answer sheet will be graded. As your OPSCAN answer sheet will not be returned, record the answers on the test paper that you will keep.

The correct answers will be displayed on the course web page, and you can find your score for this exam on CHIP.

This is a closed book exam, but a crib sheet is provided. You may also use a calculator.

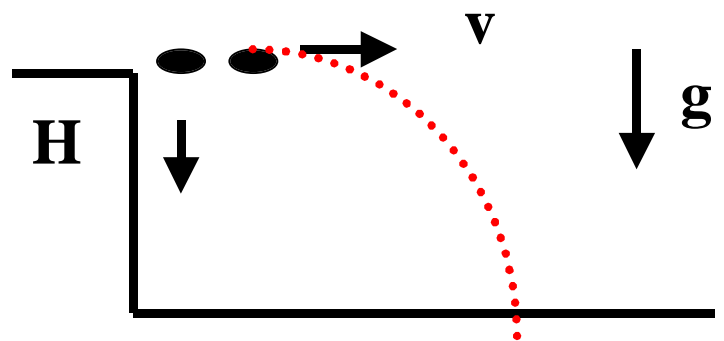
1) A pebble is dropped from rest from the top of a high building. How long in seconds does it take the pebble to reach 60 mph (=88 ft/s)? Ignore friction .

- a) 8.97
- b) 29.43
- c) 3.76
- d) 2.73
- e) 2.24



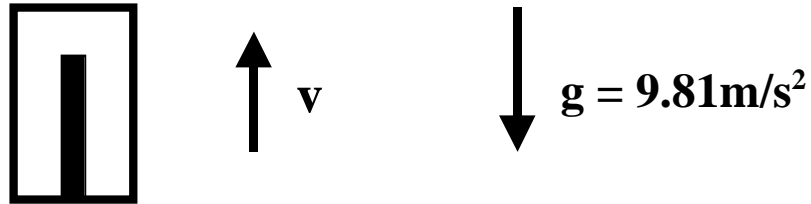
2) A rifle at a height H above the ground fires a bullet (A) parallel to the ground. At the same instant and at the same height a second object (B) of the same size and shape, but different material, is dropped from rest. In what order do the two hit the ground? (Ignore air resistance)

- a) A hits first
- b) B hits first
- c) Both hit at the same time
- d) The order depends on the speed of bullet A
- e) The one with the largest mass hits first



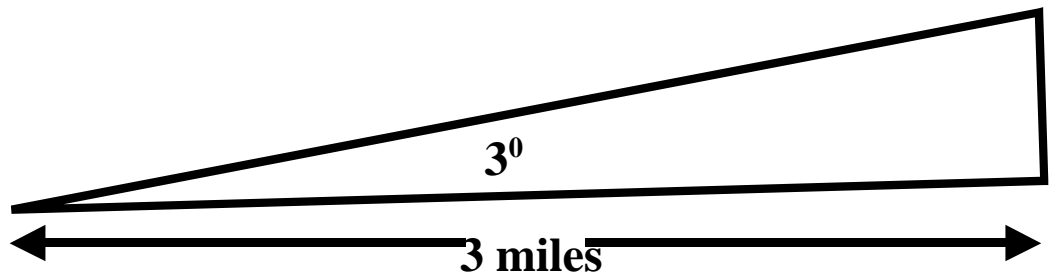
3) What is the apparent weight, in Newtons, of a person with a mass of 100 kg ascending in an elevator and slowing down with an acceleration of  $4 \text{ m/s}^2$ ?

- a) 481
- b) 581
- c) 981
- d) 1381
- e) 1181



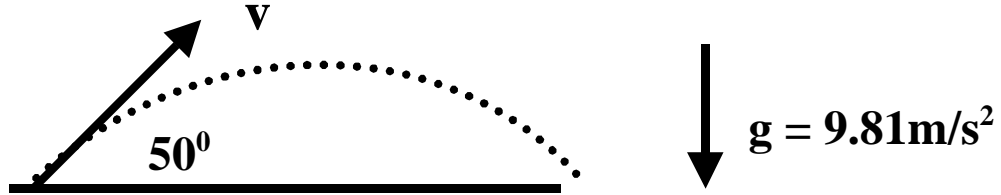
4) You are driving into St. Louis and the road sign indicates you are 3 miles from the arch and you observe the angle between the horizontal and the top of the arch to be  $3^\circ$ . How high is the arch in feet above the horizontal? (1 mile = 5280 feet)

- a) 829
- b) 820
- c) 192
- d) 157
- e) 830



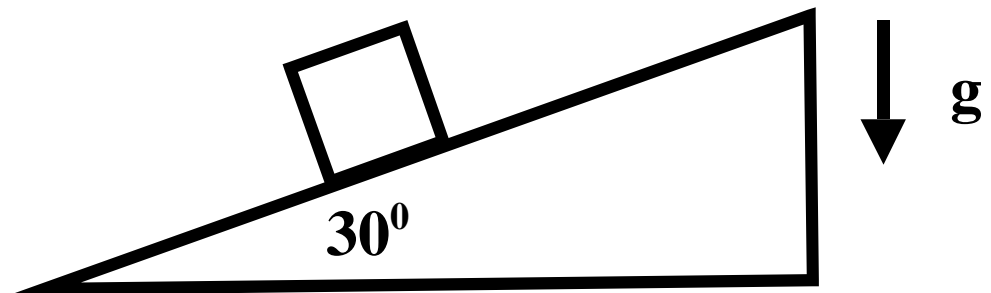
5) A projectile is fired with a velocity of 65 m/s at an angle of  $50^\circ$  to the horizontal. What is the speed at the highest point of the trajectory in m/s? (Ignore air resistance)

- a) 41.78
- b) 49.79
- c) 65.00
- d) 44.38
- e) 52.14



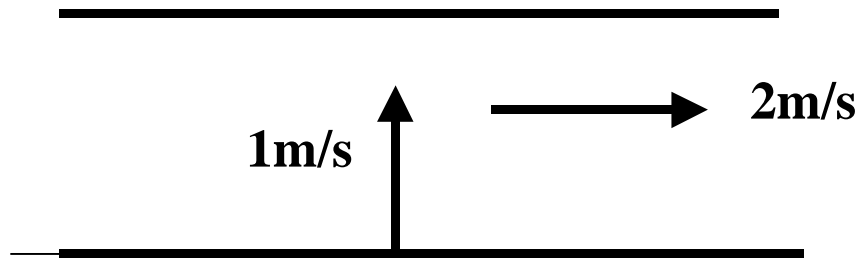
6) A 10kg block slides down a rough inclined plane with a constant speed of 0.1m/s. What is the coefficient of kinetic friction?

- a) 0.83
- b) 0.87
- c) 0.58
- d) 0.50
- e) 0.36



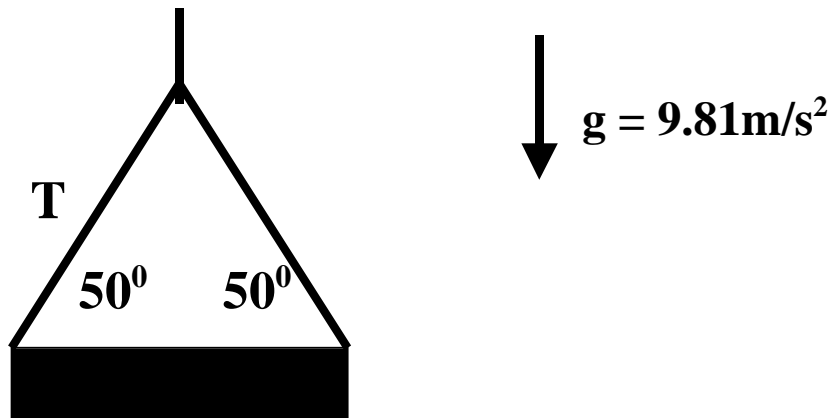
7) A rower starts to cross a river 50.4 m wide by rowing with a speed of 1 m/s directly across from his starting point. The river is flowing at 2 m/s. How long does it take to cross in seconds?

- a) 50.40
- b) 22.54
- c) 25.20
- d) 16.80
- e) 56.70



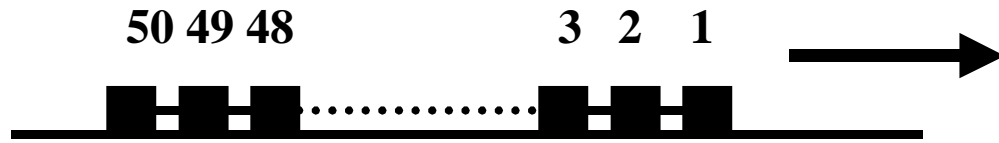
8) A beam is lifted with no acceleration by a crane. What is the tension  $T$ , in Newtons, in one of the cables supporting the beam of mass 1000 kg?

- a) 3261
- b) 7631
- c) 6403
- d) 778
- e) 653



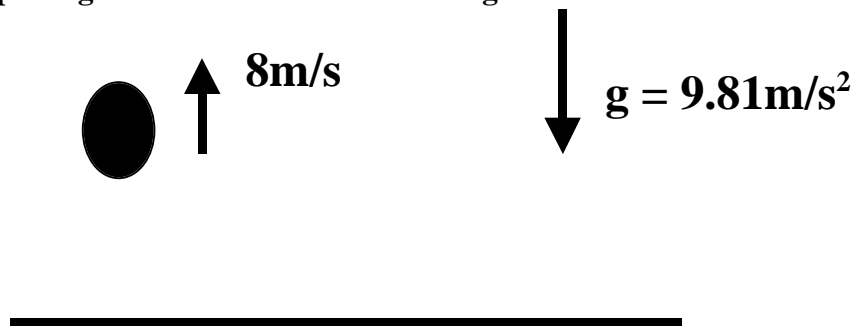
9) A train consists of 50 cars each with mass of  $7 \times 10^3$  kg. If the acceleration is  $0.1 \text{ m/s}^2$ , what is the tension, in Newtons, in the coupling between the 48<sup>th</sup> and 49<sup>th</sup> car?

- a) 700
- b) 1400
- c) 35000
- d) 33600
- e) 34300



10) A balloon rising at  $8 \text{ m/s}$  drops a package from a height of  $32.34 \text{ m}$ . What is the total distance traveled by the package in meters before it hits the ground?

- a) 32.34
- b) 34.78
- c) 35.60
- d) 38.86
- e) 42.56



## SOLUTIONS EXAM 1 Physics 218 Spring 2002

### Question #

- 1  $v = v_0 + gt$   $t = 88/(3.281 \times 9.81)$  d
- 2 Vertical motion is the same for each c
- 3  $N - mg = ma$   $N = m(9.81 - 4)$  b
- 4  $\tan 3^\circ = h/(3 \times 5280)$  e
- 5 Horizontal velocity is the same  
 $v_x = v \cos 50$  a
- 6  $N = mg \cos \theta$   $mg \sin \theta = F_f = \mu N$   
 $\tan \theta = \mu$  c
- 7 Only the component perpendicular  
to the bank matters  $t = 50.4/1$  a
- 8  $2T \sin 50 = mg$  c
- 9  $T = ma = 2 \times 7000 \times 0.1$  b
- 10 Rises a distance  $d = v_0^2/2g$   
total distance =  $2d + 32.34$  d