Department of Physics
College of Arts and Sciences
American University of Sharjah (AUS)
Fall 2014

Suggested Practice Problems for the Physics Placement Test

This document contains 25 suggested problems that are designed to help prospective science and engineering students prepare for the physics placement test. To adequately measure readiness for the placement test, those 25 problems should be solved in NO MORE THAN **90 minutes**.

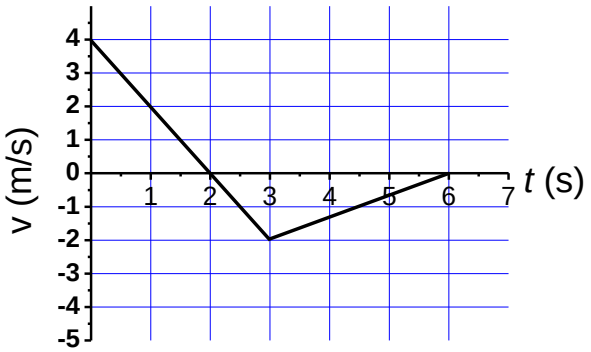
1. 9.80 m/s^2 when converted into km/hour^2, is

   (a) 127008
   (b) 980
   (c) 126500
   (d) 9800

2. The coordinate as a function of time by $x(t) = 21 + 22t - 6.0t^2$, where x is in meters m and t is in seconds s. Its average velocity, between t = 1 s to t = 3s is:
   (a) +4.0 m/s
   (b) –4.0 m/s
   (c) –2.0 m/s
   (d) +2.0 m/s

3. The velocity of a particle versus time is shown below. The instantaneous acceleration at t = 1.0 s is:

   (a) 0 m/s^2
   (b) –2 m/s^2
   (c) 2 m/s^2
   (d) –1 m/s^2



4. Toss a ball upward with an initial speed of 10 m/s. Neglecting air resistance, the time it takes to reach its release point is about

   (a) 4 s
   (b) 1 s
   (c) 3 s
   (d) 2 s

5. A stone is thrown vertically upwards. It takes about 3 seconds to reach its maximum height. The initial speed of the object was about:

   (a) 40 m/s
   (b) 30 m/s
   (c) 60 m/s
   (d) 15 m/s.

6. An apple falls from a tree. Compare its kinetic energy K.E to its potential energy P.E as it falls.

   (a) K.E increases and P.E decreases.
   (b) K.E decreases and P.E decreases
   (c) K.E increases and P.E increases
   (d) K.E decreases and P.E increases

7. An automobile of mass 2500 kg moving at 30 m/s is braked suddenly with a constant braking force of 10000 N. How far does the car travel before stopping?

   (a) 67.5 m
   (b) 45.0 m
   (c) 90.0 m
   (d) 112.5 m

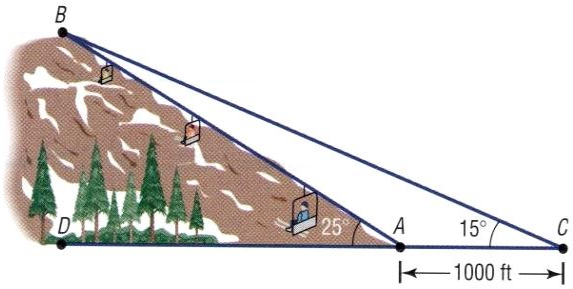
8. The speed of of ocean waves v (measured in m/s) depends on their wavelength λ (measured in m) and the accelaration due gravity g (measured in m/s^2) in this way; $v = \lambda^{1/2} g^c$. If the eqaution is correct dimensionally what is the value of the exponent c?
   a. 1
   b. 2
   c. 2/3
   d. 1/2

9. If the only forces acting on a 2.0-kg mass are $\mathbf{F}_1 = (3\mathbf{i} - 8\mathbf{j})$ N and $\mathbf{F}_2 = (5\mathbf{i} + 3\mathbf{j})$ N, what is the magnitude of the acceleration of the particle?

   a. 1.5 m/s^2
   b. 4.7 m/s^2
   c. 6.5 m/s^2
   d. 9.4 m/s^2

10. To find the length of a proposed ski lift from A to B, a surveyor measures the angle DAB to be 25^o and then walks off a distance of 1000 feet to C and measures the angle ACB to be 15^o. What is the length of a proposed ski lift from A to B?

    a. 1490 feet
    b. 671 feet
    c. 276 feet
    d. 981 feet



11. A rock is thrown **<u>downward</u>** from an unknown height above the ground with an initial speed of 10 m/s. It strikes the ground 3.0 s later. Determine the initial height of the rock above the ground.

    a. 44 m
    b. 14 m
    c. 74 m
    d. 30 m

12. A ball thrown vertically **<u>upward</u>** from ground level is caught 3.0 s later by a person on a balcony which is 14 m above the ground. Determine the initial speed of the ball.

    a. 19.4 m/s
    b. 4.7 m/s
    c. 9.8 m/s
    d. 30.1 m/s

13. A car traveling with an initial speed of 62 km/ h is 23 m from a barrier when the driver slams on the brakes. The car hits the barrier 2.25 s later. Assume that the acceleration of the car is constant. How fast is the car traveling at impact?

    a. 3.22 m/s
    b. 7.25 m/s
    c. 7.65 m/s
    d. 10.2 m/s

14. A railroad train travels forward along a straight track at a constant speed of 80.0 m/s for 1000 m and then travels at 50.0 m/s for the next 1000 m. What is the train's average speed for the entire trip?

    a. 65.0 m/s

b. 61.5 m/s
c. 63.7 m/s
d. 70.0 m/s

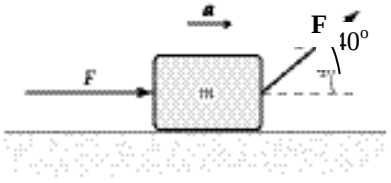
15. A rock is thrown straight up with an initial velocity of 24.5 m/s.What maximum height will the rock reach before starting to fall downward? (Take acceleration due to gravity as 9.80 m/s^2.)
    a. 9.80 m
    b. 19.6 m
    c. 24.5 m
    d. 30.6 m.

16. A dog runs 96 m away from its master in a straight line in 9.0 s and then runs halfway (1/2) back in one-third (1/3) the time. The average **velocity** of the dog for the entire run is
    a. 12 m/s
    b. –12 m/s
    c. 4 m/s
    d. –4 m/s.

17. Omar kicks a ball from a level field, at an initial velocity of 29.4 m/s at an initial angle of 60° with respect to the horizontal. The ball is in its trajectory for a **total time** of 3 s before it hits the ground. What is the ball's horizontal displacement, X?
    a. 76.4 m
    b. 44.1 m
    c. 57.3 m
    d. zero

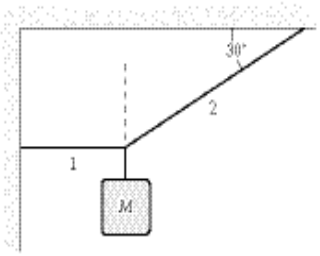
18. Omar kicks a ball from a level field, at an initial velocity of 29.4 m/s at an initial angle of 30° with respect to the horizontal. The ball is in its trajectory for a **total time** of 3 s before it hits the ground. What is the ball's **net (total) vertical** displacement during its 3-s trajectory?
    a. zero
    b. 9.80 m
    c. 11 m
    d. 22.1 m

19. Two equal forces (each is F=4 N) are acting on a 3 kg object, as shown. *W*hat is the magnitude of the acceleration a of the object? The surface is frictionless.
    a. 2.4 m/s^2
    b. 2.7 m/s^2
    c. 0.3 m/s^2
    d. 2.2 m/s^2



20. If M = 4.0 kg, what is the tension in string 1 if the system is in static equilibrium?

a. 39.2N
b. 67.9 N
c. 78.4 N
d. 45.3 N

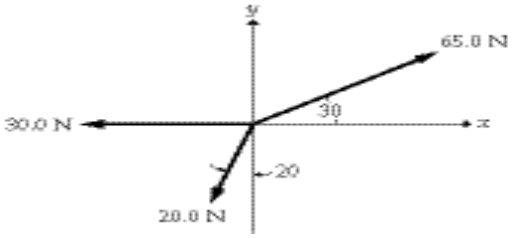


21. If vector A = 12i – 16j and vector B = –24i + 10j, what is the direction of the vector C = 2A – B?

a. –49°
b. –41°
c. –90°
d. +49°

22. The three forces shown act on a particle. What is the magnitude of the resultant of these three forces?

a. 27.0 N
b. 33.2 N
c. 36.3 N
d. 23.8 N

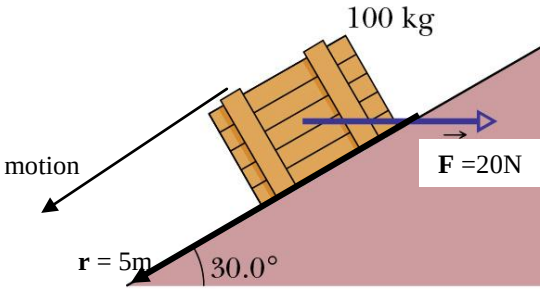


23. The three forces shown in the previous question act on a particle. What is the direction of the resultant of these three forces?

a. 35°
b. 45°
c. 65°
d. 55°

24. A 100 kg box is set into motion down a rough incline from rest. A constant horizontal force F = 20 N. If the box slides **down** a distance of 5 m, how much work done by the applied force **F**?

a. 50 J
b. –50 J
c. 87 J
d. –87 J



25. A 1000-kg roller-coaster car rolls on a frictionless track as shown in the figure. If the speed of the car at point A is 5.0 m/s, what is its speed at point B?

a. 9.9 m/s
b. 11.1 m/s
c. 98 m/s
d. 8.6 m/s