PHSCS 105 Pretest

Though this pretest will not be graded and will have no effect on your grade in the class, please take the time to answer these questions, then check them with the solutions in the key that follows the questions.

Pre-test Problems

1. **Solve for v_o: $x = v_o t + \frac{1}{2} g t^2$**

2. **Solve for I_1, I_2, and I_3:**

   a. $I_1 = I_2 + I_3$
   b. $8 = 2I_2 + 3I_3$
   c. $4 = 2I_2 - I_3$

3. **Solve for x: $3x^2 - 9x = 0$**

4. **Solve for x: $x^2 - 2x - 8 = 0$**

5. **Find the x and y components of a force vector with a length of 65 at an angle of 37^0 to the horizontal.**

6. **Find the length and direction of a vector with an x component 6 units in length and a y component 8 units in length.**

7. **Find the length of the resultant vector for the sum of the vectors in problems 5 and 6.**

8. **If $F = (AY\Delta L)/L_o$ and $\Delta L = \alpha L_o \Delta T$, find an expression for F that does not depend on either ΔL or L_o.**

9. **If $E_L = \frac{1}{2} mv^2$ and $E_R = \frac{1}{2} Iw^2$, find the ratio of E_L to E_R if $v = rw$ and $I = 0.2mr^2$.**

10. Find Δh for the pendulum bob in the two positions shown in the figure.

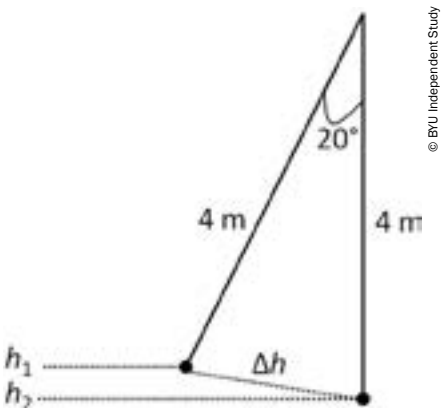

Figure 10

11. Find $B_2 - B_1$ in terms of the ratio of I_2/I_1 if:

$B_1 = 70$	$B_2 = 100$
$B_1 = 10 \log(I_1/I_0)$	$B_2 = 10 \log(I_2/I_0)$

Pre-test Key

Use these solutions to check your answers. Remember, you'll need to be able to understand and solve these types of questions so that you'll do well with the homework and exams in this course.

1. $x - \frac{1}{2} gt^2 = v_o t$
   $V_o = x/t - \frac{1}{2} gt$

2. Subtract (b) from (c).
   $8 = 2I_2 + 3I_3$
   $-4 = -2I_2 + I_3$
   $4 = 4I_3$
   $I_3 = 1$

   Use $I_3 = 1$ in (b).
   $8 = 2I_2 + 3$
   $5 = 2I_2$
   $I_2 = 2.5$

   Use $I_3 = 1$ and $I_2 = 2.5$ in (a).
   $I_1 = I_2 + I_3$
   $I_1 = 2.5 + 1$
   $I_1 = 3.5$

3. $3x(x - 3) = 0$
   x = 0 or 3

4. method 1: factor equation
   $x^2 - 2x - 8 = 0$
   $(x + 2)(x - 4) = 0$
   x = -2 or 4

   method 2: quadratic formula

   a. $x = \dfrac{-b \pm \sqrt{\left(b^2 - 4ac\right)}}{2a}$

   b. $x = \dfrac{2 \pm \sqrt{\left(4 - 4(1)(-8)\right)}}{2}$

c. $x = \frac{2 \pm 6}{2}$

***x* = 4 or -2**

5. $F_x = 65\cos 37 = 51.9$
   $F_y = 65\sin 37 = 39.1$

6. $L = \sqrt{6^2 + 8^2}$

   $L = \sqrt{36 + 64}$

   $L = \sqrt{100}$

   ***L* = 10**

   $\theta = \tan^{-1}(8/6)$
   $\theta = \tan^{-1} 1.333$
   $\theta = 53.1^o$

7. $R_x = 51.9 + 6.0 = 57.9$
   $R_y = 39.1 + 8.0 = 47.1$

   $R = \sqrt{57.9^2 + 47.1^2} = 74.6$

8. $F = (AY\alpha L_o \Delta T)/L_o =$ **$AY\alpha\Delta T$**

9. $E_L / E_R = (\frac{1}{2} mv^2) / (\frac{1}{2} Iw^2) = (mv^2) / (Iw^2) = (mv^2) / (0.2mr^2(v^2/r^2))$
   $E_L / E_R = 1/0.2 = 5:1$

10. $\Delta h = 3 - 3\cos 30 =$ **0.40**

11. $B_2 - B_1 = 100 - 70 = 30$
    $10 \log(I_2/I_0) - 10 \log(I_1/I_0) = 30$
    $10 \log((I_2/I_0)(I_0/I_1)) = 30$
    $\log(I_2/I_1) = 3$
    $I_2/I_1 = 10^3$
    $I_2/I_1 = 1000$