

# X1.6

# 205

PHYS-205(6) (Kaldon-40534)  
WMU-Fall 2000

Name \_\_\_\_\_

Exam 1 - 100,000 points + 20,000 ☆ points Book Title \_\_\_\_\_

9/20/2000\*Rev.2

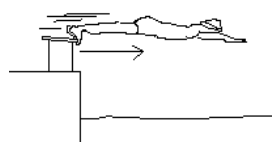
**State Any Assumptions You Need To Make – Show All Work – Circle Any Final Answers**  
**Use Your Time Wisely – Work on What You Can – Be Sure to Write Down Equations**  
**Feel Free to Ask Any Questions**       ☆2a    ☆2b    ☆2c    ☆2e

### “Flat Out Like A Lizard Drinking” AUSSIE FOR “DOING SOMETHING VERY FAST” (50,000 points)

1.) In the land Down Under (tape delayed, of course) Misty Hyman upset two of the best Australian swimmers in the 200. meter Butterfly, setting a new Olympic Record in 2:05.88.



(a) What was Misty’s average speed? *Note that the time is 2 minutes, 5.88 seconds, not 2 hours...*



(b) To dive into the pool, the swimmers start 1.45 m above the water. Assuming that Misty has  $v_{0y} = 0$ , how much time does it take for her to fall into the water?

(c) What is the y-component of her velocity when she hits the water? *Can be done with or without (b).*

(d) Assuming that  $v_x$  is the average speed of the race, find the vector velocity,  $\vec{v}$ , in standard form. *If you didn't get an answer to (a) use a speed of 4.26 m/s; if you didn't get (c), use a speed of 5.43 m/s.*

(e) The 200. m races are swum in four lengths of the pool. That means that you have to make three turns. Find the acceleration needed to go from the average speed of the race in a distance of 1.21 m. *If you didn't get an answer to (a) use a speed of 4.26 m/s.*



### “Survivor Physics: The Star Problem Immunity Challenge” (50,000 points)

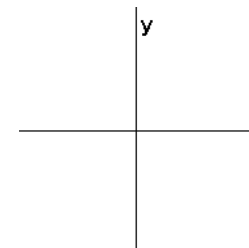
2.) An object’s equation of motion is  $x(t) = 1.00\text{ m} + (1.00\text{ m/s})t + (1.00\text{ m/s}^2)t^2 + (1.00\text{ m/s}^6)t^6$ .

☆(a) Find the equation for the vector acceleration of this object.

☆(b) Find the equation for the vector velocity of this object.

☆(c) Find the equation for the vector position of this object.

(d) Sketch the vector  $\vec{A} = 22.7\text{ m/s @ } 222^\circ$  and find  $A_x$  and  $A_y$ .



☆(e) An object has its ninth derivative of  $x$  with respect to time as  $\frac{d^9x}{dt^9} = 1.00\text{ m/s}^9$ . All of the constants of integration are zero. Find the position,  $x$ , at time  $t = 0$ .