PHYS 211 College Physics I
Exam 2C

Grades

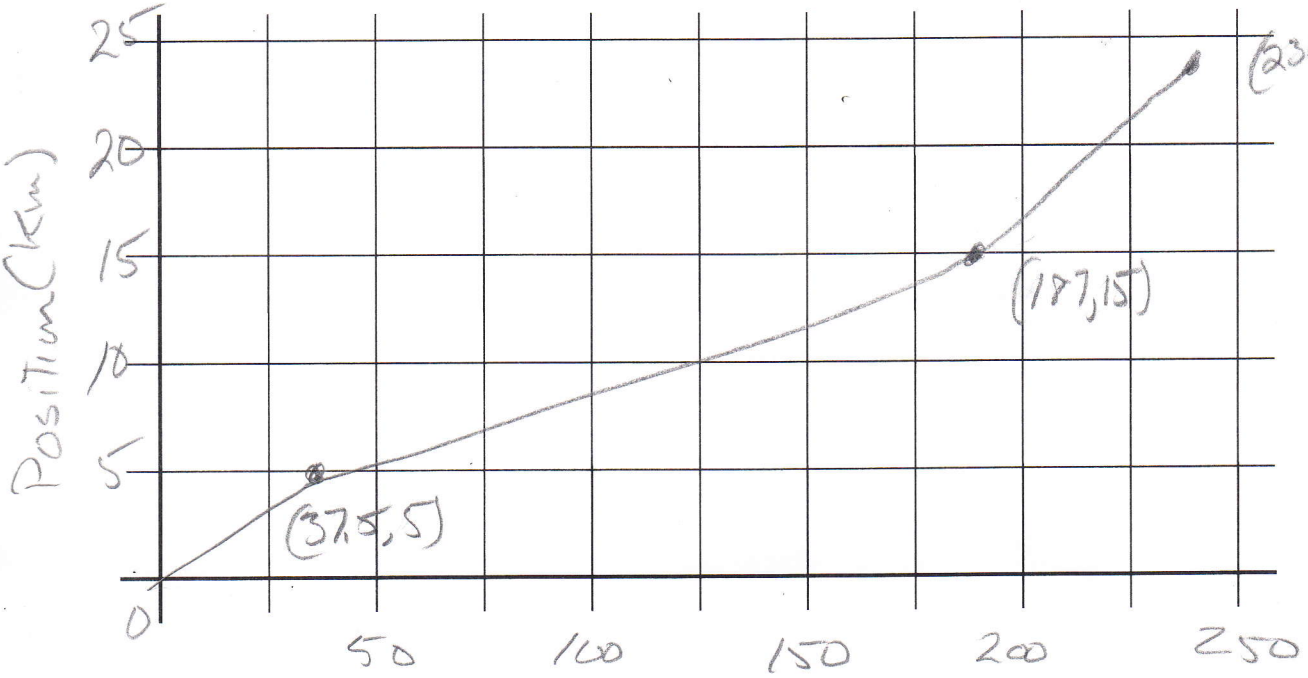
100
97
90
90
86
83
80
75,75
72,72
70
69
67
66
65
62,62,62
61,61
60
59
58
57
55
54
52
50

October 4, 2017

Name J. C. Daly

1. For the first 5.0 km of a race, a runner averages a velocity of 8.0 km/h. For the next 10.0 km he averages 4.0 km/h, and for the last 8.0 km, he averages 10.0 km/h.

   On the chart below, construct to scale, the position-time graph for the runner.



$\Delta t = \frac{\Delta x}{v}$

	Δx (km)	v (km/h)	Δt (h)	Δt (min)	t (min)	x (km)
Leg 1	5	8	5/8	37.5	37.5	5
Leg 2	10	4	10/4	150	187.5	15
Leg 3	8	10	8/10	48	235.5	23

PHYS 211 College Physics I
Exam 2C

October 4, 2017

2. A game begins with a coin toss. The referee tosses the coin with an initial vetitcal velocity of 8.00 m/s.

   a. How high does the coin go? 3.27 m

   b. How long is it in the air? 1.63 s

$v_y = v_{y0} - gt$

$y = v_{y0}t - \frac{1}{2}gt^2$

$v_y^2 = v_{y0}^2 - 2gy$

at $y = y_{max}$ $v_y = 0$

$0 = v_{y0}^2 - 2gy_{max}$

$y_{max} = \frac{v_{y0}^2}{2g} = \frac{8^2}{2 \times 9.8} = 3.27\ m$

$0 = y = v_{y0}t - \frac{1}{2}gt^2 = t\left(v_{y0} - \frac{g}{2}t\right)$

$v_{y0} - \frac{g}{2}t = 0$

$t = \frac{2v_{y0}}{g} = \frac{2 * 8}{9.8} = 1.63\ s$

PHYS 211 College Physics I
Exam 2C

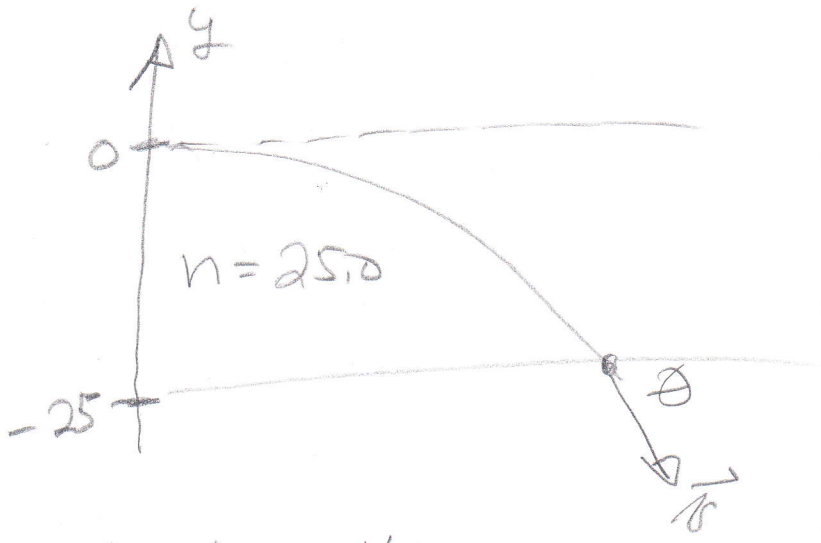
October 4, 2017

3. An eagle is flying horizontally at 22.5 m/s 25.0 meters above the ground with a fish in its claws. It accidentally drops the fish.

   What is the of the magnitude and direction of the fish's velocity when it hits the ground?

   a. Magnitude 31.6 m/s

   b. Direction 44.5°



$\vec{v} = v_x \hat{x} + v_y \hat{y}$

$v_x = v_{x0} = 22.5$ m/s

$v_x^2 = v_{x0}^2 - 2gy$

$v_{x0} = 0$

$v_y^2 = -2gy = -2 * 9.5 * (-25) = 490$

$v_y = -\sqrt{490} = -22.14$

Magnitude $v = \sqrt{v_y^2 + v_x^2} = \sqrt{490 + 22.5^2} = 31.6$ m/s

Angle $\theta = \tan^{-1}\left(\frac{-22.14}{22.5}\right) = 44.5°$