

PHYS 211 College Physics I

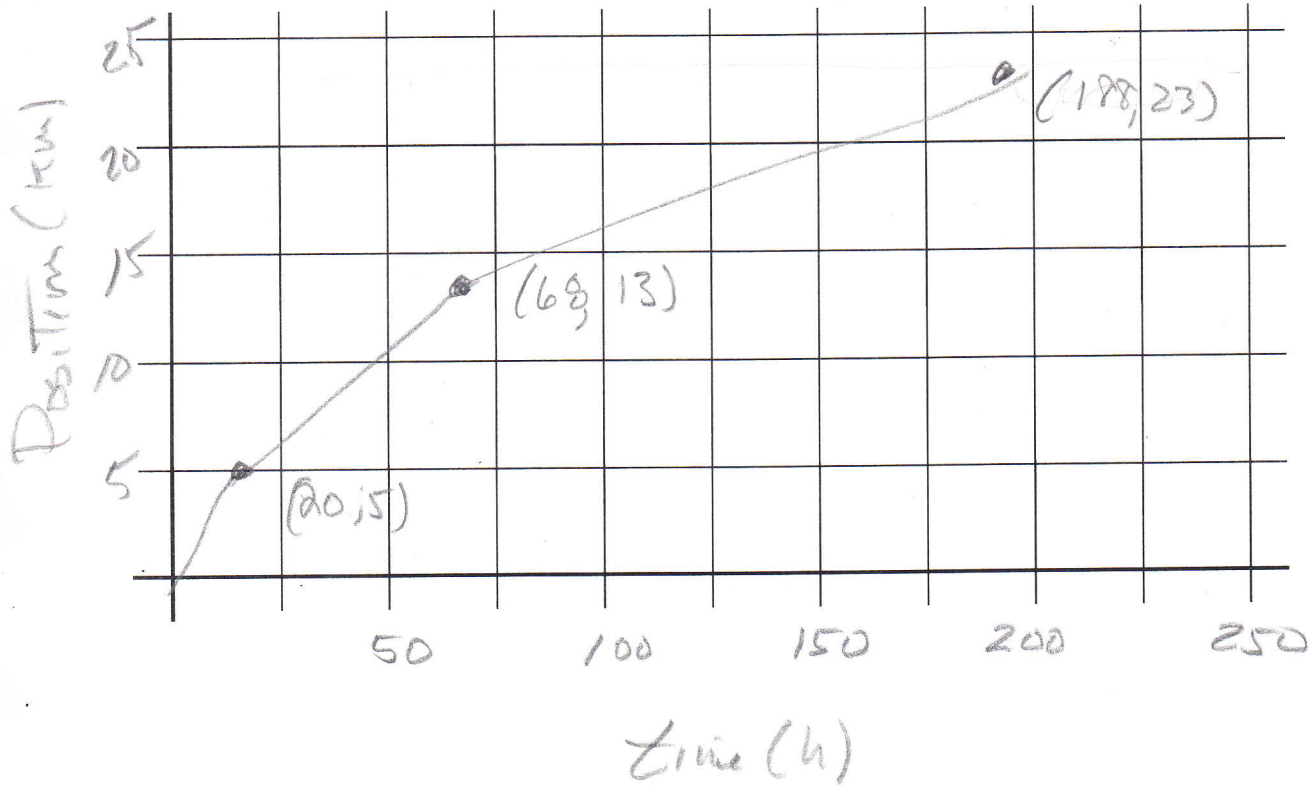
Exam 2A

October 4, 2017

Name J.C. DAY

1. For the first 5.0 km of a race, a runner averages a velocity of 15.0 km/h. For the next 8.0 km he averages 10.0 km/h, and for the last 10.0 km, he averages 5.0 km/h.

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



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

	Δx (km)	v (km/h)	Δt (h)	Δt (min)	t (min)	x (km)
Leg 1	5	15	$\frac{1}{3}$	20	20	5
Leg 2	8	10	0.8	48	68	13
Leg 3	10	5	2	120	188	23

Grades

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

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

a. How high does the coin go? 3.26 m

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

$$\begin{aligned}v_y &= v_{y0} - gt \\ y &= v_{y0}t - \frac{1}{2}gt^2 \\ v_y^2 &= v_{y0}^2 - 2gy\end{aligned}$$

a) at $y = y_{\text{max}}$ $v_y = 0$

$$v_y^2 = 0 = v_{y0}^2 - 2gy$$

$$y = \frac{v_{y0}^2}{2g} = \frac{(8)^2}{2 \times 9.8} = \underline{\underline{3.26 \text{ m}}}$$

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

$$v_{y0} - \frac{1}{2}gt = 0$$

$$t = \frac{2v_{y0}}{g} = \frac{2 \times 8}{9.8} = \underline{\underline{1.63 \text{ s}}}$$

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3. An eagle is flying horizontally at 8.00 m/s 12.5 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 17.6 m/s

b. Direction -63.0°

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

$$v_x = 8.00 \text{ m/s}$$

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

0

$$v_y^2 = -2gy = -2 * 9.8 * (-12.5) = 245$$

$$v_y = -15.7 \text{ m/s}$$

$$v = \sqrt{v_x^2 + v_y^2} = \sqrt{8^2 + 15.7^2} = \sqrt{64 + 245}$$

$$v = 17.6 \text{ m/s}$$

$$\theta = \tan^{-1}\left(\frac{v_y}{v_x}\right) = \tan^{-1}\left(\frac{-15.7}{8}\right) = -63.0^\circ$$

