

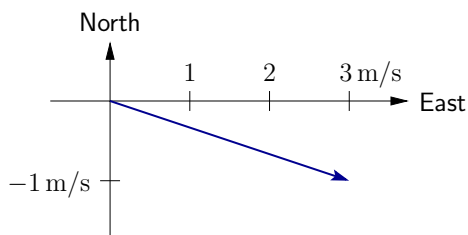
Phys 218 – Spring 2018

All *University Physics* Sections

Exam I

Short Answer: A) They will have the same speed. From $v_f^2 = v_0^2 + 2a\Delta y$, [LO 13.1, 14.1, 15.1]
 v_0^2 (as well as a and Δy) are the same in both cases, so
 v_f^2 will be as well.

B) a) [LO 9.1]



b) $x = \frac{1}{3}$ [LO 2.1, 3.1, 6.1]

c) $x = \pm 3$ [LO 2.2]

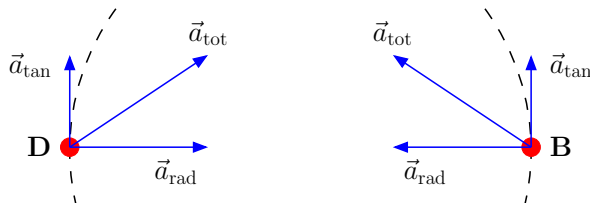
d) Since both \hat{j} components are negative, but the \hat{i} components are opposite signs between Alice and Bob, there is no value of x which will make them anti-parallel. [LO 2.3]

C) a) C [LO 12.1]

b) B [LO 12.2]

c) The slope is negative at point C , so $v = \frac{dx}{dt}$ is negative [LO 13.2]

D) [LO 13.3, 13.4, 17.1, 17.2, 18.1, 18.2]



Problem 1: (a) $\langle v \rangle = 10 \text{ m/s}$ [LO 10.1, 10.2, 11.1, 16.1]

(b) $\langle \vec{v} \rangle = 0$ [LO 11.2, 16.2]

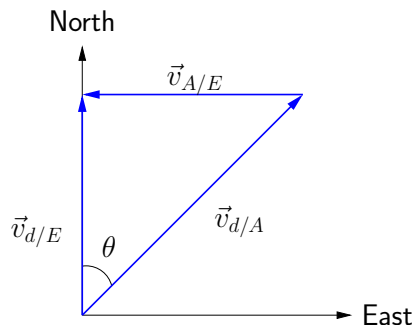
(c) $a_{\text{rad}} = \frac{\pi}{300} \text{ m/s}^2$ [LO 10.3, 18.3]

(d) $a_{\text{tan}} = 0$ [LO 17.3]

(e) $N = 6 \text{ cycles}$ [LO 10.4, 16.3]

Problem 2: (a) $\theta = 45^\circ$

[LO 1.1, 3.2, 6.2, 9.2, 20.1]



(b) $\vec{v}_{E/A} = -\vec{v}_{A/E} = 10 \text{ m/s}$ due east

[LO 20.2]

(c) $t = 1 \text{ hr}$

[LO 1.2, 10.5, 11.3]

Problem 3: (a) $\vec{r}(t=1 \text{ s}) = (\hat{i} + 3\hat{j}) \text{ m}$

[LO 12.3]

(b) $\vec{v}(t=1 \text{ s}) = 3\hat{i} \text{ m/s}$

[LO 8.1, 12.4]

(c) $\vec{a}(t=1 \text{ s}) = 6(\hat{i} - \hat{j}) \text{ m/s}^2$; No

[LO 8.2, 12.5, 15.2]

(d) Since $\vec{v}(t=1 \text{ s})$ is along $+\hat{i}$ and $\vec{a}(t=1 \text{ s})$ also has a positive \hat{i} component, the bird is speeding up.

[LO 13.5, 17.4]

(e) The other component of \vec{a} is along $-\hat{j}$, so to the right of the $+\hat{i}$ direction of motion. The bird is turning right.

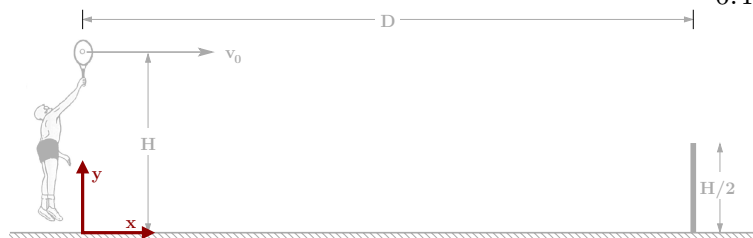
[LO 13.6, 18.4]

(f) $\vec{a}(t) = -\frac{3 \text{ m}}{t^2} \hat{i} + \left(\frac{t^6}{s^6}\right) (35 \text{ m/s}^2) \hat{j}$

[LO 8.3]

Problem 4: (a) $(v_0)_{\min} = D\sqrt{g/H}$

[LO 1.3, 1.4, 3.3, 3.4, 6.3, 6.4, 9.3, 14.2, 14.3, 15.3]



(b) $t = \sqrt{2H/g}$

[LO 3.5, 6.5, 14.4]

(c) $d = (\sqrt{2} - 1) D$

[LO 1.5, 14.5]