

Phys 218 – Spring 2017

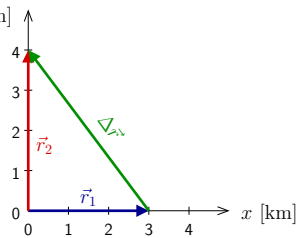
All Sections

Physics 218 – Exam I

[Learning objective(s)]

- Short Problems:**
- A) a) $\alpha = 90^\circ$ [2.1, 3.1]
 - b) $\vec{A} \cdot \vec{B} = 0$ [2.2]
 - B) $x(t) = x_{0,x} + v_{0,x}t + \frac{1}{2}a_{0,x}t^2 + \frac{1}{6}bt^3$ [8.1, 8.2, 14.1, 14.2, 15.1]
 - C) $\vec{a} = -7.85\hat{j} \text{ m/s}^2$ [16.1, 18.1, 19.1]
 - D) $T_{\text{rows}} = \frac{2v_0D}{v_0^2 - v_w^2}$ and $T_{\text{walks}} = \frac{2D}{v_0}$ [3.2, 3.3, 14.3, 20.1, 20.2]

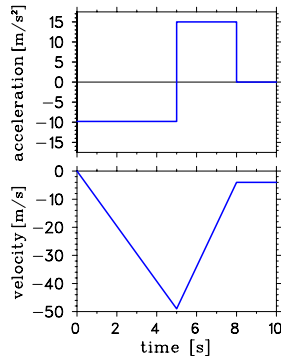
- Problem 1:**
- (a) y [km] [1.1, 1.2, 9.1]
 - (b) $\frac{1}{2}(2.3)$



- (c) \hat{i} -component: -3 km ; \hat{j} -component: 4 km [$\frac{1}{2}(2.3)$]
- (d) $|\Delta\vec{r}| = 5 \text{ km}$ [2.4]
- (e) They are parallel ($\theta = 0$) [2.5]

- Problem 2:**
- (a) $v = \sqrt{\left(\frac{2\pi R}{T}\right)^2 + v_{\text{drop}}^2}$ [1.3, 12.1, 19.2, 20.3]
 - (b) $\vec{a} = \frac{4\pi^2}{T^2}R$ towards the centre of the wheel in the horizontal plane [18.2]
 - (c) $\theta = \tan^{-1}\left(\frac{v_{\text{drop}}}{2\pi R}T\right)$ [1.4]

- Problem 3:**
- (a) [9.2, 9.3, 12.2]



- (b) $v(t = 5 \text{ s}) = 49 \text{ m/s}$ [$\frac{1}{3}(14.4)$, 15.2]
- (c) $\Delta t = 3.0 \text{ s}$ [3.4, $\frac{1}{3}(14.4)$]
- (d) $\Delta y = 202 \text{ m}$ (downward) [$\frac{1}{3}(14.4)$]

- Problem 4:**
- (a) $d = 320 \text{ m}$ [12.3, $\frac{2}{3}(14.5)$, 15.3]
 - (b) $D = 520 \text{ m}$ [3.5, $\frac{1}{3}(14.5)$]
 - (c) $\vec{v} = 65 \text{ m/s}$ horizontally towards the truck, and $\vec{a} = -g\hat{j} = 10 \text{ m/s}^2$ down [1.5, 20.4, 20.5]