

*It is strongly recommended that you read about a subject before it is covered in lectures.*

<b>Lecture Date</b>	<b>Material Covered</b>	<b>Reading from Ohanian</b>
<del>#5 Fri 9/17</del>	<del>Circular Motion - Centrifuges</del> <del>Perceived Gravity</del> <del>Watch Videos on PIVoT (reference frames)</del>	<del>Page 84 - 86</del>
<del>#6 Mon 9/20</del>	<del>Newton's Laws</del>	<del>Page 99 - 112</del>
<del>#7 Wed 9/22</del>	<del>Weight - Perceived Gravity - Weightlessness</del> <del>Free Fall - Zero Gravity in Orbit (misnomer)</del> <del>Watch Videos on PIVoT (weightlessness)</del>	<del>Page 123 - 134</del>
<del>#8 Fri 9/24</del>	<del>Friction - There is an interesting article on</del> <del>Friction in Scientific American, Oct, 1996.</del> <del>Watch Videos on PIVoT (friction)</del>	<del>Page 134 - 140</del>
<del>#9 Mon 9/27</del>	<del>Exam Review</del>	<del>Lectures #1 - #5</del>
<del>Wed 9/29</del>	<del>Exam #1</del>	<del>Handout of 9/22</del>

*Due Friday, Sept 24, before 4 PM in 4-339B. Solutions will be posted on the Web Sat 9/25.*

~~2.1 Throwing Stones~~ page 51, problem 51.

~~2.2 Measurements of Gravitational Acceleration,  $g$ .~~

~~Use the measurements made during your first lecture of the two falling apples to calculate two values for  $g$  and their associated uncertainties. Do the two values agree within the accuracy of the measurements? Use the measurements obtained in the lecture that you attended.~~

~~2.3 Vector Addition~~ page 70, problem 8.

~~Watch videos on PIVoT (under vector and look at the simulations).~~

~~2.4 Vectors~~ page 71, problem 26.

~~2.5 Vector Scaling~~ page 71, problem 27.

~~2.6 Keep in Touch with the Dutch.~~

~~Recently I drove in The Netherlands and I saw a road sign that indicated: Venlo 31 km, Eindhoven 39 km. Not knowing anything else, what is the minimum and what is the maximum distance (approximately) between these two towns.~~

~~2.7 Perpendicular Vectors.~~

~~The vectors  $\mathbf{A} = 2\hat{x} - 3\hat{y}$  and  $\mathbf{B} = -\hat{x} + a\hat{y} - 5\hat{z}$  are perpendicular to each other. What is the value of  $a$ ?~~

~~2.8 Adding, Subtracting, and Multiplication of Vectors~~ page 71, problem 25.

~~Watch videos on PIVoT (under vector and look at the simulations).~~

~~Calculate also:~~

~~d)  $\mathbf{A} \cdot \mathbf{B}$  and  $\mathbf{B} \cdot \mathbf{A}$~~

~~e)  $\mathbf{A} \times \mathbf{B}$  and  $\mathbf{B} \times \mathbf{A}$~~

~~which gives~~

$$\theta_x = \cos^{-1} \left( \frac{A_x}{|A|} \right) = \cos^{-1} \left( \frac{5.0}{\sqrt{35.0}} \right) = 32.3^\circ$$

~~Similarly,~~

$$\theta_y = \cos^{-1} \left( \frac{A_y}{|A|} \right) = \cos^{-1} \left( \frac{-3.0}{\sqrt{35.0}} \right) = 120^\circ$$

~~and~~

$$\theta_z = \cos^{-1} \left( \frac{A_z}{|A|} \right) = \cos^{-1} \left( \frac{1.0}{\sqrt{35.0}} \right) = 80.3^\circ$$

## **Problem 2.5**

~~You are given the vector~~

$$\vec{v} = 3\hat{x} - 6\hat{y} + 2\hat{z}$$

~~The magnitude is  $|\underline{v}| = \sqrt{49} = 7$ , so the vector~~

$$\underline{\vec{v}} = \frac{1}{|\underline{v}|} \vec{v} = 3/7\hat{x} - 6/7\hat{y} + 2/7\hat{z}$$

~~has the same direction as  $\vec{v}$  but magnitude  $|\underline{v}| = 1$ . Finally the vector~~

$$\underline{\vec{v}}'' = 2\underline{\vec{v}} = 6/7\hat{x} - 12/7\hat{y} + 4/7\hat{z}$$

~~has the same direction as  $\underline{\vec{v}}'$ , which has the same direction as  $\vec{v}$ , but now has magnitude  $|\underline{v}''| = 2$ .~~

## **Problem 2.6**

You are given the distances to Venlo (31 km) and Eindhoven (39 km), but you are not given any information concerning the directions to these cities. The greatest distance between the two cities is 31 km + 39 km = 70 km. This occurs when the two cities are in opposite directions. The shortest distance between the two cities is 39 km - 31 km = 8 km. This occurs when the two cities are in the same direction. The actual distance is 47 km, which is greater than 8 km and less than 70 km.