Ponderable: Activity - Unit Vectors

Factoring vectors as magnitude times direction

$\vec{a} = \underbrace{|\vec{a}|}_{\text{magnitude}} \underbrace{\hat{a}}_{\text{direction}}$ so a unit vector in a particular direction is given by: $\hat{a} = \dfrac{\vec{a}}{|\vec{a}|}$

You find unit vector for <1,1,1>m.

$$\hat{a} = \frac{\vec{a}}{|\vec{a}|} = \frac{\langle 1,1,1\rangle\,\text{m}}{\sqrt{(1\ \text{m})^2 + (1\ \text{m})^2 + (1\ \text{m})^2}} = \frac{\langle 1,1,1\rangle\,\text{m}}{\sqrt{3}\ \text{m}} = \left\langle \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right\rangle = \langle 0.58, 0.58, 0.58 \rangle$$

So $\vec{a} = \underbrace{|\vec{a}|}_{\text{magnitude}} \underbrace{\hat{a}}_{\text{direction}} = \left(\sqrt{3}\ \text{m}\right)\left\langle \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right\rangle = \langle 1,1,1\rangle\,\text{m}$

Have the even number tables calculate **unit vector** in the direction of <2,2,2>, odd number tables do <3,3,3>. They are all the same, of course.

$$\hat{b} = \frac{\vec{b}}{|\vec{b}|} = \frac{\langle 2,2,2\rangle\,\text{m}}{\sqrt{(2\ \text{m})^2 + (2\ \text{m})^2 + (2\ \text{m})^2}} = \frac{\langle 2,2,2\rangle\,\text{m}}{\sqrt{12}\ \text{m}} = \left\langle \frac{2}{2\sqrt{3}}, \frac{2}{2\sqrt{3}}, \frac{2}{2\sqrt{3}} \right\rangle = \langle 0.58, 0.58, 0.58 \rangle$$

$$\hat{c} = \frac{\vec{c}}{|\vec{c}|} = \frac{\langle 3,3,3\rangle\,\text{m}}{\sqrt{(3\ \text{m})^2 + (3\ \text{m})^2 + (3\ \text{m})^2}} = \frac{\langle 3,3,3\rangle\,\text{m}}{\sqrt{27}\ \text{m}} = \left\langle \frac{3}{3\sqrt{3}}, \frac{3}{3\sqrt{3}}, \frac{3}{3\sqrt{3}} \right\rangle = \langle 0.58, 0.58, 0.58 \rangle$$
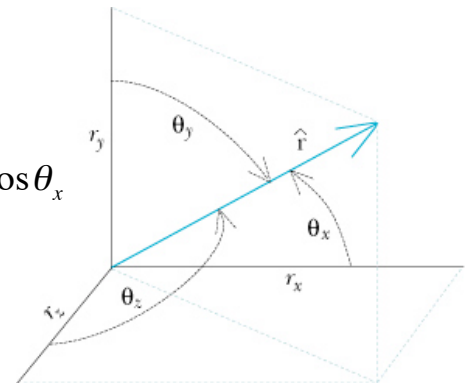
Find unit vector pointing from your table to the instructor's nose (blue vector). What is its magnitude? (1, with no units) Write your instructor vector as magnitude times direction.

Direction cosines
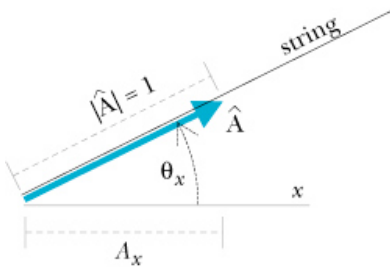
$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{A_x}{1} \quad \text{so } A_x = \cos\theta_x$$

$$\hat{r} = \left\langle \cos\theta_x, \cos\theta_y, \cos\theta_z \right\rangle$$

Activity: Unit Vectors (1053004)

0/4

Question
Points
  1
 0/4
Total
0/4

Description
This assignment gives you practice with the details of unit vectors.

Instructions
Work with your group. If you get done early, help other groups.

0/4 points unit vectors [1237691]

What is the unit vector in the direction of <4,4,4>?
< [   ] 0.577 , [   ] 0.577 , [   ] 0.577 >

What is the magnitude of the unit vector that points from your table to the instructor's nose? [   ] 1

Assignment Details

Name (AID): **Activity: Unit Vectors (1053004)**

Submissions Allowed: **5**

Category: **Activity**

Code:

Locked: **No**

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	Solution