

Re: unit vector is dimensionless, how to draw when coordinates for length?

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  - *Date:* Thu, 09 Feb 2006 23:51:29 +0100
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i.love.jeevitha@xxxxxxxxxx ha scritto:

Say there are x, y, z coordinates set up for "some space" on earth, where the coordinates represent lengths. Say the space is a playground or a space around some buildings in downtown new york.

If there is a position vector between 2 points in this space, say between two buildings or something, then the magnitude of this vector is a length (metres, or whatever). That is the dimension of the position vector or any vector which this coordinate system is really set up for is length.

Now if we find the unit vector of the said position vector, it is dimensionless. How would one graph the unit vector on this coordinate system? How would one go about "thinking" about what it really means to say that this unit vector has magnitude 1? Is that 1m? No. Then what is it (geometrically) ?

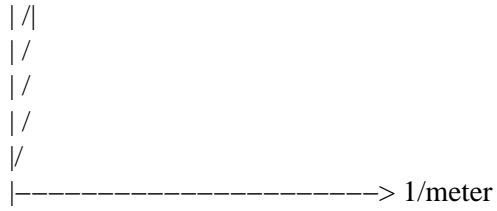
The issues gets even more muddled if we consider forces. Sometimes one finds the unit vector of a position vector between two points (along a rope or something) which has a force acting along it. The force vector can then be determined by multiplying the unit vector by the magnitude of the force. This obviously means that the unit vector is dimensionless and can be used to bring about vectors with different units into the same "x y z" frame. Anyone have an idea about what it means to say a unit vector has length 1, with respect to this coordinate system (which measures lengths)? How can it be graphed in this xyz frame?

do you like it:

1/meter  
^  
|  
| unit vector  
| -

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what is the dimension of the unit vector that I draw? you take a ruler and you measure 1 meter (maybe 1 cm, but you can think it is 1 meter), but on the axis I wrote that you have to divide by 1 meter, so the unit vector plotted has norm equal to 1: 1 meter \* 1 / meter = 1 \* 1, and 1 is our new unit of measure, or if you don't like it, you can write only 1.

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