Properties of 3D vectors

Students place the vectors in an appropriate position on the grid. The aim is to cover as many spaces as possible with the vectors; not all the vectors will be needed and there might be more than one solution. Where it says 'these' then at least two vectors are required and where it says 'this' only one vector is required. You might want to follow this activity by giving students the incomplete grid below and ask them to devise their own problem, with their own vector cards.

$\begin{pmatrix} 4 \\ 3 \\ 1 \end{pmatrix}$	$\begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix}$	$\begin{pmatrix} -1 \\ 3 \\ 4 \end{pmatrix}$	$\begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix}$	$\begin{pmatrix} 4 \\ -4 \\ -6 \end{pmatrix}$	$\begin{pmatrix} 1 \\ -3 \\ -4 \end{pmatrix}$
$\begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix}$	$\begin{pmatrix} 3 \\ -3 \\ 3 \end{pmatrix}$	$\begin{pmatrix} 3 \\ -3 \\ -4 \end{pmatrix}$	$\begin{pmatrix} 5 \\ 0 \\ -1 \end{pmatrix}$	$\begin{pmatrix} -1 \\ 5 \\ 1 \end{pmatrix}$	$\begin{pmatrix} 2 \\ -2 \\ -3 \end{pmatrix}$

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This vector has a length of $3\sqrt{3}$.	This vector is parallel to $\begin{pmatrix} -2 \\ 2 \\ -2 \end{pmatrix}$
These vectors are parallel.	These vectors have the same length.
This vector joins the points $A(1,-2,-2)$ and $B(0,1,2)$.	The sum of these vectors is $\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$

A possible solution

This vector has a length of $3\sqrt{3}$. $\begin{pmatrix} -1 \\ 5 \\ 1 \end{pmatrix}$	This vector is parallel to $\begin{pmatrix} -2 \\ 2 \\ -2 \end{pmatrix}$ $\begin{pmatrix} 3 \\ -3 \\ 3 \end{pmatrix}$
These vectors are parallel. $\begin{pmatrix} 2 \\ -2 \\ -3 \end{pmatrix}\begin{pmatrix} 4 \\ -4 \\ -6 \end{pmatrix}$	These vectors have the same length. $\begin{pmatrix} 5 \\ 0 \\ -1 \end{pmatrix}\begin{pmatrix} 4 \\ 3 \\ 1 \end{pmatrix}$
This vector joins the points $A(1,-2,-2)$ and $B(0,1,2)$. $\begin{pmatrix} 1 \\ -3 \\ -4 \end{pmatrix}$	The sum of these vectors is $\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$ $\begin{pmatrix} -1 \\ 3 \\ 4 \end{pmatrix}\begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix}\begin{pmatrix} 3 \\ -3 \\ -4 \end{pmatrix}$

This vector has a length of …..	This vector is parallel to $\begin{pmatrix} \\ \end{pmatrix}$
These vectors are parallel.	These vectors have the same length.
This vector joins the points $A(\ \ ,\ \ ,\ \ )$ and $B(\ \ ,\ \ ,\ \ )$.	The sum of these vectors is $\begin{pmatrix} \\ \end{pmatrix}$

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