

251 Day 2: Dot and Cross Products

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http://connect.mheducation.com/connect Prof. Porter's


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Question #4 (of 16) next

Problems? [Adjust credit](#) for all students.

$\mathbf{a} = \langle 4, 5 \rangle$ and $\mathbf{b} = \langle 1, 4 \rangle$, find the projection of \mathbf{a} onto \mathbf{b} .



we have

$$\text{comp}_{\mathbf{b}} \mathbf{a} = \frac{\mathbf{a} \cdot \mathbf{b}}{\|\mathbf{b}\|} = \frac{\langle 4, 5 \rangle \cdot \langle 1, 4 \rangle}{\|\langle 1, 4 \rangle\|} = \frac{4 + 20}{\sqrt{1 + 4^2}} = \frac{24}{\sqrt{17}}$$

we have

$$\text{proj}_{\mathbf{b}} \mathbf{a} = \frac{\mathbf{a} \cdot \mathbf{b}}{\|\mathbf{b}\|^2} \mathbf{b} = \left(\frac{24}{\sqrt{17}} \right) \frac{\langle 1, 4 \rangle}{\sqrt{17}}$$

$$= \frac{24}{17} \langle 1, 4 \rangle = \left\langle \frac{24}{17}, \frac{96}{17} \right\rangle$$

Handwritten notes:

$$\cos \theta = \frac{\|\mathbf{b}\|}{\|\mathbf{a}\|}$$

$$\cos \theta = \frac{\mathbf{a} \cdot \mathbf{b}}{\|\mathbf{a}\| \|\mathbf{b}\|}$$

$$\frac{\|\mathbf{b}\|}{\|\mathbf{a}\|} = \frac{\mathbf{a} \cdot \mathbf{b}}{\|\mathbf{a}\| \|\mathbf{b}\|}$$

Windows taskbar: Start, File Explorer, Media Center, Internet Explorer, Word, PowerPoint, Calculator, Paint, etc.

Evaluate the determinant.

$$\begin{vmatrix} 5 & 2 & 6 \\ 1 & 2 & -4 \\ 1 & -4 & 3 \end{vmatrix} = \text{[]}$$

5 $\begin{vmatrix} 2 & -4 \\ -4 & 3 \end{vmatrix}$ - 2 $\begin{vmatrix} 1 & -4 \\ 1 & 3 \end{vmatrix}$ - 6 $\begin{vmatrix} 1 & 2 \\ 1 & -4 \end{vmatrix}$

$$5(6 - 16) - 2(3 + 4) - 6(-4 - 2)$$
$$-50 - 14 + 36 = -28$$

NetCalculator

Assistance

- Check My Work
- View Hint
- View Question
- Show Me
- Guided Solution
- Practice This Question
- Print
- Question Help
- Report a Problem

8:00 PM
8/28/2014

The screenshot shows a web browser window with a math problem. At the top, the browser address bar shows <http://connect.mheducation.com/connect>. The page title is "student activity" and the user is logged in as "Rick Po".

The main content area displays "Question #9 (of 16)" with a "prev" and "next" navigation. The question is worth 10.00 points and asks to compute $\langle 4, 5, 4 \rangle \times \langle 2, 2, 4 \rangle$. The options are:

- A. $\langle 28, 8, 18 \rangle$
- B. $\langle 12, 8, -2 \rangle$
- C. $\langle 28, 24, 18 \rangle$
- D. $\langle 12, -8, -2 \rangle$

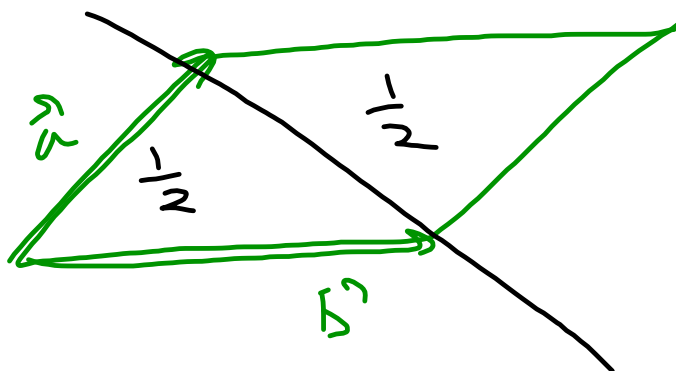
Handwritten work is visible on the page:

- At the top left, $\vec{r} = \langle 1, 0, 0 \rangle$ is written in black ink.
- Below the question, there are three vertical calculations:
 - A red calculation: $\begin{array}{r} 5 \ 4 \\ 2 \ 4 \end{array} \begin{array}{l} \rightarrow \\ \rightarrow \end{array}$
 - A blue calculation: $\begin{array}{r} 4 \ 4 \\ 2 \ 4 \end{array} \begin{array}{l} \rightarrow \\ \rightarrow \end{array}$
 - A green calculation: $\begin{array}{r} 4 \ 5 \\ 2 \ 2 \end{array} \begin{array}{l} \rightarrow \\ \rightarrow \end{array}$
- At the top right of the work area, there are three boxes: a red circle containing \vec{i} , a blue box containing \vec{j} , and a green box containing \vec{k} . Arrows point from these boxes to the corresponding columns in the calculations.
- Below the calculations, there are more handwritten notes: $12 \vec{i}$ in red, $-8 \vec{j}$ in blue, and $-2 \vec{k}$ in green.

On the right side of the page, there is a sidebar with the following options:

- NetCalculator
- Assistance
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The bottom of the browser window shows the Windows taskbar with the system clock at 8:08 PM on 8/28/2014.



$$\underline{\underline{Area}} = \|\vec{a} \times \vec{b}\|$$

Volume: $\vec{c} \cdot \vec{c}$

A diagram showing three vectors originating from a common point. Vector \vec{a} points up and to the right, vector \vec{b} points down and to the right, and vector \vec{c} points up and to the right, between \vec{a} and \vec{b} .

$$\vec{c} \cdot (\vec{a} \times \vec{b})$$