

- o. A typical format of an exam problem.

Instructions. Put your solution IN the box. Show your work BELOW the box.

Ex. Let $\vec{u} = \langle 4, 3 \rangle$ and $\vec{v} = \langle 1, -2 \rangle$. Find the following vectors. Express answer in component form.

6.1. $\frac{1}{2}\vec{u} =$ $\langle 2, \frac{3}{2} \rangle$

$$\frac{1}{2}\vec{u} = \frac{1}{2}\langle 4, 3 \rangle = \langle \left(\frac{1}{2}\right)(4), \left(\frac{1}{2}\right)(3) \rangle = \langle 2, \frac{3}{2} \rangle$$

6.2. $-\vec{v} =$ $\langle -1, 2 \rangle$

$$-\vec{v} = (-1)\langle 1, -2 \rangle = \langle (-1)(1), (-1)(-2) \rangle = \langle -1, 2 \rangle$$

6.3. $\vec{u} + \vec{v} =$ $\langle 5, 1 \rangle$

$$\vec{u} + \vec{v} = \langle 4, 3 \rangle + \langle 1, -2 \rangle = \langle 4 + 1, 3 + (-2) \rangle = \langle 5, 1 \rangle$$

6.4. $\vec{u} - \vec{v} =$ $\langle 3, 5 \rangle$

$$\vec{u} - \vec{v} = \vec{u} + (-1)\vec{v} \stackrel{\text{see}}{=} \langle 4, 3 \rangle + \langle -1, 2 \rangle = \langle 4 + (-1), 3 + 2 \rangle = \langle 3, 5 \rangle$$

6.5. $\vec{u}\vec{v} =$ Silly Prof! We can NOT multiply vectors !!

Ex. Let $\vec{u} = \langle 2, 2, 1 \rangle$ and $\vec{v} = \langle -2, -1, 1 \rangle$. Find the following vectors. Express answer component form.

6.6. $\frac{1}{2}\vec{u} =$ $\langle 1, 1, \frac{1}{2} \rangle$

$$\frac{1}{2}\langle 2, 2, 1 \rangle = \langle \left(\frac{1}{2}\right)(2), \left(\frac{1}{2}\right)(2), \left(\frac{1}{2}\right)(1) \rangle = \langle 1, 1, \frac{1}{2} \rangle$$

6.7. $-\vec{v} =$ $\langle 2, 1, -1 \rangle$

$$-\vec{v} = (-1)\langle -2, -1, 1 \rangle = \langle (-1)(-2), (-1)(-1), (-1)(1) \rangle = \langle 2, 1, -1 \rangle$$

6.8. $\vec{u} + \vec{v} =$ $\langle 0, 1, 2 \rangle$

$$\vec{u} + \vec{v} = \langle 2, 2, 1 \rangle + \langle -2, -1, 1 \rangle = \langle 2 + (-2), 2 + (-1), 1 + 1 \rangle = \langle 0, 1, 2 \rangle$$

6.9. $\vec{u} - \vec{v} =$ $\langle 4, 3, 0 \rangle$

$$\vec{u} - \vec{v} = \vec{u} + (-1)\vec{v} \stackrel{\text{see}}{=} \langle 2, 2, 1 \rangle + \langle 2, 1, -1 \rangle = \langle 2 + 2, 2 + 1, 1 + (-1) \rangle = \langle 4, 3, 0 \rangle$$