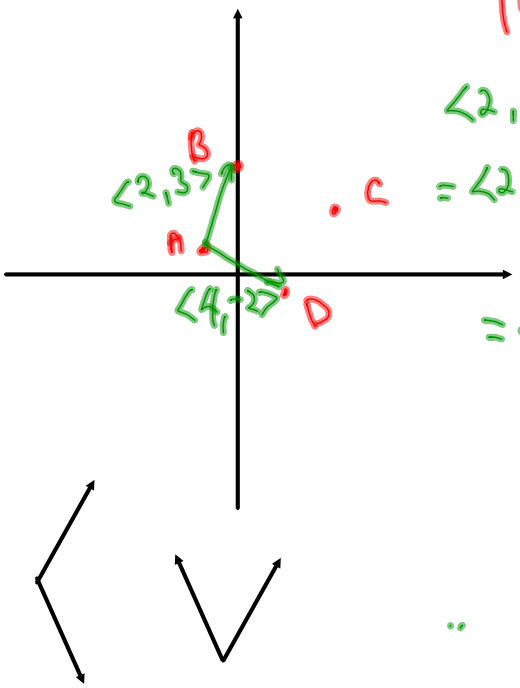
27. Find the area of the parallelogram with vertices $A(-2, 1)$, $B(0, 4)$, $C(4, 2)$, and $D(2, -1)$.

$|\vec{A} \times \vec{B}| = 16$

$\langle 2, 3 \rangle \times \langle 4, -2 \rangle$

$= \langle 2, 3, 0 \rangle \times \langle 4, -2, 0 \rangle$

$= \langle 0, 0, -16 \rangle$



29–32 (a) Find a nonzero vector orthogonal to the plane through the points P, Q, and R, and (b) find the area of triangle PQR.

29. $P(1, 0, 0)$, $Q(0, 2, 0)$, $R(0, 0, 3)$

a) $\vec{PQ} \langle -1, 2, 0 \rangle$

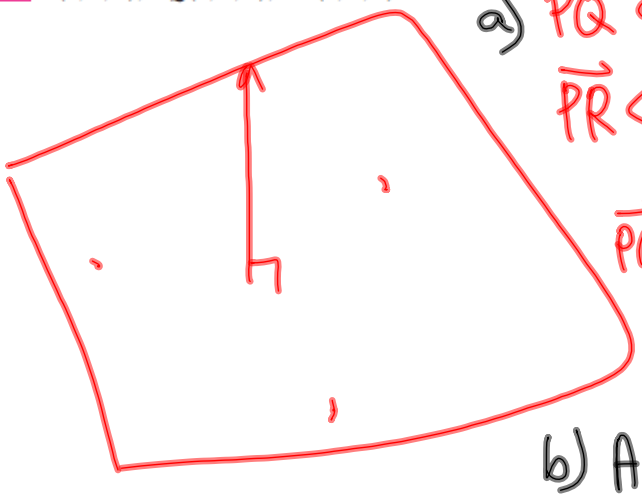
$\vec{PR} \langle -1, 0, 3 \rangle$

$\vec{PQ} \times \vec{PR} =$

$\langle 6, 3, 2 \rangle$

b) $\text{Area} = \dfrac{|\langle 6, 3, 2 \rangle|}{2}$

$= \dfrac{7}{2}$



31. $P(0, -2, 0)$, $Q(4, 1, -2)$, $R(5, 3, 1)$

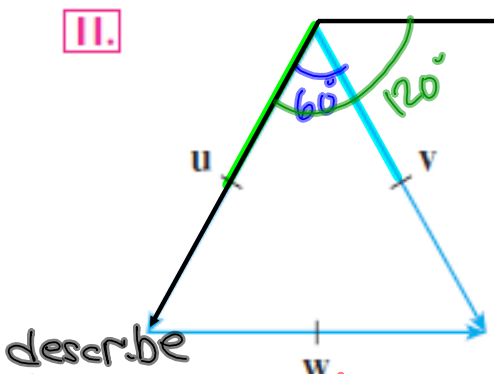
$\overrightarrow{PQ} = \langle 4, 3, -2 \rangle$

$\overrightarrow{PR} = \langle 5, 5, 1 \rangle$

$\overrightarrow{PQ} \times \overrightarrow{PR} = \langle 13, -14, 5 \rangle$

$$\text{Area} = \frac{|\langle 13, -14, 5 \rangle|}{2} = \frac{\sqrt{390}}{2}$$

11.



describe

$|u \times w| = |u||w| \sin 120°$

out of the page w/ mag of $\frac{\sqrt{3}}{2}$.

$u \cdot v = |u||v| \cos 60°$

$= \cos 60° = \frac{1}{2}$

$= |u| \cos 60°$

or

$= |v| \cos 60°$

$u \cdot w$

$= \cos 120° = -\frac{1}{2}$