
Questions:	Notes:

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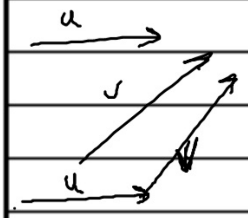
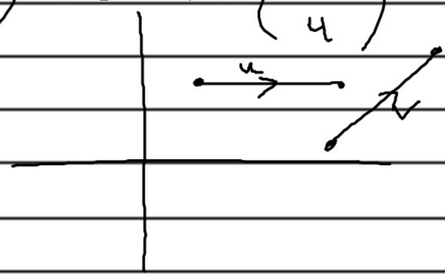
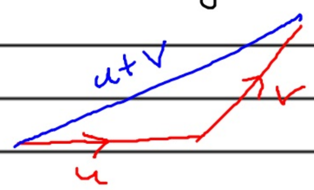


Notes: 12.2 Addition and Subtraction of vectors

$u = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$ and $v = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

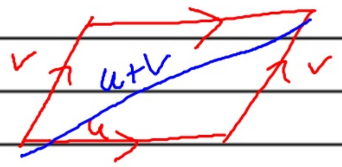


meaning of $u + v$ = move along u, then move along v



Geometric interpretation

vector addition is commutative $u + v = v + u$



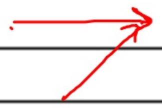
Questions:	Notes:

Algebraically

$$u = \begin{pmatrix} a \\ b \end{pmatrix} \text{ and } v = \begin{pmatrix} c \\ d \end{pmatrix}$$

$$u+v = \begin{pmatrix} a+c \\ b+d \end{pmatrix} = \begin{pmatrix} c+a \\ d+b \end{pmatrix} = v+u$$

Ex) $u = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$, $v = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ so $u+v = \begin{pmatrix} 8 \\ 4 \end{pmatrix}$

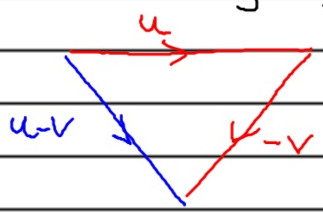


Subtracting Vectors

$u = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$, $v = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

$u - v$ = "move along u, then move along $-v$"

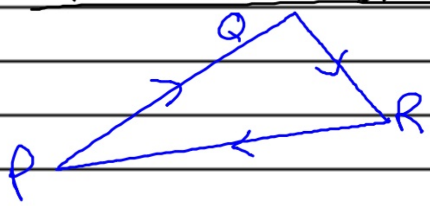
Geo:



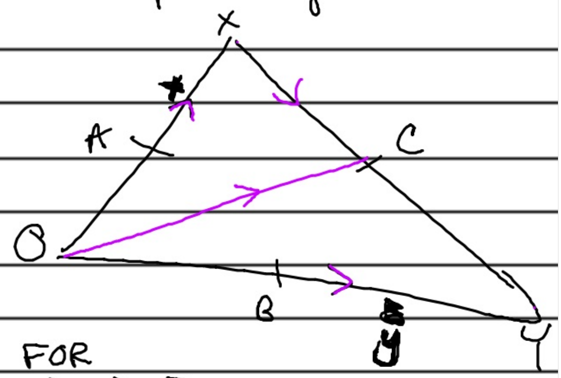
* subtraction is not commutative

Ag:

$$u-v = \begin{pmatrix} 5 \\ 0 \end{pmatrix} + \begin{pmatrix} -3 \\ -4 \end{pmatrix} = \begin{pmatrix} 5-3 \\ 0-4 \end{pmatrix} = \begin{pmatrix} 2 \\ -4 \end{pmatrix}$$

Questions:	Notes: The Zero Vetor
	 $\overrightarrow{PQ} + \overrightarrow{QR} + \overrightarrow{RP} = 0$
	were back where we started
	- Physics: equilibrium of forcen $F_{net} = 0$
$\vec{0}$	The zero vector
	$\mathbf{0} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ in 2D and $\mathbf{0} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ in 3D
	(think "additive inverse": $a = -b$, $a + b = 0$)

Questions:	Notes: Ex) GIVEN THAT $a = 2i - 3j + 3K$ and
	$b = 4i - 2j - K$ find
	a) $a+b$ b) $b-a$ c) $2b - 3a$
	a) $a+b = (2+4)i + (-3-2)j + (3-1)K$
	$= 6i - 5j + 2K$
	b) $b - a = 2i + j - 4K$
	c) $2b - 3a = (2(4) - 3(2))i \oplus (2(-2) - 3(-3))j +$
	always +
	$(2(-1) - 3(3))K$
	$= 2i + 5j - 11K$
	HW 126 p422 #1-6

Questions:	Notes: Geometrical Proofs
	In $\triangle OXY$, A, B, and C are midpoints of OX, OY, and XY respectively. $\overrightarrow{OX} = x$ and $\overrightarrow{OY} = y$
HW 12H #1	
	a) Find expressions for $\overrightarrow{OA}$, $\overrightarrow{OB}$, $\overrightarrow{XY}$, $\overrightarrow{OC}$, $\overrightarrow{CO}$ in terms of x and y
	$\overrightarrow{OA} = \frac{1}{2}\overrightarrow{OX} = \frac{1}{2}x$ $\quad \overrightarrow{OB} = \frac{1}{2}y$
	$\overrightarrow{XY} = \overrightarrow{XO} + \overrightarrow{OY} = -x + y = y - x$
	$\overrightarrow{OC} = \overrightarrow{OX} + \overrightarrow{XC} = x + \frac{1}{2}\overrightarrow{XY} = x + \frac{1}{2}(y - x)$
	$= \frac{1}{2}x + \frac{1}{2}y$
	$= \frac{1}{2}(x+y)$
	$\overrightarrow{CO} = -\frac{1}{2}(x+y)$

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