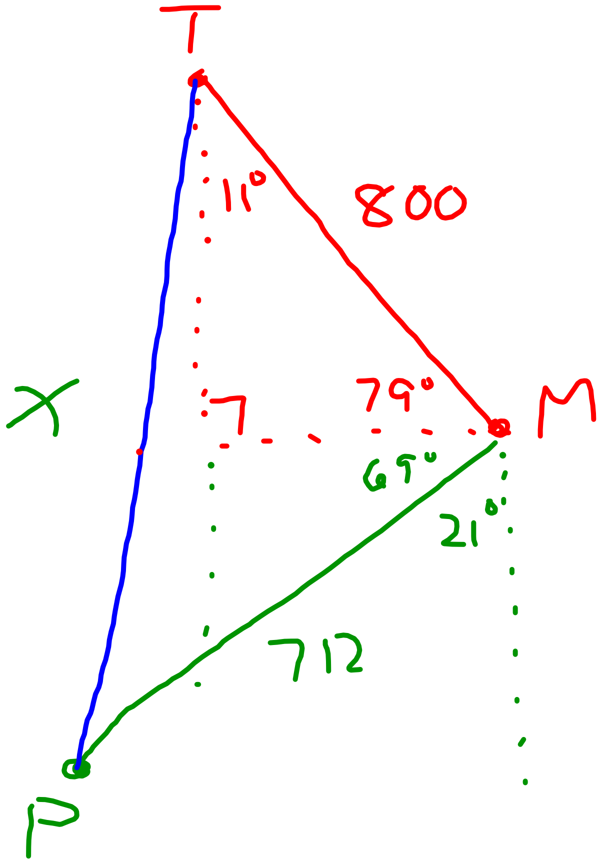
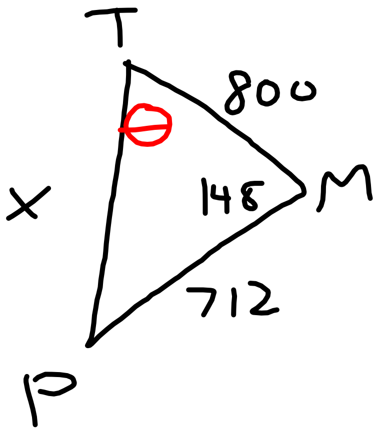
Feb. 28, 2017





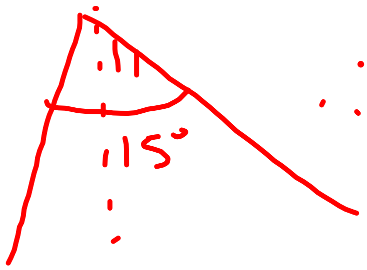
$$|x|^2 = 800^2 + 712^2 - 2(800)(712)\cos 148$$

$$|x|^2 = 2113040.391\ldots$$

$$\boxed{|x| = 1453.6}$$

$$\frac{\sin\theta}{712} = \frac{\sin 148}{1453.6}$$

$$\boxed{\theta = 15.0^\circ}$$



∴ heading [S 4° W]

∴ from Toronto to Panama is 1453.6 km [S 4° W].

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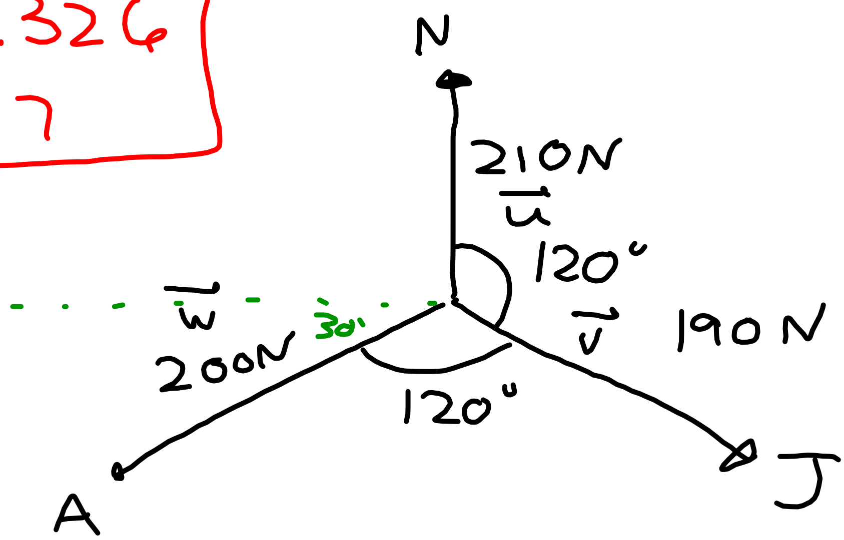
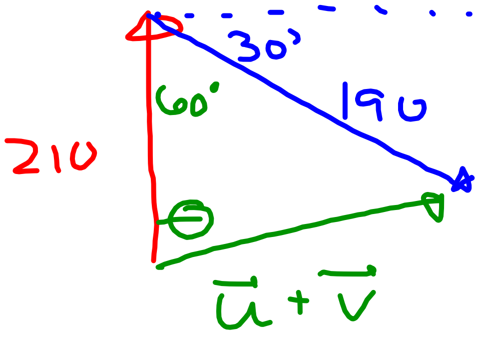
#7



$$(\vec{u}+\vec{v})+\vec{w}$$



$$|\vec{u}+\vec{v}|^2 = 210^2 + 190^2 - 2(210)(190)\cos 60$$

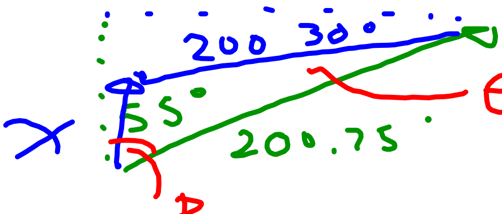
$$|\vec{u}+\vec{v}|^2 = 40300$$

$$\boxed{|\vec{u}+\vec{v}| \doteq 200.75}$$

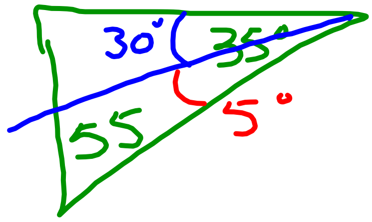
$$\frac{\sin\theta}{190} = \frac{\sin 60}{200.75}$$

$$\boxed{\theta \doteq 55.0^\circ}$$

$$\vec{u}+\vec{v} \doteq 200.75\,N\ [N\,55^\circ\,E]$$



$\theta = 5°$



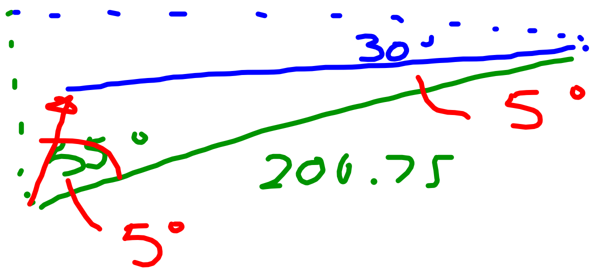
$$|x|^2 = 200^2 + 200.75^2 - 2(200)(200.75)\cos 5°$$

$$|x|^2 = 306.13\ldots$$

$$\boxed{|x| = 17.5}$$

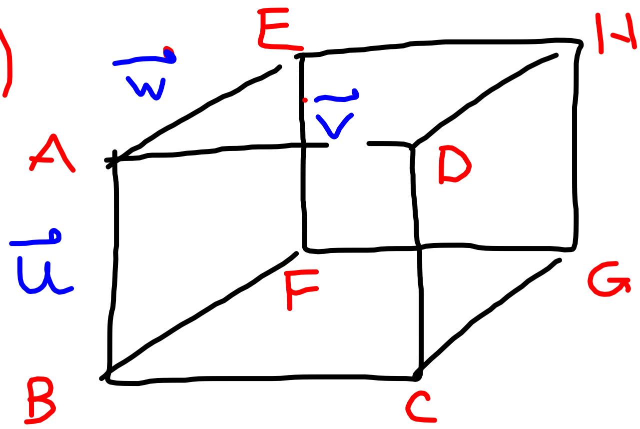
$$\frac{\sin \beta}{200} = \frac{\sin 5°}{200.75}$$

$$\boxed{\beta = 5°}$$



∴ heading is
17.5N [N 50° E] .

9)



$$\overrightarrow{AH} = \vec{v} + \vec{w}$$

$$\overrightarrow{DG} = \vec{w} + \vec{u}$$

$$\overrightarrow{AG} = \vec{u} + \vec{v} + \vec{w}$$

$$\overrightarrow{CE} = \vec{w} - \vec{u} - \vec{v}$$

$$\overrightarrow{BH} = -\vec{u} + \vec{v} + \vec{w}$$

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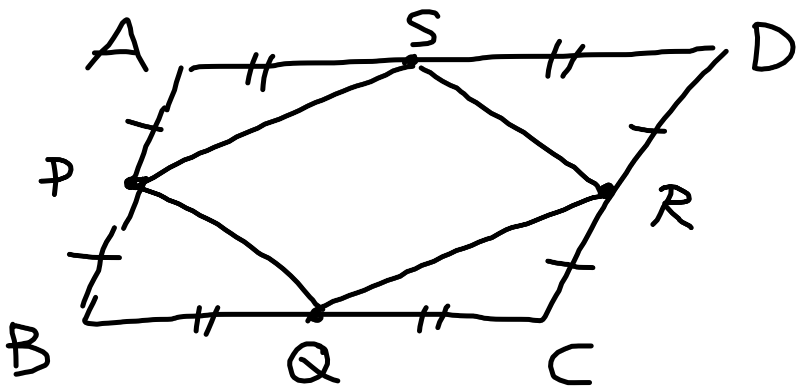


$PQ = SR$
$= SD + DR$
$= BQ + PB$
$= PB + BQ$
$\boxed{PQ = PQ}$

$PS = QR$
$= QC + CR$
$= AS + PA$
$= PA + AS$
$\boxed{PS = PS}$

$\therefore$ a parallelogram

Multiplying A Vector By A Scalar

For vector $\vec{v}$ and real number c, the scalar multiple of $\vec{v}$ by c is a vector with the following characteristics:

Magnitude: $|c||\vec{u}|$

absolute value

<u>Direction</u>:

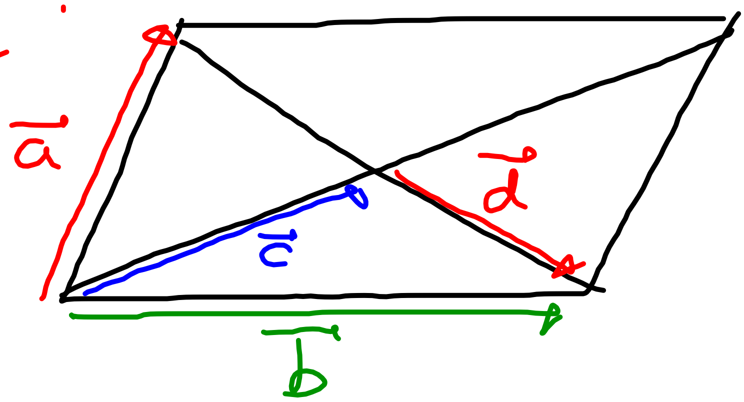
if $c > 0$, same as $\vec{u}$

if $c < 0$, opposite of $\vec{u}$

Vectors are collinear if they lie on a straight line when arranged tail to tail (i.e. parallel)

They are called linearly dependent if they can be combined to form $\vec{0}$.

Ex. 1 :



a) Write $\vec{a}$ as a linear combination of $\vec{b}$ and $\vec{c}$

$$\vec{a} = 2\vec{c} - \vec{b}$$

b) $\vec{a}$ as a linear combination of $\vec{c}$ and $\vec{d}$

$$\vec{a} = \vec{c} - \vec{d}$$

c) $\vec{b}$ as a linear combination of $\vec{a}$, $\vec{c}$ and $\vec{d}$

$$\vec{b} = 0\vec{a} + \vec{c} + \vec{d}$$

or

$$\vec{b} = \vec{a} - \vec{a} + \vec{c} + \vec{d}$$

Ex.2 : For vectors $\vec{u}$ and $\vec{v}$, write $3\vec{u}-4\vec{v}$ as a linear combination of $\vec{u}+\vec{v}$ and $\vec{u}-\vec{v}$.

$$k(\vec{u}+\vec{v}) + \ell(\vec{u}-\vec{v}) = 3\vec{u}-4\vec{v}$$

$$k\vec{u}+k\vec{v}+\ell\vec{u}-\ell\vec{v} = 3\vec{u}-4\vec{v}$$

$k\vec{u} + l\vec{u} = 3\vec{u}$

$k\vec{v} - l\vec{v} = -4\vec{v}$

$k + l = 3$

$\boxed{k = 3 - l}$

$k - l = -4$

$(3 - l) - l = -4$

$3 - 2l = -4$

$-2l = -7$

$\boxed{l = \frac{7}{2}}$

$k = 3 - \frac{7}{2}$

$\boxed{k = -\frac{1}{2}}$

$\therefore -\frac{1}{2}(\vec{u} + \vec{v}) + \frac{7}{2}(\vec{u} - \vec{v}) = 3\vec{u} - 4\vec{v}$

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#2, 4, 11, 17, 20, 21, 22, 23