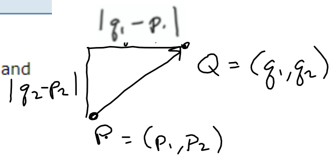
LarTrig9 3.3.002. (2548311) (Add) -- view
Comment: not randomized

Fill in the blanks.

The directed line segment $\overrightarrow{PQ}$ has ---Select--- an initial point P and ---Select--- a terminal point Q.



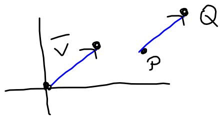
LarTrig9 3.3.003. (2446490) (Add) -- view

Fill in the blank.

The ---Select--- magnitude of the directed line segment $\overrightarrow{PQ}$ is denoted by $\|\overrightarrow{PQ}\|$.

$\|\overrightarrow{PQ}\|$

$= \sqrt{(q_2 - p_2)^2 + (q_1 - p_1)^2}$



LarTrig9 3.3.004. (2548262) (Add) -- view
Comment: not randomized

Fill in the blank.

The set of all directed line segments that are equivalent to a given directed line segment $\overrightarrow{PQ}$ is a ---Select--- vector **v** in the plane.

I insist you write $\vec{v}$

$\vec{v} = \langle q_1 - p_1, q_2 - p_2 \rangle$ corresponds to $\overrightarrow{PQ}$

LarTrig9 3.3.005. (2446358) (Add) -- view

Fill in the blanks.

In order to show that two vectors are equivalent, you must show that they have the same ---Select--- magnitude and the same ---Select--- direction.

LarTrig9 3.3.005. (2446358) (Remove) -- view

Fill in the blanks.

In order to show that two vectors are equivalent, you must show that they have the same ---Select--- magnitude and the same ---Select--- direction.

LarTrig9 3.3.006. (2447363) (Remove) -- view

Fill in the blank.

The directed line segment whose initial point is the origin is said to be in ---Select--- standard position.

LarTrig9 3.3.007. (2446130) (Add) -- view

Fill in the blank.

A vector that has a length of 1 is called a ---Select--- unit vector.

LarTrig9 3.3.008. (2447081) (Add) -- view

Fill in the blanks.

The two basic vector operations are scalar ---Select--- multiplication and vector ---Select--- addition.

$a \in \mathbb{R}$. $\vec{v}$ a vector.

Then $a\vec{v}$

$\vec{v} = \langle v_1, v_2 \rangle$

$a\vec{v} = \langle av_1, av_2 \rangle$

LarTrig9 3.3.009. (2548141) (Add) -- view
Comment: not randomized

Fill in the blank.

The vector **u** + **v** is called the ---Select--- resultant vector of vector addition.

Sum or

$\vec{u} + \vec{v} =$

$\langle u_1, u_2 \rangle + \langle v_1, v_2 \rangle$

$= \langle u_1 + v_1, u_2 + v_2 \rangle$

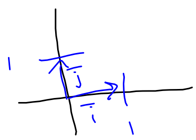
LarTrig9 3.3.010. (2446702) (Add) -- view

Fill in the blanks.

The vector sum $v_1\mathbf{i} + v_2\mathbf{j}$ is called a ---Select--- linear combination of the vectors **i** and **j**, and the scalars v_1 and v_2 are called the ---Select--- horizontal and ---Select--- vertical components of **v**, respectively.

$\vec{i} = \langle 1, 0 \rangle$

$\vec{j} = \langle 0, 1 \rangle$



LarTrig9 3.3.011. (2446340) (Remove) --

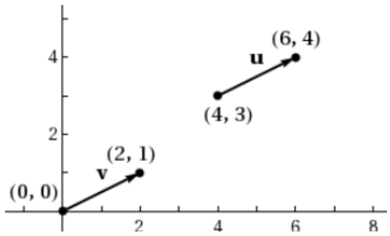
Show that **u** and **v** are equivalent.

$\|\mathbf{u}\| =$ $\sqrt{5}$

$\|\mathbf{v}\| =$ $\sqrt{5}$

$\text{slope}_{\mathbf{u}} =$ $\frac{1}{2}$

$\text{slope}_{\mathbf{v}} =$ $\frac{1}{2}$



11

$$\|\bar{u}\| = \sqrt{(6-4)^2 + (4-3)^2} = \sqrt{2^2+1^2} = \sqrt{5}$$

$$= \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$$

$$\|\bar{v}\| = \sqrt{2^2+1^2} = \sqrt{5}$$

$$\text{slop}_{\bar{u}} = \frac{4-3}{6-4} = \frac{y_2-y_1}{x_2-x_1} = \frac{1}{2}$$

$$\text{slop}_{\bar{v}} = \frac{1-0}{2-0} = \frac{1}{2}$$

$$\bar{u} \approx \langle 6-4, 4-3\rangle = \langle 2,1\rangle = \bar{v}$$

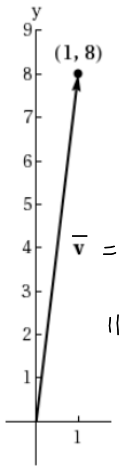
12

LarTrig9 3.3.013. (2446211) (Remove) -- view

Find the component form and magnitude of the vector **v**.

component form **v** = ⟨1, 8⟩ ⟨1, 8⟩

magnitude ||**v**|| = $\sqrt{65}$



$\bar{v} = \langle 1, 8 \rangle$

$\|\bar{v}\| = \sqrt{1^2 + 8^2} = \sqrt{65}$

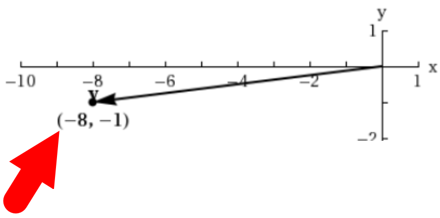
13

LarTrig9 3.3.014. (2548119) (Add) -- view

Find the component form and the magnitude of the vector **v**.

component form **v** = ⟨−8, −1⟩ ⟨−8, −1⟩

magnitude ||**v**|| = $\sqrt{65}$ $\sqrt{65}$



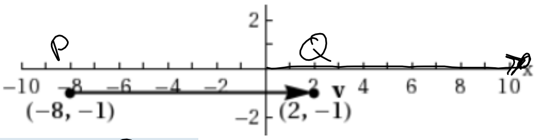
14

LarTrig9 3.3.018. (2548127) (Add) -- view

Find the component form and the magnitude of the vector **v**.

v = $\langle 10, 0 \rangle$ $\langle 10, 0 \rangle$

$\|\mathbf{v}\|$ = 10 10



$\vec{v} = \overrightarrow{PQ} = \langle 2-(-8), -1-(-1) \rangle$

$= \langle 10, 0 \rangle$

LarTrig9 3.3.020. (2595927) (Add) -- view

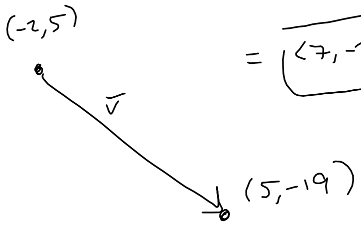
15

Find the component form and the magnitude of the vector **v**.

Initial Point	Terminal Point
(−2, 5)	(5, −19)

v = $\langle 7, -24 \rangle$ $\langle 7, -24 \rangle$

$\|\mathbf{v}\|$ = 25 25



$\vec{v} = \langle 5-(-2), -19-5 \rangle$

$= \boxed{\langle 7, -24 \rangle = \vec{v}}$

$\|\vec{v}\| = \sqrt{7^2 + (-24)^2}$

$= 49 + 576$

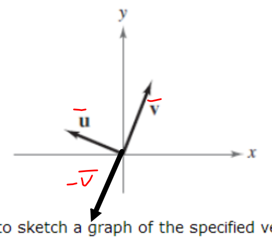
$= \sqrt{625} = 25$

LarTrig9 3.3.025. (2446672) (Add) -- view

Comment: not randomized

16

Consider the following.



Use the figure to sketch a graph of the specified vector.

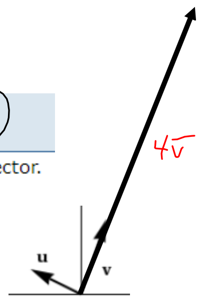
−**v**

LarTrig9 3.3.026. (2446805) (Add) -- view

17

Use the figure to sketch a graph of the specified vector.

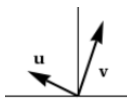
4**v**



LarTrig9 3.3.027. (2446223) (Add) -- view

Comment: not randomized

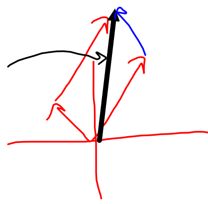
18



Use the figure to sketch a graph of the specified vector.

u + **v**

$\bar{u} + \bar{v} =$



Book: Make parallelogram $\bar{u} + \bar{v}$ = its diagonal.

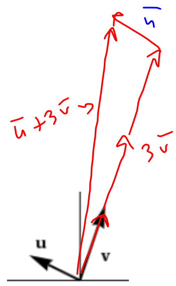
I say: Nose to tail

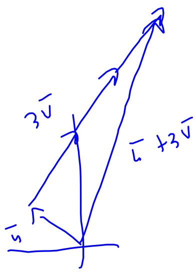
LarTrig9 3.3.028. (2447256) (Add) -- view

19

Use the figure to sketch a graph of the specified vector.

u + 3**v**





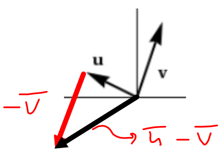
LarTrig9 3.3.029. (2446693) (Add) -- view

Comment: not randomized

20

Use the figure to sketch a graph of the specified vector.

u − **v**



LarTrig9 3.3.031. (2447278) (Add) -- view

21

Find **u** + **v**, **u** − **v**, and 3**u** − 4**v**. Then sketch each resultant vector.

u = ⟨4, 1⟩, **v** = ⟨1, 5⟩

(a) **u** + **v**

u + **v** = ⟨5, 6⟩

(b) **u** − **v**

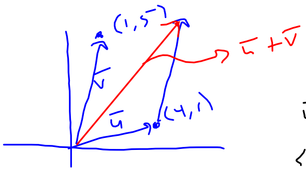
u − **v** = ⟨3, −4⟩

(c) 3**u** − 4**v**

3**u** − 4**v** = ⟨8, −17⟩

UGH. I've sketched enough vectors to "get the idea" on how to add 'em.

$\bar{u} + \bar{v} =$



$\bar{u} + \bar{v} =$
$\langle 4,1\rangle + \langle 1,5\rangle$
$= \langle 4+1, 1+5\rangle$
$= \langle 5,6\rangle$

$\bar{u} - \bar{v} =$
$= \langle 4-1, 1-5\rangle$
$= \langle 3,-4\rangle$

$3\bar{u} - 4\bar{v} = 3\langle 4,1\rangle - 4\langle 1,5\rangle$
$= \langle 12,3\rangle - \langle 4,20\rangle$
$= \langle 12-4, 3-20\rangle$
$= \langle 8,-17\rangle$

LarTrig9 3.3.035. (2447146) (Add) -- view

22

Find **u** + **v**, **u** − **v**, and 2**u** − 3**v**. Then sketch each resultant vector.

u = **i** + **j**, **v** = 4**i** − 5**j**

(a) **u** + **v**

u + **v** = [ ] 5i − 4j

$\bar{i} = \langle 1, 0 \rangle$

$\bar{j} = \langle 0, 1 \rangle$

Standard / canonical unit vectors.

$\bar{u} = \langle u_1, u_2 \rangle = u_1 \langle 1, 0 \rangle + u_2 \langle 0, 1 \rangle$

$\bar{u} + \bar{v} = \bar{i} + \bar{j} + 4\bar{i} - 5\bar{j} = 5\bar{i} - 4\bar{j} = \langle 5, -4 \rangle$

LarTrig9 3.3.039. (2446480) (Add) -- view

23

4m

Find a unit vector in the direction of the given vector. Verify that the result has a magnitude of 1.

u = ⟨10, 0⟩ $= 10\bar{i}$

unit vector is a vector of length 1.

" " in direction of $\bar{u}$ is $\dfrac{\bar{u}}{\|\bar{u}\|} = \dfrac{1}{\|\bar{u}\|} \langle u_1, u_2 \rangle$

$\|\bar{u}\| = \sqrt{10^2 + 0^2}$

$= \sqrt{100}$

$= 10$

$\dfrac{1}{\|\bar{u}\|} \bar{u} = \dfrac{1}{10} \langle 10, 0 \rangle = \langle 1, 0 \rangle = \bar{i}$!

LarTrig9 3.3.044. (2447000) (Remove) -- view

25

Find a unit vector in the direction of the given vector.

v = 8**i** − 2**j**

u = [ ] $\dfrac{4}{\sqrt{17}}$ **i** + [ ] $-\left(\dfrac{1}{\sqrt{17}}\right)$ **j**

$\bar{v} = 8\bar{i} - 2\bar{j} = \langle 8, -2 \rangle$

$2 \,|\, 68$

$2 \,|\, 34$

17

$\Rightarrow \|\bar{v}\| = \sqrt{8^2 + (-2)^2}$

$= \sqrt{64 + 4} = \sqrt{68} = 2\sqrt{17}$

$\dfrac{\bar{v}}{\|\bar{v}\|} = \dfrac{1}{\|\bar{v}\|} \bar{v} = \dfrac{1}{2\sqrt{17}} \langle 8, -2 \rangle$

$= \left\langle \dfrac{4}{\sqrt{17}}, -\dfrac{1}{\sqrt{17}} \right\rangle$ is ok

$= \left\langle \dfrac{4\sqrt{17}}{17}, -\dfrac{\sqrt{17}}{17} \right\rangle$

$\dfrac{4}{\sqrt{17}} \bar{i} - \dfrac{1}{\sqrt{17}} \bar{j}$

LarTrig9 3.3.050. (2524455) (Add) -- view

26

Find the vector **w** with the given magnitude and the same direction as **v**.

Magnitude	Direction
$\|\mathbf{w}\| = 3$	**v** = ⟨−36, −15⟩

w = [ ]

LarTrig9 3.3.063. (2446361) (Remove) -- view

27

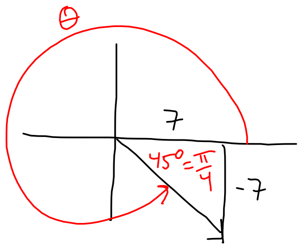
Find the magnitude and direction angle of the vector **v**.

$\mathbf{v} = 7\mathbf{i} - 7\mathbf{j}$

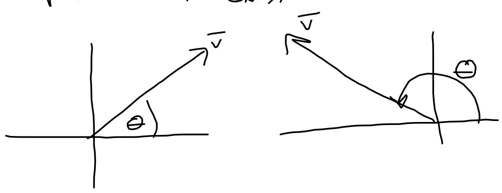
magnitude $7\sqrt{2}$

direction angle 315 °

Direction angle is the positive angle a vector makes with the positive x-axis.



$\theta = 360^\circ - 45^\circ = 315^\circ = \theta$



$$\|\bar{v}\| = \sqrt{7^2 + (-7)^2} = \sqrt{49+49} = \sqrt{98}$$

$$= 7\sqrt{2}$$

LarTrig9 3.3.067. (2446719) (Add) -- view 5m

29

Find the component form of **v** given its magnitude and the angle it makes with the positive x-axis.

Magnitude	Angle
$\|\|\mathbf{v}\|\| = 4$	$\theta = 0°$

$\langle 4, 0\rangle$

$\langle 4, 0 \rangle$

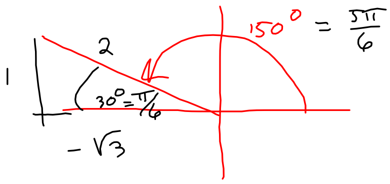
LarTrig9 3.3.069. (2447187) (Add) -- view 4m

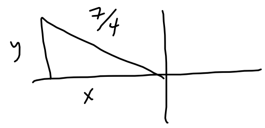
30

Find the component form of **v** given its magnitude and the angle it makes with the positive x-axis.

Magnitude	Angle
$\|\|\mathbf{v}\|\| = \frac{7}{4}$	$\theta = 150°$

$\left\langle -\frac{7\sqrt{3}}{8}, \frac{7}{8} \right\rangle$





$\frac{x}{\frac{7}{4}} = \cos\left(\frac{5\pi}{6}\right)$

$x = \frac{7}{4}\cos\left(\frac{5\pi}{6}\right)$

$= \frac{7}{4}\left(-\frac{\sqrt{3}}{2}\right) = \boxed{-\frac{7\sqrt{3}}{8} = x}$

$y = \frac{7}{4}\sin\frac{5\pi}{6}$

$= \frac{7}{4}\left(\frac{1}{2}\right) = \boxed{\frac{7}{8} = y}$

LarTrig9 3.3.074. (2548198) (Remove) -- view 13m

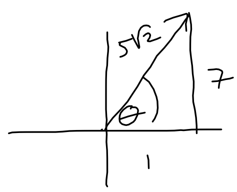
32

Find the component form of **v** given its magnitude and the angle it makes with the positive x-axis.

Magnitude	Angle
$\|\|\mathbf{v}\|\| = 5$	$\mathbf{v}$ in the direction $\mathbf{i} + 7\mathbf{j}$

$\mathbf{v} =$ $\left\langle \frac{1}{\sqrt{2}}, \frac{7}{\sqrt{2}} \right\rangle$

$\boxed{\theta = \arctan(7)}$

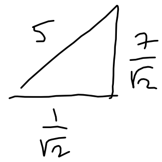


$\theta = \arctan(7)$

Pythagorus:

$1^2 + 7^2 = 50$

$\sqrt{50} = 5\sqrt{2}$



LarTrig9 3.3.076. (2548293) (Add) -- view

33

Find the component form of the sum of **u** and **v** with direction angles θ_u and θ_v.

Magnitude	Angle
$\|\mathbf{u}\| = 6$	$\theta_u = 60°$
$\|\mathbf{v}\| = 6$	$\theta_v = 90°$

$\langle 3, 6+3\sqrt{3}\rangle$

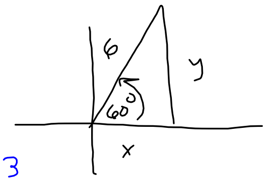
$\bar{u} = \langle u_1, u_2 \rangle \Rightarrow$

$u_1 = \|\bar{u}\| \cos\theta_u = 6 \cdot \frac{1}{2} = 3$

$u_2 = \|\bar{u}\| \sin\theta_u = 6 \cdot \frac{\sqrt{3}}{2} = 3\sqrt{3}$ $\quad \frac{x}{6} = \cos 60^\circ$

$x = 6 \cos 60^\circ$

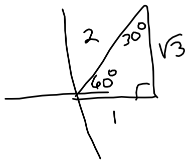
$x = \|\bar{u}\| \cos\theta_{\bar{u}}$



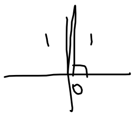
$\bar{u} = \langle 3, 3\sqrt{3} \rangle$

$\bar{v} = \langle 0, 6 \rangle$

$\bar{u} + \bar{v} = \langle 3, 6+3\sqrt{3} \rangle$



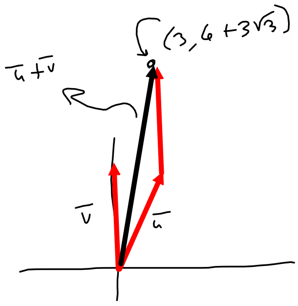
$v_1 = \|\bar{v}\| \cos\theta_{\bar{v}} = 6 \cdot 0 = 0$



$v_2 = \|\bar{v}\| \sin\theta_{\bar{v}}$

$= 6 \cdot 1 = 6$

Picture:



LarTrig9 3.3.081. (2596032) (Remove) -- view

35

Find the angle θ between the forces given the magnitude of their resultant. (*Hint:* Write force 1 as a vector in the direction of the positive x-axis and force 2 as a vector at an angle θ with the positive x-axis. Round your answer to one decimal place.)

Force 1	Force 2	Resultant Force
40 pounds	75 pounds	95 pounds

$\theta =$ 72.5 °

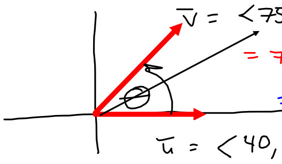
Book uses $\bar{i}$ & $\bar{j}$, here. Bleah.

$f_1 = \bar{u}$, $f_2 = \bar{v}$

$\bar{v} = \langle 75\cos\theta, 75\sin\theta \rangle$

$= 75 \langle \cos\theta, \sin\theta \rangle$

$= (75\cos\theta)\bar{i} + (75\sin\theta)\bar{j}$



$\bar{u} = \langle 40, 0 \rangle = 40\bar{i}$

$\bar{u} + \bar{v}$

$= \langle 75\cos\theta + 40, 75\sin\theta \rangle$

We know $\|\bar{u} + \bar{v}\| = 95 = \sqrt{(75\cos\theta + 40)^2 + (75\sin\theta)^2}$

$= \sqrt{75^2\cos^2\theta + 2 \cdot 40 \cdot 75\cos\theta + 40^2 + 75^2\sin^2\theta}$

$= \sqrt{75^2 + 80 \cdot 75\cos\theta + 40^2}$

$= \sqrt{75^2 + 40^2 + 80 \cdot 75\cos\theta} = 95$

$\Rightarrow 7225 + 6000\cos\theta = 9025$

$\Rightarrow 6000\cos\theta = 1800$

$\cos\theta = \frac{1800}{6000} = \frac{18}{60} = \frac{3}{10}$

$\theta = \arccos\left(\frac{3}{10}\right) \approx$ 72.54239686

LarTrig9 3.3.085. (2446545) (Remove) -- view

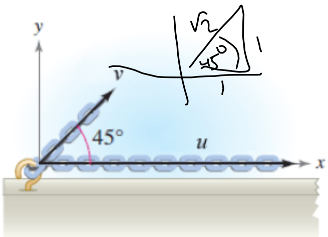
37

10m

Forces with magnitudes of **v** = 125 newtons and **u** = 310 newtons act on a hook (see figure). The angle between the two forces is 45°. Find the direction and magnitude of the resultant of these forces. (Round your answers to two decimal places.)

magnitude 408.08 newtons

direction 12.51 °



$1\ N = 1\ \frac{kg \cdot m}{s^2}$

$\|\bar{u}\| = 310\ N$

$\|\bar{v}\| = 125\ N$

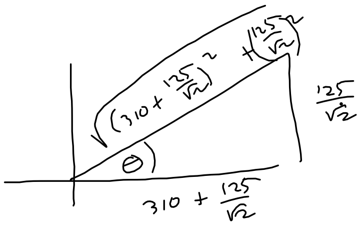
$\text{Resultant} = \bar{u} + \bar{v} = \langle 310, 0 \rangle + 125 \langle \cos 45^\circ, \sin 45^\circ \rangle$

$= \langle 310 + 125 \cdot \frac{1}{\sqrt{2}}, 125 \cdot \frac{1}{\sqrt{2}} \rangle$

$= \langle 310 + \frac{125}{\sqrt{2}}, \frac{125}{\sqrt{2}} \rangle$

$\theta = \arctan\left(\frac{\frac{125}{\sqrt{2}}}{310 + \frac{125}{\sqrt{2}}} \right)$

$\approx \boxed{12.50929069^\circ}$



$\|\bar{u} + \bar{v}\| =$

$= 5\sqrt{4469 + 1550\sqrt{2}}$

$\approx \boxed{408.0756983\ N}$

LarTrig9 3.3.089. (2446917) (Add) -- view

16m

The cranes shown in the figure are lifting an object that weighs 20,270 pounds. Find the tension in the cable of each crane. (Round your answers to the nearest whole number.)

T_L = lbs

T_R = lbs