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.

192-F

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

1m

Fill in the blank.

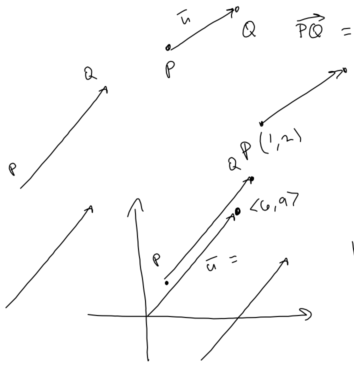
The ---Select--- magnitude of the directed line segment $\overrightarrow{PQ}$ is denoted by $\|\overrightarrow{PQ}\|$.

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

3m

Fill in the blanks.

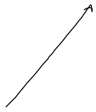
In order to show that two vectors are equivalent, you must show that they have the same ---Select--- magnitude and the same ---Select--- direction .



$\overrightarrow{PQ} = \bar{u}$ = "u-bar"

$\overrightarrow{PQ} = \langle 7-1, 11-2 \rangle = \langle 6, 9 \rangle$
is the representative for ALL
vectors of this length and direction.

Standard representation of $\overrightarrow{PQ} = \bar{u}$
has butt @ the origin

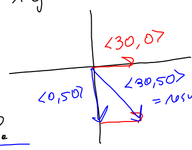


$\bar{u} = \langle 6, 9 \rangle$
$\bar{v} = \langle -2, 5 \rangle$

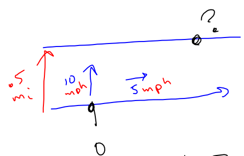
Resultant $= \bar{u} + \bar{v} = \langle 6, 9 \rangle + \langle -2, 5 \rangle$
$= \langle 6-2, 9+5 \rangle = \langle 4, 14 \rangle$

gravity is straight down:
$\langle 0, 9.8 \cdot 50 \rangle = \langle 0, 490 \rangle$ is the
downward force vector on me, sitting down.
$9.8 \frac{m}{sec^2}$ = acceleration from gravity
130 lbs $\approx$ 50 Kg (roughly), so
$(9.8)(50) \frac{kg \cdot m}{sec^2} = 490$ N on me,
from gravity.

Somebody's gonna push my wheelchair. 30 Newtons
to the right



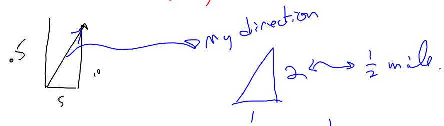
Resultant forces on me: $\langle 0, 50 \rangle + \langle 30, 0 \rangle$
$= \langle 30, 50 \rangle$

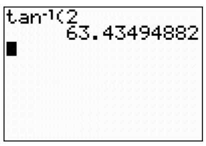


Boat crossing a stream with engine
pushing it at 10 mph, current is 5 mph

where do I end up if the river is $\frac{1}{2}$-mile wide?

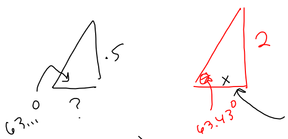
$\langle 0, 10 \rangle + \langle 5, 0 \rangle = \langle 5, 10 \rangle$ = the direction
I'm going




tan⁻¹(2
63.43494882

arctan(2) ≈ 63.43°

.25 by similar triangles!



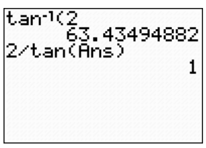
what's this side given you don't know the tangent is 2?

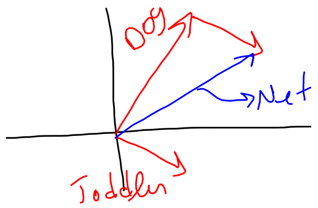
$? = .5 \cot(63...°)$

$= .25$

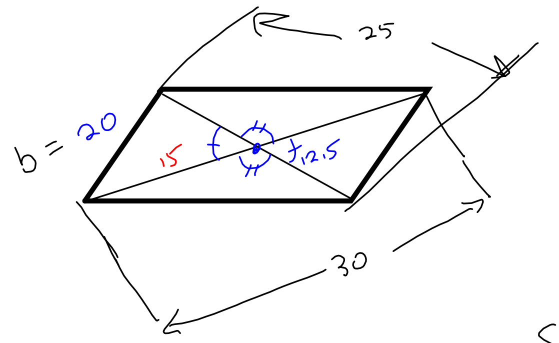
$\frac{x}{2} = \cot 63...°$

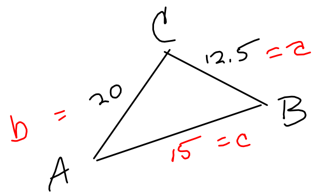
$x = 2 \cot 63...°$


tan⁻¹(2
63.43494882
2/tan(Ans)
1



Net force on dad w/ dog & toddler on leashes. Resultant.





From the lengths, the side b is the longest side, so the angle B should be the biggest angle. Let's just continue with our fake diagram

SSS:

$$a^2 = b^2 + c^2 - 2ab\cos A$$

$$2ab\cos A = b^2 + c^2 - a^2$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2ab} = \frac{20^2 + 15^2 - 12.5^2}{2(12.5)(20)}$$

This is how you'd work it out, piece by piece, slowly filling in the triangles

Long and messy. Good for muscles, but maybe not the best use of your time.

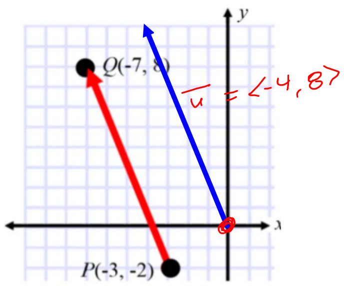
All you need are 2 of the angles in one of the triangles, say A and B, and then use

C = 180 - (A + B)

Note the supplementary angles $\angle$ & $\angle$.

Do-able, but tedious.

2. Consider the directed line segment $\overrightarrow{PQ}$ in the figure on the right. I want you to provide some basic facts about the vector $\bar{u}$:
   a. (5 pts) Express the vector $\bar{u} = \overrightarrow{PQ}$ in component form.
   b. (5 pts) Compute the magnitude of $\bar{u}$. Leave your answer in simplified radical form.
   c. (10 pts) Find the direction angle of $\bar{u}$. Use degrees, rounded to 4 places.



3. Let $\bar{u} = \langle 7, -6 \rangle$.
   a. (5 pts) Express $\bar{u}$ as a linear combination of the canonical (standard) unit vectors $\bar{i}$ and $\bar{j}$.
   b. (5 pts) What's another word for the sum of 2 vectors?

2a $\bar{u} = \overrightarrow{PQ} = \langle -7-(-3), 8-(-2) \rangle$

$= \langle -4, 10 \rangle$

2b $\|\bar{u}\| =$ Pythagorus!

$\bar{u} = \langle -4, 10 \rangle$

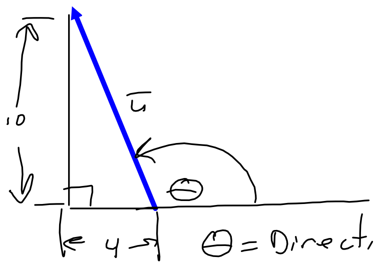
$\|\bar{u}\| = \sqrt{(-4)^2 + 10^2}$

$= \sqrt{16 + 100}$

$= \sqrt{116}$

$= \sqrt{2^2 \cdot 29} = \boxed{2\sqrt{29} = \|\bar{u}\|}$

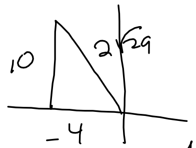
$2 \,|\, 116$, $2 \,|\, 58$, 29

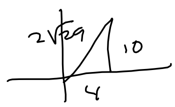


θ = Direction Angle

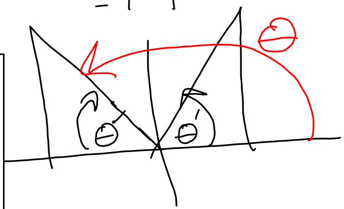
2c Direction Angle: measure from positive x-axis.

θ: $\arcsin\left(\frac{10}{2\sqrt{29}}\right)$ gives:






```
180-sin⁻¹(5/√(29)
)
         111.8014095
```



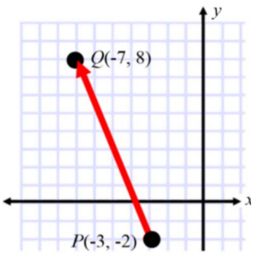
We want QII result

& $\theta = 180^\circ - \theta'$

$= 180^\circ - \arcsin\left(\frac{5}{\sqrt{29}}\right)$

$\approx \boxed{111.8014^\circ \approx \theta}$

2. Consider the directed line segment $\overrightarrow{PQ}$ in the figure on the right. I want you to provide some basic facts about the vector $\vec{u}$:
   a. (5 pts) Express the vector $\vec{u} = \overrightarrow{PQ}$ in component form.
   b. (5 pts) Compute the magnitude of $\vec{u}$. Leave your answer in simplified radical form.
   c. (10 pts) Find the direction angle of $\vec{u}$. Use degrees, rounded to 4 places.



3. Let $\vec{u} = \langle 7, -6\rangle$.
   a. (5 pts) Express $\vec{u}$ as a $\boxed{\text{linear combination}}$ of the canonical (standard) unit vectors $\vec{i}$ and $\vec{j}$.

$\to a\bar{i} + b\bar{j}$

   b. (5 pts) What's another word for the sum of 2 vectors? RESULTANT

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

So $\bar{u} = \langle 7, -6\rangle = \langle 7, 0\rangle + \langle 0, -6\rangle$

$= 7\langle 1, 0\rangle + -6\langle 0, 1\rangle$

$= 7\bar{i} + (-6)\bar{j}$

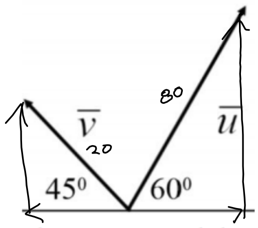
$\bar{u} = \langle u_1, u_2\rangle$ $\bar{u} = 7\bar{i} - 6\bar{j}$ & DONE.

$5\bar{u} = \langle 5u_1, 5u_2\rangle$

$5\langle u_1, u_2\rangle = \langle 5u_1, 5u_2\rangle$ Scalar '5' times vector $\bar{u}$.

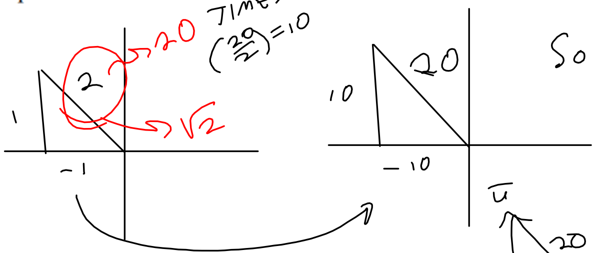
b. (5 pts) What's another word for the sum of 2 vectors?

4. Dad's out walking his dog and his toddler. The dog pulls with 80 pounds of force in the direction of the vector $\overline{u}$. The toddler pulls with 20 pounds of pressure in the direction of the vector $\overline{v}$.

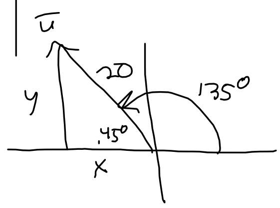


a. (10 pts) Express $\overline{u}$ and $\overline{v}$ in component form, in two ways: Give an exact answer, and an answer rounded to 3 decimal places.

b. (10 pts) What's the net force, as a vector, on poor Dad? Give an exact answer, and an answer rounded to 3 decimal places.



So $\bar{v} = \langle -10, 10 \rangle$



Another way:

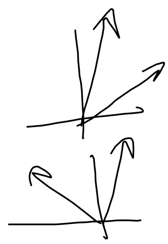
$\frac{y}{20} = \sin(135^\circ)$

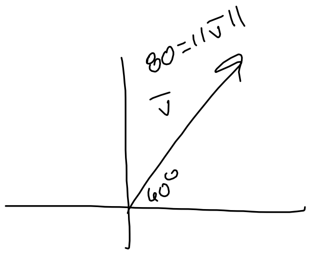
$y = 20 \sin(135^\circ)$

$x = 20 \cos(135^\circ)$

$\bar{u} = \langle x, y \rangle$

$= \langle 20\cos(135^\circ), 20\sin(135^\circ) \rangle$





$\bar{v} = \langle 80 \cos 60^\circ, 80 \sin 60^\circ \rangle$

Resultant:

$\bar{u} + \bar{v} = \langle 20(-\frac{1}{\sqrt{2}}), 20(\frac{1}{\sqrt{2}}) \rangle$

$+ \langle 80 (\frac{1}{2}), 80 \frac{\sqrt{3}}{2} \rangle$

$= \langle \frac{-20}{\sqrt{2}} + 40, \frac{20}{\sqrt{2}} + 40\sqrt{3} \rangle$ is exact!