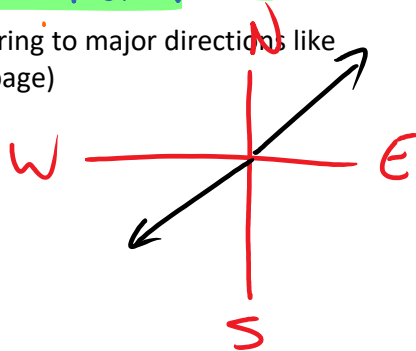


Vectors

Wednesday, September 07, 2011 8:55 AM

Vectors are physical measurements that contain both a size and direction. Size is called magnitude. **18 N at 43° W from N**

Direction is measured along compass bearings referring to major directions like North, East, South, West (out of the page, into the page)



List of Vectors:

- Displacement
- Velocity
- Acceleration*
- Force
- Momentum
- Gravitational field
- Electric field
- Current
- Magnetic field
- Magnetic Flux

Things which are not vectors are called SCALARS. These have size (magnitude) only.

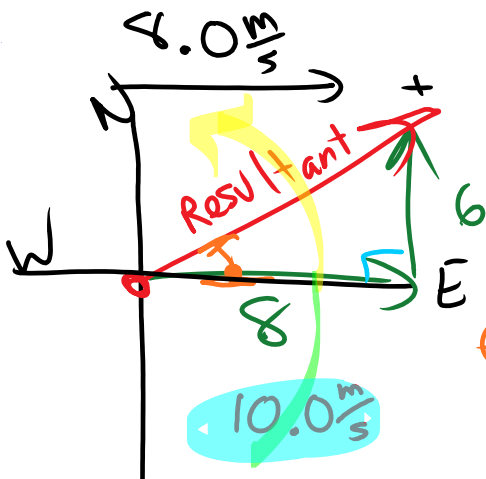
Scalars:

- Time
- mass
- Distance
- Speed
- Acceleration*
- Work
- Power
- Energy
- Voltage/potential/electrical potential/potential difference/EMF
- Resistance



0 S from W

RESULTANT ← result of adding vectors



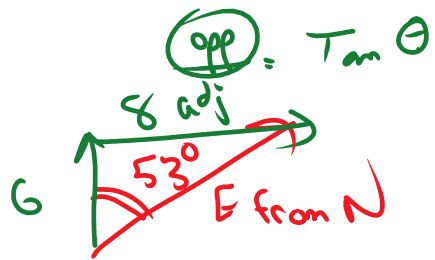
Draw vectors tip to tail
Resultant goes from start to finish

⊖ between 1st vector & resultant

⊖ = $\tan \theta$ $\tan^{-1} \left(\frac{6}{8} \right) = \theta = 37^\circ$

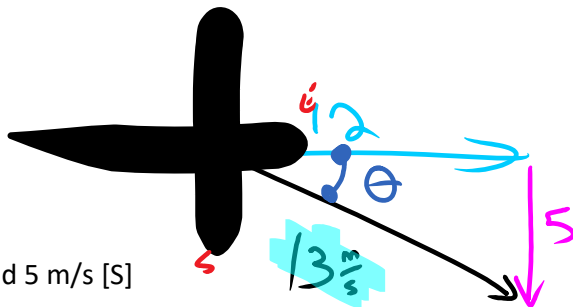
adding

10.0 m/s



$Tan^{-1}(\frac{6}{8}) = 37^\circ$
N from E

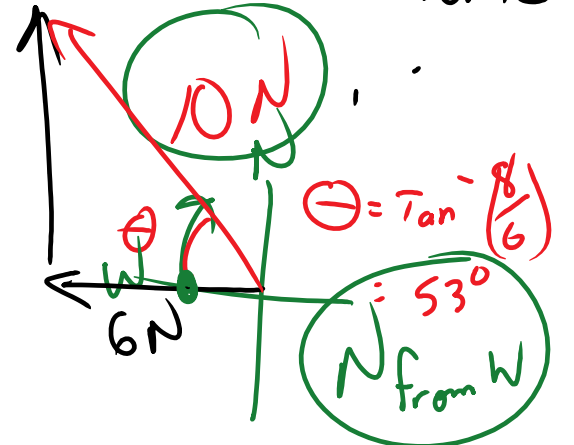
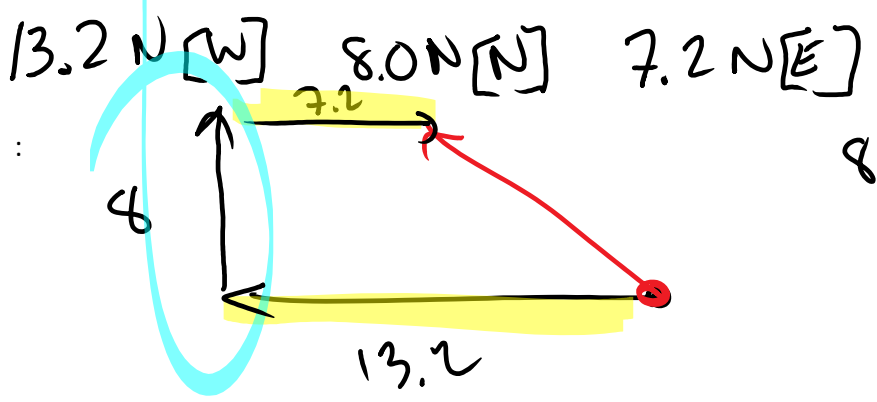
Resultant



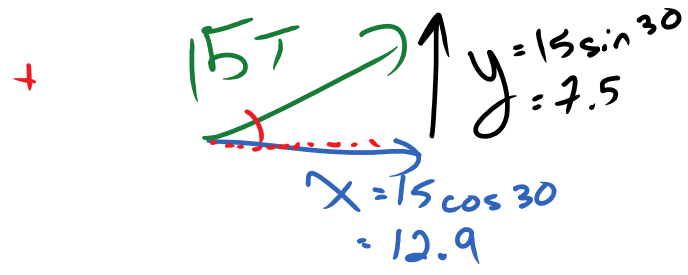
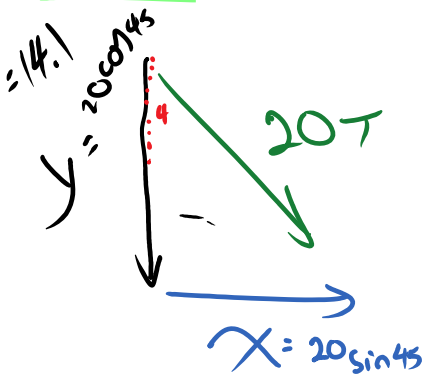
Find the resultant of: 12 m/s [E] and 5 m/s [S]

$\theta = Tan^{-1}(\frac{5}{12}) = 23^\circ$
S from E
67° E from S

$P = \tan \theta$
 $\theta = \tan^{-1} P$
 $\theta = 23^\circ$
From E



Vector Components (parts) used to add vectors that are neither parallel, nor perpendicular



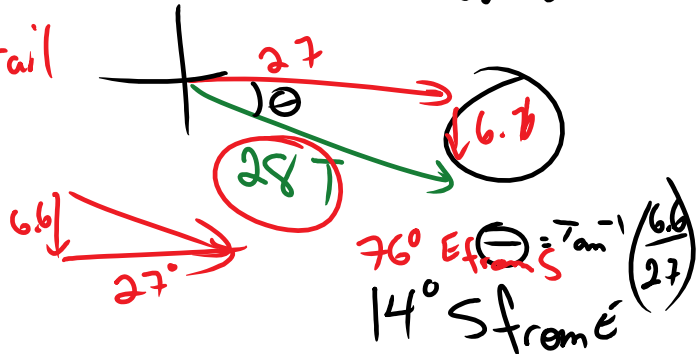
in θ
37
7

= 14.1

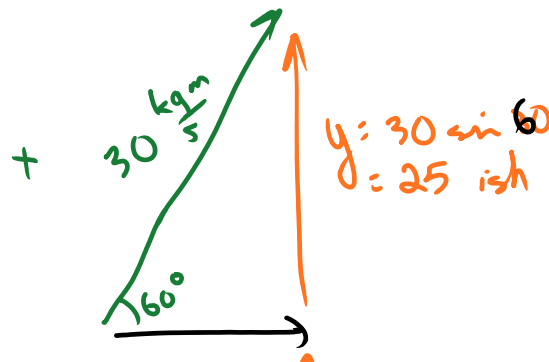
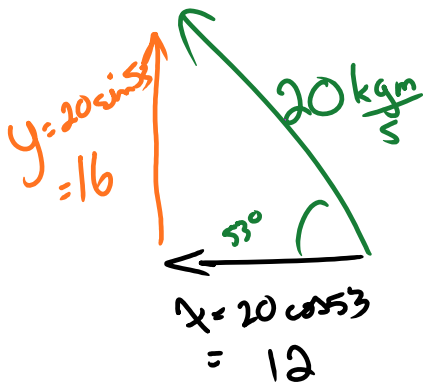
find $X_{TOTAL} = 14.1 + 12.9$
 $= 27$

Draw Tip to tail

find $Y_{TOTAL} = 14.1 \downarrow + 7.5 \uparrow$
 $= 6.6 \downarrow$

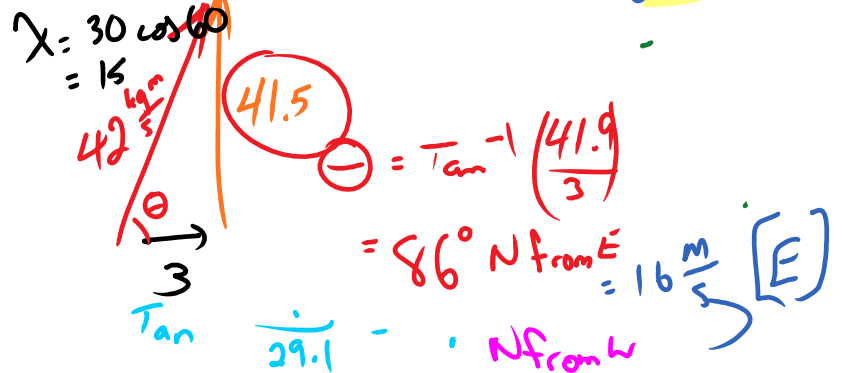


1. Find x and y components of each vector
2. Find an X total and a Y total
3. Draw the X total tip to tail with the Y total
4. Use Pythagoras to find the magnitude
5. Use \tan^{-1} to find direction



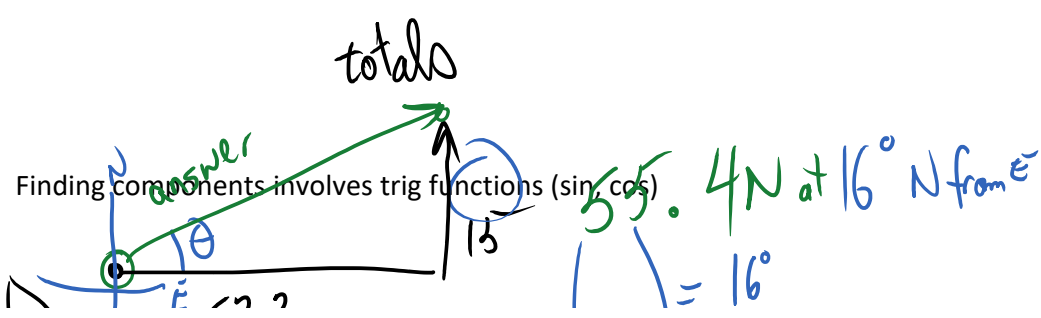
$X_{TOTAL} = 12 + 15 = 27$

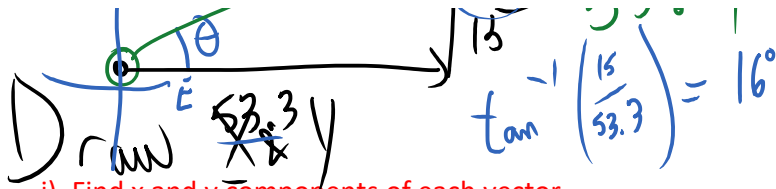
$Y_{TOT} = 16 \uparrow + 25.5 \uparrow = 41.5 \uparrow$



$\tan^{-1} \left(\frac{6}{13} \right)$
 25° N from E

One component goes in the X-direction
 One component goes in the Y-direction
 (one component goes in the Z-direction)





- i) Find x and y components of each vector
- ii) Find an X total and a Y total
- iii) Draw the X total tip to tail with the Y total
- iv) Use Pythagoras to find the magnitude
- v) Use \tan^{-1} to find direction

Find the sum of 40 N at 45° S of E and 50 N at 60° N of E

Method 3 Sine Law/Cosine Law vector addition: