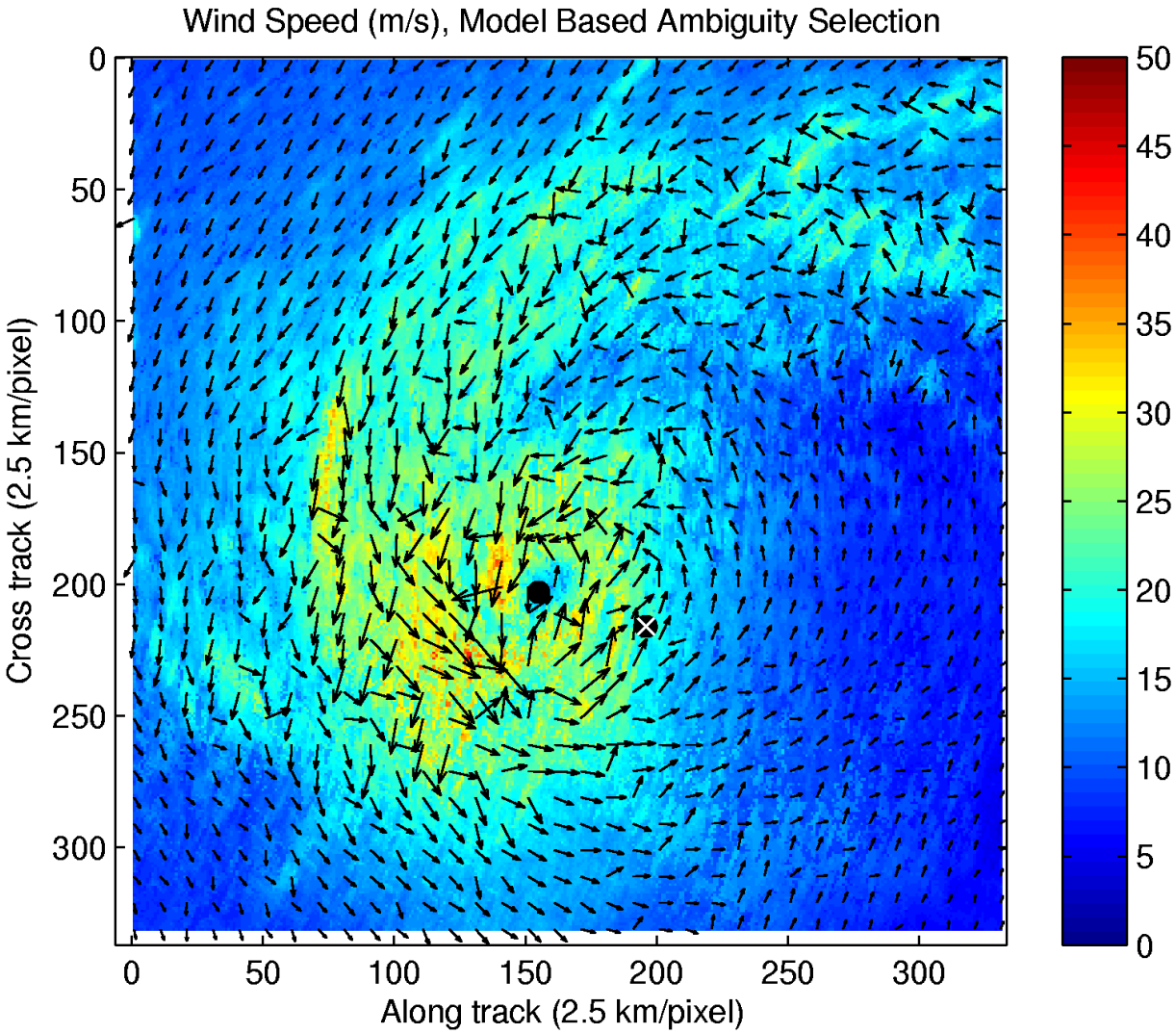
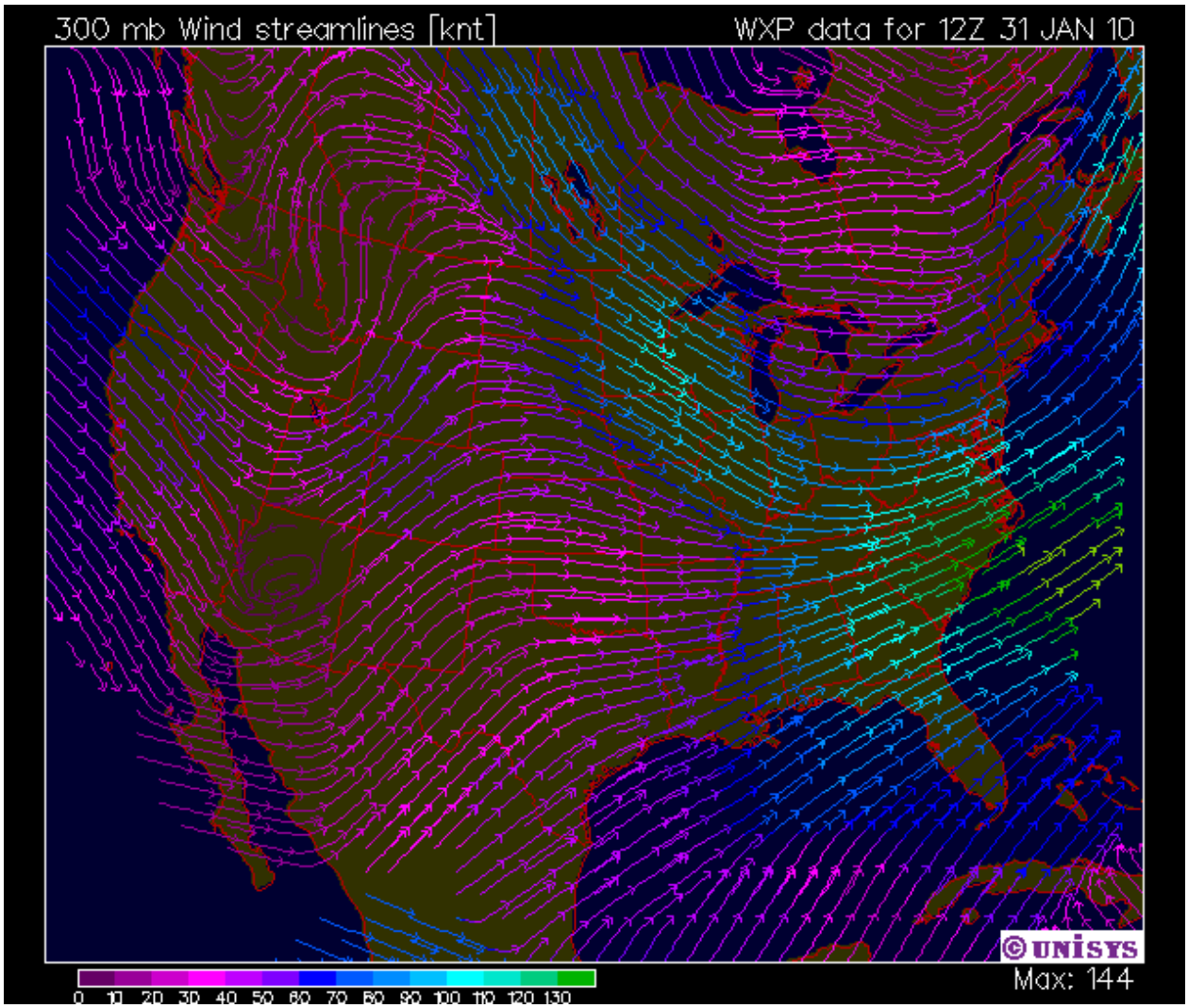
Graphical Analysis of Vectors in 2D



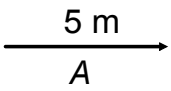

300 mb Wind streamlines [knt]
WXP data for 12Z 31 JAN 10
©UNISYS
Max: 144
0 10 20 30 40 50 60 70 80 90 100 110 120 130

Graphical Representation of Vectors

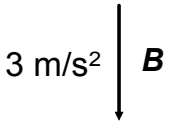
Vectors are represented by ***arrows***.

- The ***length*** of the arrow corresponds to the magnitude of the vector.
- The ***direction in which the arrow points*** represents the direction of the vector.

Vector ***A*** or $\overrightarrow{A}$ has a magnitude of 5 m and is directed to the right:



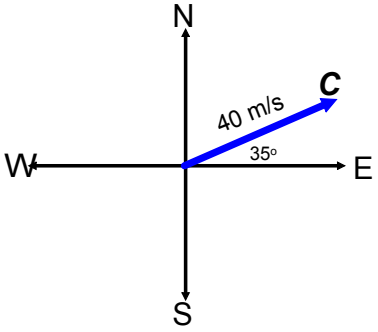
Vector ***B*** or $\overrightarrow{B}$ has a magnitude of 3 m/s² and is directed downward:



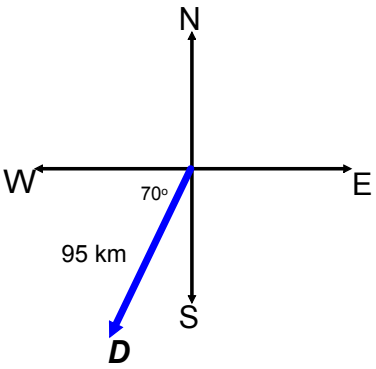
Vector ***C*** or $\overrightarrow{C}$ represents a vector of 40 m/s [E35°N] or [35° NofE]

reference

reference

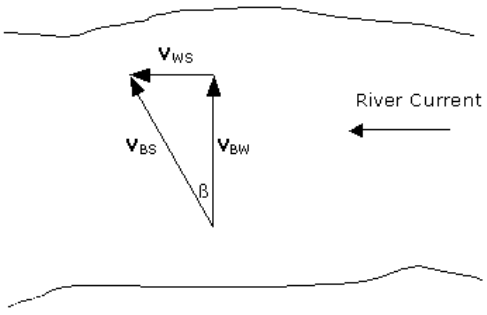


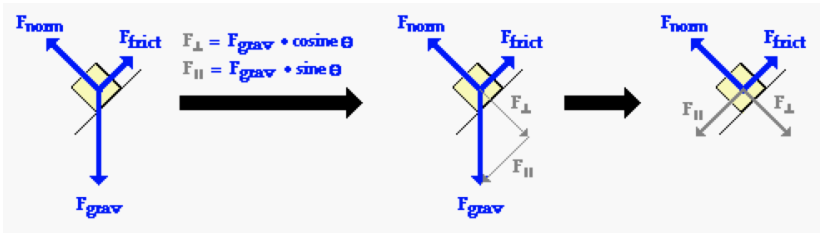
Vector ***D***, or $\overrightarrow{D}$ represents a vector of 95 km, W70°S:



Adding Vectors Graphically

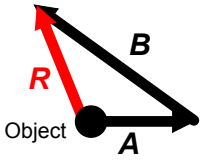
- It is possible for an object to experience many vectors acting on it at once.
  - > For example, a boat that is subject to a velocity from its engine, water current, and wind.
  - > Other examples includes many forces of gravity acting on a planet, or many magnets pulling on a nail.





Adding Vectors Graphically: 2 Methods

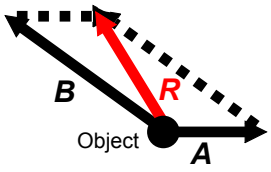
Method 1: Tip-to-Tail



Pro: Easier to solve.

Con: More difficult conceptually to picture.

Method 2: Parallelogram



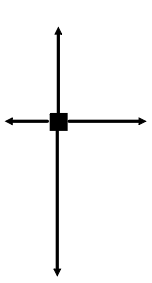
Pro: Easier to conceptually picture.

Con: More difficult to solve.

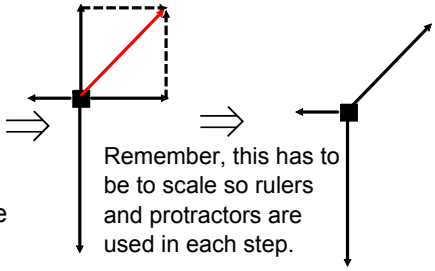
Take this example with many vectors, we won't solve it just walk through the steps for each method.

An object has four people pulling (forces) on it:10 N [E], 15 N [N], 5 N [W], and 25 N [S]. Calculate the resultant force on the object,

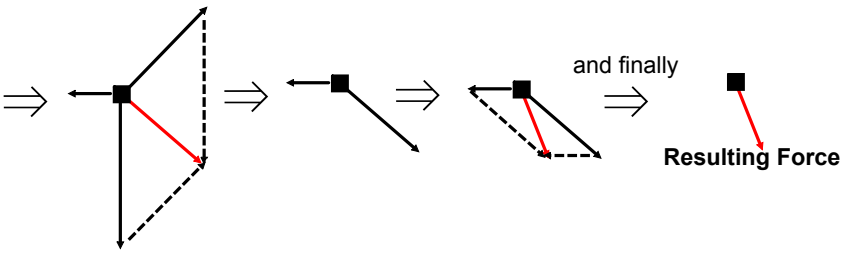
Parallelogram Method



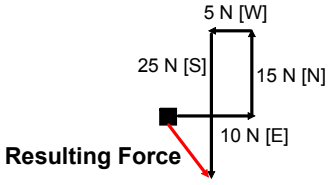
You can not find the answer in one step. You would have to find the resultant between two vectors then use that to find the next resultant and so on.



Remember, this has to be to scale so rulers and protractors are used in each step.



Tip-to-Tail Method



In the next few pages we will go in to more detail about how to properly use the tip-to-tail method.