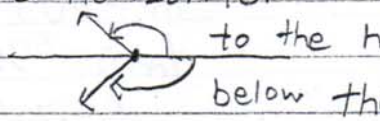
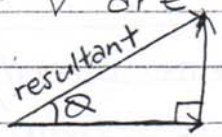
AW p.343 # 1 fgh, 2, 3.

6.4 Applications of Vector Addition

Revisit - to the horizontal

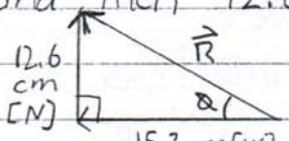


Two vectors that are ⊥ to each other and add together to give a vector $\vec{v}$ are called the rectangular vector components of $\vec{v}$.



Example 1

Determine the resultant of combination of vectors 15.3 cm[W] and then 12.6 [N]



$\vec{R} = ?$

$|\vec{R}|^2 = 12.6^2 + 15.3^2$

$|\vec{R}| = 19.8$ cm

$\tan\theta = 12.6/15.3$

$\theta = \tan^{-1}(12.6/15.3)$

$\theta = 39.5°$

$\vec{R} = 19.8\text{cm}\ [N\ 50.5°W]$

$= 19.8$ cm at a true bearing at 309.5°

Equilibriant vector is the opposite of the resultant.

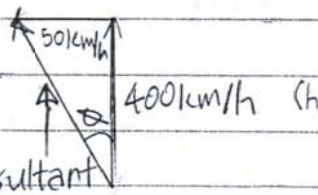
Example 2

What is the equilibrant of Example 1?

$\vec{E} = 19.8$ cm [S 50°E]

Example 3

An aeroplane is flying with airspeed 400 km/h on a heading 000°. There is a 50 km/h wind blowing from the direction 090°. a) Draw a vector diagram.



$|\vec{R}|^2 = 400^2 + 50^2$

$|\vec{R}| = 403$ km/h

$\tan\theta = 50/400$

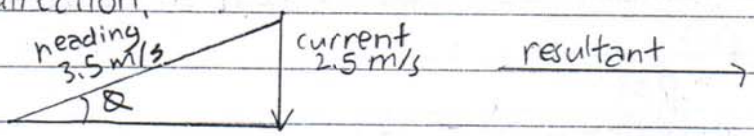
$\theta = 7.1°$

∴ Ground velocity is 403 km/h [N7°W]

Example 4

A swimmer wishes to swim directly across a river that has a current of 2.5 m/s. He can swim 3.5 m/s in a pool.

a) calculate the heading that the swimmer must use in orde to swim directly across the river relative to the current direction.

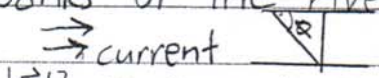


$\sin\theta = 2.5/3.5$

$\theta = 45.6°$

$\vec{H} = 3.5$ m/s [N 44.4° E]

b) Calculate the velocity of the swimmer relative to the banks of the river



$|\vec{R}|^2 = 3.5^2 - 2.5^2$

$|\vec{R}| = 2.4$ m/s

$\vec{R} = 2.4$ m/s [⊥ to the bank]