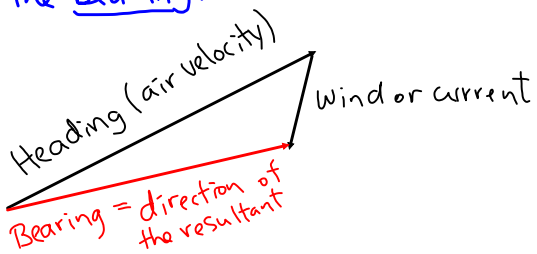
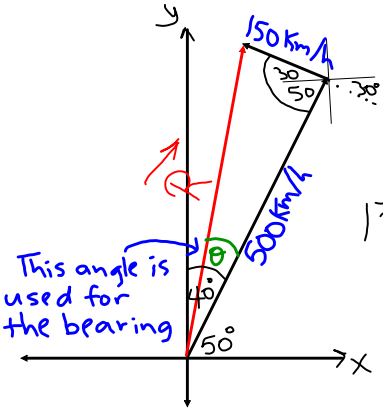
Section 7.2 – Velocity

A heading is the direction in which a vessel is steered to overcome other forces, such as wind or current, with the intended resultant direction being the bearing.



Ground Velocity: is the velocity of an object relative to the ground. It is the resultant, or bearing velocity when the heading velocity, or air velocity, and the effects of wind or current are added.

ex1: An airplane is flying at an airspeed of 500 Km/h on a heading of 040°. A 150 Km/h wind is blowing from a bearing of 120°. Determine the ground velocity of the airplane and the direction of the flight.



$|\vec{R}|^2 = 500^2 + 150^2 - 2(500)(150)\cos 80$

$|\vec{R}| = 496.4 \text{ Km/h}$

$\frac{\sin\theta}{150} = \frac{\sin 80}{496.4}$

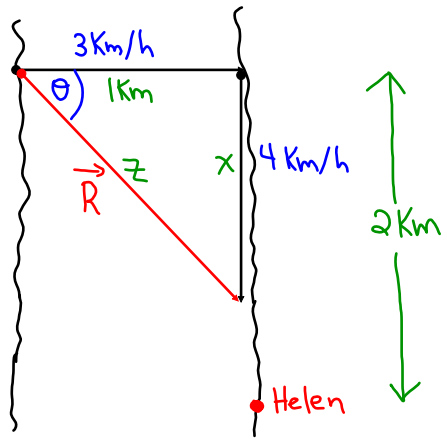
$\theta = 17.3°$

∴ Bearing is $40° - 17.3°$
$= 22.7°$

N22.7°E

May 1-8:09 AM

P370 #10.



$|\vec{R}|^2 = 3^2 + 4^2$
$= 9 + 16$
$= 25$
$|\vec{R}| = 5$
$|\vec{R}| = 5\,Km/h$

$\tan\theta = 4/3$
$\theta = 53.1°$ to the current
or $36.9°$ to the shore

b) Using proportions,

$\frac{x}{1} = \frac{4}{3}$

$3x = 4$
$x = \frac{4}{3}$ Km
$x = 1.33$ Km
$\therefore 2 - 1.33 = 0.67$ Km

c) $z^2 = 1^2 + \left(\frac{4}{3}\right)^2$
$z^2 = 1 + \frac{16}{9}$

$z^2 = \frac{25}{9}$
$z = \frac{5}{3}$ Km

$\therefore$ Judy swims 5Km/h for $\frac{5}{3}$ Km

$t = \frac{d}{s}$
$= \frac{5/3}{5}$
$= \frac{1}{3}$ hours or 20 minutes

May 7-10:18 AM