Answer on question #80022, Physics / Mechanics

a) Aircraft 'A' travels at a velocity of 300 km/h in a direction 600 South of East. The wind direction is due North with a velocity of 70 km/h. Determine the resultant velocity of the aircraft.

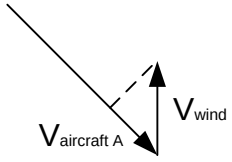
b) Aircraft 'B' is sighted from A and travels at a velocity of 200 km/h in a direction 300 east of north and crosses this path at a point 2.5 Km ahead. Find the relative velocity of B with respect to A and what will be their closest distance of approach.

c) Draw the space diagram and velocity vector diagram for both the cases.

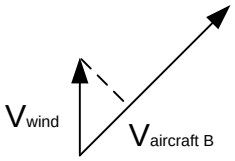
Solution

a) The resultant velocity of the aircraft:

$$v_{res\,A} = v_{Aircraft\,A} - v_{wind} = 300 - \cos(45^{\circ}) = 275.25\ \frac{km}{h}$$

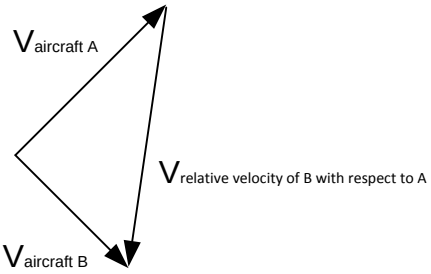


b) $v_{res\,B} = v_{Aircraft\,B} + v_{wind} = 200 + \cos(45^{\circ}) = 224.25\ \frac{km}{h}$



relative velocity of B with respect to A

$$v_{relative} = \sqrt{v_{res\,A}^2 + v_{res\,B}^2} = 368.66\ \frac{km}{h}$$


$V_{aircraft\ A}$
$V_{relative\ velocity\ of\ B\ with\ respect\ to\ A}$
$V_{aircraft\ B}$

c)