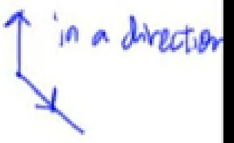
Relative velocitites

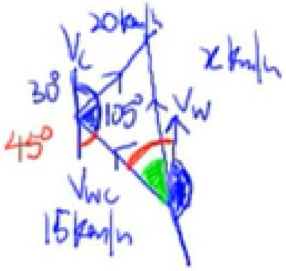
Example 4:

To a cyclist traveling on a bearing of 030° at speed of 20 km/h, the wind appears to be blowing at 15 km/h from a direction of 135°. Find the true wind speed and the direction from which the wind is blowing.



$V_{WC} = V_W - V_C$

$V_{WC} + V_C = V_W$

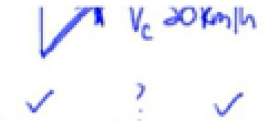


$x^2 = 20^2 + 15^2 - 2(20)(15)\cos 105°$

$x = 27.93$ km/h

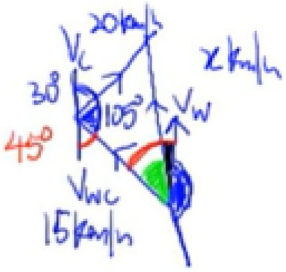
$\frac{27.93}{\sin 105°} = \frac{20}{\sin \alpha}$

$\alpha = 43.76°$



$V_{WC} = V_W - V_C$

$V_{WC} + V_C = V_W$



$x^2 = 20^2 + 15^2 - 2(20)(15)\cos 105°$

$x = 27.93$ km/h

$\frac{27.93}{\sin 105°} = \frac{20}{\sin \alpha}$

$\alpha = 43.76°$

$45 - 43.76° = 1.24°$

bearing $= 360° - 1.24° = 358.8°$

required angle $= 180° - 1.24° = 178.76°$