Relative velocity

Thursday, 1 February 2024 7:03 pm

Relative velocity - 从一个物品的视角看另一个物品的速度

Vector - direction
Velocity depends on the fame of the reference (relative - compare the object).

When doing the velocity question - always add the direction(bearing)

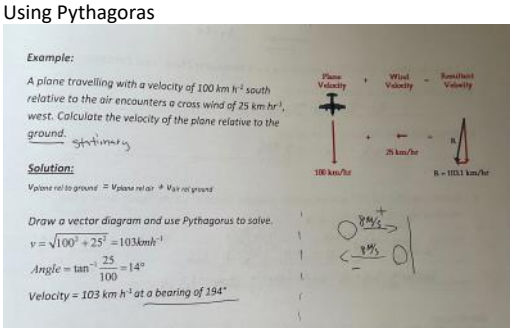
We can calculate their relative velocity when two thing move in the same straight line but at different speed, or object change its direction and speed.

Change direction = change velocity
Velocity - rate of change of displacement/position

Vector addition: (for calculate the relative velocity that include the direction change)

- Add the vector head to tail (not tail to tail)
- Sum of vector will be from tail of 1st to head last

Using Pythagoras



Subtraction: (When the comparing objects are in the same straight line)
V A relative to B = Va - Vb / 两个object不同速度的compare $V_{a\,rel\,b} = v_a - v_b$
Vf = velocity final
Vi = velocity initial

change V = Vf - Vi /one object 两个不同速度的变化 $V = v - u$ change of velocity can be negative because it indicate the direction of velocity is changing.
Change S = biggerS - smaller S - no direction so don't need to define the positive and negative value(speed can only be positive number or zero)

Acceleration - vector
Rate of change always relate with per second/overtime

$\Delta v = v - u$ $a = \frac{\Delta v}{\Delta t}$ $a = \frac{v-u}{\Delta t}$

Acceleration increase, change of the velocity increase

Large acceleration, but low velocity - when the object start acceleration at the begin of the motion which velocity is low due to the acceleration is just started
High velocity but low acceleration - when the object in constant speed which the velocity has already increased by the acceleration

Velocity and acceleration are not always the same direction(not always positive)
Speeding up - velocity +, acceleration +
Slowing down - velocity +, acceleration -

When the object change the direction - the velocity change aswell
Eg: calculate the acceleration as object change velocity(=change direction)