Chapter 7 Describing Motion

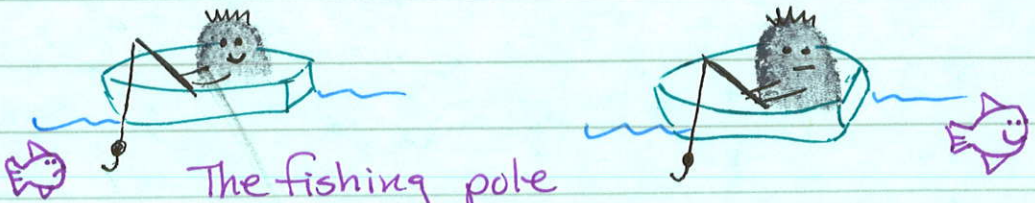
7-1

A **reference point** is the starting point used to describe the location, or position, of an object.

The sun is a reference point... but not a good one. It is so far away that is seems like it is moving instead of us on the earth.

Position is an object's distance and direction from a reference point.

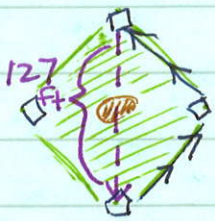
Motion is the process of changing position. It relates to the reference point



The fishing pole has not moved away from Kevin, but if the fish is still in the center of the lake, the fishing pole has moved.

Displacement is the difference between the initial position and the final position of an object.

The distance Lisa ran to 2nd base is 180 ft.



But, the displacement is only 127 ft.

7-2 **Speed** is a measure of the distance an object travels within a unit of time. (Standard SI unit is m/s.)

Madison flew 328 km in 2 hours

$$\bar{v} = \frac{d}{t}$$

$$= \frac{328\text{ km}}{2\text{ hr}}$$

$$= 164\text{ km/hr}$$

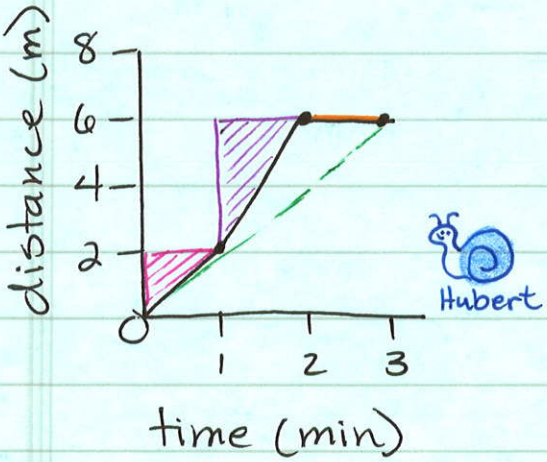
$\bar{v}$ is the symbol for average speed. "v" is for velocity... which refers to speed and direction

Average speed is $\frac{\text{total distance}}{\text{total time}}$

7-2 cont.

Constant speed - when the speed is not changing
Instantaneous speed - speed at a particular moment

Distance-Time Graphs



Hubert's Speed

Minute 1

$v = \frac{\Delta d}{\Delta t}$

$= \frac{2m}{1\ min}$

$= 2\ m/min$

Minute 2

$v = \frac{\Delta d}{\Delta t}$

$= \frac{4m}{1\ min}$

$= 4\ m/min$

minute 3

$v = \frac{\Delta d}{\Delta t}$

$= \frac{0m}{1\ min}$

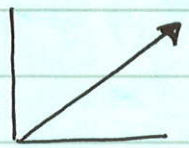
$= 0\ m/min$

average speed

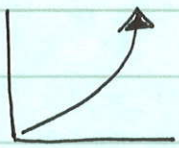
$\bar{v} = \frac{\text{total dist.}}{\text{total time}}$

$= \frac{6\ m}{3\ min}$

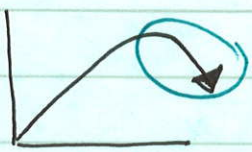
$= 2\ m/min$



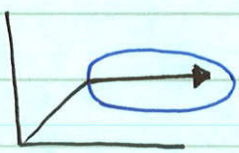
constant speed



increasing speed



decreasing speed



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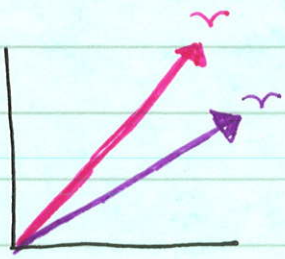
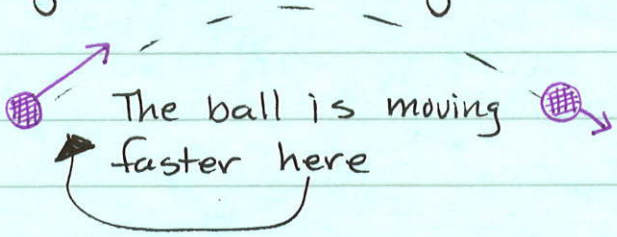


The pink bird is faster than the purple bird.

Velocity is the speed and direction of a moving object.

The arrow points in the direction of the motion.

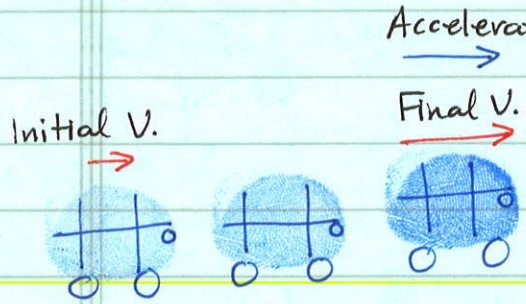
A longer arrow has a greater speed.



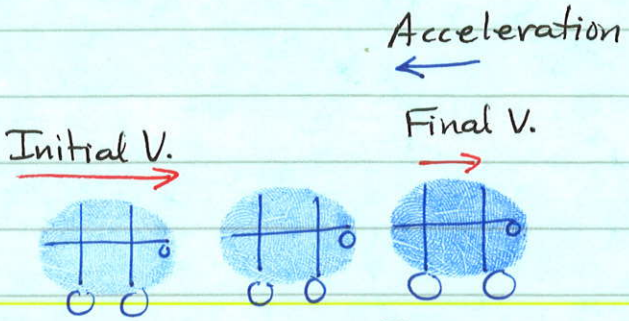
7-3 Acceleration - a measure of the change in velocity during a period of time

The SI unit is m/s^2

- increasing speed
- decreasing speed (negative acceleration)
- changing direction

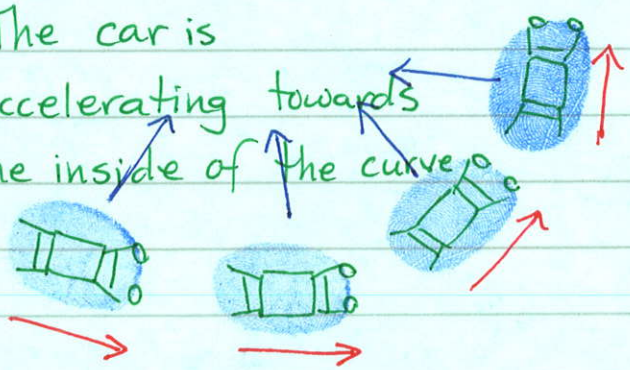


Speeding Up



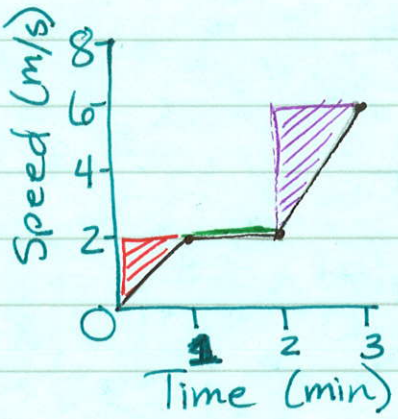
Slowing Down

The car is accelerating towards the inside of the curve



7-3 cont.

Acceleration-Time Graphs



$$\text{Accel.} = \frac{\text{Final V.} - \text{Initial V.}}{\text{time}}$$

$$\text{Acc} = \frac{FV - IV}{\text{time}}$$

$$= \frac{2-0}{1}$$

$$= 2\ m/s^2$$

$$\text{Acc.} = \frac{FV - IV}{\text{time}}$$

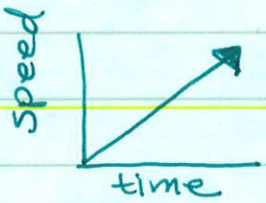
$$= \frac{6-2}{3-2}$$

$$= 4\ m/s^2$$

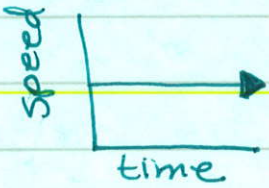
$$\text{Acc.} = \frac{FV - IV}{\text{time}}$$

$$= \frac{2-2}{2-1}$$

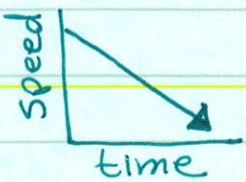
$$= 0\ m/s^2$$



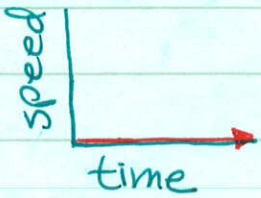
increasing speed



constant speed



decreasing speed



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