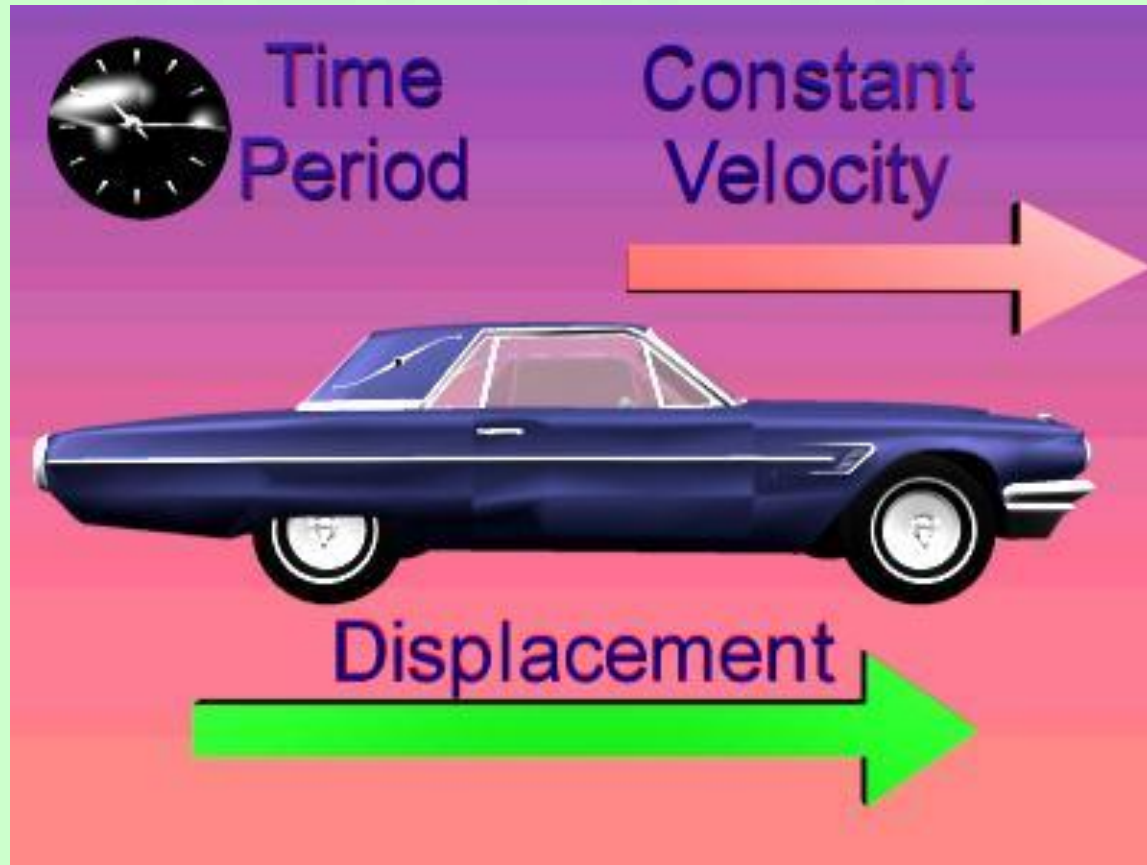
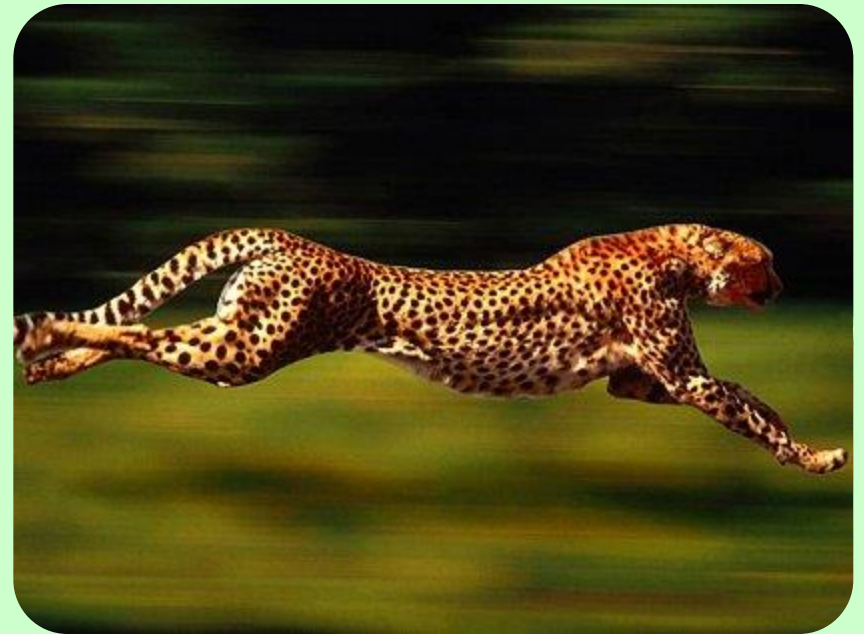


8.2: AVERAGE VELOCITY



VOCABULARY

- speed
- velocity
- average velocity



Speed vs. Velocity

Speed: (v) distance an object travels divided by the time.

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

Speed is a **scalar**

Velocity: (\vec{v}) the displacement of an object divided by the time.

$$\vec{v} = \frac{D\vec{d}}{t}$$

Velocity describes how fast an object's position is changing.

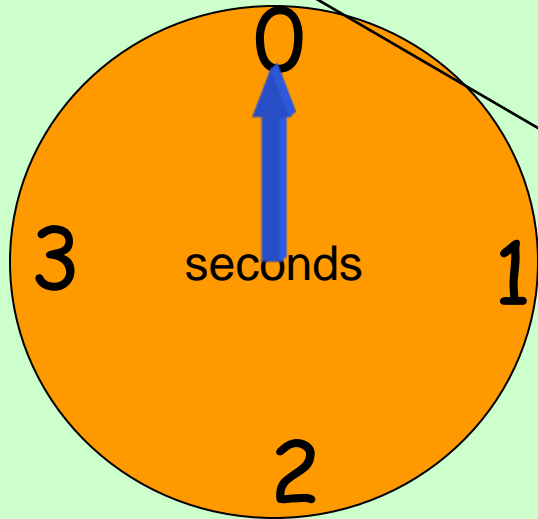
Velocity is a **vector**



These two ski gondolas have the same speed but have different velocities since they are travelling in opposite directions.

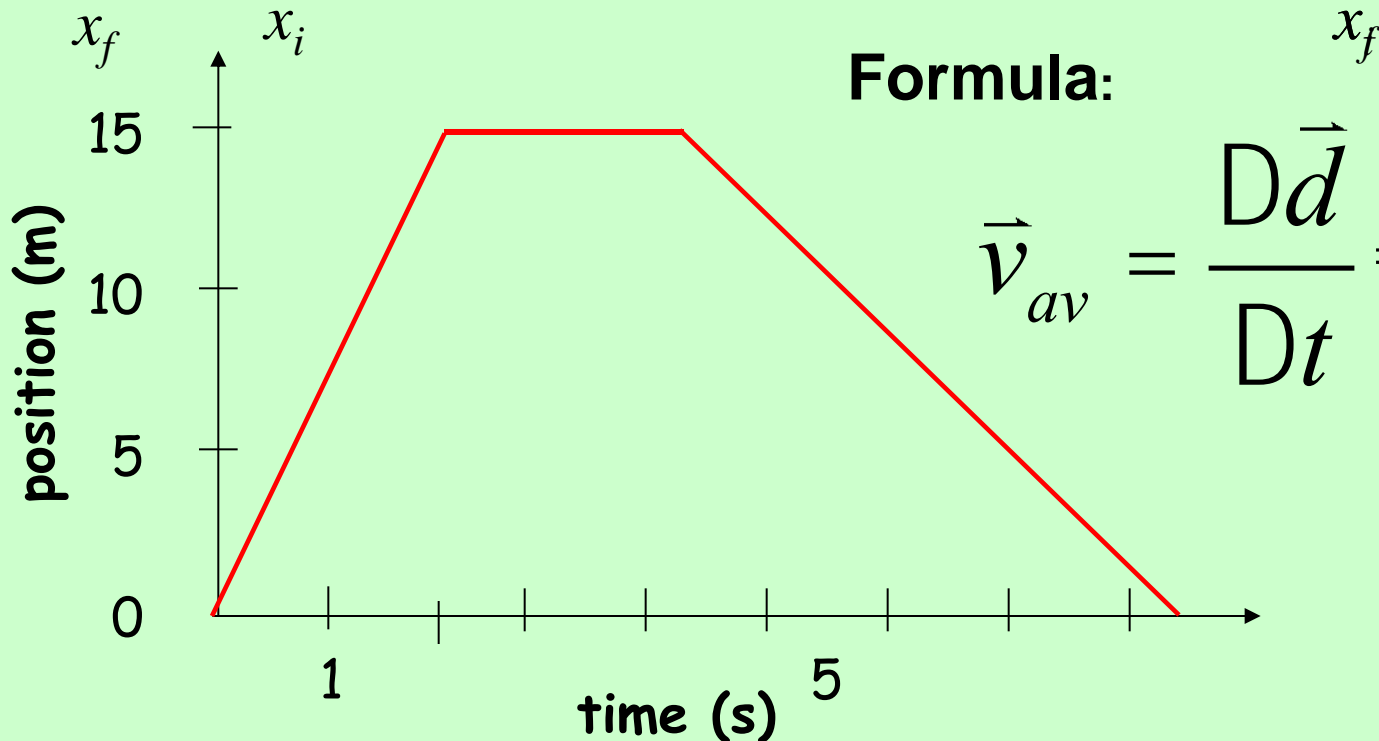
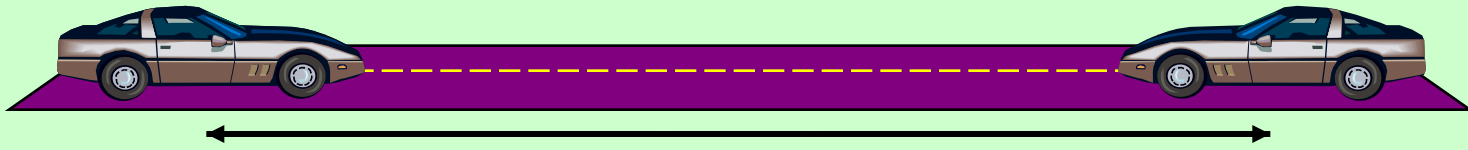
Velocity

speed of an object in a certain direction.



Average Velocity

- We often use average velocity in calculations because objects do not move at a perfectly constant speed



Formula:

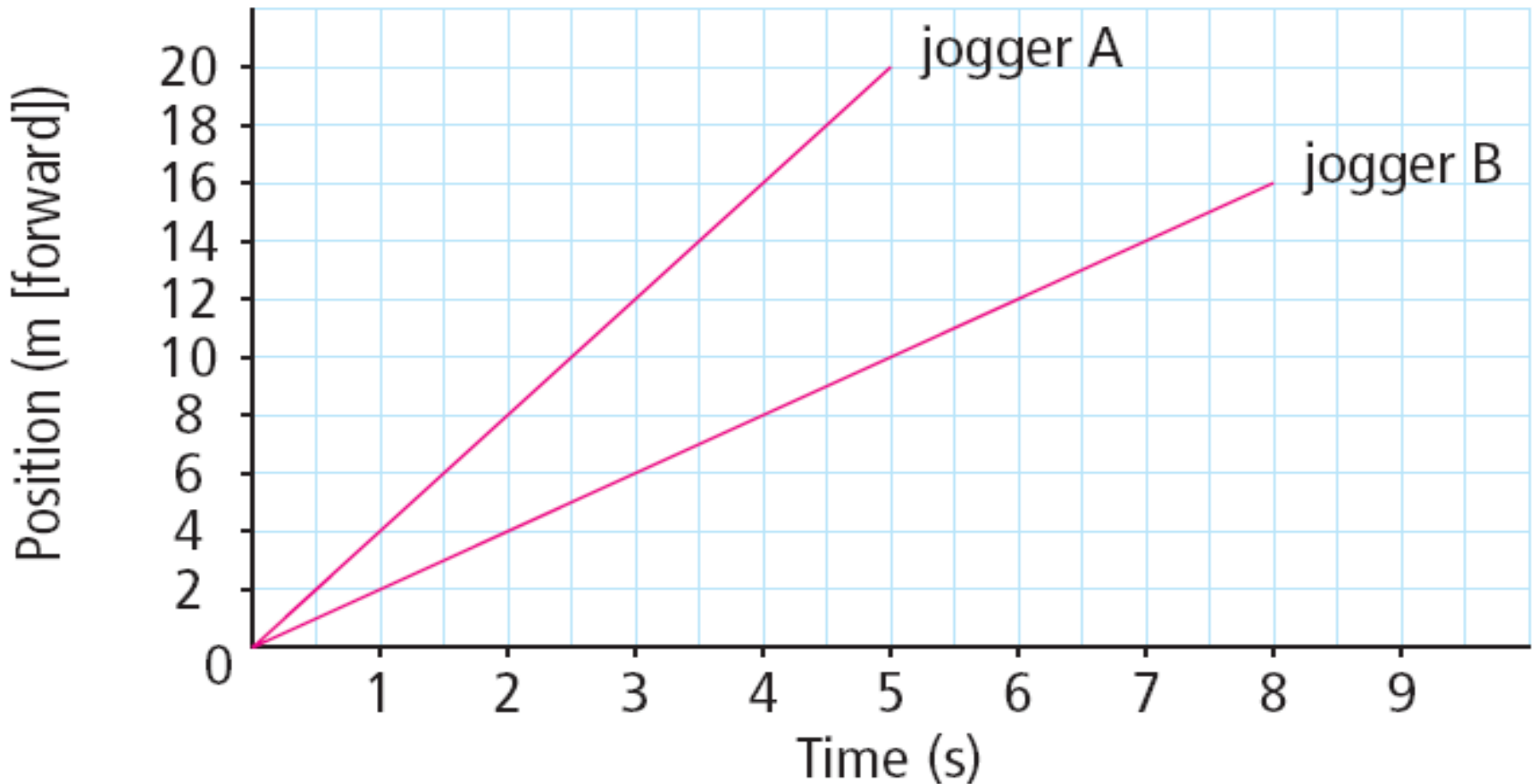
$$\vec{v}_{av} = \frac{D\vec{d}}{Dt} = \frac{\text{rise}}{\text{run}} = \text{slope}$$



Average velocity

- So, the **slope** of a position-time graph is the **average velocity** in m/s

Position vs. Time



C. Calculating Average Velocity - Example Questions

1. What is the average velocity of a dog that takes 4.0 s to run forward 14 m?



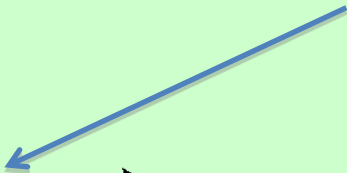
2. A boat travels 280 m East in a time of 120 s. What is the boat's average velocity?

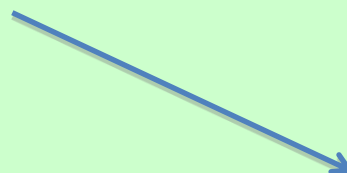


Calculating Displacement and Velocity

- We can also use the average velocity formula to calculate $\Delta\vec{d}$ and Δt

$$\vec{v}_{av} = \frac{D\vec{d}}{Dt}$$


$$Dt = \frac{D\vec{d}}{\vec{v}_{av}}$$


$$D\vec{d} = \vec{v}_{av} \times Dt$$

3. What is the displacement of a bicycle that travels 8.0 m/s [N] for 15 s ?

4. A person, originally at the starting line, runs west at 6.5 m/s . What is the runner's displacement after 12 s ?

5. A car is driving forward at 15 m/s . How long would it take this car to pass through an intersection that is 11 m long?



Review: Unit Conversions

- To convert from **km/h to m/s**

For example, convert 75 km/h to m/s.

Example 6:

What is the displacement of an airplane flying 480 km/h [E] during a 5.0 min time interval?

Homework:

- Big book p. 374-376