Chapter 11.1 -11.2 Motion

Ch. 11.1: Speed

- _____ - an object's change in position relative to a reference point.
- _____- a system for specifying the _____ in space and time.
    - Object that you assume is _____

Displacement

- Displacement- _____.
    - ▶ Always includes _____
    - ▶ Shorter than distance _____

Speed

- To describe motion, you _____
- _____ is the _____ an object travels per unit of _____.
- _____-A moving object that doesn't change it's speed.
- _____ speed-total distance traveled per total time it took.
    - Speed is usually NOT CONSTANT

Calculating Speed

- To calculate its speed you divide the distance it travels by the time it travels
- **Speed (S)** = _____ (d) / the amount of _____it took (t).
- S= ____
- Units of Speed: _____, _____, _____, _____
    - Problem: If I travel 100 kilometer in one hour then I have a speed of…
    - Problem: If I travel 1 meter in 1 second then I have a speed of….
    - Problem: If a runner travels 100 m in 10 seconds what was his average speed?
- Formulas for the other pieces too

  Distance = _____ x _____ Time = _____

Practice Problems: Speed

- 1. A car race is 500 km long. It takes the winner 2.5 hours to complete it. How fast was he going?
- 2. It is 320 km to Las Vegas. If you average 80 km/hr, how long will it take you to get there?
- 3. You are going on a trip. You average 80 km/hr for 6 hours. How far did you go?

Velocity

- Formula: _____
- **Velocity** – The _____ an object travels in a certain period of _____in a specific _____.
- May be ___ or __
- It is more precise for describing motion
    - Example:
    - An airplane moving _____ at _____
    - A missile moving _____ at _____
- People often use the word _____
    - Speed tells how _____
    - Velocity tells both _____
        - ▶ _____=40 km/hr (only speed)
        - ▶ _____= 40 km/hr west (both speed and direction)
- Velocity can change in two ways
    - _____
    - Change _____

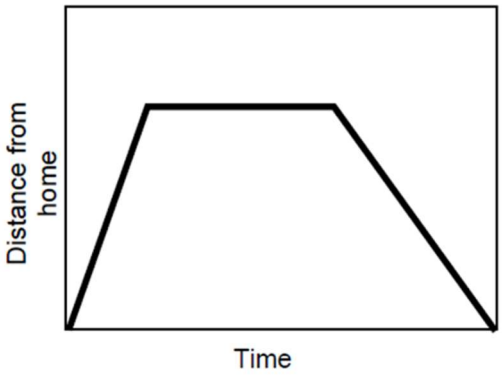
Practice Problems: Velocity

1. Young male cheetah covered 100 meters east in 7.19 seconds in a timed run. What is his velocity?

2. It took 3.5 hours for a train to ravel the distance between two cities at a velocity of 120 km/hr. How many kilometers lie between the two cities?

Understanding Speed Graphs

Write a brief story to go along with this distance-time graph.



Using graph above, answer the following questions.

What is the total distance traveled by the object in this graph?

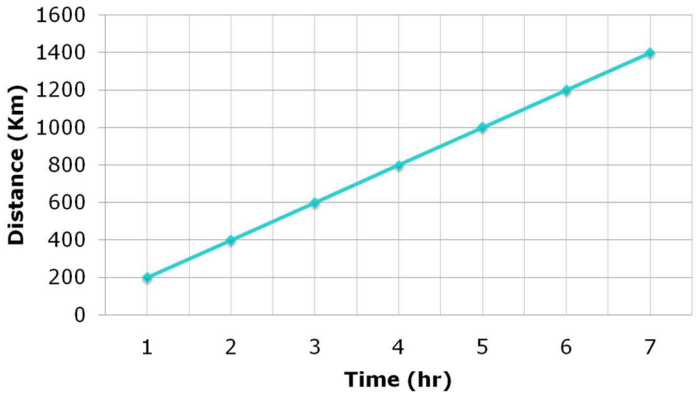
What is the object's displacement?

What is the frame of reference?

How does this graph display speed?

How do you know?

Distance vs. Time Graph

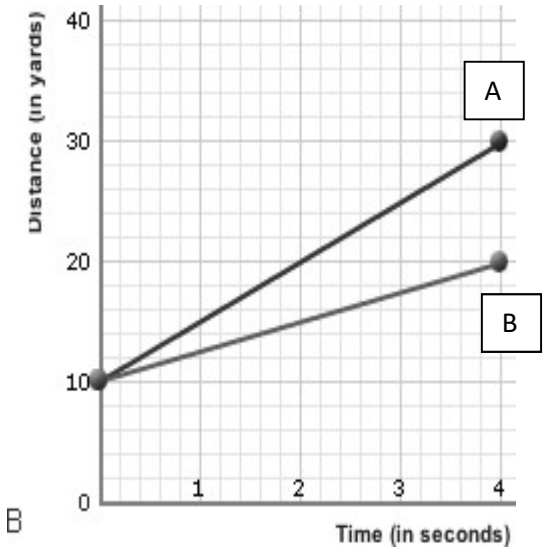


Interpreting Slope

The graph on the right show the motion of two cars traveling at different speeds.

Slope = $\frac{y_2 - y_1}{x_2 - x_1}$ = $\frac{\text{change in distance}}{\text{change in time}}$

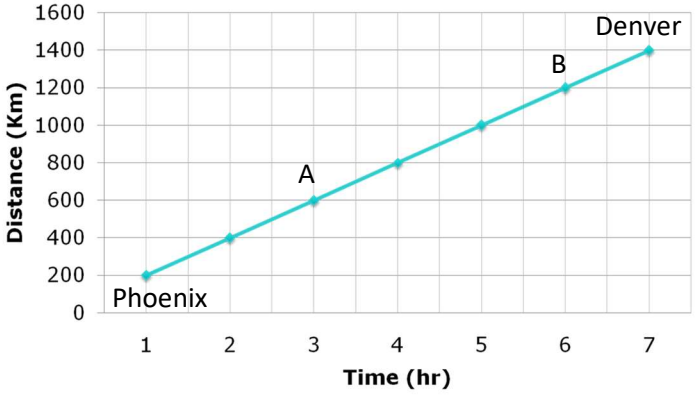
Use the slope equation to calculate the slope of each graph.



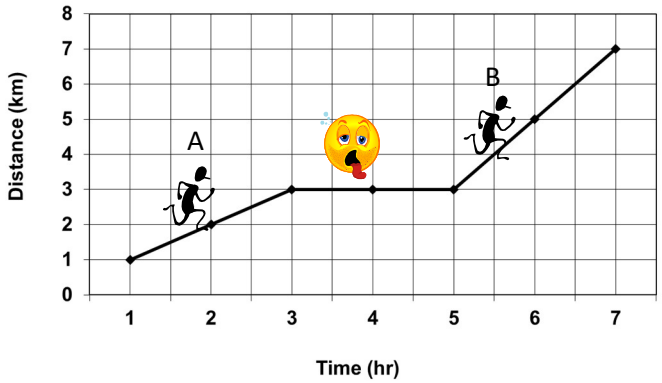
B

What is the slope for the graph on the right?

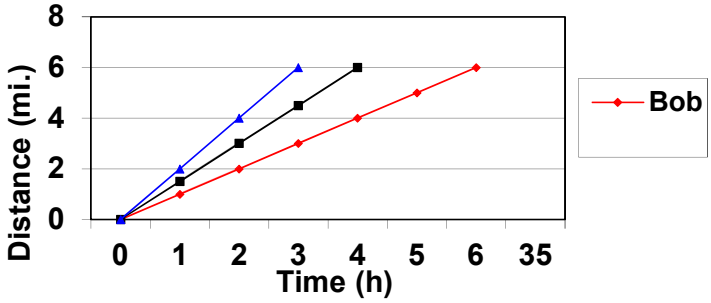
What is the slope from points A to B?



1. What is the speed of the first guy on the graph?
2. What is the speed of the tired guy in the middle of the graph?
3. What is the speed of the last guy in the graph?

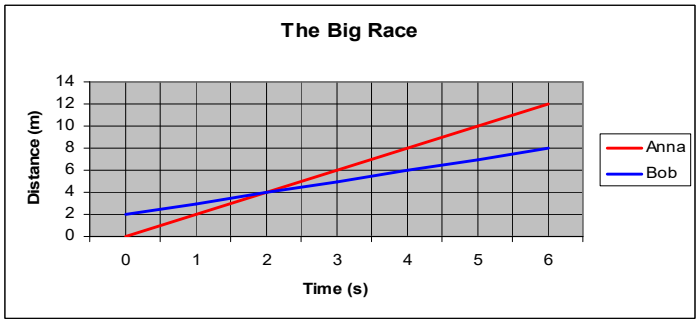


Using graph on the right, who is the fastest?

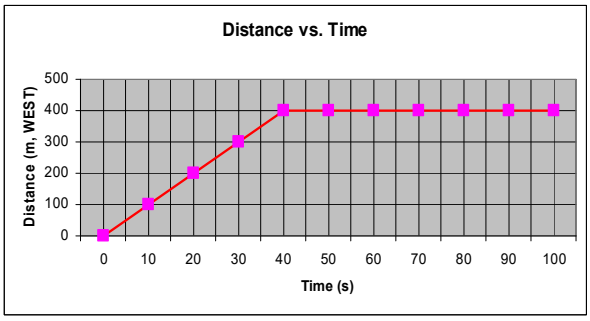


Using graph on the right.

1. Who has the greater velocity?
2. Who starts ahead of the starting line?
3. What happens at 2 seconds?

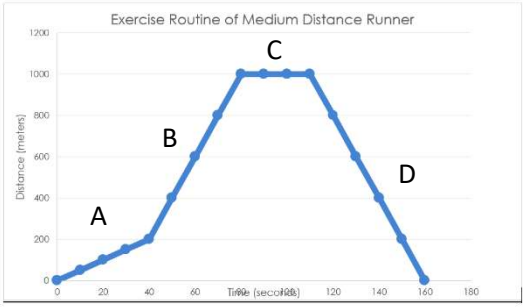


Describe what is happening in this graph.

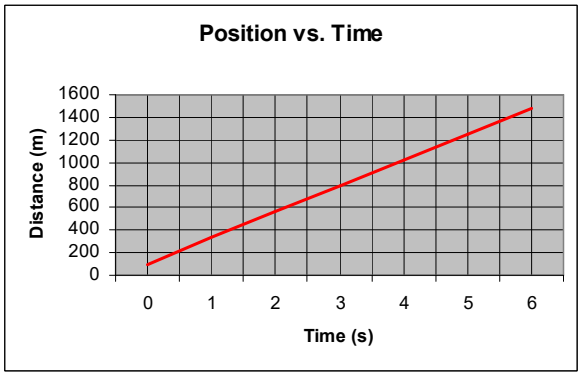


Describe the routine of this runner

A.
B.
C.
D



Use the graph to calculate the velocity



Ch. 11.2: Acceleration

- Any _____ is acceleration, even if the _____ of the object remains the same.
- **Acceleration** – _____

Types of acceleration

- _____ speed
  - Example: Car speeds up at _____
- _____ speed
  - Example: Car _____ down at stop light
- Changing _____
  - Example: Car turns _____ (can be at _____)
- How can a car be accelerating if its speed is a constant 65 km/h? _____

Calculating Acceleration

- If an object is moving in a straight line
- Calculate acceleration by figuring the difference in _____from initial velocity and then divide by _____.
- Units of acceleration: _____
- Formula:

Practice Problem:

1. A skydiver accelerates from 20 m/s to 40 m/s in 2 seconds. What is the skydiver's average acceleration?

2. 2. Natalie accelerates her skateboard along a straight path from o m/s to 4.0 m/s in 2.5 s. Find her average acceleration.

3. 3. A turtle swimming in a straight line toward shore has a speed of 0.50 m/s. After 4.0s, its speed is 0.80 m/s. What is the turtle's average acceleration?

4. 4. Mai's car accelerates at an average rate of 2.6 m/s2. How long will it take her car to speed up from 24.6 m/s to 26.8 m/s?

5. 5. Tom is driving down I-75. He notices a police officer and slows down from 81 m/s to 62 m/s in 5.0 s. Calculate his acceleration.

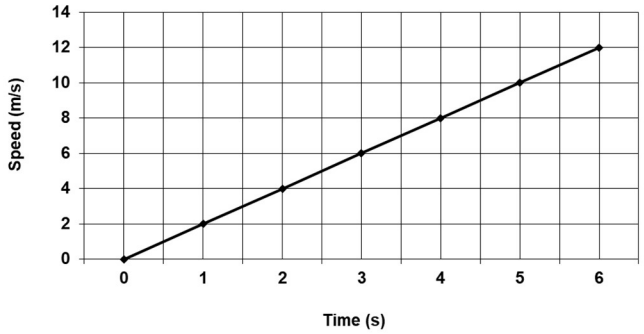
6. 6. A cyclist travels at a constant velocity of 4.5 m/s westward and then speeds up with a steady acceleration of 2.3 m/s2. Calculate the cyclist's speed after accelerating for 5.0s.

Graphing Acceleration

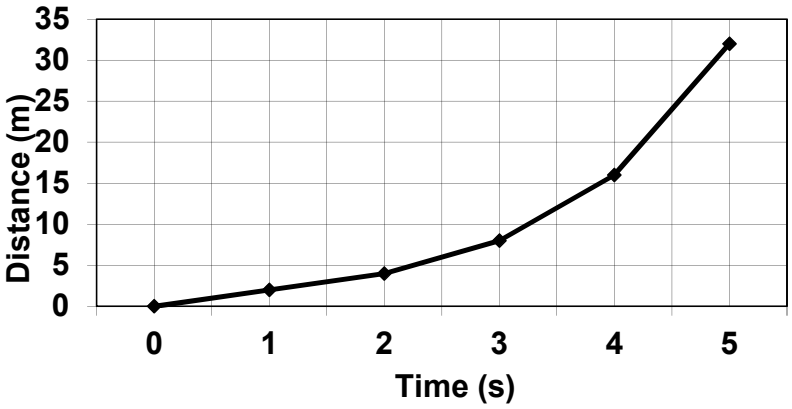
- Can use 2 kinds of graphs
  - Speed vs. time
  - Distance vs. time
- Speed is increasing with time = _____
- Line is straight = _____
  - How is the object in the graph below moving? _____

* Dependent Variable= _____
* Independent Variable= _____

Speed vs. Time Graphs

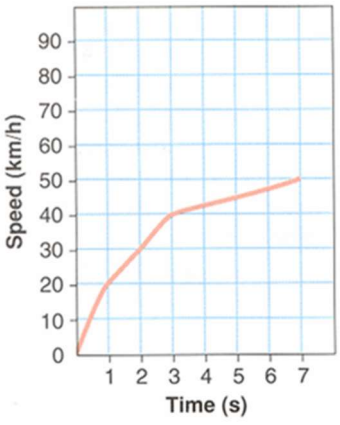


Distance vs. Time



- **On Distance vs. Time graphs a _____ means the object is _____**
- Curved line also means your _____is _____. Remember _____

_____



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