1-26-09 DSQ

- How do you calculate average speed?

- TODAY
  - Workbook p. 12-13 due for stamps
  - 1.3 Notes
  - Quiz tomorrow – open notes – BRING YOUR NOTES!! (sections 1.1, 1.2, 1.3)
  - Finish workbook pages 14-17 – due Wednesday.
  - Test Thursday

1.3 Notes

ACCELERATION

KEY CONCEPTS

- What kind of motion does acceleration refer to?
- How is acceleration calculated?
- What graphs can be used to analyze the motion of an accelerating object?

ACCELERATION

- The rate at which velocity changes (speed OR direction!)

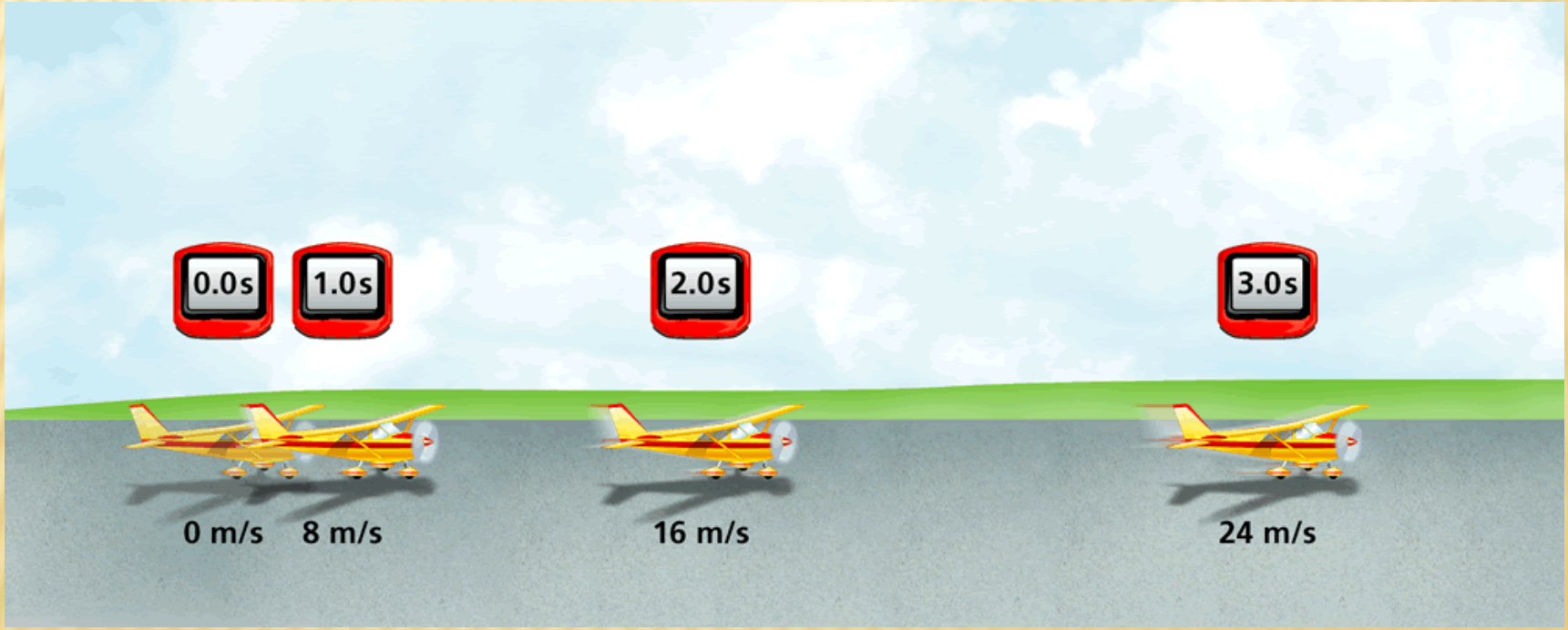
- 3 types of acceleration
  1. Increasing speed
  2. Decreasing speed (deceleration)
  3. Changing direction

IS THE MOON ACCELERATING?

- Yes!
- Constantly changing direction when it orbits the earth

CALCULATING ACCELERATION

- To determine the acceleration of an object moving in a straight line, you must calculate the change in speed per unit of time.



CALCULATING ACCELERATION

- Acceleration (m/s^2) = $\frac{\text{final speed (m/s) – initial speed (m/s)}}{\text{time (s)}}$

- Airplane accelerates at a rate of 8 m/s^2
- Means speed increases by 8 m/s every second

Math Sample Problem

CALCULATING ACCELERATION

- As a roller-coaster car starts down a slope, its speed is 4 m/s. But 3 seconds later, at the bottom, its speed is 22 m/s. What is its average acceleration?

- **Read and Understand**

- What information have you been given?
- Initial speed = 4 m/s
- Final Speed = 22 m/s
- Time = 3 s

Math Sample Problem

CALCULATING ACCELERATION

- As a roller-coaster car starts down a slope, its speed is 4 m/s. But 3 seconds later, at the bottom, its speed is 22 m/s. What is its average acceleration?
- **Plan and Solve**
- **What quantity are you trying to calculate?**
- The average acceleration of the roller-coaster car = __
- **What formula contains the given quantities and the unknown quantity?**
- **Acceleration = (Final speed – Initial speed)/Time**
- **Perform the calculation.**
- **Acceleration = (22 m/s – 4 m/s)/3 s = 18 m/s/3 s**
- **Acceleration = 6 m/s^2**
- The roller-coaster car's average acceleration is 6 m/s^2.

Math Practice

CALCULATING ACCELERATION

- **Practice Problem**

- A falling raindrop accelerates from 10 m/s to 30 m/s in 2 seconds. What is the raindrop's average acceleration?

- (30 m/s – 10 m/s) ÷ 2 seconds = 10 m/s^2

Math Practice

CALCULATING ACCELERATION

- **Practice Problem**

Q.

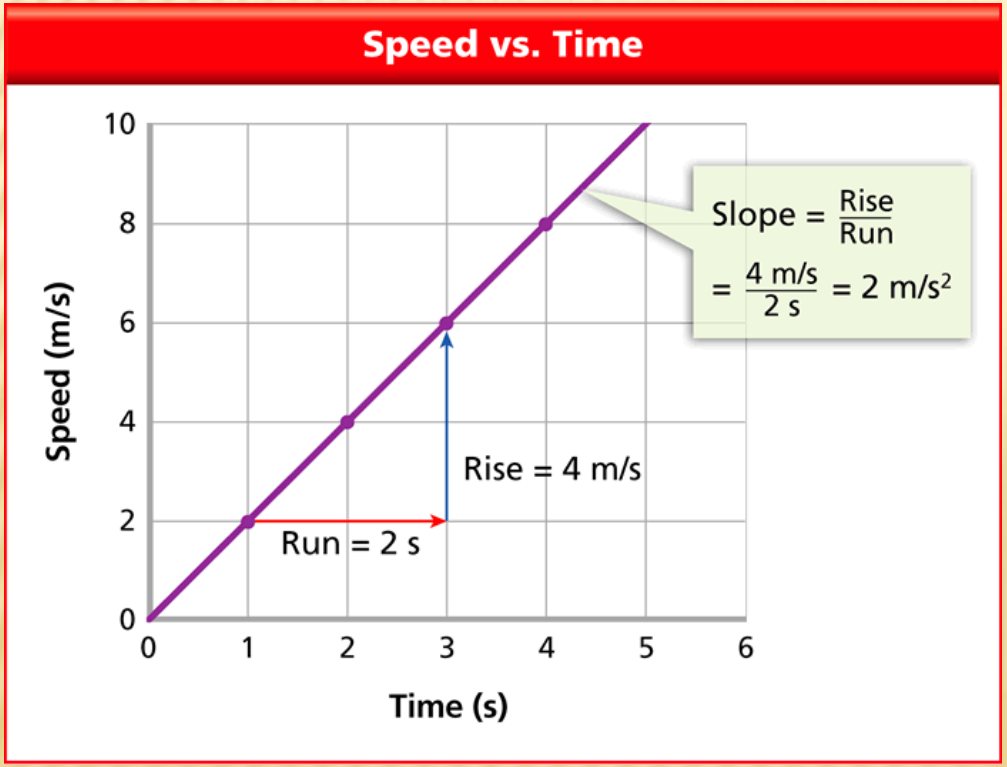
- A certain car can accelerate from rest to 2.7 m/s in 9 seconds. Find the car's average acceleration.

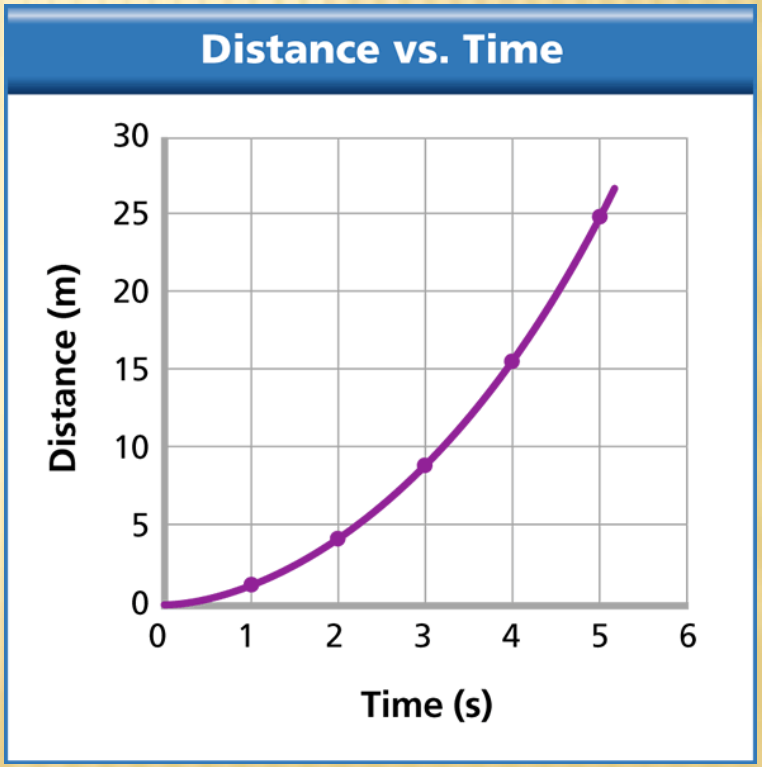
A.

- (27 m/s – 0 m/s) ÷ 9 s = 27 m/s ÷ 9 s = 3 m/s^2

GRAPHING ACCELERATION

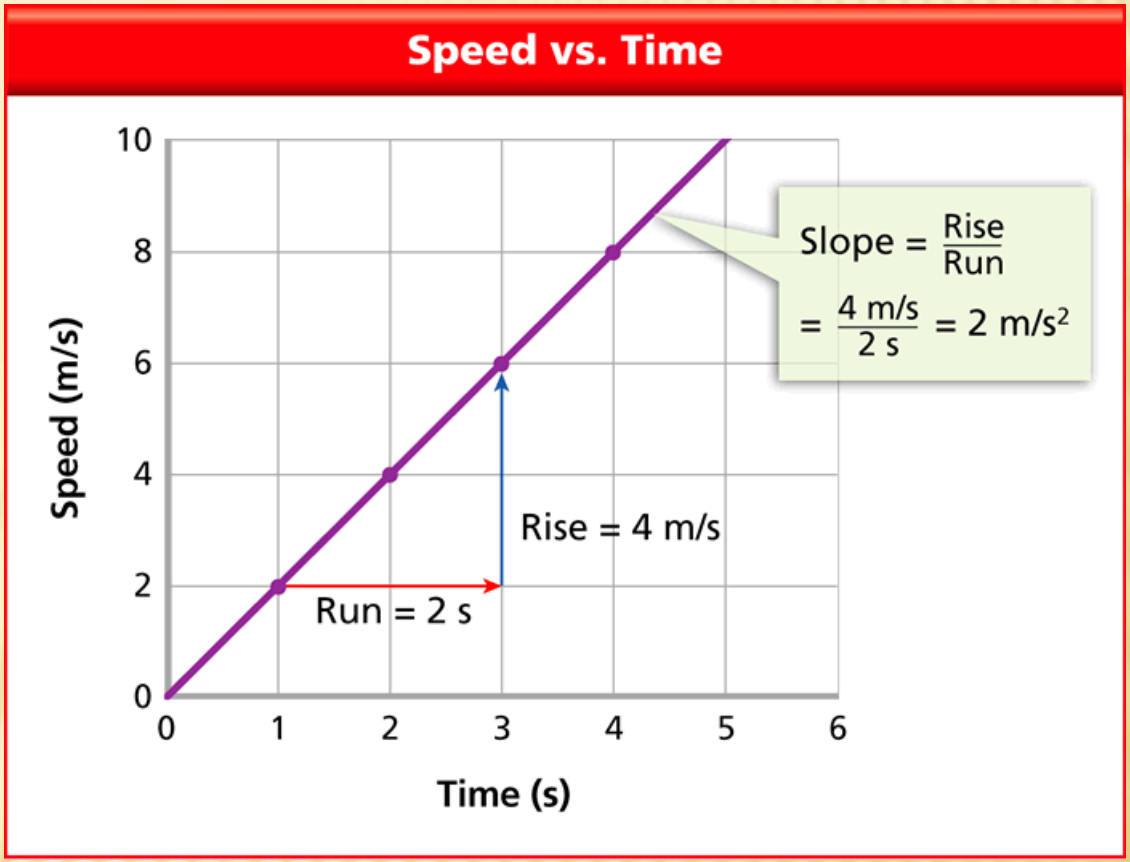
- You can use both a speed-versus-time graph and a distance-versus-time graph to analyze the motion of an accelerating object.





SPEED VS. TIME GRAPH

- Slant up = speed increasing
- Straight line = acceleration constant
- Find acceleration by calculating slope of the line

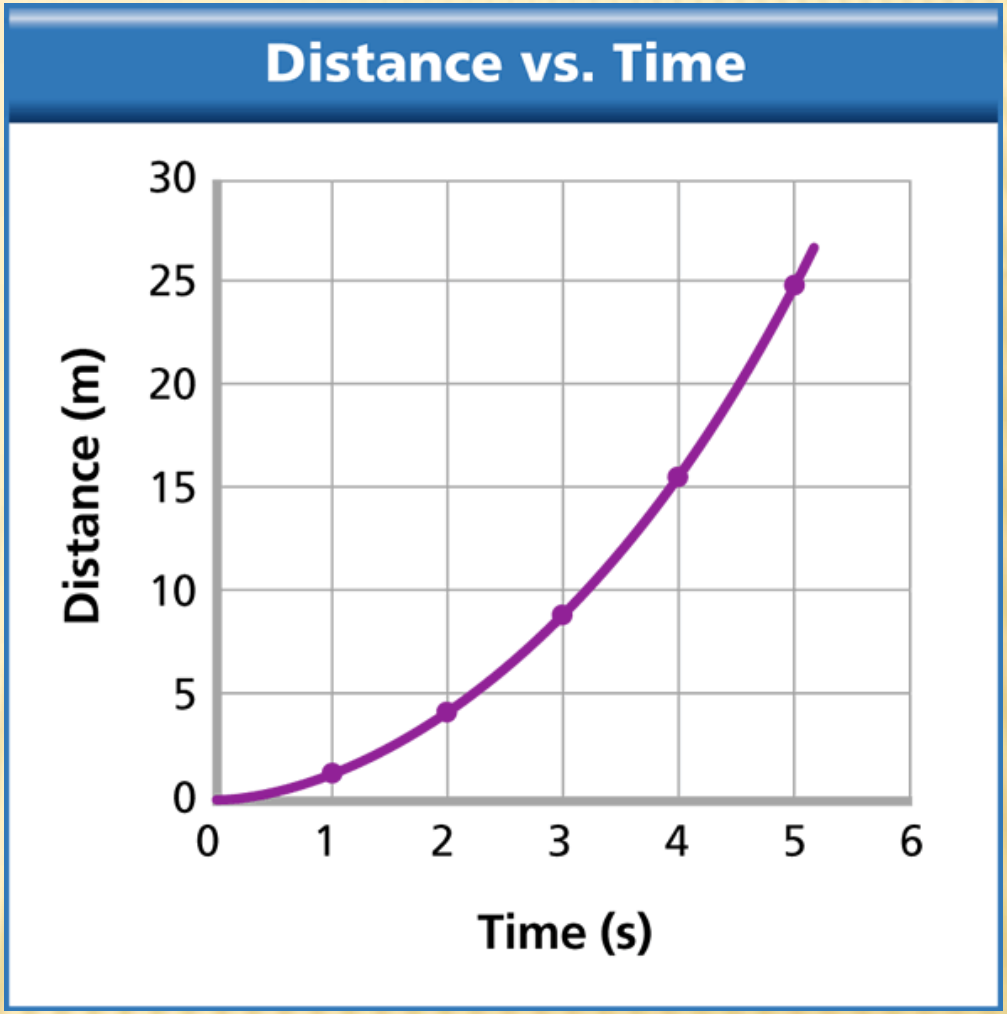


DISTANCE VS TIME GRAPH

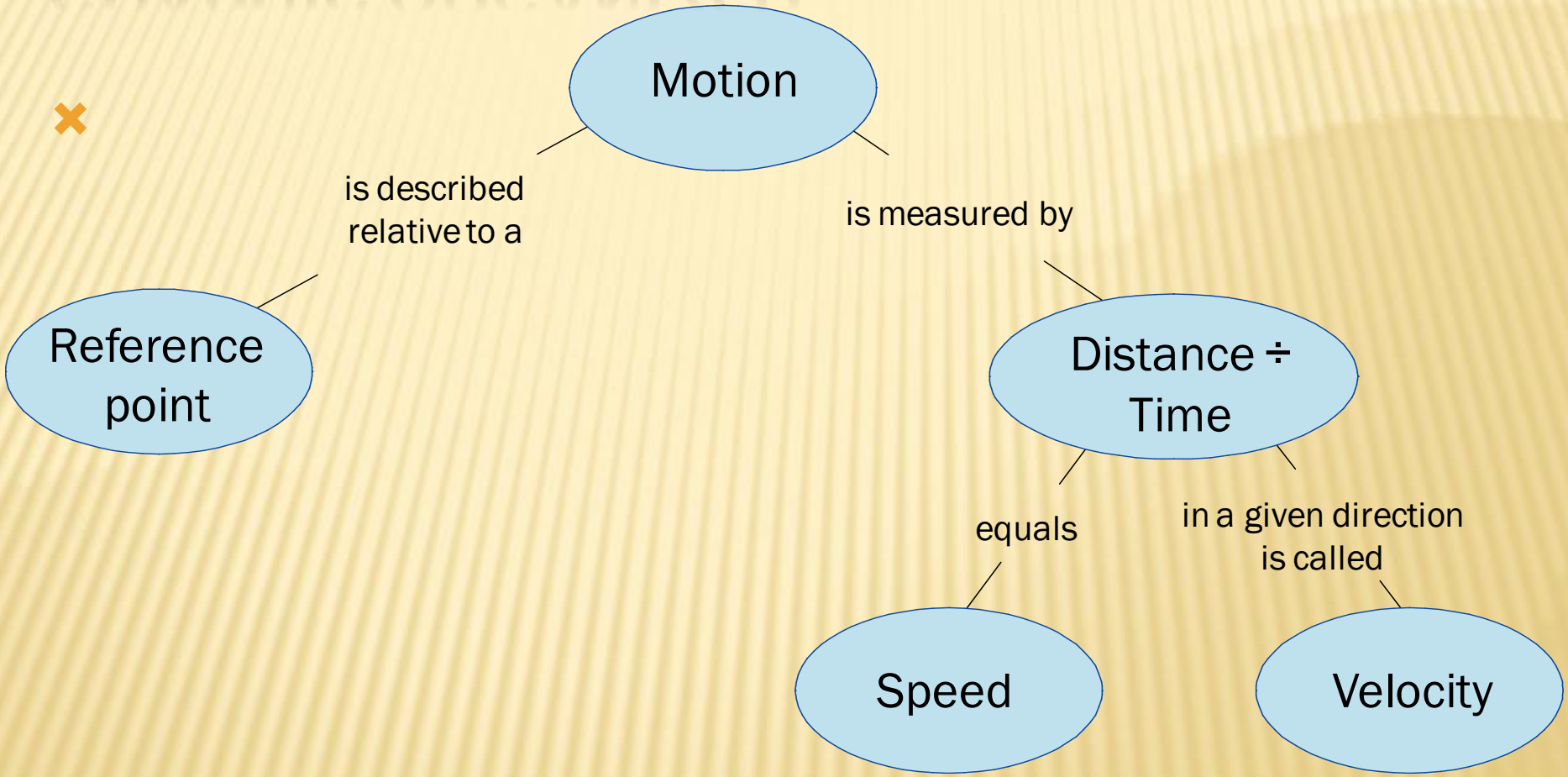
- Curved line = acceleration

- During each second your speed is greater than the second before

- Slope = speed
- Slope increasing = speed increasing
- Steeper slope = greater speed



GRAPHIC ORGANIZER



NOTES TO TEACHERS….

- Brainpop
  - Acceleration

- Good review movie: United Streaming
- “The physics of motion”
- Forces & Motion segment (23:00)
  - Covers speed, acceleration