

# Physics

## Unit 2A Review

Name: KEY Block: \_\_\_\_\_

### Distance vs. Displacement

1. Write a simple definition for distance.

Number of "units" an object travels.

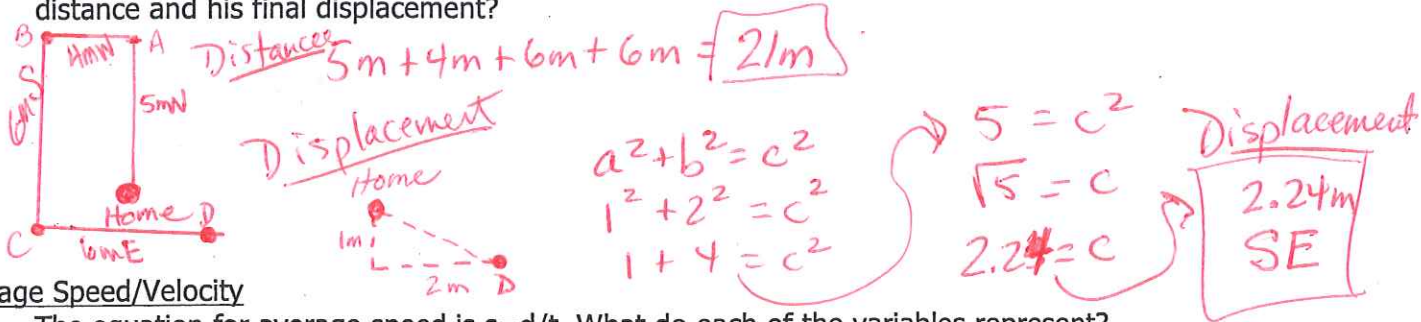
2. Write a simple definition for displacement.

Where an object ends up relative to an origin.

3. What is the major difference between distance and displacement?

Displacement includes direction.

4. If James leaves home and travels 5 m N, then 4 m W, then 6 m S, and finally 6 m E, what is his total distance and his final displacement?



### Average Speed/Velocity

1. The equation for average speed is  $s = d/t$ . What do each of the variables represent?

$s$  = average speed     $d$  = total distance     $t$  = time

2. What is the difference between speed and velocity? Which one is a vector and which is a scalar?

Velocity has direction.

↓  
Velocity

↓  
Speed

3. If Annabelle drives at an average speed of 60 km/hr for 4.5 hours, how far has she traveled?

$s = 60 \text{ km/hr}$      $s = \frac{d}{t}$      $d = (60 \text{ km/hr})(4.5 \text{ hr})$   
 $d = ?$      $st = d$      $d = 270 \text{ km}$   
 $t = 4.5 \text{ hr}$

4. If I ran a distance of 5,000 m at an average speed of 6.5 m/s, how long would it take in minutes?

$s = 6.5 \text{ m/s}$      $s = \frac{d}{t}$      $t = \frac{5000 \text{ m}}{6.5 \text{ m/s}}$   
 $d = 5,000 \text{ m}$      $st = d$      $t = 769.23 \text{ s}$   
 $t = ?$      $t = \frac{769.23 \text{ s}}{60 \text{ s/min}} = 12.82 \text{ min}$

## Position-Time Graphs & Velocity-Time Graphs

1. What does the slope of a line on a POSITION-time graph tell us?

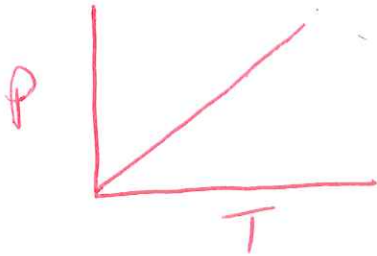
Velocity

2. What does the slope of a line on a VELOCITY-time graph tell us?

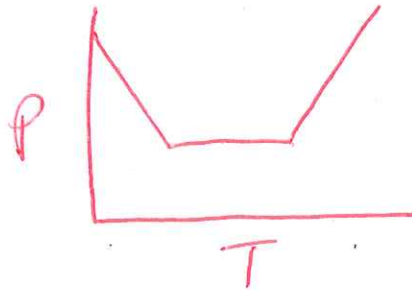
Acceleration

3. Draw a position-time graph showing:

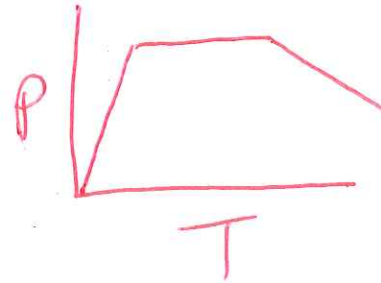
a) an object moving at a constant, positive velocity



b) an object moving at a constant, negative velocity, stopping for a little while, and turning around moving at a constant, positive velocity.



c) an object moving at a fast, constant, positive velocity, stopping for a while, turning around and moving at a slower, constant, negative velocity.



## Acceleration

1. Define acceleration.

Rate of change of velocity

2. What is the basic equation for calculating acceleration? What do each of the variables represent?

$$a = \frac{v_f - v_i}{t}$$

$a$  = acceleration  
 $v_f$  = final velocity

$v_i$  = initial velocity  
 $t$  = time

3. Francesca starts at rest and is walking at 3.5 m/s after 4 s. What is her acceleration?

$$a = ?$$

$$v_f = 3.5 \text{ m/s}$$

$$v_i = 0 \text{ m/s}$$

$$t = 4 \text{ s}$$

$$a = \frac{v_f - v_i}{t} = \frac{3.5 \text{ m/s} - 0 \text{ m/s}}{4 \text{ s}} = \frac{3.5 \text{ m/s}}{4 \text{ s}}$$

$$= 0.875 \text{ m/s}^2$$

## Motion Maps

1. Explain each of the following parts of a motion map:

a. A dot:

Time ; 1 dot = 1 second.

b. Orientation of an arrow:

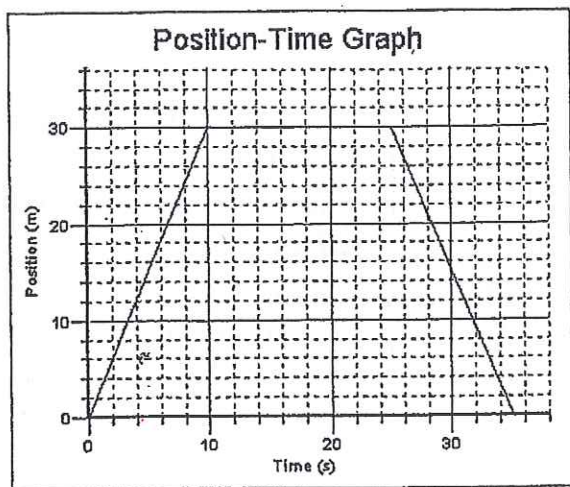
Direction

c. Length of an arrow:

Magnitude (speed)

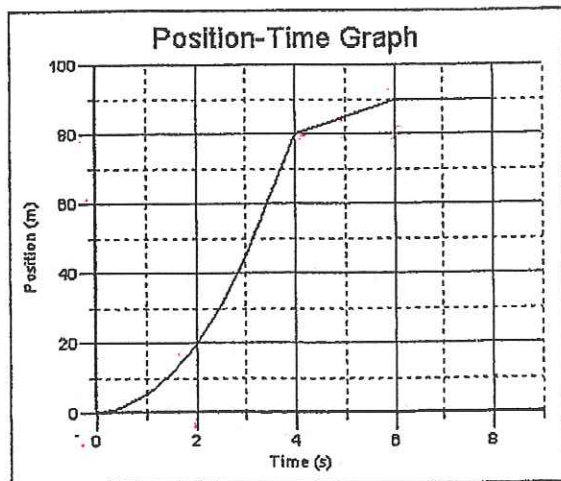


## 4.6. Graphing Student Motion Review Sheets (Homework or Class Work)

Graph 1.<sup>4</sup>

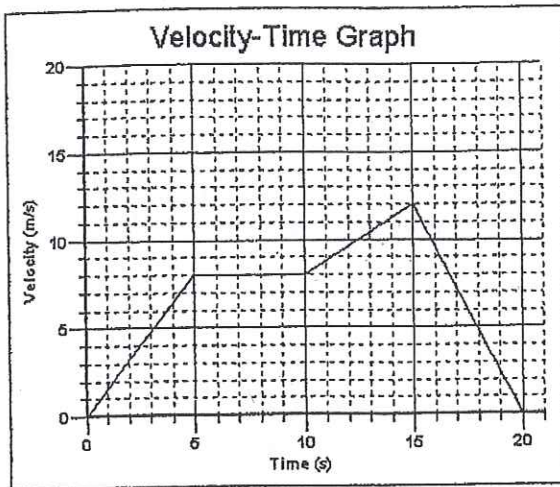
Answer the following questions for the object moving as shown in Position-Time Graph 1.

- 15 m (a) How far does the object travel between 5 and 10 s?
- 10-25 s (b) During which time interval is the velocity zero?
- 0 m (c) How far does the object travel between 10 and 25 s?
- 25-35 s (d) During which time interval is the velocity negative?
- 0 m (e) What is the position of the object at 35 s?
- No (f) Is the object accelerating during any time period represented by the graph?

Graph 2.<sup>4</sup>

Answer the following questions for the object moving as shown in Position-Time Graph 2.

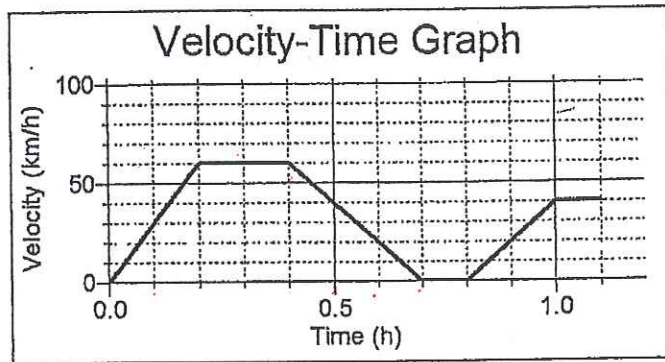
- 0 m/s (a) What is the velocity between 6 and 8 s?
- 5 m/s (b) What is the velocity at 5 s?
- 3-4 s (c) Is the velocity greater between 0 and 2 s or between 3 and 4 s?
- 0-3 s (d) During which time interval(s) did the object accelerate?
- 10 m (e) What is the displacement between 4 and 6 s?



Graph 3.<sup>4</sup>

Answer the following questions for the object moving as shown in Velocity-Time Graph 3.

- 5-10s (a) During which time interval is the acceleration zero?
- 15-20s (b) Is the acceleration greater between 10 and 15 s or between 15 and 20 s?
- 110m (c) What is the displacement at the end of 15 s.
- 50m (d) What is the displacement between 10 and 15 s?
- 2.4m/s<sup>2</sup> (e) What is the acceleration between 15 and 20 s?



Graph 4.<sup>4</sup>

Answer the following questions for the car moving as shown in Velocity-Time Graph 4.

- 0.7-0.8hr (a) At what time was the car stopped?
- 60 km/hr (b) What was the greatest velocity the car reached?
- 60 km/hr (c) How fast was the car going at 0.3 h?
- 0.2-0.4 hr (d) At what time did the car have the greatest velocity?
- 0-0.2 (e) During which time intervals was the car accelerating?
- 0.4-0.7  
0.8-1.0 (f) What is the car's acceleration at 0.5 h?
- 200 km/hr<sup>2</sup> (g) What is the acceleration of the car at 0.9 h?
- +200 km/hr<sup>2</sup>