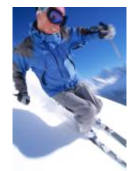
Sudden Impact Study Guide
Summative Assessment
Date of Assessment: ___________________________

Use the worksheets in your binder as study materials.

Review the following concepts for the test:

Motion

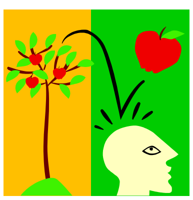


- Motion is described as a change in position relative to other objects in the background.

- Newton's Three Laws of Motion
    - Be able to state each law.

      -Newton's 1st Law

      Be able to identify the force that starts or stops the motion

      -Newton's 2nd Law

      Be able to calculate the force acting on an object using the formula. For example, if the <u>mass</u> of an object increases and the <u>force</u> acting on the object increases, what will happen to the <u>acceleration</u> of the object?

      -Newton's 3rd Law

      Be able to identify the action and the reaction
    - Be able to match each law with examples of motion and vice versa.

Forces

- A force is a push or a pull.

- Forces are measured in Newtons (N)
    - Forces may be balanced or unbalanced.
    - An arrow can show the direction of a force.
    - The size of the arrow indicates the size of the force.
    - Net force is the difference between forces in opposite directions, OR the sum of two forces in the same direction.

- Gravity
    - Gravity is the force that pulls all objects in the universe towards one another.

Speed

- Know the formula to determine speed
    - Speed = distance ÷ time

- **Know how to read and use a speed (distance vs. time) graph**
    - A straight line indicates **constant** speed
    - Read the distance and time at any given point and divide to find the speed at that point.
    - A horizontal (flat) line indicates that the speed is 0. The object is NOT moving.

Velocity

- Velocity is speed in a given direction
- You can use an arrow to indicate the velocity of an object

Acceleration

- Acceleration is a change in velocity
    - Acceleration may be a change in direction
    - Positive acceleration is speeding up
    - Negative acceleration (deceleration) is slowing down
    - Acceleration is given in distance/(unit of time) ^{2} Ex. m/sec/sec or m/sec^2

- **Know how to read and use an acceleration (speed vs. time) graph**
    - A horizontal (flat) line indicates **constant** acceleration. A horizontal line indicates that the acceleration is 0. The object is moving at a constant speed.
    - If the line angles **up**, the object is accelerating (positive acceleration).
    - If the line angles **down**, the object is slowing down (decelerating).

- You can calculate acceleration using the following formula
    - (Final velocity-initial velocity) ÷ time

NAME ______________ **Review Guide for Final Assessment on Force and Motion**

Formulas for Physics
Be able to recognize and apply each of the following formulas or measurements.

Speed = $\frac{\text{Distance}}{\text{Time}}$ **Average Speed** = $\frac{\text{Total Distance}}{\text{Total Time}}$

Velocity: includes both **Speed AND Direction** (like 25 mph North, etc.)

Acceleration = $\frac{\text{Final Velocity} - \text{Initial Velocity}}{\text{Time}}$ Acceleration is measured in units of **distance/time**^{2}

Newton's Second Law: (Write both ways)

F= M x A
(Force = Mass x Acceleration)

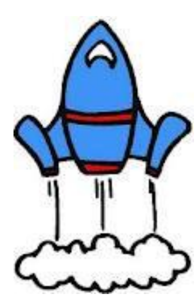
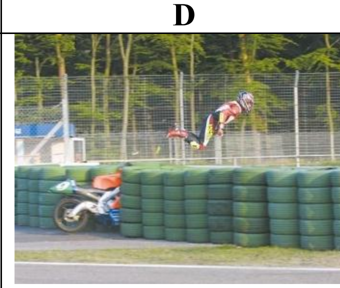
A = F/M
(Acceleration = Force divided by Mass)

1. What is Newton's **1st** Law? ____

2. What is Newton's **2nd** Law? ____

3. What is Newton's **3rd** Law? ____

4. Which law is demonstrated by each of the following pictures? Also EXPLAIN your choice.

A	B	C	D
 Exercising with a punching bag.	 These children are pulling rocks with different masses.	 A **rocket ship** taking off from NASA.	 Motorcyclist running into a tire wall.
Law Demonstrated by this picture (and explain!)	**Law Demonstrated by these pictures**	**Law Demonstrated by this picture**	**Law Demonstrated by this picture**

5. Review worksheets about Newton's Laws!

Vocabulary Word Bank

Fill in the blanks for the definitions below using the words in the word bank. Use each word only once. Use your worksheets, like your vocabulary sheet, to help you find the right match!

motion	**friction**	**inertia**	**velocity**	**force**	**net force**	**balanced forces**
Newton	**acceleration**	**gravity**	**speed**	**mass**	**weight**	**unbalanced forces**

6. ________________: the amount of matter in an object
7. ________________: tendency of an object to resist a change in motion
8. ________________: measurement of the distance an object travels in one unit of time
9. ________________: type of force that can change an objects motion
10. ________________: speed in a given direction
11. an object is in _________________ when its distance from another object is changing
12. ________________________: an increase or decrease in speed or change in direction
13. ________________: a push or a pull
14. ________________: the force gravity exerts on an object
15. ________________: unit used to measure force
16. ________________: type of force that will not change an objects motion
17. ________________: sum of all forces acting on an object
18. ________________: invisible force that pulls objects together: force that keeps us on Earth
19. ________________: force that one surface puts on another when they rub against each other

Mass versus Weight:

20. A new planet has recently been discovered- Planet Xargon. The gravitational force of this new planet is much less than Earth's gravitational force. Mr. Eisenhower will be traveling to Planet Xargon this summer, and he has some questions for you:

    a. Would his **weight** *increase*, *decrease*, or stay the *same* on Planet Xargon? ________________

    b. Would his **mass** *increase*, *decrease*, or stay the *same* on Planet Xargon? ________________

Calculating Acceleration:

Time (s)	0	1	2	3	4	5	6	7	8
Velocity (m/s)	2	2	2	2	2	4	6	8	10

21. The chart above shows Mrs. Kron's acceleration as she roller blades on the Capital Crescent Trail afterschool. Calculate her average **acceleration** for the following times: (Don't forget units!)

Average Acceleration =
(Final Velocity - Initial Velocity) / Time

a. 0-4 Seconds:

b. 4-8 Seconds:

c. The entire trip (0-8 seconds):

Calculating Net Force:

22. What happens when the **net force** acting on an object **equals 0**?

    a. Is it a **balanced** or **unbalanced** force? ___________________
    b. Will the object's motion change? (Yes or No) ____________

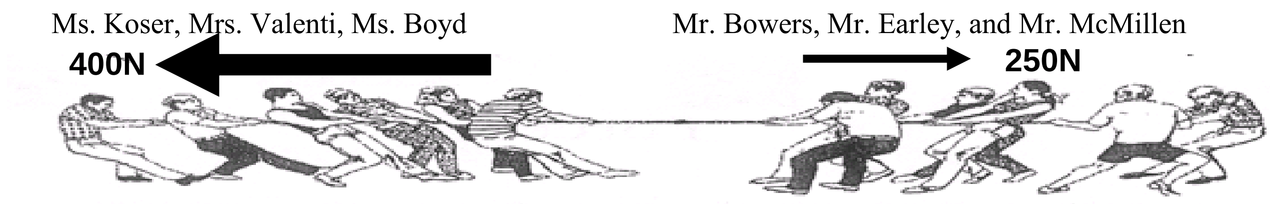
23. What happens when the **net force** acting on an object does **not equal** 0?

    a. Is it **balanced** or **unbalanced**? ___________________
    b. Will the object's motion change? _________

24. Label the following examples as **balanced (B)** or **unbalanced (U)** forces:

    a. A dog pulls on the leash to go forward, but the owner pulls back with the same amount of force. ___
    b. Mr. Crane rollerblades down Westland's driveway. ___
    c. Mrs. Lee's clock hanging on a nail in her wall. ___
    d. Mrs. Lee pulls Mr. Vogelman down the hallway in the wagon. ___

25. Ms. Koser, Mrs. Valenti, Ms. Boyd and some friends have challenged Mr. Bowers, Mr. Earley, Mr. McMillen and some of their friends to a tug-o-war contest. The picture below shows their contest. Using the picture, calculate the <u>**net force**</u>, and <u>**explain the results**</u> of the contest. Is this an example of a <u>**balanced or unbalanced**</u> force?



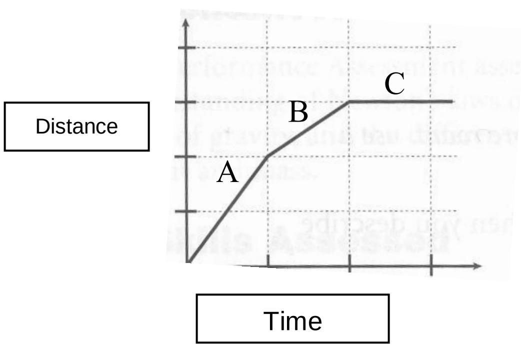
26. Mrs. Lee and Ms. Black both want to show a movie to their classes. The TV is in the doorway between their rooms. Ms. Lee pulls the TV towards her room with **90N** while Ms. Black pulls back with **30N** towards her classroom. What is the <u>**net force**</u> and in what <u>**direction**</u> does the TV move?

27. Mrs. Lee is visiting her sisters in Wheaton. Their dogs, Snickers (15kg) and Louie (35kg), are playing out in the yard. Mrs. Lee decides to pull Snickers around the neighborhood in her wagon. As Mrs. Lee starts running away from the house with Snickers in the wagon, Louie spots them and decides he wants to ride in the wagon too! Louie runs up and jumps in the wagon. Since Mrs. Lee's arms are not very strong, she can't pull the wagon any harder than she was with just Snickers in it, so she has to slow down to a walk to finish pulling the dogs through the neighborhood. Identify which of **Newton's Laws of Motion** most closely relates to this situation and **explain** your choice.

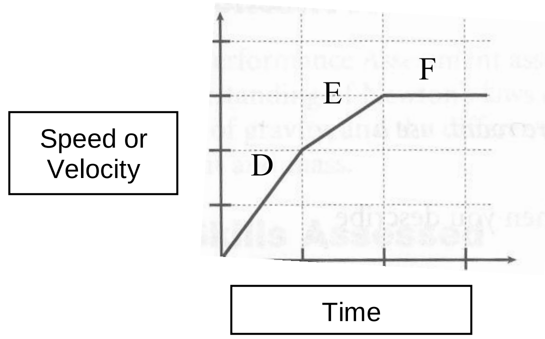

28. Mr. VanBlargan wasn't paying attention as he drove one of his cats to the vet. He was going 50 mph when a light suddenly turned red. When Mr. VB slammed on his brakes to stop the car, he had to put out his arms to catch his cat as it flew forward. Identify which of **Newton's Laws of Motion** most closely relates to this situation and **explain** your choice.

GRAPHS

Speed Graph



Acceleration Graph



Answer the following questions using the Speed and Acceleration graphs above.

29. What is the major difference between the <u>speed</u> graph and the <u>acceleration</u> graph?

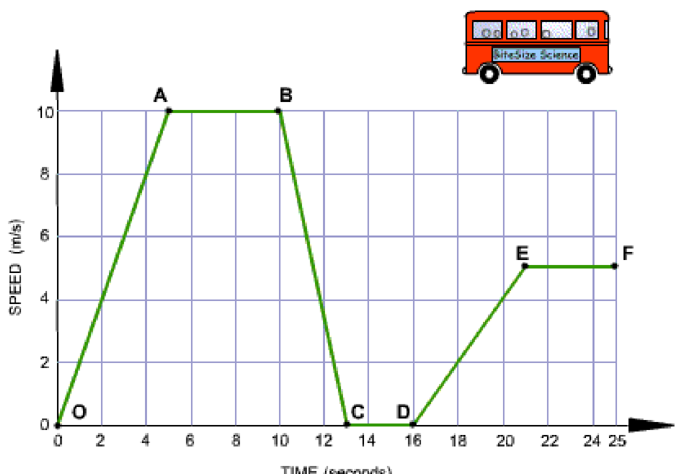
30A. What does the flat, straight line at C tell you about the motion of the object?

30B. What does the flat, straight line at F tell you about the motion of the object?

31A. What does line segment A tell you about the motion of the object?

31B. What does line segment D tell you about the motion of the object?

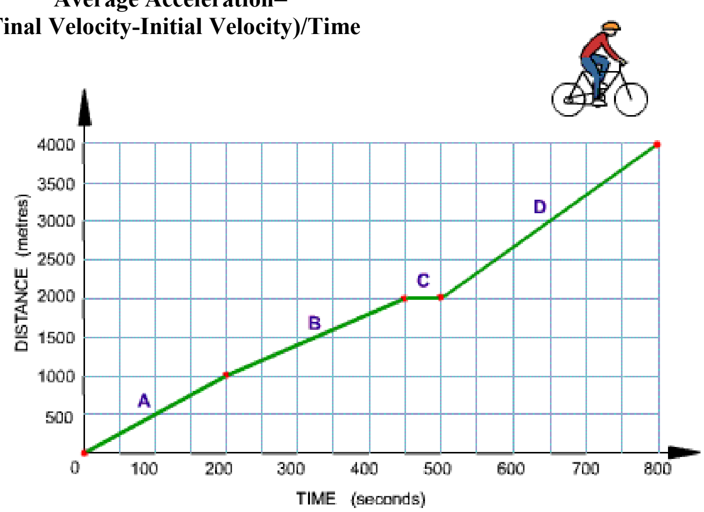
The graph shows how the speed of a bus changes during part of a journey.



Average Acceleration=
(Final Velocity-Initial Velocity)/Time

32. Acceleration Graph Questions
Use the graph to identify when the bus is:

A. Not moving: _______________
B. Accelerating: ______________
C. Decelerating:_______________
D. At a constant speed: _________
E. What was the average acceleration the first 10 seconds?
F. What was the average acceleration between 16-21 seconds?



Average Speed = Total Distance/Time

33. Speed Graph Questions

A. What is the biker's average speed for the whole trip?

B. What is the biker's average speed during Segment B (200-450meters)?

C. How far had the biker traveled in the first 200 seconds?

D. How far did the biker travel during the whole trip?

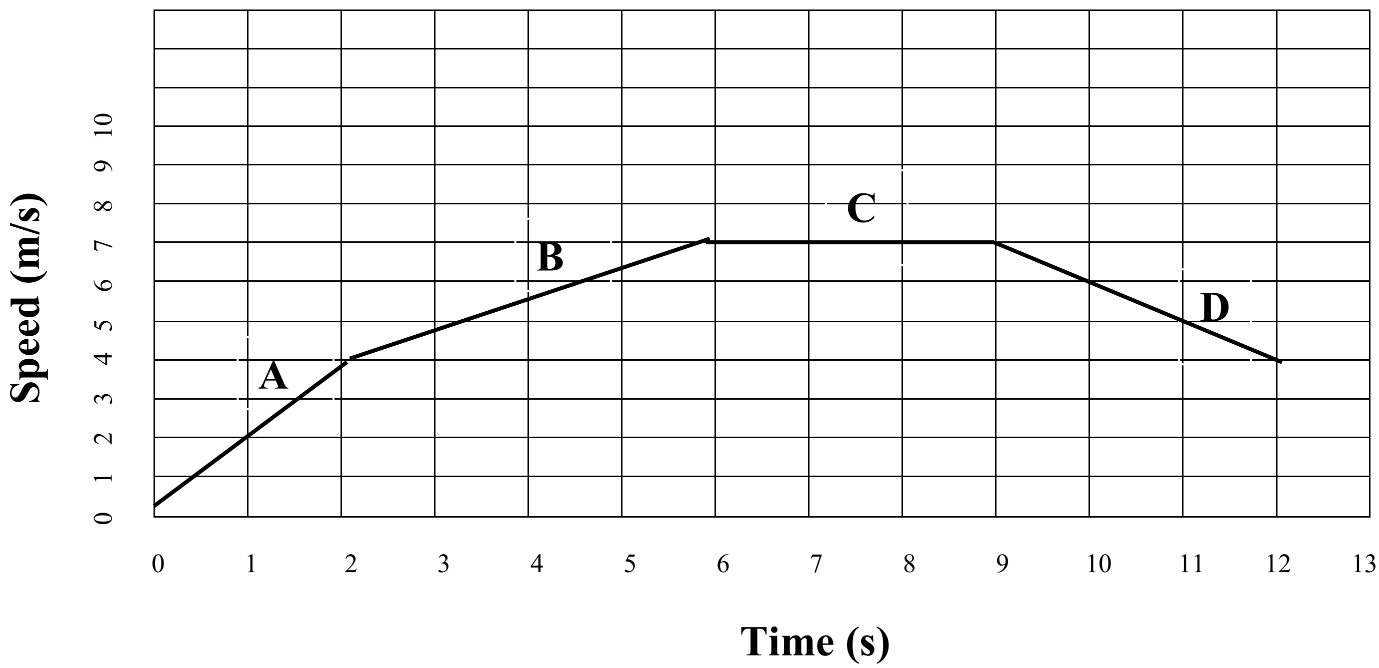
E. What happened to the biker's motion at part C?

Name ____ PD ________

Directions: Use the following graph to answer the questions below.

Remember: **Acceleration =** $\frac{\text{Final velocity – Initial Velocity}}{\text{Time}}$

Mr. Eisenhower's Speed to the Coffee Machine



1. How long did it take Mr. Eisenhower to get up to 7 m/s?

2. In which section did Mr. Eisenhower's speed stay constant (no acceleration)?

3. In which section was his acceleration the greatest (positive acceleration)?

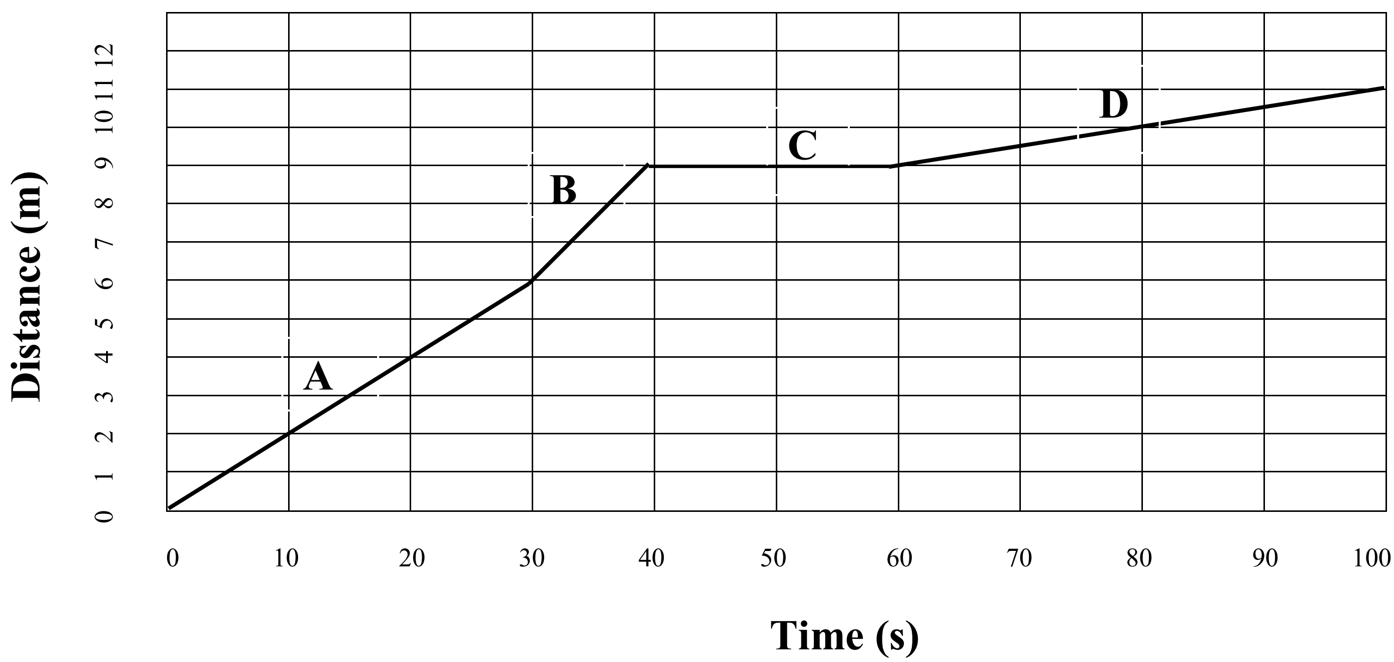
4. In which section did Mr. Eisenhower have to slow down (negative acceleration) because he stopped to say hi to Mr. Lubin?

5. How many seconds did it take Mr. Eisenhower to get to the coffee machine?

Directions: Use the following graph to answer the questions below.

Remember: $\textbf{Speed} = \frac{\text{Distance}}{\text{Time}}$

Ms. Reed Chasing and Catching her Dog



1. How many meters had Ms. Reed traveled when she caught her dog?

2. In which section did Ms. Reed stop to catch her breath? How long did she stand still?

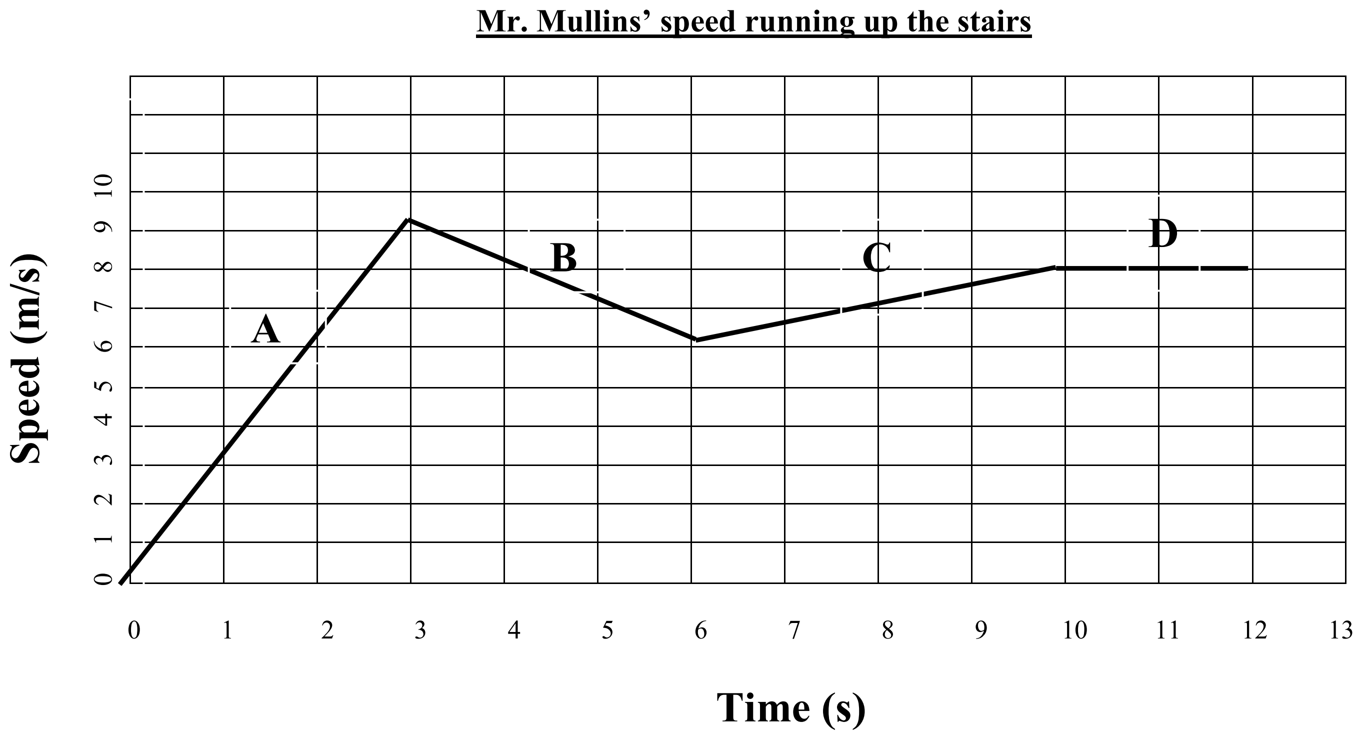
3. Did Ms. Reed walk faster in Section A or Section D? **Hint: Calculate her speed for both sections - show your work!**

4. What was Ms. Reed's speed in Section B? **Show work and units.**

5. What was Ms. Reed's total average speed? **Show work and units.**

Name ____ PD ________

Directions: Use the following graph to answer the questions below.



6. How long did it take Mr. Mullins to get up to a speed of 9 m/s?

7. In which section did Mr. Mullins' speed stay constant (no acceleration)?

8. In which section was his acceleration the greatest (positive acceleration)?

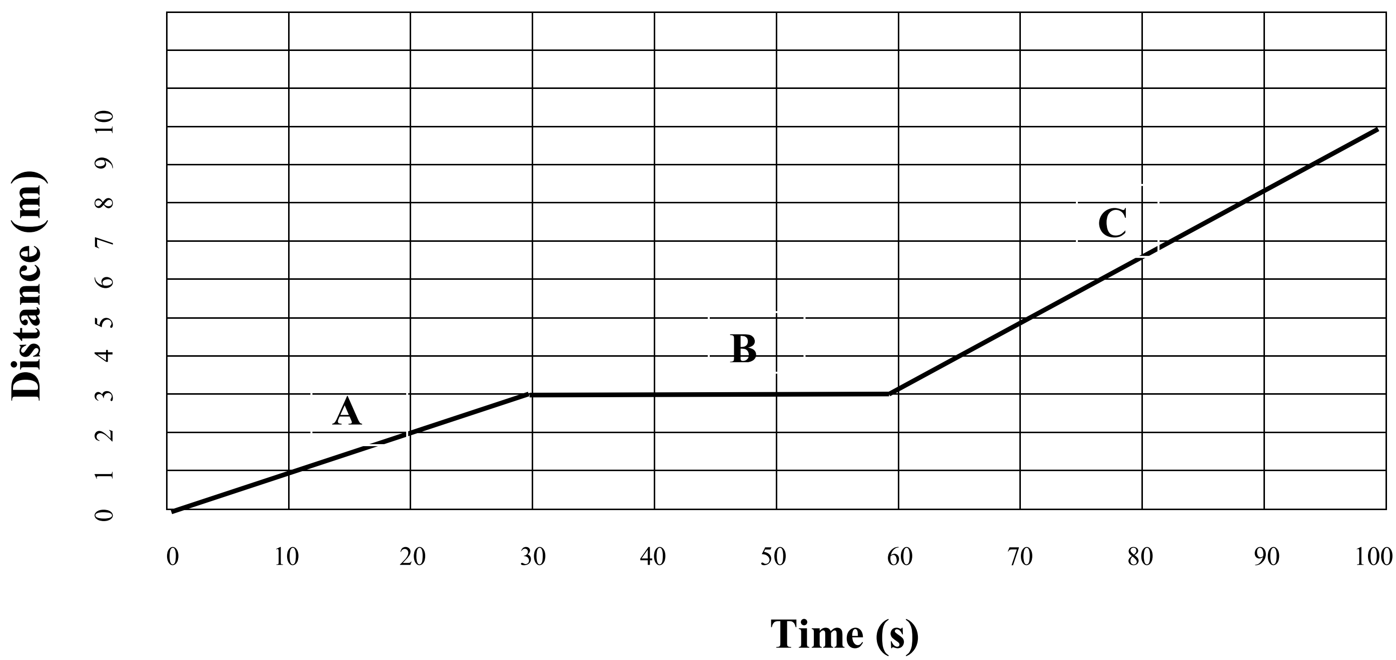
9. In which section did Mr. Mullins have to slow down (negative acceleration) because a 7th grader got in his way?

10. How many seconds did it take Mr. Mullins to get to the top of the stairs?

Directions: Use the following graph to answer the questions below.

Remember: **Speed =** $\frac{\text{Distance}}{\text{Time}}$

Mrs. Todaro walking to the copy machine



6. How many meters away was Mrs. Todaro from the copy machine?

7. In which section did Mrs. Todaro stop to talk to Mrs. Filano about her dog? How long did she stand still?

8. Did Mrs. Todaro walk faster in Section A or Section C? **(Calculate the speeds of section A and C – show your work!)**

9. What was Mrs. Todaro's speed in Section A? **Show your work!**

10. What was Mrs. Todaro's total average speed? **Show your work!**