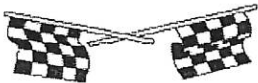


Unit 2 MOTION REVIEW

Name _____

Speed Machines



FORMULA : $\text{SPEED} = \text{Distance} \div \text{Time}$

Round answers to the nearest tenth (one decimal place)!

1. NASCAR fans love race day when they get a chance to cheer on their favorite team! If a driver was able to travel 600 miles in 3 hours, what was his average speed?

2. The fastest car on Earth, a British-made *Thrust SSC*, would win every NASCAR race in America. If it takes 0.5 hours (30 minutes) to travel 380 miles, what is its speed?

3. The fastest train on Earth, the *TGV* from France, can travel at faster speeds than trains in the United States. During a speed test, the train traveled 800 miles in 2.5 hours. What is its speed?

4. *Spirit of Australia*, a hydroplane boat, made speed records by traveling 239 miles in 0.75 hours (45 minutes). What is its record-breaking speed?

5. The fastest plane ever made, the *Lockheed SR71*, was able to travel 2200 miles per hour. Based on this speed, how far could it travel in:

a. 2 hours?

b. 3 hours?

c. 5 hours?

Challenge:

Which machine on this page is the fastest? _____



DISTANCE, TIME, SPEED PRACTICE PROBLEMS

YOU MUST SHOW YOUR WORK.

You can use a calculator but you must show all of the steps involved in doing the problem.

SPEED *Speed =*

1. If a car travels 400m in 20 seconds how fast is it going?
2. If you move 50 meters in 10 seconds, what is your speed?
3. You arrive in my class 45 seconds after leaving math which is 90 meters away. How fast did you travel?
4. A plane travels 395,000 meters in 9000 seconds. What was its speed?
5. It takes Serina 0.25 hours to drive to school. Her route is 16 km long. What is Serina's average speed on her drive to school?

TIME *Time =*

6. How much time will it take for a bug to travel 5 meters across the floor if it is traveling at 1 m/s?
7. You need to get to class, 200 meters away, and you can only walk in the hallways at about 1.5 m/s. (if you run any faster, you'll be caught for running). How much time will it take to get to your class?
8. In a competition, an athlete threw a flying disk 139 meters through the air. While in flight, the disk traveled at an average speed of 13.0 m/s. How long did the disk remain in the air?

DISTANCE *Distance =*

9. How far can you get away from your little brother with the squirt gun filled with paint if you can travel at 3 m/s and you have 15s before he sees you?

10. How far can your little brother get if he can travel at 2.5 m/s and in 5 seconds you will discover that his squirt gun has run out of paint?

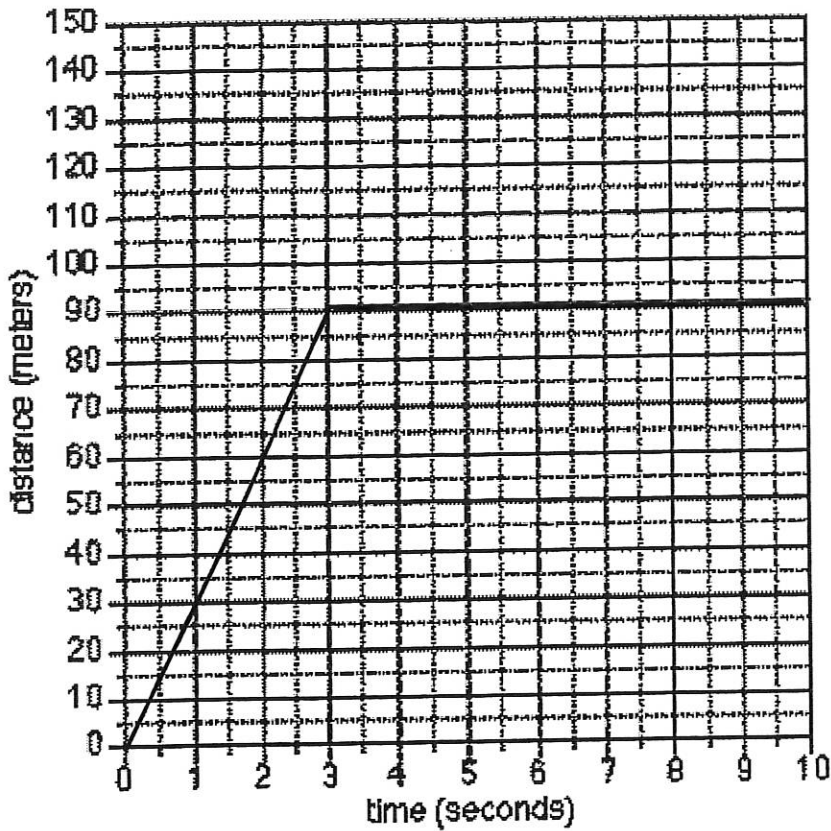
11. If you shout into the Grand Canyon, your voice travels at the speed of sound (340 m/s) to the bottom of the canyon and back, and you hear an echo. How deep is the Grand Canyon at a spot where you can hear your echo 5.2 seconds after you shout?

CHALLENGE PROBLEM

Bill and Amy want to ride their bikes from their neighborhood to school which is 14.4 kilometers away. It takes Amy 40 minutes to arrive at school. Bill arrives 20 minutes after Amy. How much faster (**in meters/second**) is Amy's average speed for the entire trip?

Be sure to show all necessary metric conversions!!

Using the graph below, complete the tasks in the space provided.



1. Create your own data table to show the data from this distance vs. Time Graph.

Time (seconds)	Distance (Meters)

2. What is the speed of the object...
 - a. between 0 and 3 seconds?

 - b. Between 3 and 10 seconds?

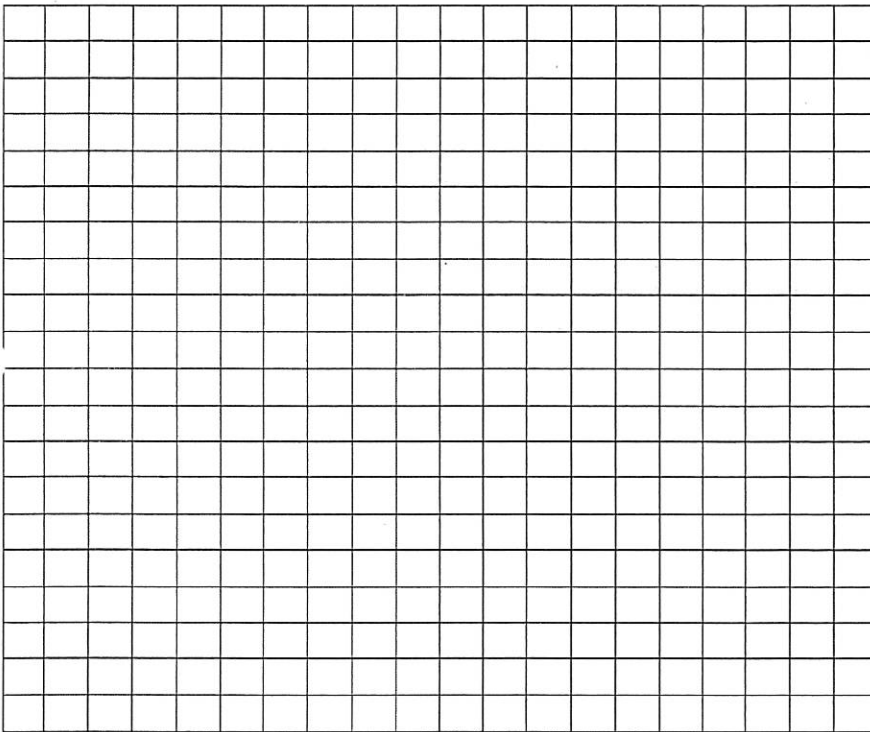
3. Describe what happens to the objects motion during the time represented by this graph.

Velocity/Acceleration Worksheets

Calculating Average Speed

Graph the following data on the grid below and answer the questions at the bottom of the page. **SHOW WORK!**

<u>Time (sec)</u>	<u>Distance (m)</u>
0	0
1	50
2	75
3	90
4	110
5	125



1. What is the average speed after two seconds?
2. After three seconds?
3. After 5 seconds?
4. What is the average speed between two and four minutes?
5. What is the average speed between four and five minutes?

Acceleration Formula =

Acceleration Calculations

Acceleration means a change in speed or direction. It can also be defined as a change in velocity per unit time.

Calculate the acceleration for the following data. SHOW WORK!

	<u>Initial Velocity</u>	<u>Final Velocity</u>	<u>Time</u>	<u>Acceleration</u>
1.	0 m/s	24 m/s	3 s	_____
2.	0 m/s	35 m/s	5 s	_____
3.	20 m/s	60 m/s	10 s	_____
4.	50 m/s	150 m/s	5 s	_____
5.	25 m/s	1200 m/s	3600 s	_____

6. A car accelerates from a standstill to 60 m/s in 10 seconds. What is the acceleration?

7. A car accelerates from 25 km/hr to 55 km/hr in 30 seconds. What is its acceleration?

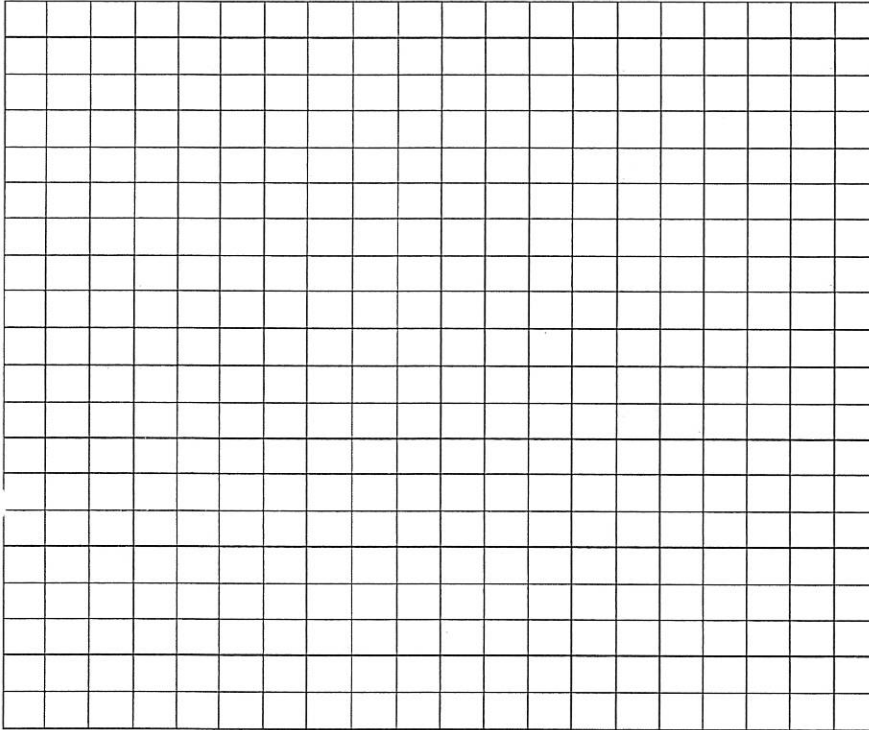
8. A train is accelerating at a rate of 2 m/s. If its initial velocity is 20 m/s, what is its velocity after 30 seconds?

9. A runner achieves a velocity of 11.1 m/s, 9 sec after he begins. What is his acceleration? What distance did he cover?

Graphing Velocity vs Time

Plot the following data on the graph and answer the questions below. SHOW WORK IF APPLIES!

Speed (m/s)	Time (sec)
0	0
10	2
20	4
30	6
40	8
50	10

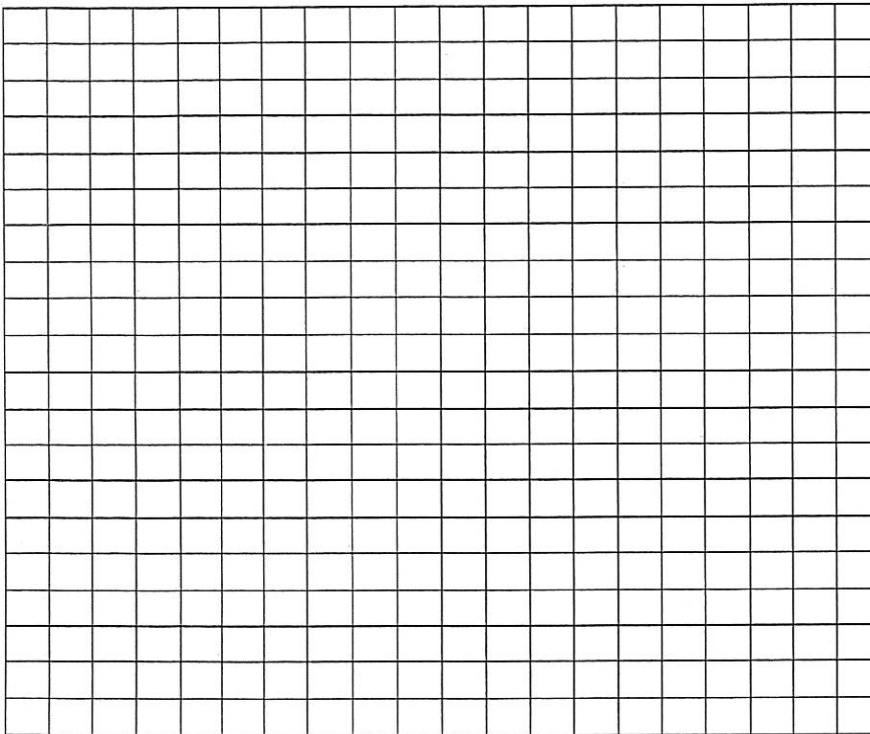


- As time increases, what happens to the speed? _____
- What is the speed at 5 seconds? _____
- Assuming constant acceleration, what would be the speed at 14 seconds? _____
- At what time would the object reach a speed of 45 m/s? _____
- What is the object's acceleration? _____
- What would the shape of the graph be if a speed of 50 m/s is maintained from 10s to 20 s?
- Based on the information in Problem 6, calculate the acceleration from 10 s to 20 s.
- What would the shape of the graph be if the speed of the object decreased from 50 m/s at 20 s to 30 m/s at 40 s?

Graphing Distance vs. Time

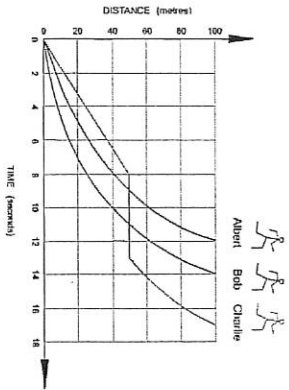
Plot the following data on the graph and answer the following questions below. SHOW WORK IF APPLIES!

<u>Distance (m/s)</u>	<u>Time (s)</u>
0	0
5	10
12	20
20	30
30	40
42	50
56	60



1. What is the average speed at 20 s? _____
2. What is the average speed at 30 s? _____
3. What is the acceleration between 20 and 30 s? _____
4. What is the average speed at 40 s? _____
5. What is the average speed at 60 s? _____
6. What is the acceleration between 40 and 60 s? _____
7. Is the object accelerating at a constant rate? _____

Questions:
 (Some questions adapted from <http://www.bbc.co.uk/schools/qa/science/physics/forces/speedvelocityacceleration/inv2.shtml>)



Look at the graph above. It shows how three runners ran a 100-meter race.

Which runner won the race? Explain your answer.

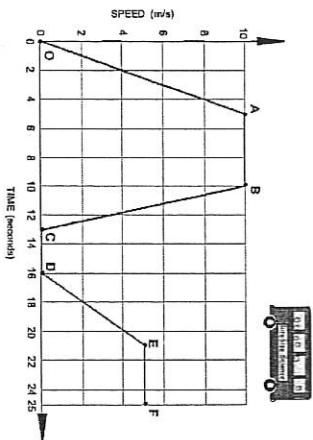
Which runner stopped for a rest? Explain your answer.

How long was the stop? Explain your answer.

How long did Bob take to complete the race? Explain your answer.

Calculate Albert's average speed. (Figure the distance and the time first!)

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



Choose the correct words from the following list to describe the motion during each segment of the journey to fill in the blanks.

- accelerating
- decelerating
- constant speed
- at rest

Segment O-A The bus is _____. Its speed changes from 0 to 10 m/s in 5 seconds.

Segment A-B The bus is moving at a _____ of 10 m/s for 5 seconds.

Segment B-C The bus is _____. It is slowing down from 10 m/s to rest in 3 seconds.

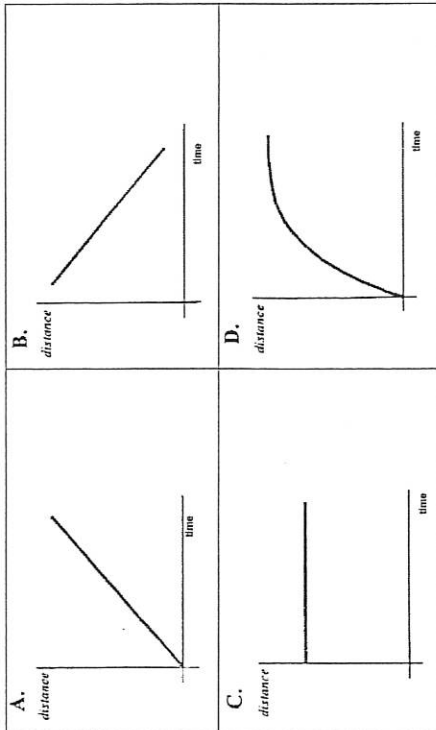
Segment C-D The bus is _____. It has stopped.

Segment D-E The bus is _____. It is gradually increasing in speed.

The distance-time graphs below represent the motion of a car. Match the descriptions with the graphs. **Explain your answers.**

Descriptions:

1. The car is stopped.
2. The car is traveling at a constant speed.
3. The speed of the car is decreasing.
4. The car is coming back.



Graph A matches description ____ because _____.

Graph B matches description ____ because _____.

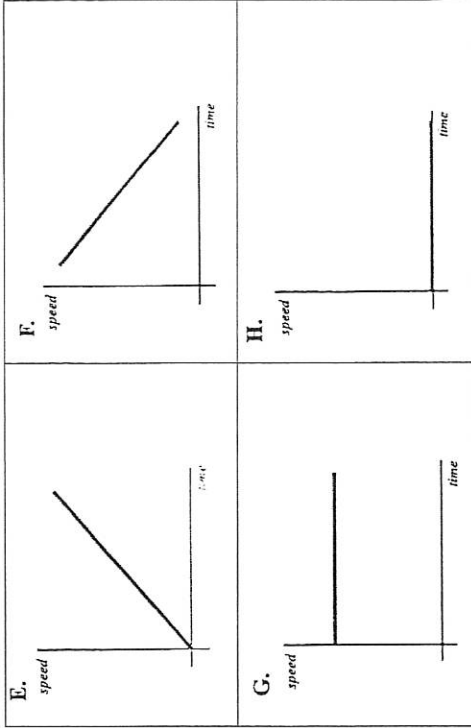
Graph C matches description ____ because _____.

Graph D matches description ____ because _____.

The speed-time graphs below represent the motion of a car. Match the descriptions with the graphs. **Explain your answers.**

Descriptions:

5. The car is stopped.
6. The car is traveling at a constant speed.
7. The car is accelerating.
8. The car is slowing down.



Graph E matches description ____ because _____.

Graph F matches description ____ because _____.

Graph G matches description ____ because _____.

Graph H matches description ____ because _____.