Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hr \_\_\_\_\_\_

**SPEED VS. TIME GRAPHS-NOTES AND PRACTICE**



**A helicopter’s speed increases from 25 m/s to 60 m/s in a time of 5 seconds. What is the helicopter’s *acceleration*?**

We know that:  
 vstart = vfinish = t =   
  
Use those to calculate acceleration:  
  
a =

**A skateboarder traveling at a speed of 9.0 m/s rolls to a stop at the top of a ramp in a time of 3.0 seconds. What is the acceleration of the skateboarder?**

We know that:

vstart = vfinish = t =   
  
Use those to calculate acceleration:  
  
a =

**A race car accelerates from a velocity of 18 m/s to a finish velocity of 32 m/s in a time of 2 seconds. Calculate the acceleration of the car.**

We know that:

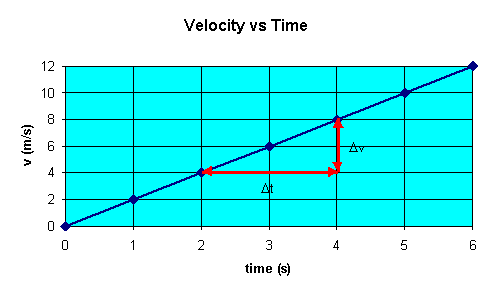
vstart = vfinish = t =   
  
Use those to calculate acceleration:  
  
a =

We have learned to analyze and make ***distance vs. \_\_\_\_\_\_\_\_\_*** graphs. We saw that:

* slope = \_\_\_\_\_\_\_\_\_\_\_
* steeper slope = \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Straight line = \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_
* flat line = \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_
* Single point = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_

**Now we will look at *speed vs. time* graphs.**

* A \_\_\_\_\_\_\_\_\_\_\_\_ vs. time graph is useful for showing how the speed of a moving object changes over \_\_\_\_\_\_\_\_\_\_\_.
* If the line on the graph is horizontal, then the car is moving at a \_\_\_\_\_\_\_\_\_\_\_\_ speed. There is no change in speed so there is no change in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* You can use speed vs. time graphs to determine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Remember: The “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” of a line is called its \_\_\_\_\_\_\_\_\_.



Speed vs. Time

* The slope is equal to the \_\_\_\_\_\_\_\_\_\_\_ divided by the \_\_\_\_\_\_\_\_\_.
* The slope for speed vs. time graph is therefore \_\_\_\_\_\_\_\_\_\_\_\_ *in \_\_\_\_\_\_\_\_\_\_ divided by time.*
  + Which equals WHAT? \_\_\_\_\_\_\_\_\_\_

Positive \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ adds more speed each second.

* + Positive slope: the line slopes \_\_\_\_\_\_\_\_\_\_\_\_\_; acceleration \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Negative acceleration \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ some speed each second, so things get \_\_\_\_\_\_\_\_\_\_\_.

* Negative slope: the line slopes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; acceleration \_\_\_\_\_\_\_\_\_\_\_\_\_

The position vs. time graph also shows acceleration. The graph is a \_\_\_\_\_\_\_\_\_\_\_when there is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Review of terms:**

* \_\_\_\_\_\_\_\_\_\_\_\_\_: amount of space between 2 points
* Speed: how quickly something moves over a \_\_\_\_\_\_\_\_\_; distance divided by \_\_\_\_\_\_\_
  + Velocity: the same as speed but with a specific \_\_\_\_\_\_\_\_\_\_
  + Acceleration: the rate at which speed or velocity changes; change in \_\_\_\_\_\_\_\_\_ divided by \_\_\_\_\_\_\_\_\_

**Reading Graphs: *Position* vs. Time**

* x-axis (independent variable): \_\_\_\_\_\_\_\_
* y-axis (dependent variable): \_\_\_\_\_\_\_\_\_\_\_\_
* Slope = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Horizontal line: at rest; speed is \_\_\_\_\_\_\_\_
* Straight line: \_\_\_\_\_\_\_\_\_\_\_ speed; speed \_\_\_\_\_\_ changing
  + positive slope = moving away from starting point
  + negative slope = moving toward starting point
* Curved line: changing speed (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
  + Speeding up or \_\_\_\_\_\_\_\_\_\_\_\_\_ down

**Reading Graphs: *Speed* vs. Time**

* x-axis (independent variable): \_\_\_\_\_\_\_\_\_\_\_
* y-axis (dependent variable): \_\_\_\_\_\_\_\_\_\_
* Slope = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Horizontal line = constant speed; \_\_\_\_\_\_\_\_ acceleration
* Straight line = \_\_\_\_\_\_\_\_\_\_\_\_ acceleration (speed is changing at the same rate every second)
  + positive slope = acceleration \_\_\_\_\_\_\_\_\_\_\_\_\_
  + negative slope = acceleration decreasing (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**Practice: Using a piece of graph paper:**

1. Graph the following speed vs. time data.

Speed (m/s) Time (sec)

0 0

10 2

20 4

30 6

40 8

50 10

2. Graph the following velocity vs. time data:

|  |  |
| --- | --- |
| **Velocity (m/s)** | **Time (s)** |
| 0 | 0 |
| 1.27 | 0.59 |
| 2.13 | 0.87 |
| 2.63 | 1.5 |
| 3 | 2.03 |

3. Graph the following velocity vs. time data:

|  |  |
| --- | --- |
| **Velocity (m/s)** | **Time (s)** |
| 0 | 0 |
| 1.03 | 0.97 |
| 0.94 | 2.03 |
| 0.83 | 3.23 |
| 0.54 | 5.09 |