Graphing This and That Notes
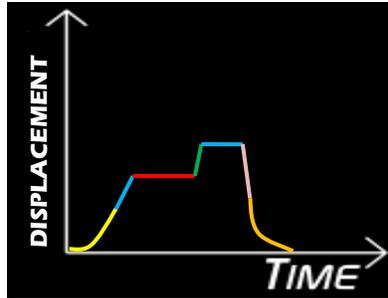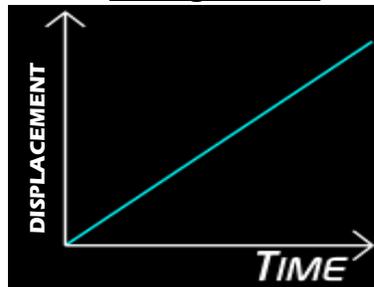
DISPLACEMENT vs. TIME (SPEED GRAPHS)

Position runs vertically (the y-axis). Time always runs horizontally (the x-axis).
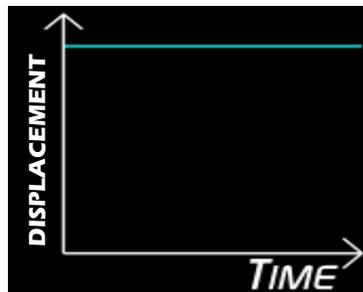
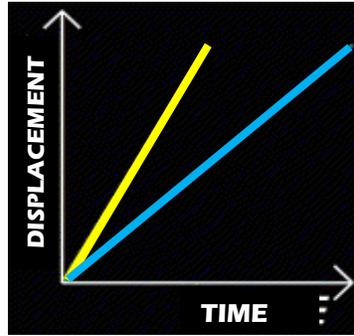**SLOPE = Rise/Run   or   Distance/Time   which = AVERAGE SPEED**

A straight line

A straight line = constant speed.

A straight, horizontal line

The distance traveled is not changing over time.
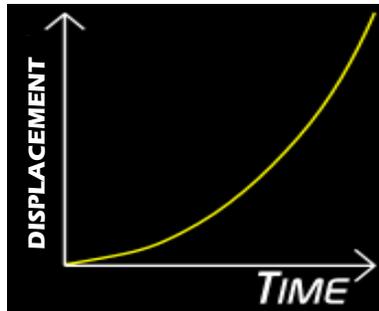**(Ex: You STOP to take a break during the mile run.)**

Different Slopes = different speeds

(Ferrari vs. Mini Van)

Steeper (larger) SLOPE = greater average speed
Both travel the SAME DISTANCE,
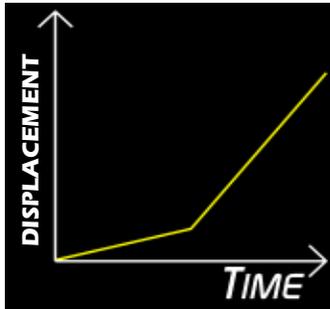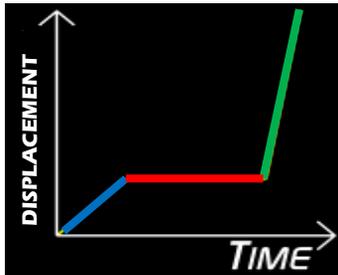**but the yellow line (Ferrari) got there faster.**

A CURVED LINE

A CURVE upwards means an INCREASE in average speed (NOT CONSTANT).

It is ACCELERATING.

Which line has the greatest average speed? Which is the smallest?

Two different slopes for this trip. Why?

First part of the trip object <u>moved slower</u>
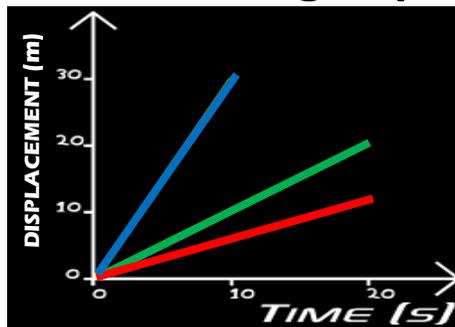**second part of the trip it <u>moved faster</u>.**

Segment 1:   *Segment 2:*   *Segment 3*:

Find the Average Speeds

Blue line:	Avg. *Speed* =	*Distance / Time* =	30 m / 10 s = **3 m/s**
Green line:	Avg. *Speed* =	*Distance / Time* =	20 m / 20 s = **1 m/s**
Red line:	Avg. *Speed* =	*Distance / Time* =	10 m / 20 s = **.5 m/s**

Find the average speed (for a kitty cat) for the 3 parts of the trip up a tree:
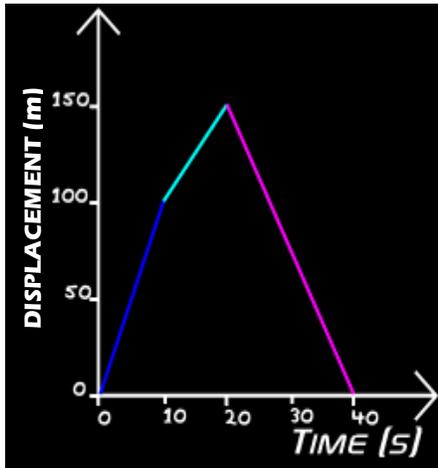
Part 1: 100 m in 10 s
Part 2: 50 m in 10 s
Part 3: 150 m in 20 s

- How far did Mr. Kitty travel?
- What is the overall displacement (distance from starting place)?
- Why does Part 3 have a negative slope?

Blue line: Avg. *Speed = Distance / Time =* 100 m / 10 s = **10 m/s**
Green line: Avg. *Speed = Distance / Time =* 50 m / 10 s = **5 m/s**
Purple line: Avg. *Speed = Distance / Time =* 150 m / 20 s = **7.5 m/s**
ENTIRE TRIP: Avg. *Speed = Distance / Time =* 300 m/40 s = **7.5 m/s**

- Mr. Kitty traveled a <u>total distance</u> of **300 meters**
- Overall <u>displacement</u>? = **0 meters**
- A Negative slope means you are going **<u>backwards</u>** or towards where you started.
(It <u>does not</u> mean a negative speed or distance traveled)
(That would be silly...)

Keys to a Cool Graph

SULTAN

SCALE
UNITS
LABELS
TITLE
ACCURATE
NEAT

1. Make your graph **big** (at least ½ the page).

2. Draw **straight lines** (use your ruler).

3. Use a **proper scale** for distance and time.

    a. Use the **ENTIRE** graph area (not the lower left corner).

4. **Label** the **y-axis** and **x-axis** (**including units**).

5. Include a **title**.

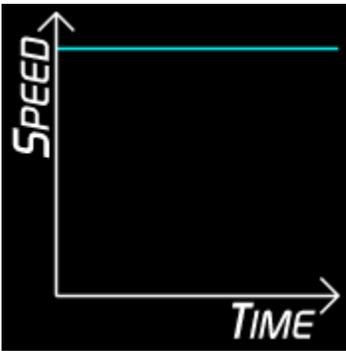6. Include a **key**.

SPEED vs. TIME
(ACCELERATION GRAPHS)

The first thing to note about these is that, on first glance, they look EXACTLY the same as the position vs. time graphs.

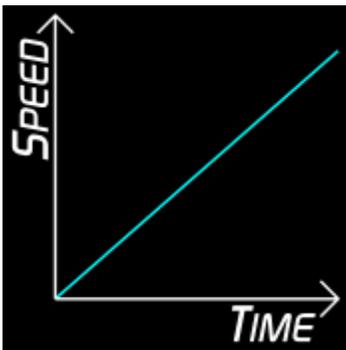**Spot** the difference between these two graphs:
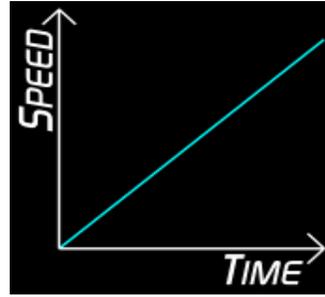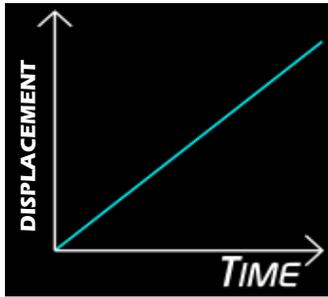
The only way you can tell the difference is by **reading the labels** on each axis.
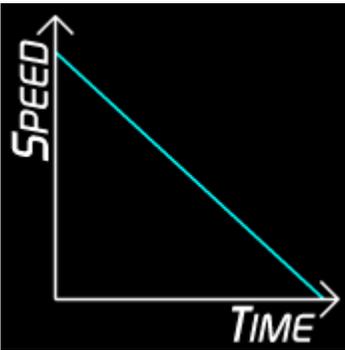

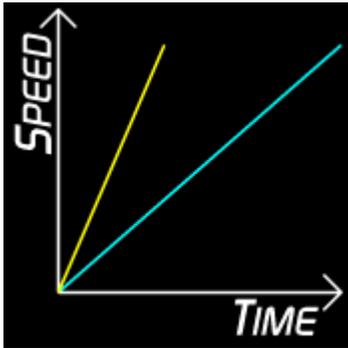**Horizontal line - Don't** be tempted to think this means it's not moving.

This is **Speed vs. Time** and the speed is **constant**. This shows a **constant speed** with **NO ACCELERATION**.

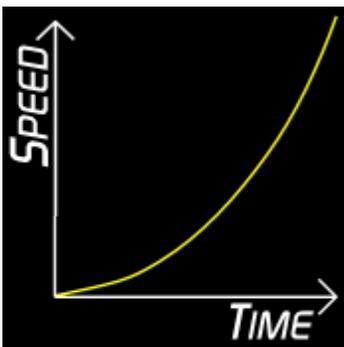The speed is **increasing**, so the object must be **accelerating**.

The speed is **decreasing**, so the object must be **decelerating** (to a stop).

Both the yellow and blue line show **increasing speed**.
They both **reach the same top speed**, but the yellow one **accelerated faster** and took **less time** (Ferrari vs. minivan)

This shows **ACCELERATION is increasing** and is **not constant**.

This could happen when you star rolling down a steeper and steeper hill on a roller coaster.