**INTRODUCTION TO DISTANCE – TIME GRAPHS**



**Distance** is the total length travelled by an object. Distance is plotted on the y-axis (dependent) and time is plotted on the x-axis (independent).

On the left, you can see that the object represented by line A has travelled 10m in 2s whereas the object represented by the line B has only travelled 4m in this time and is therefore travelling more slowly.

**'Straight lines**' on a distance-time graph tell us that the object is travelling at a **constant speed**. Note that you can think of a stationary object (not moving) as travelling at a constant speed of 0 m/s.

**CALCULATING THE SPEED**

The slope (gradient) of a distance-time graph indicates the speed of the object.

**Δ = Greek Letter Delta represents change**

$$Speed=\frac{change in distance}{change in time}= \frac{Δd}{Δt}=\frac{rise}{run}$$

**\*Note that if the graph slopes downwards, you will get a negative value indicating the object is travelling back towards its origin.**



|  |  |  |  |
| --- | --- | --- | --- |
|  | **Part A** | **Part B** | **Part C** |
| **Distance Travelled** |  |  |  |
| **Time Travelled** |  |  |  |
| **Speed** |  |  |  |

 **Total Distance** travelled =

**DESCRIBING THE MOTION**

During **Part A** of the journey the object travels \_\_\_\_\_\_ km in \_\_\_\_hours. It is travelling at a **constant velocity** (a fancy term for speed when you include the direction) of \_\_\_\_ km/h.

During **Part B** of the journey the object travels \_\_\_ km in \_\_\_ hours. It is **stationary for 2 hours.**

During **Part C** of the journey the objects travels \_\_\_\_ km in \_\_\_ hours. It is travelling at a **\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_** of -15 km/h back to its starting point, our reference point 0.

The graph below shows Cole’s journey between his home and a campsite. The origin indicates **home**.



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Part AB** | **Part BC** | **Part CD** | **Part DE** | **Part EF** |
| **Distance Travelled** |  |  |  |  |  |
| **Time Travelled** |  |  |  |  |  |
| **Speed** |  |  |  |  |  |

Note= + direction represents going towards campsite, - direction represents going back home (origin).

**Describe the journey for each part using the words: constant velocity, direction, stationary**

|  |  |
| --- | --- |
| **Part****AB** |  |
| **Part****BC** |  |
| **Part****CD** |  |
| **Part****DE** |  |
| **Part****EF** |  |

**CURVED LINES**



**'Curved lines**' on a distance time graph indicate that the speed is changing.

The object is either getting faster = **'accelerating**' or slowing down = **'decelerating**'. You can see that the distanced moved through each second is changing.