Acceleration

11SCIE - Mechanics

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What is Acceleration?

Acceleration is how quickly the velocity changes.

e.g. A supercar will accelerate to 50km/hr faster than a cyclist. That is to say, the supercar has a greater acceleration.

Calculating Acceleration

$$acceleration = \frac{\text{change in speed}}{changeintime}$$

$$a = \frac{\Delta V}{\Delta t}$$

- **Velocity** has units meters per second (ms^{-1})
- **Time** has units seconds (s)
- **Acceleration** has units meters per second per second (m/s^2 or ms^{-2})

Rearranging Equations

$a = \frac{\Delta V}{\Delta t}$	v is divided by t
$a \times \Delta t = \Delta V$	Undo the divide by multiplying

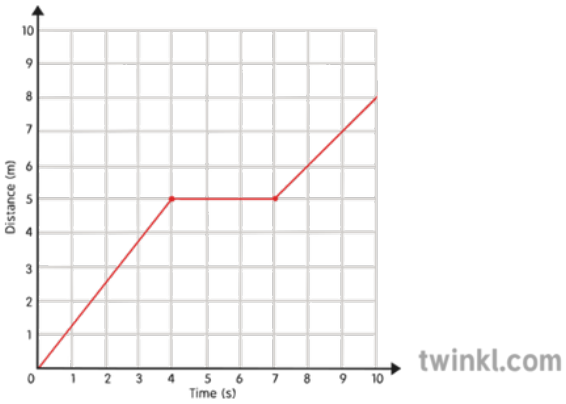

Figure 1: Distance-Time Graph

$v = \dfrac{\Delta d}{\Delta t}$	d is divided by t
$v \times \Delta t = \Delta d$	Undo the divide by multiplying

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Using Formula Triangles: Velocity

If you are having a hard time with maths, you can write your formula into triangles like this. Multiplication on the bottom and the product on the top. You will **not** be given formula in this form, you will have to remember the triangles if you want to use them.

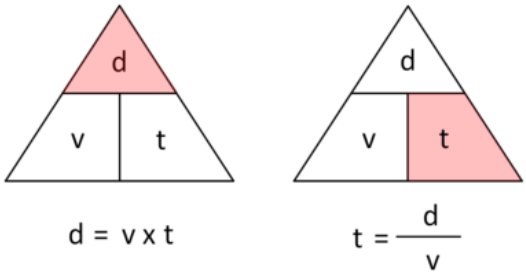

Figure 2: Velocity Triangle

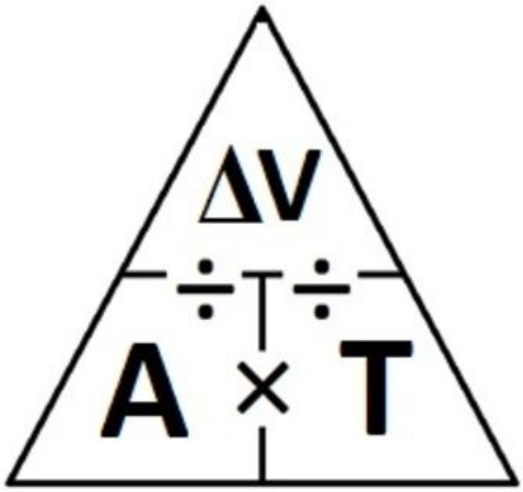

Figure 3: Acceleration Triangle

Using Formula Triangles: Acceleration

Velocity-Time Graphs

Much like we can plot a distance-time graph, we can also plot velocity-time graphs.

Velocity-time graphs are useful for determining whether an object is accelerating and for calculating the distance travelled.

Calculating Acceleration

$$a = \frac{\Delta v}{\Delta t}$$

$$a = \frac{rise}{run} \qquad \text{using a velocity-time graph}$$

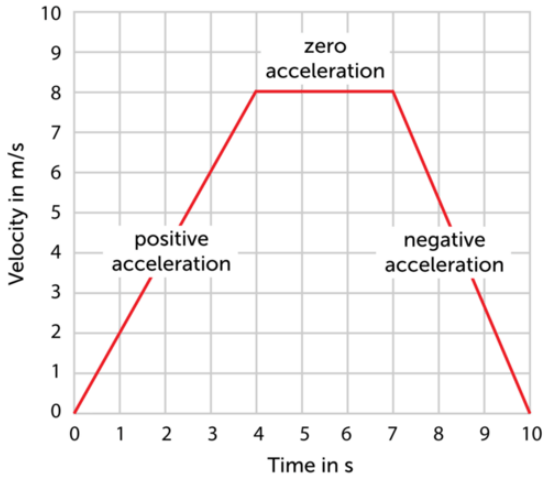

Figure 4: Velocity-Time Graph

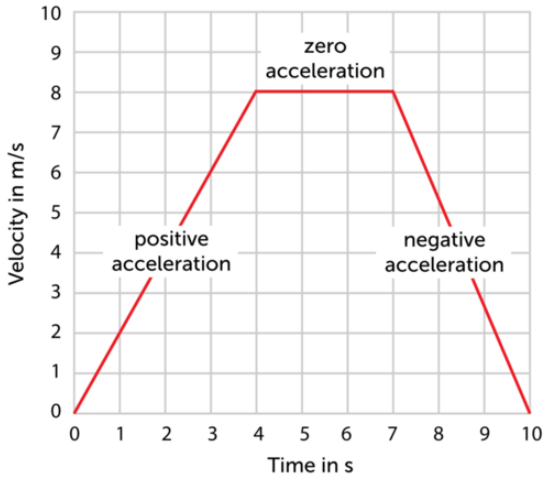

Figure 5: Velocity-Time Graph