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Glue on this side

# Speed and Gravity

1	I can state that speed is a measurement of how fast an object is moving
2	I can describe simple changes in motion
3	I can describe changes in relative motion, such as trains and cars passing one another
4	I can explain factors that may affect an object's speed
5	I can calculate the average speed of an object
6	I can interpret distance-time graphs to describe changes in motion and calculate speed

	Keyword	Definition
1	acceleration	How quickly speed increases or decreases.
2	average speed	The overall distance travelled divided by overall time for a journey.
3	interaction pair	When two objects interact there is a force on each one that is the same size but in opposing directions.
4	mass	The amount of stuff in an object (kg).
5	metres per second	A unit of speed.
6	newton	Unit for measuring forces (N).
7	newtonmeter	A piece of equipment used to measure weight in newtons.
8	relative motion	Different observers judge speeds differently if they are in motion too, so an object’s speed is relative to the observer’s speed.
9	speed	How much distance is covered in a given time.
10	weight	The force of gravity due to the Earth (or other planet or moon) on an object (N).

## Gravity

- Gravity** is a non-contact force that acts between two objects
- Gravitational force** pulls you back to Earth when you jump
- The size of the gravitational force depends on the mass of the two objects and how far apart they are

- Weight** is the downward force caused by gravity acting upon the mass of an object, it is measured in Newtons (N)
- Mass** is the amount of matter within an object, whereas weight is the downward force of the object, we measure mass in **kilograms**
- We calculate weight with the equation:

$$\text{weight (N)} = \text{mass (kg)} \times \frac{\text{gravitational field strength (N/kg)}}{\text{field strength}}$$

- The value of the gravitational field strength can vary, so although a person's mass would be the same on different planets, their weight would not be

## Speed

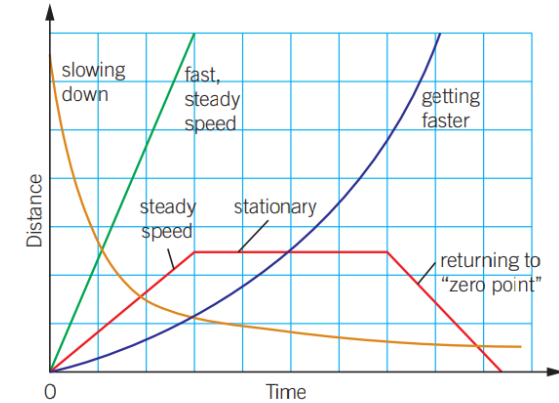
- Speed** is a measure of how quickly or slowly that something is moving
- We measure speed in meters per second (m/s), this means that distance must be in meters and time must be in seconds
- We calculate speed with the following formula:

$$\text{speed (m/s)} = \frac{\text{distance travelled (m)}}{\text{time taken (s)}}$$

- Relative motion** compares how quickly one object is moving compared to another
- If both objects are moving at the same speed, they are not changing position in comparison to one another, meaning that their relative speed is zero

## Distance-time graphs

- Distance-time graphs** tell the story of a journey, they show how much distance has been covered in a certain period of time



- To find the average speed, the total distance must be divided by the total time

Prior Knowledge From KS2:

*In KS2 you will have explained that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. You will have also identified the effects of air resistance, water resistance and friction, that act between moving surfaces.*

Future Learning:

*At GCSE you will learn that speed and gravity are forces. The speed of a moving object is rarely constant. When people walk, run or travel in a car their speed is constantly changing. Weight is the force acting on an object due to gravity.*

Why?




*Engineers analyse forces when designing a great variety of machines and instruments, from road bridges and fairground rides to atomic force microscopes. Anything mechanical can be analysed in this way.*

Careers:

*Engineer  
Mechanic  
Racing car driver  
Astronaut*

## Speed & Gravity Homework Grid

Complete some of the tasks below to reach a total of \_\_\_\_\_ points over this unit of work – highlight the box once completed.

Topic	1 Point	2 Points	4 Points	6 Points	10 Points
<b>Balanced and unbalanced forces</b> 	Describe what a balanced force is?	Write 2 sentences to explain the difference between balanced and unbalanced forces.	Draw a diagram of forces acting on an object, Label the forces and explain whether they are balanced or unbalanced.	Explain how you can reduce resistive forces on an object.	Write a story that includes a description of at least 4 different forces.
<b>Speed</b> 	Write the equation for speed.	Draw the speed triangle.	A man rides his bike to work each day. He lives 1700m from work, and it takes him 179 seconds. Calculate his speed.	Liam Heath and Jon Schofield won the bronze medal in the men's 200m kayak double at the London 2012 Olympic Games with a time of 34.42 seconds. Calculate his average speed.	Gold medallist Ellie Simmonds competed in the 100m freestyle event at the 2008 and 2012 Paralympic Games. In 2008 her time was 78.75 seconds and in 2012 it was 74.82 seconds. Calculate the difference in her average speed at each event.
<b>Gravity</b> 	What is the gravitational field strength on earth?	Research and write down the gravitational field strength on different planets.	Write down the units mass, weight and gravitational field strength are measured in.	Design a jigsaw with all the different equations needed for this topic.	Produce a poster of all the different keywords you have learnt this topic.

