

MOTION GRAPHS

SENT INTO SPACE CLASSTRONAUTS PROGRAMME

LAUNCH YOUR SCHOOL INTO
SPACE



MOTION GRAPHS

Today we will be learning...

how to draw and interpret graphs showing the motion of an object

By the end of the lesson you should be able to...

- Sketch speed-time and distance-time graphs
- Describe the motion of an object based on its speed-time and distance-time graphs



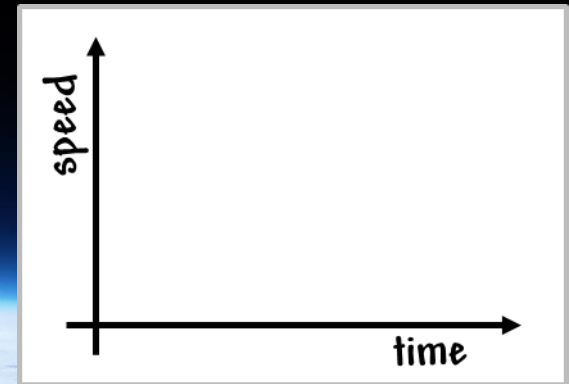
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Task:

On a plain piece of paper, sketch a graph showing the speed of a rocket during a flight from take-off to crashing to the ground.

Consider Newton's first two laws:

1. An unbalanced (resultant) force will cause an object to accelerate
2. Acceleration is proportional to the size of the resultant force



First, think about what happens at different points during the flight.



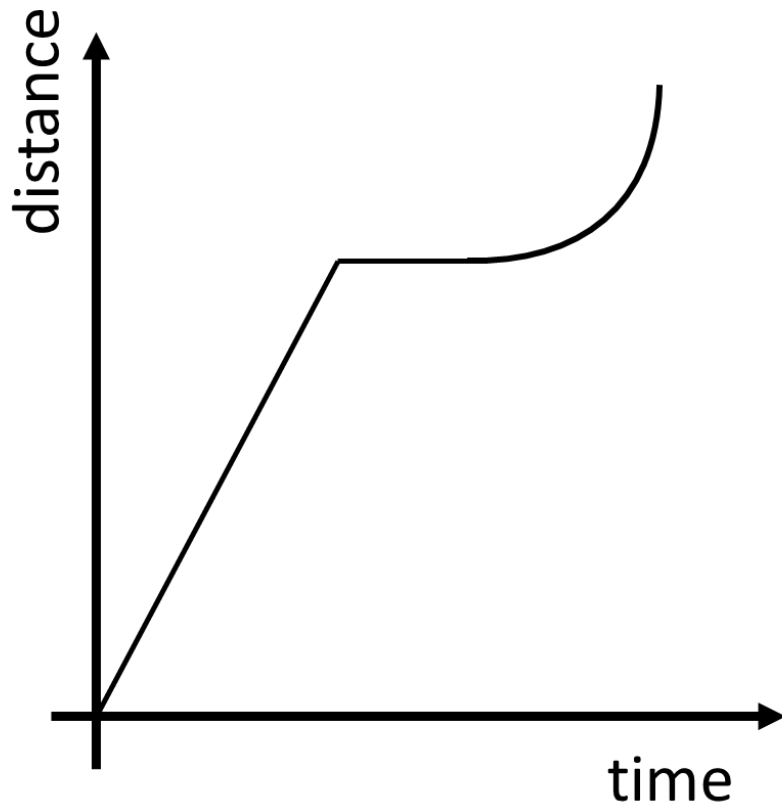
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Task:

Open the 'Shuttle Launch Task' spreadsheet and the 'Shuttle Launch' video. Follow the instructions and answer the questions on the task sheet.



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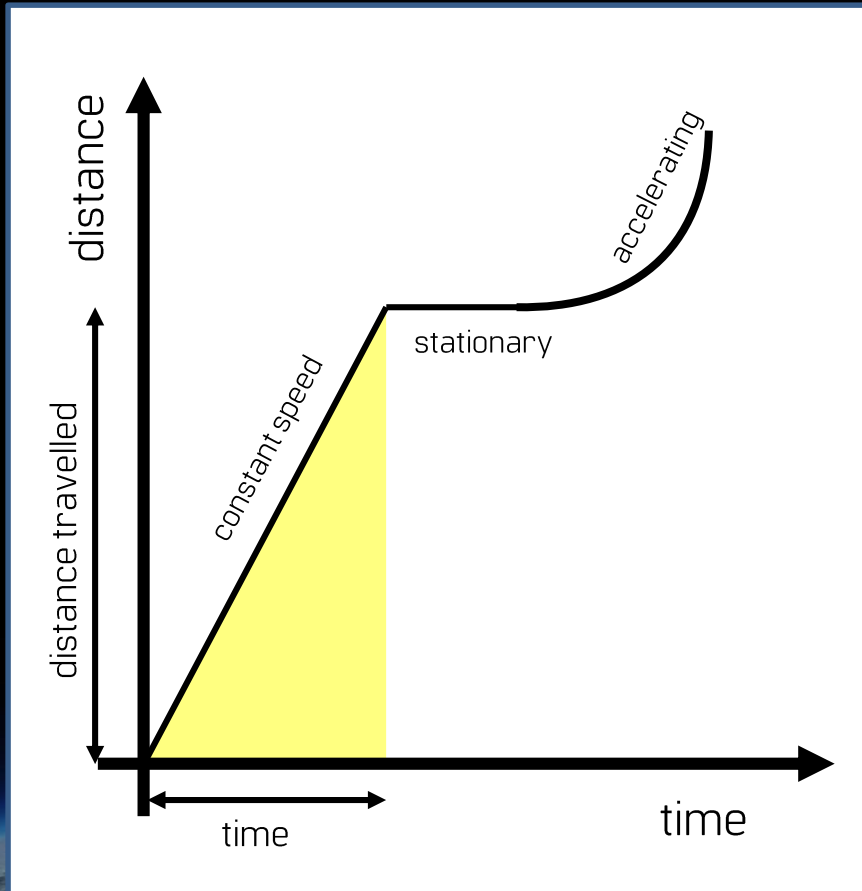


A **distance-time** graph shows how the distance of an object from its start point changes with time.

Can you describe the journey represented by this graph?



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Distance-time graphs

Calculating speed

$$\text{average speed} = \frac{\text{distance travelled}}{\text{time}}$$

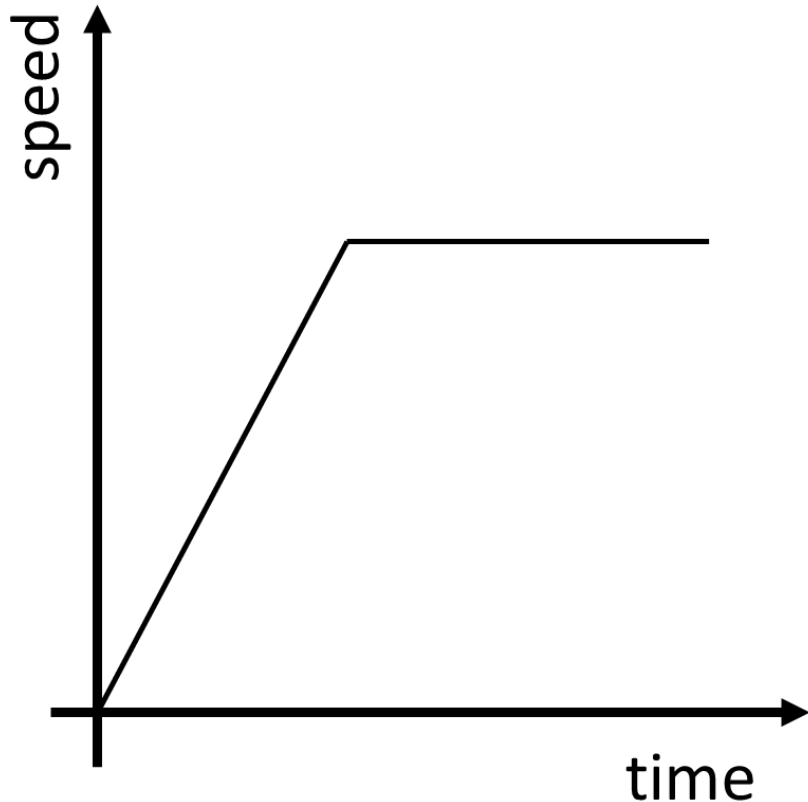
(the gradient of the line)

+ gradient = forwards

- gradient = backwards



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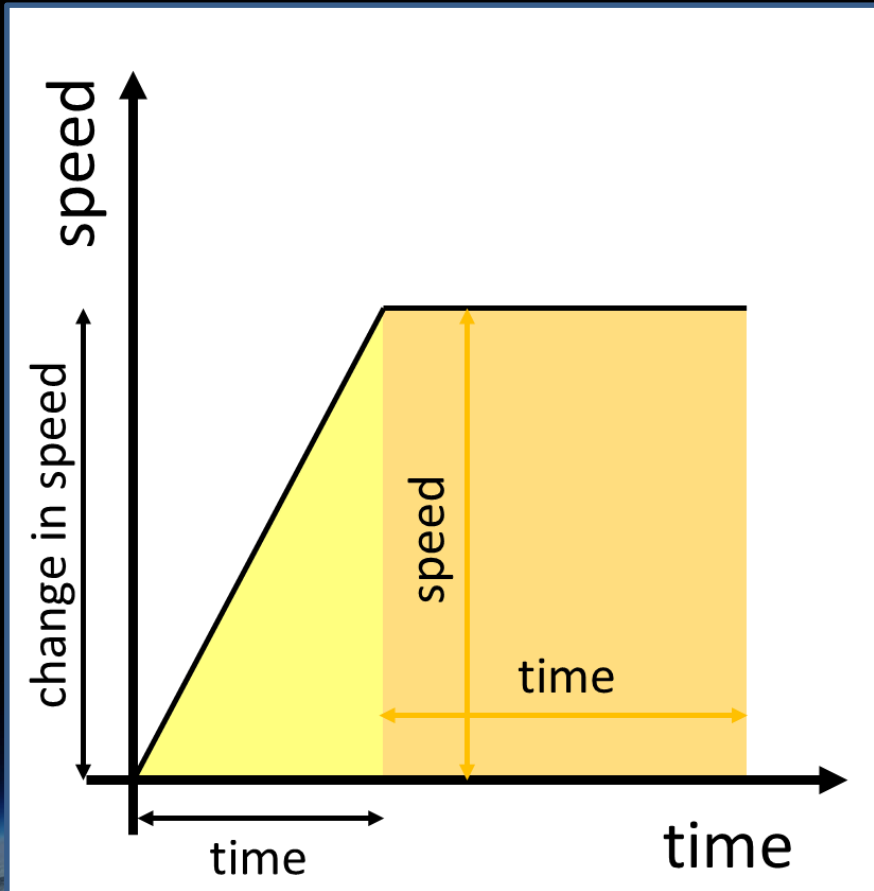


A **speed-time** graph shows how the speed of an object changes with time.

Can you describe the journey represented by this graph?



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Acceleration

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

(the gradient of the line)
+ gradient = accelerating
- gradient = slowing down

Distance travelled

$$\text{distance} = \text{speed} \times \text{time}$$

(the area underneath the line)



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Sketch the following **distance-time** graph:

An object travelling at a constant speed



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Sketch the following **distance-time** graph:

An object going backwards



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Sketch the following **distance-time** graph:

An object accelerating



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Sketch the following **speed-time** graph:

An object accelerating



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Sketch the following **speed-time** graph:

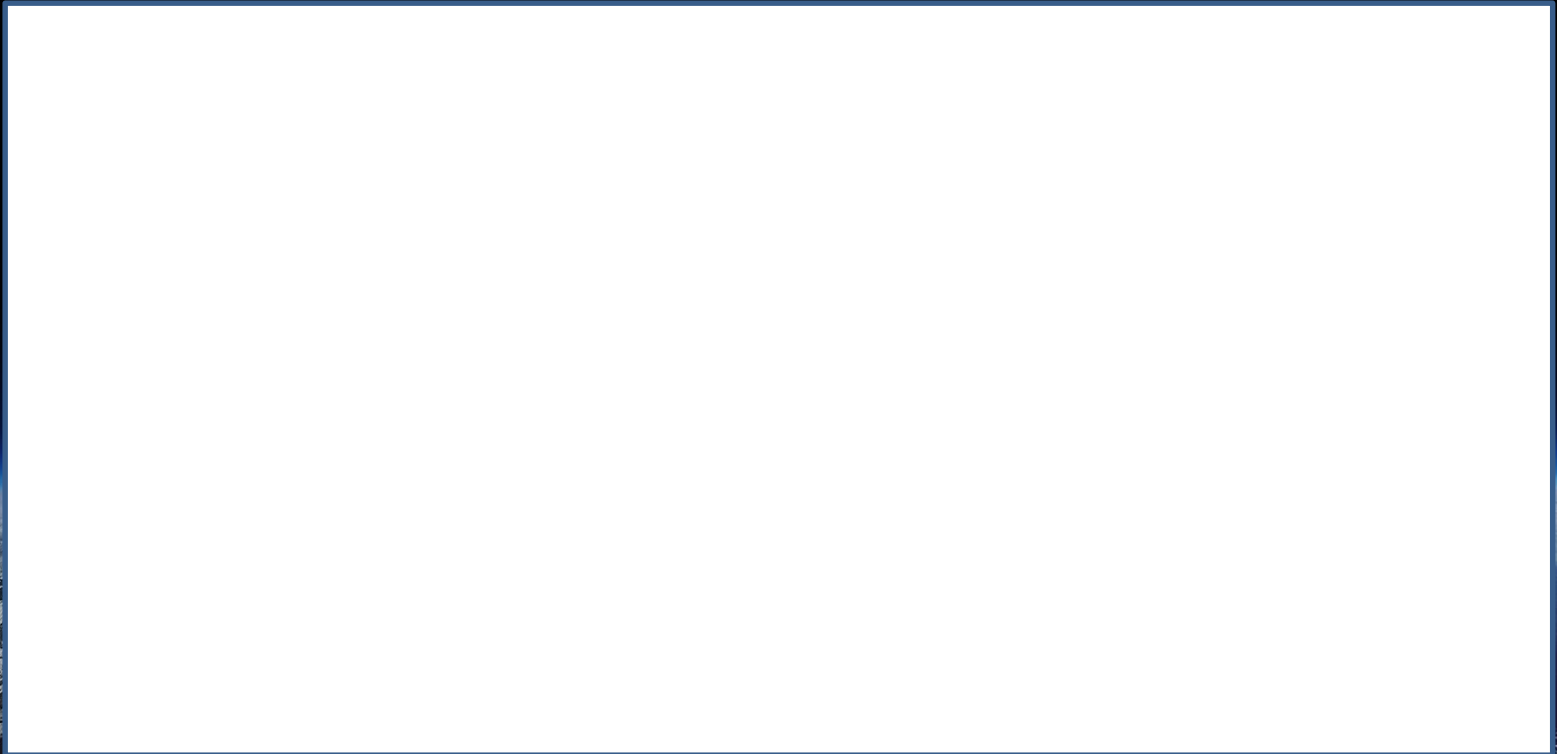
An object slowing down



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Sketch the following **speed-time** graph:

A tennis ball being thrown up and then falling to the ground



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Sketch the following **distance-time** graph:

A tennis ball being thrown up and then falling to the ground



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Sketch the following **distance-time** graph:

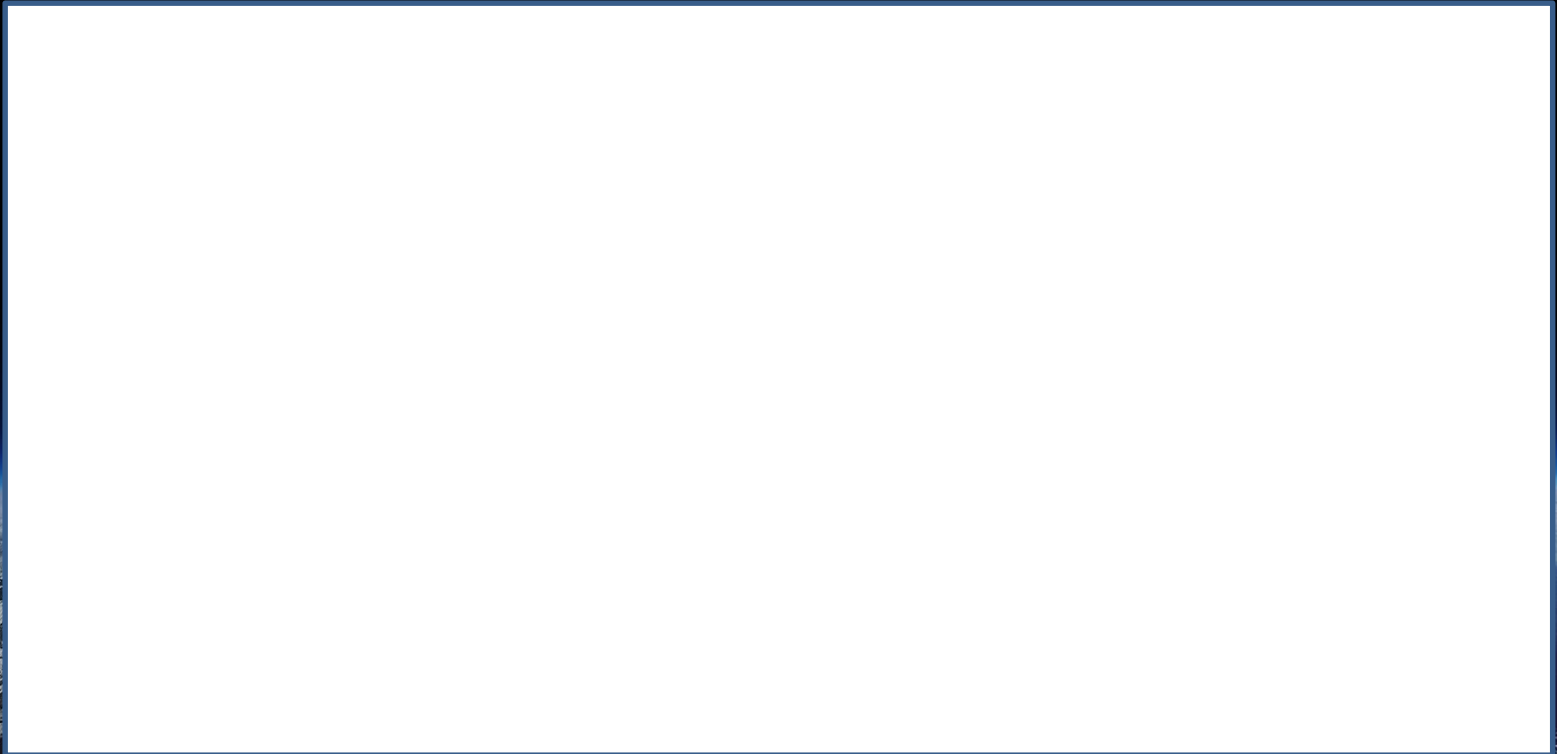
a bungee jump



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Sketch the following **speed-time** graph:

a bungee jump



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Task:

On a plain piece of paper, sketch a graph showing the speed of a rocket during a flight from take-off to crashing to the ground.

Question

Look at an object, such as a book, on your desk.

What is the Newton's Third Law pair of forces?



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Task:

On a plain piece of paper, sketch a graph showing the speed of a rocket during a flight from take-off to crashing to the ground.

Question

Look at an object, such as a book, on your desk.

What is the Newton's Third Law pair of forces?



OUR CLASSTRONAUTS PROGRAMME



This presentation is produced by Sent Into Space and supports the Classtronauts school space launch programme. The ultimate STEM project, launching a balloon into space is a great idea if you're wondering how to engage your pupils with the science curriculum. We'll visit your school and fly a craft into space right from your playground. Our presenter gives a mission briefing explaining the science behind high altitude flight, answering questions from the pupils before launching an item of your choosing into space. It's the perfect activity for Space Week.

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