The Thomas Alleyne Academy

Knowledge Organiser - Motion and Pressure

Science Department

Sc Yr9 P1: Know how distance-time graphs can be used to represent motion

Distance-time graphs

A distance-time graph shows how far an object has moved from its starting point over time.

Distance travelled is always plotted on the y-axis (vertical)
Time taken is always plotted on the x-axis (horizontal)

You can find the speed of an object from a distance-time graph by finding the gradient of the graph. This is the 'steepness' of the line.

Gradient = Change in y-axis ÷ Change in x-axis

Using the graph opposite we can find the speed of the object represented by the green line between 6 and 10 seconds by:

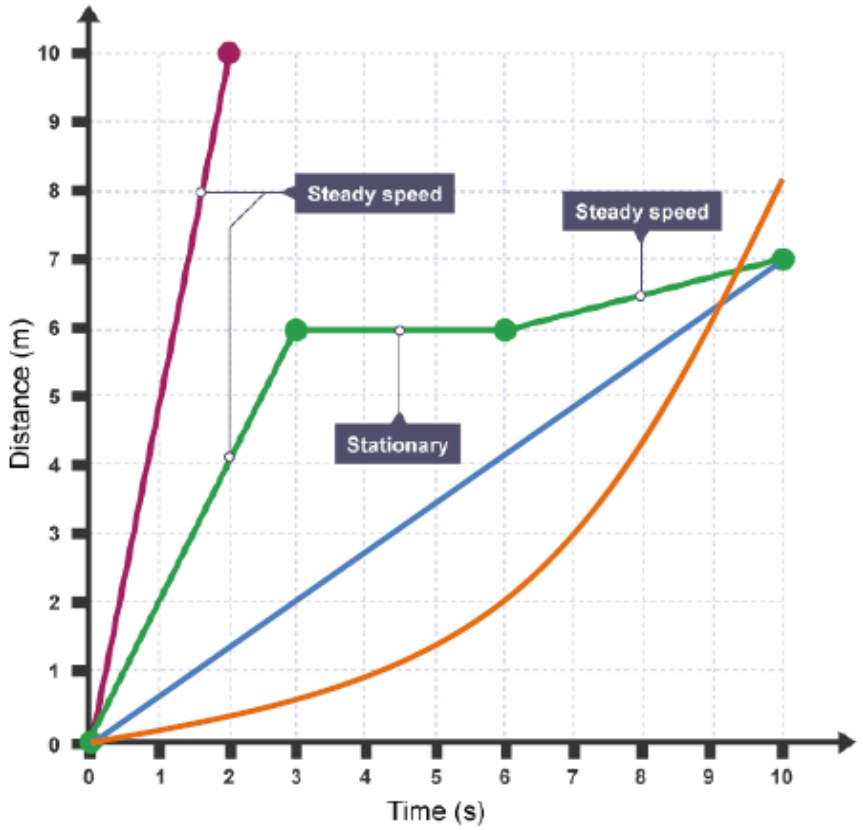
Gradient = Change in y-axis ÷ Change in x-axis
= (7-6) ÷ (10-6)
= 1 ÷ 4
= 0.25m/s

We can also find the average speed of the green object by drawing a line from the start of its motion to the end of its motion. This is shown opposite by the **blue line** and how to find the average speed is shown below.

Gradient = Change in y-axis ÷ Change in x-axis
= (7-0) ÷ (10-0)
= 7 ÷ 10
= 0.7m/s

Interpreting Distance-time graphs

- A straight diagonal line of a distance-time graph shows that the object is travelling at a steady/constant speed.
- A straight horizontal line on a distance-time graph shows that the object is not moving (stationary)
- If a curved line were to appear on a distance-time graph (orange line) this shows the object is accelerating.



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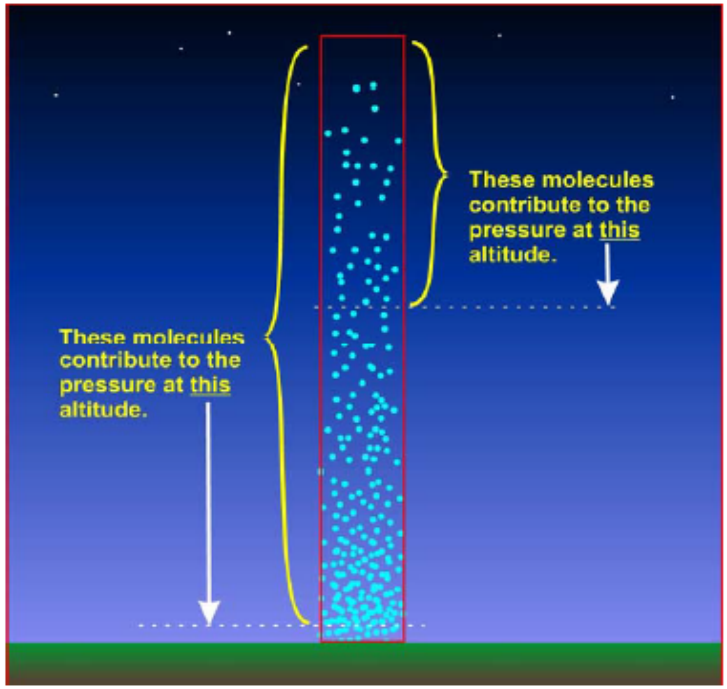
Sc Yr9 P2: Understand the factors that can affect the pressure in substances

Atmospheric pressure

The mass of the air above us is being attracted to the Earth by the force of gravity. The weight of this air causes atmospheric pressure.

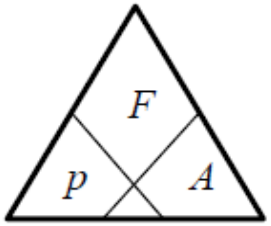
The higher up in the atmosphere that you are the less molecules there are above you so the lower the atmospheric pressure. At the surface of the Earth we say that the pressure is equal to 1 atmosphere (atm) of pressure. This is equivalent to about 100,000Pa.



Pressure

Pressure (N/m²) = Force (N) ÷ Area (m²)

$$p = \frac{F}{A}$$



Pressure is caused by an object pushing on another.

The bigger the force applied by the object and the smaller the area over which the force is applied the larger the pressure

Pressure in liquids

Like air pressure the pressure in a liquid depends upon the amount of liquid above the object. The more liquid above the object the greater the pressure that is exerted. This can be demonstrated by looking at water flowing out of bucket.

The lower down the bucket the hole is the greater force is being applied to the liquid coming out of the bucket. This causes the water jet to squirt further from the bucket.

Pressure is liquids acts on all sides of an object immersed (completely surrounded by) in a liquid. The deeper the object is in the liquid the more pressure that it will experience. If the object is less dense than the liquid it is suspended in the object will rise in the liquid and float.

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Sc Yr9 P3: Know about moments and their applications

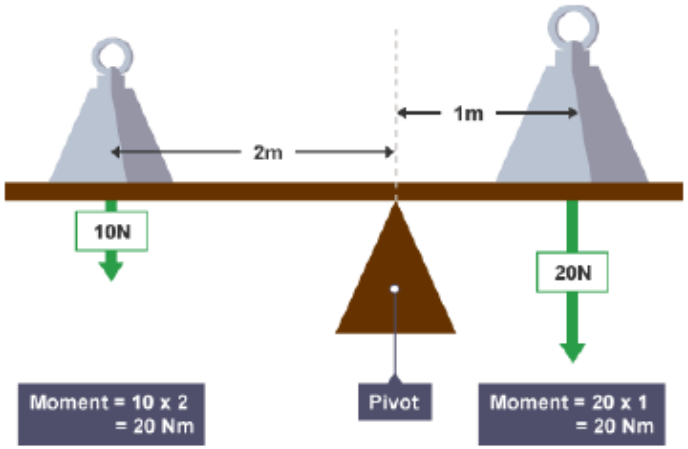
Moments

A moment is the turning effect of a force. In order for a force to provide a turning effect there must be a pivot. For example in a see-saw.

You calculate the moment of a force using the equation:

moment = force × distance

The unit of a moment is Newton metres (Nm).



In the situation above the moment is equal on both sides of the pivot so the object will be in balance. If the moments on either side of a pivot are not equal then the object will turn in the direction of the greater moment.

Uses of moment in simple machines

By adjusting the distances from a pivot and adjusting the sizes of the forces acting the idea of moments can be used to great effect. Look at the examples below for some uses of moments.

Wheelbarrows

By placing the load in a wheelbarrow nearer the pivot (the wheel) the force needed to lift the wheelbarrow is must less because the handle is further away from the pivot.

Forceps

Forceps use the opposite effect than the wheelbarrow. By providing the force (effort) closer to the pivot the force at the end of the forceps will be smaller. This means you can pick up things more carefully.