# CAIE Physics A-level

## 2 - Kinematics

### Flashcards

Define speed, the equation used to calculate speed, and the respective SI units.

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Speed is defined as the rate of change of distance.

The equation used is speed = distance / time and the SI units are m $s^{-1}$

# Define displacement.

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The displacement of an object is the distance it has travelled in a given direction, so it is a vector with both magnitude and direction.

Define velocity, the equation used to calculate velocity, and the respective SI units.

# Define velocity, the equation used to calculate velocity, and the respective SI units.

The velocity of an object is defined as the rate of change of displacement, or speed in a given direction, making velocity a vector.

The equation used is velocity = change in displacement/time and the SI units are $ms^{-1}$

Define acceleration, the equation used to calculate acceleration, and the respective SI units.

# Define acceleration, the equation used to calculate acceleration, and the respective SI units.

Acceleration is defined as the rate of change of velocity, making it a vector.

The equation used is acceleration = change in velocity / time and the SI units are $ms^{-2}$.

How would you go about finding the gradient of a straight line on a graph?

# How would you go about finding the gradient of a straight line on a graph?

Take a portion of the line. Measure the horizontal and vertical length of that portion.

Gradient = vertical length/horizontal length.

# What does a straight, horizontal line represent on a displacement-time graph?

What does a straight, horizontal line represent on a displacement-time graph?

A stationary object.

What does a line with a constant, non-zero gradient represent on a displacement-time graph?

What does a line with a constant, non-zero gradient represent on a displacement-time graph?

An object moving with constant velocity.

# What does a curved line represent on a displacement-time graph?

# What does a curved line represent on a displacement-time graph?

Acceleration (if gradient is increasing) or deceleration (if gradient is decreasing).

What does a straight, horizontal line represent on a velocity-time graph?

What does a straight, horizontal line represent on a velocity-time graph?

An object moving with constant velocity.

What does a line with a constant, non-zero gradient represent on a velocity-time graph?

What does a line with a constant, non-zero gradient represent on a velocity-time graph?

An object that is moving with a constant acceleration (positive gradient) or deceleration (negative gradient).

# What does the area under a velocity-time graph represent?

What does the area under a velocity-time graph represent?

Displacement.

# What does the area under an acceleration-time graph represent?

What does the area under an acceleration-time graph represent?

Velocity.

Describe how the acceleration of an object under gravity can be determined using light gates.

# Describe how the acceleration of an object under gravity can be determined using light gates.

Set up the light gates vertically and measure the distance between them. Connect them to a data logger and then release an object from rest above them, using the light gates to measure the velocity of the falling object at their respective positions. Using these velocities, and the known distance, you can calculate the acceleration of the falling object.

A ball is projected off a castle at $6ms^{-1}$. How does its horizontal velocity change from its launch until it hits the ground?

A ball if projected of a castle at $6ms^{-1}$. How does its horizontal velocity change from its launch until it hits the ground?

The horizontal velocity should remain the same, provided air resistance is negligible, since there is no acceleration in the horizontal direction.

# In projectile motion, what is the vertical acceleration?

In projectile motion, what is the vertical acceleration?

The vertical acceleration is equal to gravitational field strength (g), acting downwards.

# State the 5 SUVAT equations.

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$s=ut+1/2at^2$

$v=u+at$

$v^2=u^2+2as$

$s=vt-1/2at^2$

$s=\frac{1}{2}(u+v)t$

s is displacement
v is final velocity
u is initial velocity
a is acceleration
t is time taken