Your notes

GCSE Physics: revision notes

Distance–time and velocity–time graphs

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Distance–time graphs

- The **gradient** of a **distance–time graph** gives the speed.
- A straight, sloping line means a constant speed; a steeper line means a faster speed.
- A horizontal line means the object is **stationary**.
- A curve that gets steeper means the object is accelerating. (Higher) The speed at any point is the **gradient** of a **tangent** to the curve.

Velocity–time graphs

- The **gradient** of a **velocity–time graph** gives the acceleration.
- A horizontal line means a constant velocity; a line sloping upwards means acceleration; a line sloping downwards means deceleration.
- (Higher) The area under a **velocity–time graph** gives the distance travelled (displacement).
- Count squares or split the area into triangles and rectangles to find it.

Falling objects and terminal velocity (separate sciences)

- An object falling through a fluid, such as a skydiver, first accelerates because of the force of gravity.
- As it speeds up, the frictional force (air resistance) increases, so the resultant force and the acceleration decrease.
- Eventually the resultant force is zero and the object moves at a constant speed: its **terminal velocity**.
- On a **velocity–time graph** this shows as a curve that levels off.

Reading graphs

- Always check the axes: a line going up on a **distance–time graph** (moving) means something different from one going up on a **velocity–time graph** (accelerating).
- Include units when you give a **gradient**: m/s for speed and m/s² for acceleration.

Key terms

Distance–time graph	A graph of distance against time; its gradient is speed.
Velocity–time graph	A graph of velocity against time; its gradient is acceleration.
Gradient	The steepness of a line: change in y ÷ change in x.
Tangent	A straight line touching a curve at a point, used to find the gradient there.
Terminal velocity	The constant maximum velocity of a falling object, when the resultant force is zero.
Stationary	Not moving.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What does the gradient of a distance–time graph show?
2. What does a horizontal line on a distance–time graph mean?
3. What does the gradient of a velocity–time graph show?
4. What does a horizontal line on a velocity–time graph mean?
5. What does the area under a velocity–time graph show? (Higher)
6. A car accelerates steadily from 0 to 10 m/s in 5 s. How far does it travel? (Higher)
7. On a distance–time graph, a line rises from 0 to 120 m in 40 s. What is the speed?
8. On a velocity–time graph, velocity rises from 0 to 12 m/s in 6 s. What is the acceleration?

Answers

1. Speed
2. The object is stationary
3. Acceleration
4. Constant velocity
5. The distance travelled
6. 25 m
7. 3 m/s
8. 2 m/s²

Your notes

What to do next

Practise 10 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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