

Section 2: Velocity and acceleration

Crucial points

1. **Remember that velocity and acceleration can have different directions**

If you apply the brakes to slow down on your bicycle, your velocity vector is in the direction you are moving but your acceleration vector is in the opposite direction.

If your direction of motion is taken to be positive, when you are slowing down your velocity is positive but your acceleration is negative.

However, if you are travelling in a negative direction and speeding up, your acceleration is negative.

2. **Remember that acceleration is given by the gradient of a velocity-time graph**

If the gradient of the velocity-time graph is negative, then the acceleration is negative.

Section 4: Using areas

3. **Don't confuse speed-time graphs and velocity-time graphs**

Always check how the axes of a graph are labelled. Speed is a scalar and so can never be negative. Velocity is a vector and can be both positive and negative.

4. **Make sure you interpret the area under a graph correctly**

The area enclosed between a speed-time graph and the time axis gives the distance travelled, which like speed is a scalar.

The area enclosed between a velocity-time graph and the time axis (with areas beneath the time axis counted as negative) gives the displacement, which like velocity is a vector. If you want to find the distance travelled from a velocity-time graph, then find the total area enclosed between the graph and the time axis, counting all areas as positive.