

Copyright - not legal for resale.

From Isaac Covid lessons archive:

isaacphysics.org/pages/covid19_gcse

10 Motion Graphs; Displacement-Time (s-1)

A displacement-time graph has displacement on the y -axis (the **vertical** axis) and time on the x -axis (the **horizontal** axis). The gradient of the line at any point is the **velocity at that instant**.

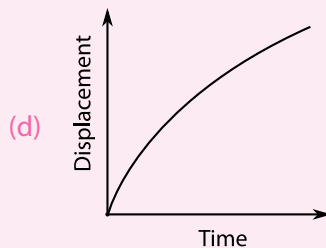
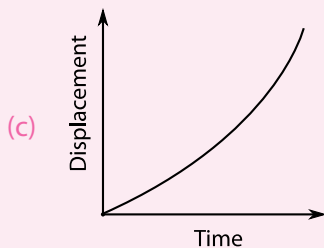
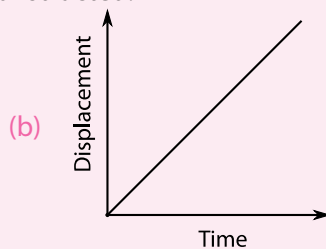
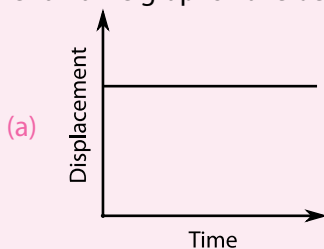
To review gradient calculations, see Straight Line Graphs - P14.

Take particular care of the unit for the gradient. It will be equal to the unit on the y -axis divided by the unit on the x -axis. For example, if displacement is measured in **km** on the y -axis and time in **minutes** on the x -axis, the gradient would have units of **km per minute**.

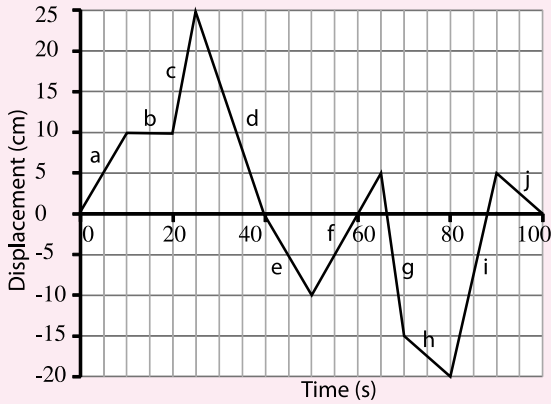
When displacement is on the y -axis, the direction of the displacement is **equal** to the direction of the velocity, unless the gradient has a negative value, in which case the direction of the velocity is **opposite** to the direction of the displacement.

When distance is on the y -axis instead of displacement, the gradient equals **speed** instead of velocity.

10.1 Describe the motions of the object for which the following displacement – time graphs have been constructed.



10.2 For the graph below, calculate the velocity for each labeled section a – j.



10.3 Considering the graph below:

- (a) Between which times is the velocity most negative? Calculate the velocity between these times.
- (b) Between which times is the velocity most positive? Calculate the velocity between these times.
- (c) Between which times is the speed highest? Calculate the speed between these times.
- (d) Between which times is the speed lowest? Calculate the speed between these times.

