# Chapter 2_Kinematics graphs

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↳ Distance-time graphs
↳ Displacement-time graphs
↳ Velocity-time graphs
↳ Speed-time graphs
↳ Acceleration-time graph

misconception! ~~only straight line graph~~ straight line (uniform) and curved (non-uniform) graphs

**Keywords:**
- Gentler
- Steeper
- Motion of object

scalar quantity: only magnitude

**Distance-time graph:**
↳ Graph is always sloping upwards (object is moving) or is a horizontal line (object is at rest)
↳ Graph can NEVER slope downwards as distance travelled can only increase
↳ Gradient of distance-time graph = Speed
↳ The larger the gradient, the higher the magnitude of the speed of the object
↳ The smaller the gradient, the lower the magnitude of the speed of the object

vector quantity: Both magnitude and direction

**Displacement-time graph**
↳ Upward graph --> positive gradient --> Object is travelling in positive direction
↳ Downward graph --> Negative gradient --> Object is travelling in negative direction
↳ Horizontal line graph --> zero gradient --> Object is at rest
↳ Curved graph --> Non-uniform gradient --> non-uniform velocity
↳ Gradient of displacement-time graph: velocity
↳ same concept as distance-time graph
↳ Graph can slope downwards unlike distance-time graph

vector quantity

**Velocity-time graph:**
↳ Area under the graph = Displacement travelled by object
↳ Horizontal line graph --> constant/Uniform velocity --> zero acceleration
↳ Linear line graph --> Increasing/Decreasing velocity --> constant acceleration/deceleration
↳ Non-linear line graph --> Non-uniform velocity --> Non-uniform acceleration
↳ Decreasing acceleration ≠ Deceleration
↳ Acceleration: Object is speeding up --> Upward graph
↳ Deceleration: Object is slowing down --> Downward graph
↳ Gradient of velocity-time graph = Acceleration
↳ steeper graph --> higher acceleration
↳ Gentler graph --> Lower acceleration
*Draw tangent line to determine magnitude of gradient
*Deceleration = Negative acceleration = Negative gradient

} Commonly tested!

**Acceleration-time graph**
↳ Area under the graph = Velocity of object
↳ Horizontal line graph --> Constant/Uniform acceleration
↳ Linear graph --> Uniform increase/decrease in acceleration
↳ Non-linear graph --> Non-uniform increase/decrease in acceleration

} Important!

*Formula:

$$a = \frac{v-u}{t}$$

v: Final velocity
u: Initial velocity
t: time taken