**11A Functions of Time**



1. A body moves in a straight line, such that its displacement, metres, from a point O at time seconds is given by for
2. Find the value of when
3. Find the time taken for the body to return to O.
4. A toy train travels along a straight track, leaving the start of the track at time . It then returns to the start of the track. The distance, metres, from the start of the track at time seconds is modelled by:

where

Explain why there is a time restriction on this model

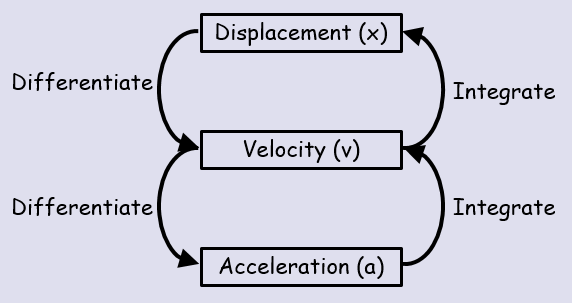
1. A body moves in a straight line such that its velocity, , at time seconds is given by:

for

Find:

1. The initial velocity
2. The values of t when the body is instantaneously at rest
3. The value of t when the velocity is 64ms-1
4. The greatest speed of the body in the interval

**11B Differentiating between x, v, a**



1. A particle P is moving along the x-axis. At time t seconds, the displacement x metres from O is given by:

Find:

1. The speed of P when t = 3
2. The value of t for which P is instantaneously at rest
3. The magnitude of acceleration when t = 1.5

**11C Maxima & Minima**

1. A child is playing with a yo-yo. The yo-yo leaves the child’s hand at time and travels vertically in a straight line before returning to the child’s hand. The distance in metres, of the yo-yo from the child’s hand after time seconds is given by:

1. Justify the restriction
2. Find the maximum distance of the yo-yo from the child’s hand, to 3sf

**11D Integrating between x, v, a**

1. A particle is moving on the x-axis. At time , the particle is at the point where . The velocity of the particle at time t seconds () is . Find:
2. An expression for the displacement of the particle from O at time t seconds
3. The distance of the particle from its starting point when
4. A particle travels in a straight line. After seconds its velocity, , is given by . Find the distance travelled by the particle in the third second of its motion.

**11E Deriving SUVAT**

1. A particle moves in a straight line with constant acceleration, . Given that its initial velocity is and its initial displacement is 0m, prove that:
2. The particle’s velocity at time seconds is given by
3. The particle’s displacement, , at time t is given by