

#### Kinematic

Displacement s(t)Velocity v(t) = s'(t)Acceleration a(t) = v'(t)

## **Key words**

At rest or change direction: v(t) = 0

Constant velocity: a(t) = 0

v(t)	Meaning
= 0	At rest
> 0	Moving to the right
< 0	Moving to the left

#### IBDP Mathematics (SL) Kinematic



1. A particle moves in a straight line with position given by $s(t)=t^3-3t+1$ , where $t$ is the time in seconds, $t\geq 0$ . Find the velocity of the particle at $t=1$ .	Learning
2. The velocity v $ms^{-1}$ of a particle after t seconds is given by v(t) = $(0.1t + 0.5)^2 - 4$ . Find the value of $t$ when the accelera is 0.9.	tion



### Paper 1

- 1. In this question, you are given that  $\cos\frac{\pi}{3}=\frac{1}{2}$  and  $\sin\frac{\pi}{3}=\frac{\sqrt{3}}{2}$ . The displacement of an object from a fixed point, O is given by  $s(t)=t-\sin 2t$  for  $0\leq t\leq \pi$ .
- (a) Find s'(t). In this interval, there are only two values of t for which the object is not moving. One value is  $t=\frac{\pi}{6}$ .
- (b) Find the other value.
- (c) Show that s'(t) > 0 between these two values of t.
- (d) Find the distance travelled between these two values of t.



# Paper 2

1. The population of deer in an enclosed game reserve is modelled by the function $P(t) = 210 \sin(0.5t - 2.6) + 990$ , where t is in months, and $t = 1$ corresponds to 1 January 2014.
(a) Find the number of deer in the reserve on 1 May 2014.
(b) (i) Find the rate of the deer population on 1 May 2014.
(ii) Interpret the answer to part (i) with reference to the deer population size on 1 May 2014.