

## 參數方程式

For  $t \geq 0$ , a particle is moving along a curve so that its position at time  $t$  is  $(x(t), y(t))$ . At time  $t = 2$ , the particle is at position  $(1, 5)$ . It is known that  $\frac{dx}{dt} = \frac{\sqrt{t+2}}{e^t}$  and  $\frac{dy}{dt} = \sin^2 t$ .

- Is the horizontal movement of the particle to the left or to the right at time  $t = 2$ ? Explain your answer. Find the slope of the path of the particle at time  $t = 2$ .
- Find the  $x$ -coordinate of the particle's position at time  $t = 4$ .
- Find the speed of the particle at time  $t = 4$ . Find the acceleration vector of the particle at time  $t = 4$ .
- Find the distance traveled by the particle from time  $t = 2$  to  $t = 4$ .

位置函數  $X(t) = (x(t), y(t))$ , velocity  $v(t) = (x'(t), y'(t))$

Speed =  $\sqrt{(x'(t))^2 + (y'(t))^2}$ , acceleration =  $(x''(t), y''(t))$ ,

distance =  $\int \sqrt{(x'(t))^2 + (y'(t))^2} dt$

ANS (a) the particle is moving to the right at  $t=2$ ; 3.055

(b) 1.253 (c) speed=0.575, acceleration=(-0.041, 0.989)

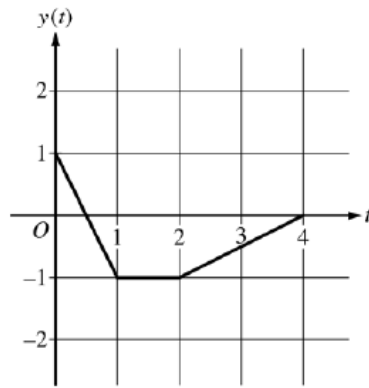
(d) 0.651 2012BC

## 習作

At time  $t \geq 0$ , a particle moving along a curve in the  $xy$ -plane has position  $(x(t), y(t))$  with velocity vector  $v(t) = (\cos(t^2), e^{0.5t})$ . At  $t = 1$ , the particle is at the point  $(3, 5)$ .

- Find the  $x$ -coordinate of the position of the particle at time  $t = 2$ .
- For  $0 < t < 1$ , there is a point on the curve at which the line tangent to the curve has a slope of 2. At what time is the object at that point?
- Find the time at which the speed of the particle is 3.
- Find the total distance traveled by the particle from time  $t = 0$  to time  $t = 1$ .

ANS (a) 2.557 (b) 0.840 (c) 2.196 (d) 1.595 2015BC



At time  $t$ , the position of a particle moving in the  $xy$ -plane is given by the parametric functions  $(x(t), y(t))$ , where  $\frac{dx}{dt} = t^2 + \sin(3t^2)$ . The graph of  $y$ , consisting of three line segments, is shown in the figure above.

At  $t = 0$ , the particle is at position  $(5, 1)$ .

- Find the position of the particle at  $t = 3$ .
- Find the slope of the line tangent to the path of the particle at  $t = 3$ .
- Find the speed of the particle at  $t = 3$ .
- Find the total distance traveled by the particle from  $t = 0$  to  $t = 2$ .

ANS (a)  $(14.377, -0.5)$  (b)  $0.05$  (c)  $9.969$  (d)  $4.350$  2016BC