

10

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

A particle P is moving along a straight line. At time t seconds ($t \geq 0$) the displacement,

s metres, of P from a fixed point O on the line is given by $s = \sqrt{3} \sin \frac{1}{2}t + \cos \frac{1}{2}t$

(a) Find the exact value of s when $t = \frac{\pi}{3}$ (2)

(b) Find the exact value of t when P first passes through O . (4)

The velocity of P at time t seconds is v m/s.

(c) Find an expression for v in terms of t . (2)

(d) Show that $v = \cos\left(\frac{\pi}{6} + \frac{1}{2}t\right)$ (2)

(e) Find the exact value of t for which $v = \frac{1}{2}$ when

(i) $0 \leq t < 2\pi$

(ii) $2\pi \leq t < 4\pi$ (4)





This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

TOTAL FOR PAPER IS 100 MARKS