10. Acceleration is defined as the rate of change of velocity.
An object is travelling in a straight line. The velocity, \( v \) m/s, of this object, \( t \) seconds after the start of the motion, is given by \( v(t) = 8\cos(2t - \frac{\pi}{2}) \).

(a) Find a formula for \( a(t) \), the acceleration of this object, \( t \) seconds after the start of the motion.

(b) Determine whether the velocity of the object is increasing or decreasing when \( t=10 \).

(c) Velocity is defined as the rate of change of displacement.
Determine a formula for \( s(t) \), the displacement of the object, given that \( s(t)=4 \) when \( t=0 \).

Answers

(a) \[ a(t) = -16\sin(2t - \frac{\pi}{2}) \]

(b) \( a(10) > 0 \) therefore increasing

(c) \[ s(t) = 4\sin\left(2t - \frac{\pi}{2}\right) + 8 \]