Q- The displacement of a wave traveling in the negative *y*-direction is $D(y, t)$ = (5.0 cm) sin (5.5*y* + 74*t*), where *y* is in m and *t* is in s. What are each for the following of this wave?
(a) Frequency
(b) Wavelength
(c) Speed

The equation of a wave traveling in negative y direction is given by

$$D(y,t) = A\sin(Ky + \omega t)$$

Here A is the amplitude of wave, K is the wave number given by $\dfrac{2\pi}{\lambda}$ and ω is the angular frequency.

Comparing the equation with the given equation we get

A = 5.0 cm, K = 5.5 m^{-1} and ω = 74 rad/s

(a) Frequency

The frequency of the wave is given by

$$n = \frac{\omega}{2\pi} = \frac{74}{2*3.14} = 11.78 \text{ Hz}$$

(b) Wavelength

The wavelength is given by

$$\lambda = \frac{2\pi}{K} = \frac{2*3.14}{5.5} = 1.14m$$

(c) Speed

The speed of a wave in the medium is given by

$$c = n*\lambda = 11.78*1.14 = 13.43 \text{ m/s}$$