PHY1106: Waves and Oscillators	Dr. Pete Vukusic

Lecture 13.

Lecture objectives.

- To recognise and understand that the wave equation for classical dispersionless waves is $$\frac{\partial^2 A}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 A}{\partial t^2}$$
- To appreciate that its general solution is $A(x,t) = f(vt \pm x)$ where *v* is the *phase velocity*.
- To understand that small-amplitude waves on strings satisfy this wave equation, with a phase velocity of;
- To be familiar with the wave equation derivation for waves on a string.

$$v = \sqrt{\frac{T}{\rho}}$$

Post-lecture tasks.

- Complete the following past paper question:

A transverse wave on a string with linear density r = 0.1 kg m^{-1} is given by;

$$y = (0.03\ \text{m}) \sin [\ (32\ \text{s}^{-1})\ t - (7.5\ \text{m}^{-1})\ z\ ]$$

where m and s indicate the units of the numerical quantities.
For this wave calculate or state:
(a) the frequency
(b) the wavelength
(c) the phase velocity
(d) the largest transverse speed reached by each point on the string
(e) the tension of the string *T*
(f) the wave direction.