Resonance, Superposition and Standing Waves (Teacher)

1. Define resonance.

   Resonance is when one object causes another to vibrate at its natural frequency and results in a dramatic increase in the amplitude of the resultant vibrations.

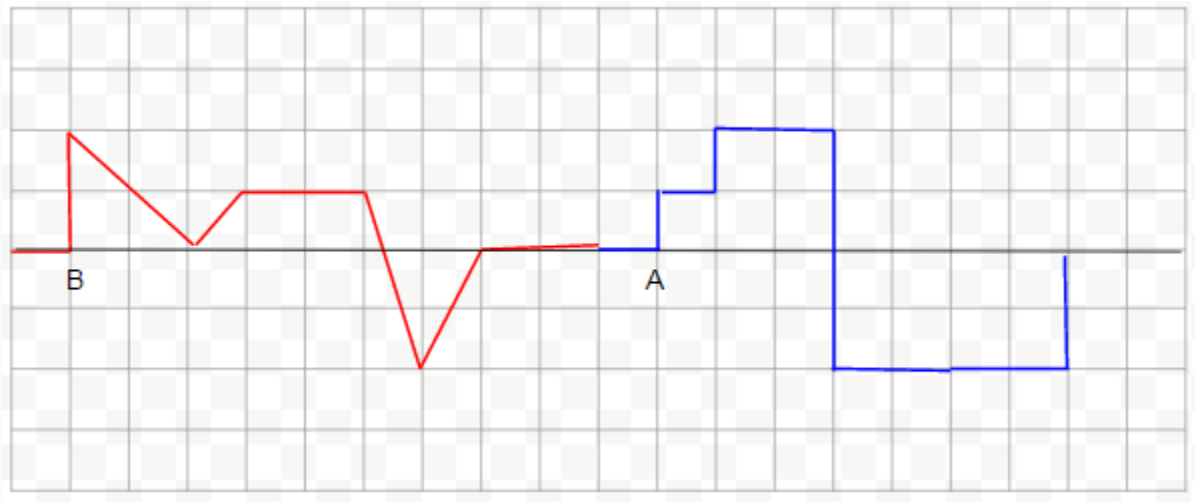
2. Describe an example of mechanical resonance.

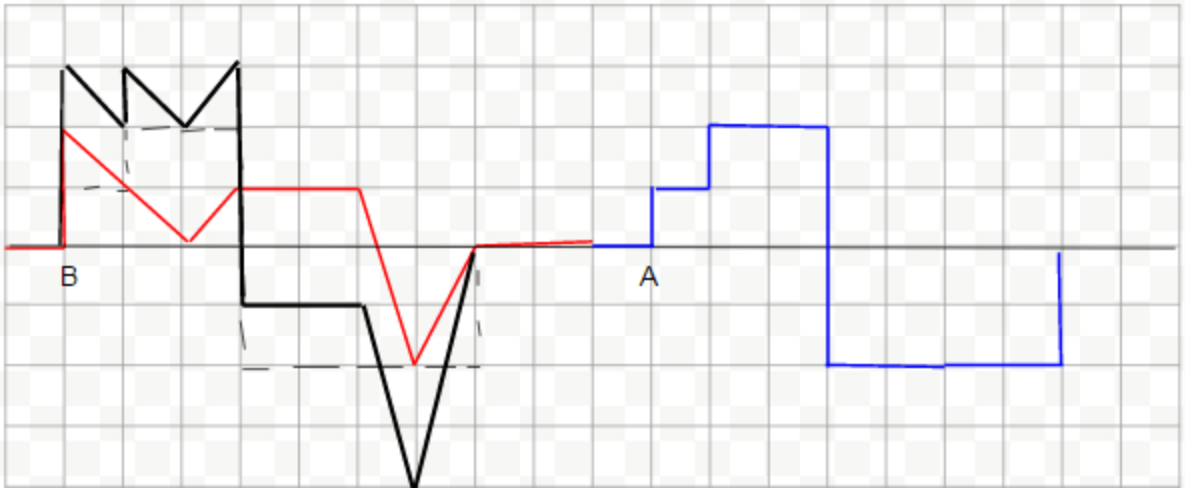
   Many examples

3. Define the Principle of Superposition.

   When two waves are travelling in a medium, as they interfere with each other, the resultant displacement of the medium is the algebraic sum of the displacements of the individual waves.

4. Imagine two waves travelling in opposite directions in a spring. With a dashed line, draw the wave coming from the right side so that point B coincides with point A. Draw with a heavy solid line the resulting superposition of the two waves.





5. a) A standing wave has 4 nodes and is 3.0 m long. The wave speed is 100 cm/s. What is λ? What is f?

$3.0\ m\ =\ 1.5\ \lambda$

$2.0\ m\ =\ \lambda$

$v = \lambda f$

$0.100\frac{m}{s} = (2.0\ m)f$

$0.050\ Hz = f$

b) How many nodes for in a standing wave with a wavelength of 2.0 m in a rope in a 10m rope?

5 λ = 10 m

11 nodes