Alvl P2: SHM (ch11) Cheat Sheet

by MostAncientDream via cheatography.com/168994/cs/42401/

basics

conditions:
- force/acceleration is proportional to and in the opposite direction to the displacement

$a = w^2x$

> amplitude: max displacement from equilibrium

$a_{max} = w^2A$

> displacement at any point:

$x = Acos(2pi.ft)$ (rads)

> velocity at any point:

$v = +- 2pi.f(A^2-x^2)^{1/2}$

$v_{max} = 2pi.fA = wA$ (at equilibrium)

resonance and vibrations

when frequency of external driving force F matches natural frequency
it is 90' out of phase with each other
free vibrations- frequency a system tends to vibrate at in a vibration is called the natural frequency
forced vibrations- a driving force causes systems to vibrate at a different frequency

damping

when external force opposes motion/opposite direction of v
- this occurs when energy is transferred out of the system adn the total energy is no longer being constant

main types of damping:
1. **light dampening** where the oscillations are damped slowly eg. air resistance/friction
2. **heavy damping** where the oscillations still continue but are brought to a stop more quickly
3. **critical damping** involves stopping oscillations in the quickest time possible
4. **overdamping** caused when the force is too great and stops the oscilations but takes longer to return to equilibrium position

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