

AS Mathematics- Mechanics 1

Chapter 1: Mathematical Models in Mechanics

Common models and modeling assumptions needed to know:

Particle: The mass of it can be concentrated at a single point. The fact that it has not dimensions means we can ignore any forces that are acting on it.

Rod: The mass of it is distributed along a straight line and it is rigid (so does not bend or buckle).

Lamina: The mass of it is distributed across a flat surface (for example a sheet of paper or metal).

Uniform body: The mass of an object is evenly distributed over its entire volume (not a sharpened pencil).

Light object: an object that has a small mass in comparison to other objects (sometimes 0). Strings and pulleys are often said to be light.

Inextensible string: If a string does not stretch under a load (it is inelastic).

Smooth surface: There is no friction between the surface and the object that is moving along it.

Rough surface: There is friction between the surface and the object that is moving along it.

Wire: A rigid thin length of metal, which is one-dimensional.

Smooth and light pulley: Pulleys are **smooth** (there is not friction at the between the pulley and the string) and **light** (the pulley has 0 mass).

Bead: A particle which can be threaded into and freely move along a wire or string.

Peg: A support from which a object can be dropped or on which an object can rest (can be rough or smooth).

Wind: Unless otherwise told, you can ignore any effects due to wind in your models.

Gravity: The force of attraction between all forces with mass. Gravity acts downwards with constant acceleration 9.8m/s^2 . If you use this approximation to two significant figures in your explanation, you will need to use the same degree of accuracy in your answer.

Normal reaction: the force that acts perpendicular to a surface when an object is in contact with the surface.

Friction: the force that opposes the motion between two rough surfaces.

Tension: the force acting on an object that is being pulled along by a string.

Compression/thrust: the force acting on the object, when it is pushed along using a light rod.

Resistance: the force experienced when an object is moving through air or fluid due to friction between the object and air or fluid.

Coefficient of friction: roughness of a surface. The rougher a surface the larger the coefficient of friction is. For smooth surface there is no friction so coefficient of friction=0.