**Physics Topic 5: Forces**

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| **Definitions** | | | **Equations** | | | |
| 1 | **Vector** | A quantity that has both size and direction. | 1 | force applied to a spring = spring constant x extension | | *F = k e* |
| 2 | **Scalar** | A quantity that has size only. | 2 | distance travelled = speed x time | | *s = v t* |
| 3 | **Weight** | The force of gravity acting on an object. | 3 | weight = mass x gravitational field strength (g) | | *W = m g* |
| 4 | **Mass** | The amount of matter an object is made of. | 4 | resultant force = mass x acceleration | | *F = m a* |
| 5 | **Work done** | The amount of energy transferred. | 5 | Work done = foce x distance moved | | *W = F s* |
| 6 | **Elastic deformation** | When an object can return to its original shape after being stretched or compressed. | 6 |  | |  |
| 7 | **Limit of proportionality** | The point at which the extension of a spring stops increasing in proportion with force. | 7 | Momentum = mass x velocity  **(HT only)** | | *ρ = m v* |
| 8 | **Distance** | How much ground an object has covered during its motion (scalar). | **Diagrams** | | | |
| 9 | **Displacement** | How far an object is from its starting position (vector). | Distance-Time Graph    **Gradient = speed** | | Velocity – Time Graph    **Gradient = acceleration**  **Area under graph = distance travelled** | |
| 10 | **Acceleration** | The rate of change of velocity. |
| 11 | **Terminal velocity** | The maximum speed an object can fall at (when air resistance balanced with weight). |
| 12 | **Inertial mass**  **(HT only)** | How difficult it is to change the velocity of an object. (Ratio of force over acceleration). |
| 13 | **Thinking distance** | The distance travelled while reacting to a hazard. |
| 14 | **Braking distance** | The distance travelled between applying the break and stopping. |
| 15 | **Stopping distance** | The combined thinking and braking distance. | The **reaction force** is equal and opposite to the weight of an object when resting on a flat surface. | | **Hooke’s Law**  The extension of an elastic object is directly proportional to the force applied, provided its limit of proportionality is not exceeded. (*F=ke*) | |
| 16 | **Spring constant** | A number that indicates the stiffness of a spring (bigger number = stiffer spring). |
| 17 | **Inertia (HT only)** | The tendency of objects to continue in their state of rest or of uniform motion. |
| **Newton’s Laws** | | |
| 1 | An object will continue at constant speed and direction unless acted on by a force. | |
| 2 |  | |
| 3 | Whenever two objects interact, the forces they exert on each other are equal and opposite. | |