

P7-8: Energy and forces and their effects

Lesson sequence

1. Work and power
2. Contact and non-contact forces
3. Vector diagrams (HT)

1. Work and power

*Energy	The capacity to do work.
*Joules	The units of energy, symbol = J.
*Kilojoules	1000 J, symbol = kJ.
*Work done	The energy transferred by a force.
*Calculating work done	Work done = force x distance $E = F \times d$ Work done = joules Force = newtons Distance = metres
*Power	The rate of energy transfer.
*Watts, W	The unit of power: 1 W = 1 joule per second
*Calculating power	Power = work done / time $P = E / t$ Power = watts Work done = joules Time = seconds

2. Contact and non-contact forces

*Contact force	A force that acts when two objects touch.
*Contact force examples	Normal force, normal reaction force, friction, upthrust, air resistance.
*Non-contact force	A force that acts at a distance.
*Non-contact force examples	Gravity, magnetism, electrostatic force.

*Action-reaction forces	If, A applies an action force to B, B applies a reaction force of same size and opposite direction to A.
**Force field	The area around an object where its force can affect other objects.
**Magnetic field	The area of magnetic force around a magnet.
**Electric field	The area of electrostatic force around an object charged with static electricity.
*Vectors	Arrows that show size and direction.

3. Vector diagrams (HT)

***Free body diagram	A diagram showing all the forces on an object.
***Vector diagram arrows	Arrows showing the size and direction of a force – must be drawn to scale.
***Scale diagram	Diagram drawn on graph paper to find the size of forces.
**Resultant force	The force left over when forces acting in opposite directions are cancelled out.
***Resultant force diagram	Draw correct arrows for two forces, add lines to make a parallelogram. Resultant force = the diagonal of the parallelogram.
***Resolving forces	Breaking a force up into its horizontal and vertical components.
***Component forces	The vertical and horizontal forces that a diagonal force is made from.
***Resolving forces diagram	Draw a correct force arrow, add arrows for vertical and horizontal component forces.

