

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

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| *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 | <p>Work done = force x distance $E = F \times d$</p> <p>Work done = joules Force = newtons Distance = metres</p> |
| *Power | The rate of energy transfer. |
| *Watts, W | The unit of power: 1 W = 1 joule per second |
| *Calculating power | <p>Power = work done / time $P = E / t$</p> <p>Power = watts Work done = joules Time = seconds</p> |

2. Contact and non-contact forces

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| *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. |

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| *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)

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| ***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. |

