

KS3 Physics

Energy

1. What is the energy value of a food?
2. What unit is used to measure the energy value of food?
3. How can food labels be used to compare the energy values of different foods?
4. What does kJ stand for?
5. What does a higher energy value on a food label mean?
6. What is power?
7. What unit is used to measure power?
8. What does W stand for?
9. What does kW stand for?
10. How can the power ratings of two appliances be compared?
11. What does a higher power rating mean for an appliance?
12. What is the difference between energy and power?
13. What units can be used to measure the amount of energy transferred?
14. What does J stand for?
15. What does kWh stand for?
16. How can the amount of energy transferred by two appliances be compared?
17. What is a domestic fuel bill?
18. What information can be found on a domestic fuel bill?
19. How does the amount of fuel used affect the cost of a fuel bill?
20. What factors affect the cost of using a domestic fuel?
21. What is a fuel?
22. What is an energy resource?
23. What is a renewable energy resource?
24. What is a non-renewable energy resource?
25. What are the main differences between renewable and non-renewable energy resources?

Energy changes and transfers

1. What is a simple machine?
2. How can a simple machine produce a bigger force?
3. What happens to the movement when a simple machine produces a bigger force?

4. What happens to the force when a simple machine produces a bigger movement?
5. What does it mean when the product of force and displacement is unchanged?
6. What causes thermal energy to transfer between two objects?
7. In which direction does thermal energy transfer between two objects at different temperatures?
8. What is thermal equilibrium?
9. What happens to the temperature difference between two objects as they reach thermal equilibrium?
10. What is conduction?
11. How does conduction transfer energy?
12. What is radiation?
13. What is convection?
14. What is an insulator?
15. How do insulators reduce energy transfer?
16. How is energy transferred when an object's motion changes?
17. How is energy transferred when an object is dropped?
18. How is energy transferred when an electrical circuit is completed?
19. How is energy transferred when a spring is stretched?
20. How is energy transferred during the metabolism of food?
21. How is energy transferred when a fuel burns?
22. What happens to the temperature of an object when it gains thermal energy?
23. What happens to the temperature of an object when it loses thermal energy?
24. How does heating transfer energy from a hotter object to a cooler object?
25. Why does thermal energy transfer tend to reduce the temperature difference between objects?

Changes in systems

1. What is energy?
2. What does it mean to say that energy can be measured?
3. What happens to the total amount of energy during a change?
4. What happens to the energy of a moving object when it speeds up?
5. What happens to the energy of an object when its temperature increases?
6. What happens to an object's energy when it is raised higher?
7. What happens to the energy stored in a spring when it is stretched?
8. What happens to energy stored in a fuel when the fuel burns?
9. What should be compared to describe the energy changes in a system?
10. What physical processes can cause energy to be transferred or changed?

Motion and forces

Describing motion

1. What is speed?
2. What is the equation for speed?
3. What unit is speed usually measured in?
4. What is distance?
5. What unit is distance usually measured in?
6. What is time?
7. What unit is time usually measured in?
8. How is average speed calculated?
9. A car travels 120 m in 10 s. What is its average speed?
10. A cyclist travels at 8 m/s for 15 s. How far does the cyclist travel?
11. What happens to average speed if the same distance is travelled in less time?
12. What happens to average speed if more distance is travelled in the same time?
13. What is a distance-time graph?
14. What does the gradient of a distance-time graph represent?
15. What does a horizontal line on a distance-time graph show?
16. What does a straight sloping line on a distance-time graph show?
17. What does a steeper line on a distance-time graph show?
18. What does a curved line on a distance-time graph show?
19. How can a distance-time graph be used to describe a journey?
20. How can the speed of an object be found from a distance-time graph?
21. What is meant by relative motion?
22. Why can two moving vehicles appear to move relative to each other?
23. How do two vehicles travelling in the same direction move relative to each other?
24. How do two vehicles travelling in opposite directions move relative to each other?
25. Why do two vehicles travelling towards each other appear to approach each other faster?

Forces

Forces and their effects

1. What is a force?
2. What can a force do to an object?
3. How do forces arise between two objects?
4. What is a push?

5. What is a pull?
6. What is a force arrow used to show?
7. What does the direction of a force arrow show?
8. How can forces acting in one dimension be added together?
9. What are balanced forces?
10. What are forces measured in?
11. What happens when the forces acting on an object are balanced?
12. What happens when the forces acting on an object are unbalanced?
13. What is a moment?
14. What is meant by the turning effect of a force?
15. What is a pivot?
16. How does the distance from a pivot affect the turning effect of a force?
17. What is deformation?
18. How can a force cause an object to deform?
19. What happens when an object is stretched?
20. What happens when an object is squashed?
21. What is friction?
22. How does friction affect moving objects?
23. What happens when an object pushes through air or water?
24. What is air resistance?
25. What is water resistance?

Springs, energy and non-contact forces

1. What unit is force measured in?
2. What is extension?
3. How is the extension of a spring calculated?
4. What is compression?
5. What happens to the extension of a spring when the force increases?
6. How can the extension of a spring be measured?
7. What is a force-extension relationship?
8. What does a straight-line force-extension relationship show?
9. What is Hooke's Law?
10. What happens when a spring is stretched beyond its limit of proportionality?
11. What is work done?
12. What happens to energy when an object is deformed?
13. Where is energy stored when a spring is stretched?
14. What is a non-contact force?
15. What is gravity?
16. How can gravity act between objects that are not touching?
17. How does gravity act on objects near Earth?
18. How does gravity act between objects in space?
19. What is a magnetic force?

20. What happens when two like magnetic poles are brought together?
21. What happens when two unlike magnetic poles are brought together?
22. What is static electricity?
23. What happens when two objects have the same electric charge?
24. What happens when two objects have opposite electric charges?
25. What are three types of non-contact force?

Pressure in fluids

1. What is atmospheric pressure?
2. What causes atmospheric pressure?
3. Why does atmospheric pressure decrease as height increases?
4. What happens to the weight of air above you as height increases?
5. How does the weight of air above you affect atmospheric pressure?
6. What is pressure in a liquid?
7. How does liquid pressure change with depth?
8. Why does liquid pressure increase with depth?
9. What is upthrust?
10. What causes upthrust on an object in a liquid?
11. How does upthrust affect whether an object floats or sinks?
12. What happens when upthrust is greater than the weight of an object?
13. What happens when the weight of an object is greater than its upthrust?
14. What happens when upthrust equals the weight of an object?
15. What is pressure?
16. What is the equation for pressure?
17. What unit is pressure measured in?
18. What unit is force measured in when calculating pressure?
19. What unit is area measured in when calculating pressure?
20. What happens to pressure when the force increases but the area stays the same?
21. What happens to pressure when the area increases but the force stays the same?
22. Why does a sharp object produce a greater pressure than a blunt object?
23. What does it mean for a force to act normally to a surface?
24. How does the contact area affect the pressure produced by a force?
25. How can pressure be calculated from force and area?

Balanced forces

1. What are opposing forces?
2. What is equilibrium?
3. What happens when opposing forces are balanced?
4. What force acts downwards on an object because of gravity?
5. How can a stretched spring support an object?

6. How can a compressed surface support an object?
7. What happens when the upward support force equals the object's weight?
8. Why does an object remain in equilibrium when its weight is balanced?
9. What happens to an object when its weight is greater than the upward support force?
10. What happens to an object when the upward support force is greater than its weight?

Forces and motion

1. What can a force do to an object that is at rest?
2. What can a force do to an object's speed?
3. What can a force do to an object's direction of motion?
4. What happens when a force acts in the same direction as an object's motion?
5. What happens when a force acts opposite to an object's motion?
6. What happens when a force acts at an angle to an object's motion?
7. How does the size of a force affect its effect on an object's motion?
8. How does the direction of a force affect an object's motion?
9. Why is a force needed to make an object start moving?
10. Why is a force needed to make an object stop or change its motion?

Waves

Observed waves

1. What is a water wave?
2. How do water waves travel through water?
3. What type of wave motion do water waves have?
4. What is a transverse wave?
5. What happens when a water wave is reflected?
6. What happens when two waves meet?
7. What is superposition?
8. What happens when two waves add together?
9. What happens when two waves cancel each other?
10. How can reflection and superposition change the appearance of water waves?

Sound waves

1. What is frequency?
2. What unit is frequency measured in?

3. What does a high-frequency sound have compared with a low-frequency sound?
4. What is an echo?
5. How is an echo produced?
6. What happens when sound is reflected?
7. What happens when sound is absorbed?
8. Why does sound need a medium to travel through?
9. What is a medium?
10. Can sound travel through a vacuum?
11. How does the speed of sound in air compare with its speed in water?
12. How does the speed of sound in solids compare with its speed in air?
13. What produces sound?
14. How does a loudspeaker produce sound?
15. How does a microphone detect sound?
16. What happens to a microphone diaphragm when sound reaches it?
17. What part of the ear detects sound vibrations?
18. What type of wave is sound?
19. What is a longitudinal wave?
20. How do particles move in a longitudinal wave?
21. What is the auditory range of humans?
22. How can the auditory range of animals differ from that of humans?
23. Why can some animals hear sounds that humans cannot hear?
24. What happens to sound when it reaches a surface that absorbs it?
25. How can reflected sound be used to produce an echo?

Energy and waves

1. What do pressure waves transfer?
2. What is ultrasound?
3. How can ultrasound be used for cleaning?
4. How can ultrasound be used in physiotherapy?
5. How can waves transfer information?
6. How can a microphone convert sound into an electrical signal?
7. What happens when a sound wave reaches a microphone?
8. What part of a microphone responds to sound vibrations?
9. Why are pressure waves useful for transferring energy?
10. Why are waves useful for transferring information?

Light waves and reflection

1. What is a light wave?
2. How are light waves similar to waves in matter?
3. How are light waves different from waves in matter?
4. Can light waves travel through a vacuum?
5. What is a vacuum?
6. What is the speed of light in a vacuum?
7. Why can light travel through empty space?
8. What happens when light is absorbed by a material?
9. What is absorption of light?
10. What is diffuse scattering of light?
11. What happens to light during diffuse scattering?
12. What is specular reflection?
13. What happens to light during specular reflection?
14. How is diffuse scattering different from specular reflection?
15. What type of surface produces specular reflection?
16. What type of surface produces diffuse scattering?
17. What happens to light when it reaches a material that does not transmit it?
18. What happens to the energy of light when it is absorbed?
19. How does the behaviour of light change when it reaches different materials?
20. What is meant by the transmission of light?
21. What happens when light is transmitted through a material?
22. What happens when light is reflected from a surface?
23. What happens when light is scattered from a surface?
24. How can a surface affect the way light is reflected or scattered?
25. What are the three ways light can interact with a material: absorption, transmission and reflection?

Light rays, lenses and the eye

1. What is a ray model of light?
2. What do arrows on light rays show?
3. How can the ray model be used to show how light travels?
4. How is an image formed in a plane mirror?
5. What happens to light when it reaches a mirror?
6. What is a pinhole camera?
7. How does a pinhole camera form an image?
8. Why is the image formed by a pinhole camera upside down?
9. What is refraction?
10. What happens to a light ray when it passes from one material into another?

11. Why does light change direction when it is refracted?
12. What is a convex lens?
13. What happens to light rays passing through a convex lens?
14. What does it mean when a convex lens focuses light?
15. What is the focal point of a convex lens?
16. How can a ray diagram show the focusing of light by a convex lens?
17. What is the main function of the human eye?
18. What is the function of the cornea?
19. What is the function of the iris?
20. What is the function of the pupil?
21. What is the function of the lens in the eye?
22. What is the function of the retina?
23. What is the function of the optic nerve?
24. How does the eye form an image of an object?
25. How does the eye detect light?

Light, energy and colour

1. How does light transfer energy from a source to an absorber?
2. What is a source of light?
3. What is an absorber of light?
4. What chemical effects can light cause?
5. What electrical effects can light cause?
6. What is a photosensitive material?
7. Where is photosensitive material found in the human eye?
8. What is the role of photosensitive material in the retina?
9. How do cameras use photosensitive materials?
10. What is meant by the colour of light?
11. What is frequency?
12. How are different colours of light related to frequency?
13. What is white light?
14. What colours make up white light?
15. What happens when white light passes through a prism?
16. Why does a prism separate white light into different colours?
17. What is a light filter?
18. How does a coloured filter affect white light?
19. What happens when white light falls on a black object?
20. Why does a black object appear black?
21. Why does a red object appear red?
22. Why does a white object appear white?
23. What happens when light is absorbed by a coloured object?
24. What happens when light is diffusely reflected from a coloured object?
25. Why does an object appear to have a particular colour?

Electricity and electromagnetism

Current electricity

1. What is electric current?
2. What is the unit of electric current?
3. What does an ammeter measure?
4. What is meant by the flow of charge?
5. What is a series circuit?
6. What is a parallel circuit?
7. How does current behave in a series circuit?
8. What happens to current where branches meet in a parallel circuit?
9. What is potential difference?
10. What unit is potential difference measured in?
11. What does a voltmeter measure?
12. What does a battery provide in an electrical circuit?
13. What does a bulb rating tell you?
14. What is resistance?
15. What unit is resistance measured in?
16. What is the relationship between potential difference, current and resistance?
17. How can resistance be calculated from potential difference and current?
18. What is a conductor?
19. What is an insulator?
20. How does resistance differ between conducting and insulating components?
21. Why does an insulator have a high resistance?
22. Why does a conductor have a low resistance?
23. How does current behave when a parallel circuit splits into branches?
24. What happens to the total current when current from branches meet?
25. Why must a complete circuit be present for current to flow?

Static electricity

1. What is static electricity?
2. What happens when two objects are rubbed together?
3. Which particles are transferred when objects are rubbed together?
4. How can an object become negatively charged?
5. How can an object become positively charged?
6. What happens when two objects have the same type of charge?
7. What happens when two objects have opposite charges?
8. How does the force between charged objects depend on their charges?
9. What is an electric field?
10. How can an electric field exert a force on an object without direct contact?

Magnetism

1. What is a magnetic pole?
2. What are the two types of magnetic pole?
3. What happens when two north poles are brought together?
4. What happens when two south poles are brought together?
5. What happens when a north pole and a south pole are brought together?
6. What is a magnetic field?
7. How can a magnetic field be investigated using a compass?
8. What do magnetic field lines represent?
9. What does the direction of magnetic field lines show?
10. How does Earth produce a magnetic field?
11. How can a compass help with navigation?
12. Why does a compass point in a particular direction?
13. What happens around a wire when an electric current flows through it?
14. What is an electromagnet?
15. How can an electromagnet be made stronger?
16. What happens to an electromagnet when the current is switched off?
17. What is a D.C. motor?
18. What is the basic principle of a D.C. motor?
19. How does a magnetic field interact with a current-carrying wire?
20. How can electricity produce movement in a motor?
21. Why are electromagnets useful?
22. How are electromagnets different from permanent magnets?
23. How can a compass be used to detect a magnetic field?
24. What happens to the magnetic field around a wire when the current changes?
25. How are electricity and magnetism linked in an electromagnet?

Matter

Physical changes

1. What is meant by conservation of material?
2. What happens to the mass of a substance when it melts?
3. What happens to the mass of a substance when it freezes?
4. What happens to the mass of a substance when it evaporates?
5. What happens to the mass of a substance when it condenses?
6. What happens to the mass of a substance when it dissolves?
7. What does it mean for a physical change to be reversible?
8. Why can melting and freezing be reversed?
9. Why can evaporation and condensation be reversed?
10. What is sublimation?

11. What happens during condensation?
12. What happens during evaporation?
13. What happens during dissolving?
14. What is density?
15. How does the density of a solid generally compare with the density of a liquid?
16. How does the density of a liquid generally compare with the density of a gas?
17. How are the particles arranged in a solid?
18. How are the particles arranged in a liquid?
19. How are the particles arranged in a gas?
20. What is Brownian motion?
21. What causes Brownian motion in gases?
22. What is diffusion?
23. What causes diffusion in liquids and gases?
24. How does a difference in concentration cause diffusion?
25. What is the difference between a physical change and a chemical change?

Particle model

1. How are particles arranged in a solid?
2. How are particles arranged in a liquid?
3. How are particles arranged in a gas?
4. How does the movement of particles differ between solids, liquids and gases?
5. How does the spacing between particles differ in solids, liquids and gases?
6. How can the particle model explain changes of state?
7. How can the particle model explain why solids keep their shape?
8. How can the particle model explain why liquids can flow and change shape?
9. Why is ice less dense than liquid water?
10. What are atoms and molecules?

Energy in matter

1. What happens to the movement of particles when a substance is heated?
2. What happens to the spacing between particles when a substance is heated?
3. What happens to the movement of particles when a substance is cooled?
4. What happens to the spacing between particles when a substance is cooled?
5. What is internal energy?
6. Where is internal energy stored in a material?
7. How does increasing temperature affect the internal energy of a material?

8. How does decreasing temperature affect the internal energy of a material?
9. How are particle movement and internal energy linked?
10. How can heating a material change its internal energy?

Space physics

1. What is gravity?
2. What is weight?
3. An object has a mass of 6 kg on Earth. What is its weight? Use $g = 10 \text{ N/kg}$.
4. What is the unit of weight?
5. What is the unit of mass?
6. What is the unit of gravitational field strength?
7. What is the gravitational field strength on Earth?
8. Why is an object's weight different on different planets?
9. What is the gravitational force between the Earth and Moon?
10. What is the gravitational force between the Earth and Sun?
11. What is the Sun?
12. What is a star?
13. How does the Sun compare with other stars?
14. What is the Milky Way?
15. What is a galaxy?
16. What is another galaxy?
17. What causes the seasons on Earth?
18. How is the Earth's tilt linked to the seasons?
19. Why is the length of daylight different at different times of the year?
20. Why can day length differ between the Northern and Southern Hemispheres?
21. What happens to day length during summer in the Northern Hemisphere?
22. What happens to day length during winter in the Northern Hemisphere?
23. What is a light year?
24. What does a light year measure?
25. Why is a light year useful for describing distances in space?