Infra red

Q: 1 Why is it best to paint the outside of a metal cooking pot black?

A: Because black is a good absorber of heat. The heat will be used to cook the food.

Infra red

Q: 2 Why does a cooking pot have a lid?

A: To reduce energy loss by convection.

Infra red

Q: 3 Why is a car radiator painted black?

A: Black is a good emitter of heat, the heat is emitted to the surroundings to keep the engine cool.

Infra red

Q: 4 Explain why thermal imaging cameras work better at night than during the day.

A: At night the surroundings are cooler so the surroundings emit less IR radiation than the warm body and this gives a clearer image.

Infra red

Q: 5 What is the name given to heat transfer from particle to particle?

A: Conduction

Infra fed

Q: 6 What name is given to the heat transfer by the movement of hot liquids?

A: Convection

Infra red

Q: 7 Why is the outside of a fire fighter's suit shiny?

A: To reflect heat away from the fire fighter.

Infra red

Q: 8 How is heat transferred through a metal?

A: Free electrons inside the metal gain kinetic energy and collide with the metal ions.

Infra red

Q: 9 Why are radiators painted white and not black?

A: if they were painted black, they would transfer heat too quickly and the water temperature inside the radiator would drop too quickly. The next radiator would then stay cold.

Infra red

Q: 10 How does the Sun transfer heat?

A: Radiation

Infra red

Q: 11 A bag is filled with water and placed in the Sun. What colour should the bag be so that the water can be warmed?

A: Black, as black surfaces are good absorbers and emitters of thermal energy. Heat from the Sun is absorbed and used to heat the water.

Infra red

Q: 12 Which methods of heat transfer are reduced by a vacuum?

A: Convection and conduction as both require particles.

Infra red

Q: 13 which method of heat transfer is reduced by silver surfaces?

A: Radiation; heat is reflected

Infra red

Q: 14 Which methods of heat transfer are reduced by plastic caps?

A: conduction as plastics are good insulators & convection

Infra red

Q: 15 Why does a fridge have a white shiny surface?

A: A white shiny Surface is a poor absorber of heat and reduces heat transfer into the fridge. The heat is reflected instead.

Infra red

Q: 16 How is energy transferred from the base of a sauce pan to the water inside the pan?

A: water particles at the bottom gain energy and move faster; the density of water decreases; hot water rises and is replaced by cold water

Infra red

Q: 17 What is thermal radiation?

A: infra red radiation

Infra red

Q: 18 Why does warm water freeze quicker inside a freezer than cold water?

A: The rate of heat transfer is greater with warm water.

Kinetic theory

Q: 19 why does 1kg of a gas have a larger volume than 1 kg of a solid?

A: There are strong forces of attraction between the particles in a solid holding the particles close together. In a gas the forces are very small so the particles can spread out.

Kinetic theory

Q: 20 Why does the temperature of a liquid decrease as the liquid evaporates?

A: the particles with most energy leave the liquid and the mean energy of the remaining particles decreases so the temperature goes down.

Kinetic theory

Q: 21 Why does sweating cool you down?

A: To evaporate the sweat requires energy which is taken from the skin/body.

Kinetic theory

Q: 22 How can you speed up evaporation?

A: Increase the surface area; use wind/draughts to allow particles with high energy to escape from the liquid

Kinetic theory

Q: 23 Describe the arrangement of particles in solids, liquids and gases.

A: In solids, particles vibrate around fixed positions. In liquids they are arranged in a pattern, in gases they move at high speed in any direction.

Kinetic theory

Q: 24 What is the ideal weather for drying clothes outside?

A: Warm/sunny and windy

Energy

Q: 25 What is a renewable energy source?

A: An energy source that is replaced faster than it can be used.

Energy

Q: 26 Give examples of renewable energy sources.

A: Wind, waves, tides, hydroelectric, biofuel, geothermal, solar

Energy

Q: 27 How does the step-up transformer increase the efficiency of the National Grid?

A: It increases the voltage and decreases the current, therefore reducing energy loss along the cables.

Energy

Q: 28 Explain one effect burning fossil fuels has on the environment.

A: produces greenhouse gases, nitrogen oxides (trigger asthma attacks), sulphur dioxide (leads to acid rain)

Energy

Q: 29 Pumped storage hydroelectric power stations have a short start-up time. Why is this important?

A: to meet surges in demand/ start generating electricity in a short time

Energy

Q: 30 Give an advantage of a pumped storage hydroelectric power station.

A: can store energy for later use/ renewable

Energy

Q: 31 Using mainly wind turbines to supply electricity might cause fluctuations in the electricity supply. Why?

A: wind speeds fluctuate so turbines don't generate electricity at a constant rate

Energy

Q: 32 Between 2002 and 2008 the amount of electricity used in the UK decreased. Suggest why.

A: energy efficient lighting used/ developed; increase in energy costs so people switch off more; 'switch off' campaign raises awareness of environment

Energy

Q:33 Although gas boilers are very efficient, some energy is wasted. What happens to this waste energy?

A: it is transferred to the surroundings, becomes spread out; wasted as sound

Energy

Q: 34 Give a disadvantage of a large scale hydroelectric power station.

A: large areas of land flooded, homes and habitats destroyed

Energy

Q: 35 What is the National Grid?

A: system of cables and transformers

Energy

Q: 36 Why is transferring electricity directly to local homes more efficient than using the National Grid?

A: less energy is wasted as the cables used are shorter

Energy

Q: 37 A solar cell can be used to recharge a mobile phone. Suggest and explain one factor that would affect the charging time.

A: time of day, position of solar cell, angle of solar cell towards Sun, latitude, cloud cover, dust; all cause a change in light intensity

Energy

Q: 38 What are the advantages of using solar cells instead of fossil fuel power stations to generate electricity?

A: no air pollution, free resource, renewable, usable in remote areas, no need to connect to National Grid

Energy

Q: 39 Fitting a new hot water boiler costs £1800 but saves £200 per year. What is the payback time?

A: 9 years

Energy

Q: 40 Explain why using an energy efficient light bulb rather than an ordinary light bulb reduces carbon dioxide emissions.

A: less electricity needs to be generated from power stations, less fossil fuel needs to be burnt

Energy

Q: 41 Give two advantages of burning wood instead of coal.

A: carbon neutral, renewable, conserves fossil fuel reserves

Energy

Q: 42 Why do wood burning stoves have a large surface area?

A: to increase the rate of energy transfer

Energy

Q: 43 Do you agree with the statement that 'replacing old freezers with more energy efficient freezers' benefits the environment?

A: y- less fossil fuels burnt as less electricity needed, so fewer greenhouse gases emitted
n- old freezers must be dumped and there are hazardous chemicals inside them

Energy

Q: 44 How do you reduce energy loss from the loft/ roof?

A: Fibreglass

Energy

Q: 45 How do you reduce energy loss from the walls?

A: Cavity wall insulation such as polystyrene beads

Energy

Q: 46 How do you reduce energy loss from windows?

A: double/ triple glazing

Energy

Q: 47 How do you reduce energy loss from doors?

A: draught excluders

Energy

Q: 48 why are electricity companies selling electricity at night at a lower rate?

A: Supply exceeds demand

Energy

Q: 49 Leaving a 1kW radiator switched on for the same length of time as a 40W lamp is worse for the environment. Why?

A: radiator uses more energy, more electricity is needed, more fossil fuel is burnt, more CO_2 produced

Energy

Q: 50 What is meant by the word efficient?

A: most input energy is usefully transformed

Energy

Q: 51 Give examples of stored energy.

A: gravitational, elastic, chemical

Energy

Q: 52 Why must the total energy input equal the total energy output?

A: energy cannot be created or destroyed

Energy

Q: 53 Name the useful and wasted energy output from a hair dryer.

A: useful thermal and kinetic and wasted sound energy

Energy

Q: 54 Name the useful and wasted energy output from a TV.

A: useful sound and light, wasted thermal

Energy

Q: 55 what does it mean to decommission a nuclear power station?

A: remove radioactive waste/ fuel- very expensive process

Energy

Q: 56 How could companies reduce CO_2 emissions?

A: use more nuclear power, use more renewable energy sources, use carbon capture technology

Energy

Q: 57 Give the advantages of using nuclear power.

A: little fuel needed for a large amount of energy released (concentrated source of energy), continuous process, no greenhouse gas emissions

Energy

Q: 58 give advantages and disadvantages of tidal power generating systems.

A: renewable, calms coastal waters, low running costs, no air pollution but high installation costs, time dependent, disturbs coastal habitats

Energy

Q: 59 Give advantages and disadvantages of wind power.

A: renewable, no air pollution, leave land undamaged when removed but unsightly and noisy, require large areas of land as many turbines are needed

Waves

Q: 60 List the EM waves from longest to shortest wave length.

A: radio, micro, IR, visible, UV, X-Ray, gamma

Waves

Q: 61 State one difference between UV and visible light.

A: UV has a higher frequency, shorter wavelength, has more energy

Waves

Q: 62 What does redshift tell scientists about galaxies?

A: that they are moving away from Earth

Waves

Q: 63 Why is the redshift not the same for all galaxies?

A: galaxies are moving away from Earth at different speeds

Waves

Q: 64 What does redshift suggest about the Universe?

A: that it is expanding

Waves

Q: 65 What happens when a metal aerial absorbs radio waves?

A: it creates an alternating current with the same frequency as the radio wave

Waves

Q: 66 Why would an X-ray telescope placed on Earth not be able to detect X-rays emitted from distance stars?

A: X-rays cannot penetrate the atmosphere

Waves

Q: 67 Give an example of IR being used for communication.

A: TV, remote controls, optical fibres, remote control, thermal imaging

Waves

Q: 68 Give the difference between transverse and longitudinal waves.

A: oscillations are perpendicular to the direction of energy transferred for transverse waves but parallel for longitudinal waves

Waves

Q: 69 Why can you hear but not see the TV in another room?

A: light waves will not diffract but sound waves will because the width of the door is similar to the wavelength of the sound wave.

Waves

Q: 70 Why do thermal imaging cameras work better at night than during the day?

A: at night the surroundings are cooler so they emit less IR than a person; the difference in IR emitted is larger

Waves

Q: 71 Give two properties of all EM waves.

A: Travel at the same speed, transfer energy, travel through a vacuum, can be reflected, refracted, diffracted, absorbed, are transverse, travel in straight lines

Waves

Q: 72 What is the property of microwaves that allows them to be used for satellite communications?

A: They can pass through the ionosphere.

Waves

Q: 73 An image in the mirror is virtual. Why?

A: Image is formed by imaginary rays crossing; formed behind the mirror

Waves

Q: 74 if microwaves are absorbed by a tennis ball, what effect do the microwaves have on the ball?

A: Make it hotter

Waves

Q: 75 How does red shift provide evidence for the Big Bang theory?

A: Redshift of distant galaxies is greater which means that the further apart galaxies are the faster they are moving away from each other; relationship is proportional, so must have started at same point.

Waves

Q: 76 Compare a quiet and low pitch sound to a loud and high pitch sound.

A: Low pitch has longer wavelength and lower frequency/ Quieter sound has lower amplitude

Waves

Q: 77 What is cosmic background radiation?

A: Microwave noise that reaches Earth from many stars and galaxies; radiation created just after the Big Bang

Waves

Q: 78 How do you calculate wave speed?

A: wave speed (m/s) = frequency (Hz) x wavelength (m)

Waves

Q: 79 Describe the Big Bang theory.

A: Universe started in one place; huge explosion took place and sent matter outwards; Universe has been expanding ever since.

Waves

Q: 80 What is the Universe?

A: An innumerable collection of galaxies

Waves

Q: 81 What is redshift?

A: light moves towards the red end of the spectrum

Waves

Q: 82 Describe how the sound changes when a car drives past you.

A: car drives towards you: wavelength shortens and frequency increases
Car drives away from you: wavelength lengthens and frequency decreases

Waves

Q: 83 Why do scientists use X-ray, gamma ray and microwave telescopes to observe the Universe?

A: stars emit different types of EM radiation

Waves

Q: 84 How is the wavelength of CMBR likely to change over the next billion years?

A: increase as Universe continues to expand

Waves

Q: 85 What is the Doppler effect?

A: change in wavelength and frequency when the source of waves or observer moves (relative to each other)

Waves

Q: 86 Give one example of microwaves being used for communications.

A: Mobile phone/satellite communications

Waves

Q: 87 What are the dangers of IR, UV and micro wave radiation?

A: IR- skin burns
UV- skin burns, skin cancer
Microwaves- burns, cancer

Waves

Q: 88 Give a use of radio waves.

A: TV broadcasting, mobile phone communications

Waves

Q: 89 Describe an image formed in the mirror.

A: virtual and upright, same distance behind the mirror as object is in front of the mirror

Waves

Q: 90 What is refraction?

A: when light travels from one medium to another, it changes direction because it's speed has changed; this is due to the density of the medium having changed

Waves

Q: 91 What are sound waves caused by?

A: vibrations

Waves

Q: 92 How can you reduce the amount of noise transmitted through walls? Why does the method work?

A: panel the walls with wood or plaster or similar so the sound is reflected back or absorbed

Waves

Q: 93 What is diffraction?

A: the spreading of waves when they pass through a gap or around the edges of an obstacle which has a similar size as the wavelength of the wave

Waves

Q: 94 How do microwaves heat food?

A: microwaves are absorbed by the water inside the food, the water heats the food

Waves

Q: 95 What does the term frequency mean?

A: number of waves per second

Waves

Q: 96 What do the words compression and rarefaction mean?

A: compression is squeezing together, rarefaction is stretching apart

Kinetic theory

Q: 97 Why does the mirror get misty when you have a hot shower?

A: water evaporates and goes into the air, mirror is colder than the air, water particles hit mirror and lose energy, condensation is caused

Energy

Q: 98 How does a vacuum flask keep the liquid inside hot?

A: plastic cap is poor conductor & stops evaporation of hot liquid as particles cannot escape; stops convection currents so no heat loss by convection; vacuum prevents heat loss by conduction & convection as both require particles; silver lining to reflect IR back inside the flask and reduce heat loss by radiation

Energy

Q: 99 Why do arctic foxes have small ears?

A: ears have a small surface area so reduce heat loss

Waves

Q: 100 What is the law of reflection?

A: angle of incidence = angle of reflection

Energy

Q: 101 Why is foam a good insulator?

A: air cannot circulate inside foam as the air bubbles are trapped inside the foam

Energy

Q: 102 What is meant by the term U-value?

A: how effective an insulator a material is; the lower the U-value, the better the material is at insulating

Energy

Q: 103 What is geothermal energy?

A: energy from hot rocks in the Earth

Energy

Q: 104 Why does the National Grid include step-up transformers?

A: to increase the voltage across the cables and reduce energy loss

Energy

Q: 105 Why are copper pipes inside a solar panel painted black?

A: black is a good absorber of radiation so there will be a faster transfer of energy to the water

Energy

Q: 106 Why is electricity essential for modern communication and public health?

A: Many devices transform one type of energy into others; doctors and hospitals can store vaccines and blood in refrigerators; internet runs on electricity

Energy

Q: 107 What is the role of the step-down transformer?

A: It reduces the voltage to a safe working value for homes and offices

Waves

Q: 108 What are the two main pieces of evidence for the Big Bang theory?

A: Redshift and cosmic microwave background radiation