Conservation of Energy and Power and Energy forms MCQS

Q:1 Electrical appliances usefully transform only part of the energy that is supplied to them. The rest of the energy is wasted.

Chefs often use electric mixers to combine ingredients.

A A mixer **usefully** transforms electrical energy to . . .

1 kinetic energy.

2 light energy.

3 sound energy.

4 thermal energy.

B The energy that is **not** usefully transformed by the mixer is wasted as . . .

1 heat and sound.

2 heat only.

3 sound and kinetic energy.

4 sound only.

C Which of the following statements is **false**?

1 The energy transformed by the mixer becomes difficult to use for other energy transformations.

2 The energy transformed by the mixer ends up making the surroundings a little warmer.

3 The energy transformed by the mixer ends up very spread out.

4 The energy transformed by the mixer no longer exists.

D A second mixer transforms useful energy at the same rate as this one however, it wastes more energy.

This means that the second mixer . . .

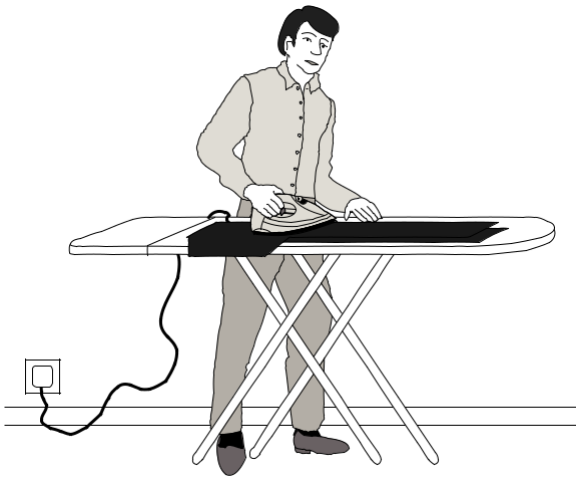
1 costs less per minute to run.

2 is less efficient.

3 is more efficient.

4 transforms energy at a slower rate.

Q:2 This question is about an electric iron. The power of the iron is 1.2 kW.



A The base of the iron radiates energy.
It will radiate least energy when the base is . . .

1)at a high temperature and black.

2)at a high temperature and shiny.

3)at a low temperature and black.

4)at a low temperature and shiny.

B What is the maximum quantity of energy, in joules, that can be transformed by the iron in one hour?

1)72 J
2)4320 J
3)72 000 J
4)4 320 000 J

C When the iron is used for one hour, less than the calculated maximum amount of energy is transformed.
Why is this?

1)Some energy is provided by the person doing the ironing.
2)Some energy is transferred to the surroundings.
3)The ironing board is covered with an insulator.
4)The iron switches off at times to keep it at the correct temperature.

Q:3 This question is about the use of energy in cars that use petrol.

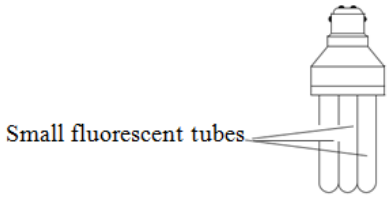
A A car engine transfers kinetic energy.

The kinetic energy is transformed from . . .
1)chemical energy.
2)electrical energy.
3)light energy.
4)sound energy.

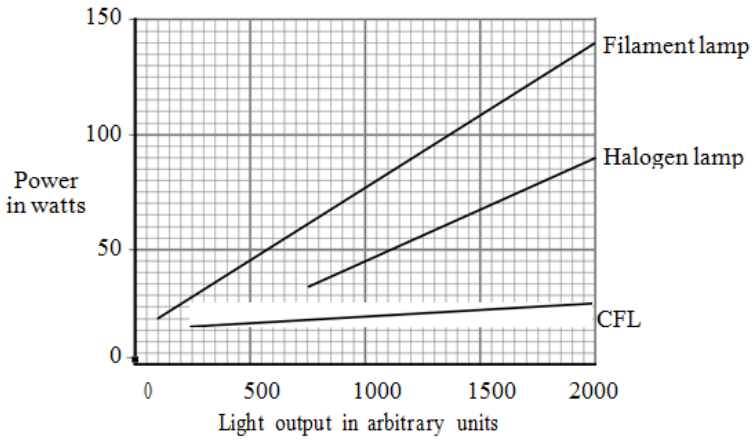
B Car makers are producing engines that are more efficient.
Compared with a less efficient engine of the same power, a more efficient engine always . . .

1)has a higher top speed.
2)has a lower top speed.
3)uses less petrol.
4)uses more petrol.

Q:4 The diagram shows a compact fluorescent lamp (CFL).



The graph shows the electrical power of a CFL compared with a filament lamp and a halogen lamp.



A How much power does a halogen lamp need in order to give an output of 1000 units of light?

1)40 watts
2)45 watts
3)50 watts
4)55 watts

B How many more watts of power would a filament lamp need, compared with a halogen lamp, to produce 2000 units of light?

1)40
2)50
3)70
4)120

C What happens to the extra energy that the filament lamp uses compared with the halogen lamp? The extra energy . . .

1)is stored in the filament of the lamp.
2)is transferred as heat to the surroundings.
3)is used to produce a chemical reaction in the lamp.
4)returns to the electricity supply.

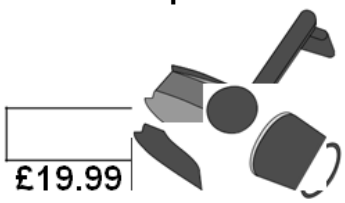
D In some countries, governments are making it compulsory to use CFLs rather than filament lamps.

What is the reason for this?

1)CFLs are more powerful than filament lamps.
2)CFLs can give out much more light than filament lamps.
3)CFLs can heat the room as well as light it.
4)CFLs save energy because they are more efficient.

Q:5 Read this advertisement for a wind-up torch.

Wind-up Torch



This torch is always ready to go. Simply wind the handle for just 1 minute and this will power your torch for up to 2 hours of use.

The torch also has a mobile phone connection that will power mobile phones for up to 7 minutes of talk-time for every 1 minute of winding.

You won't have to scrabble around in the dark looking for your torch. The 1 minute of winding also powers a standby light for up to 2 months.

The wind-up torch is strong, splash-proof and eco-friendly.

A The wind-up torch and a power station both generate electricity.

Which feature of the power station process is the equivalent of the torch's winding handle?

1)boiler
2)generator
3)steam
4)turbine

B The source of energy for the operator of the torch's winding handle is food.
Which of these forms of energy is not involved in the chain of useful energy transformations for the torch as it is wound up?

1)chemical
2)electrical
3)kinetic
4)thermal

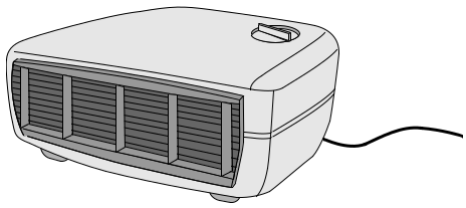
C What feature of the wind-up torch enables the advertisement to claim that it is eco-friendly?

1)It can be used to power mobile phones.
2)It has a standby light.
3)It is splash-proof.
4)It produces no waste products when in use.

D A dog owner uses a conventional torch every night. The torch she uses is powered by 4 batteries. She has to replace the batteries every 3 months. The batteries cost 75p each. If she bought this wind-up torch, how long would the pay-back time be?

1)between 6 months and 1 year
2)between 1 year and 1.5 years
3)between 1.5 years and 2 years
4)between 2 years and 2.5 years

Q:6 A fan heater is used to heat air and to move it around a room.



A The fan heater usefully transforms electrical energy to . . .

1)kinetic and sound energy.
2)light and thermal energy.
3)sound and light energy.
4)thermal and kinetic energy.

B Energy that is not usefully transformed by the fan heater is wasted as . . .

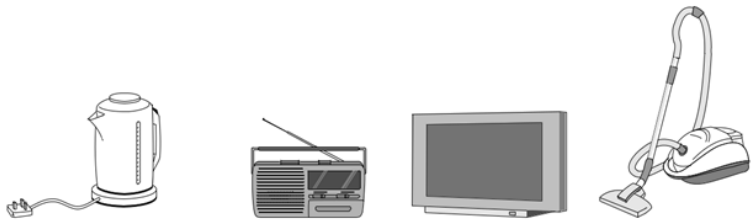
1)chemical energy.
2)kinetic energy.
3)sound energy.
4)thermal energy.

C The fan heater moves hot air around the room. This method of heat transfer is sometimes called forced . . .
1)conduction.
2)convection.
3)evaporation.
4)radiation.

Q:7 The diagram shows a device for measuring the electrical energy used by domestic appliances.

The device is plugged into an electrical socket. The domestic appliance is then plugged into the device.

The diagrams show some domestic appliances.



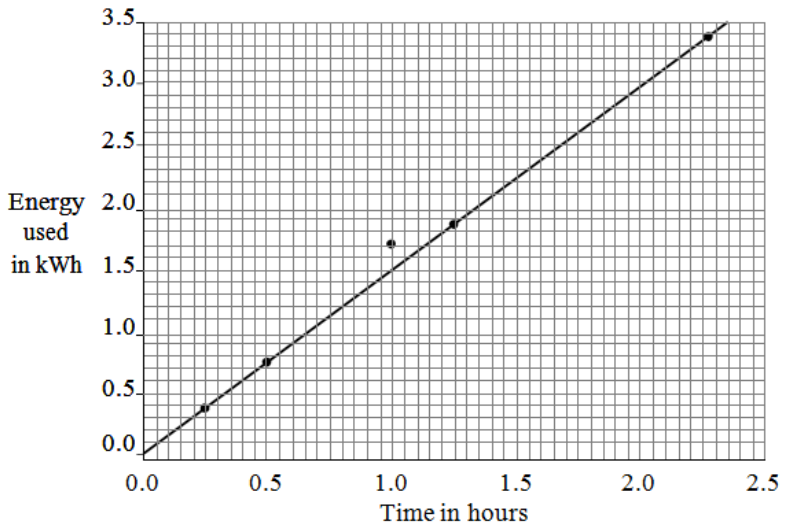
A. Which appliance will use the most electrical energy when switched on for 5 minutes?

1)kettle
2)radio
3)television
4)vacuum cleaner

B It is important that we should use less electrical energy because . . .

1)electrical energy will run out in the future.
2)generating electricity can pollute the environment.
3)waste electrical energy can cause electric shocks.
4)we can store electrical energy for future use.

Q:8 The graph shows the amount of energy used by an electric fire plotted against the length of time it is switched on.



A The unit of energy on the graph is the kilowatt-hour (kWh). Energy is usually measured in . . .
1)joules.
2)joules per second.
3)watts.
4)watts per second.

B The point on the graph at the time of one hour could be anomalous.

This means that the value of the energy . . .

1)was measured with too little precision.
2)was measured with too much precision.
3)does not fit the general pattern.
4)is subject to a systematic error.

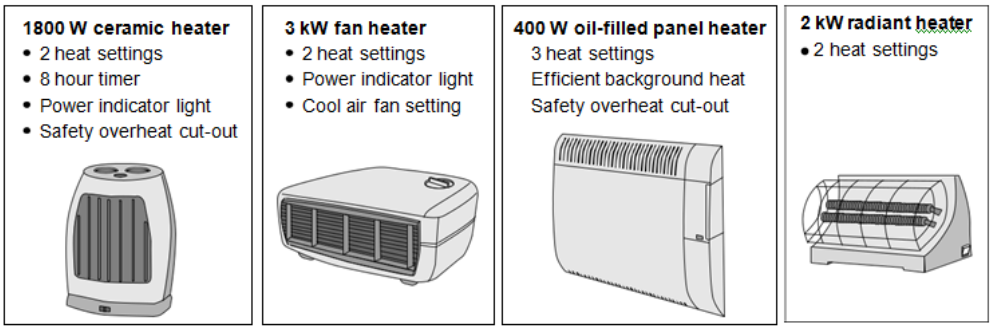
C The graph shows that . . .
1)the energy used decreases with time.
2)the energy used is directly proportional to the time.
3)the energy used is inversely proportional to the time.
4)the energy used halves when the time is doubled.

D What is the power of the electric fire?

energy transferred = power × time
(kilowatt-hour, kWh) (kilowatt, kW) (hour, h)

1)1.5 W
2)6.7 W
3)1500 W
4)6700 W

Q:9 The pictures show four different types of electric heater.



A Which heater is the most powerful?
1)the ceramic heater
2)the fan heater
3)the oil-filled panel heater
4)the radiant heater

B The fan heater is run on full power for 4 hours.

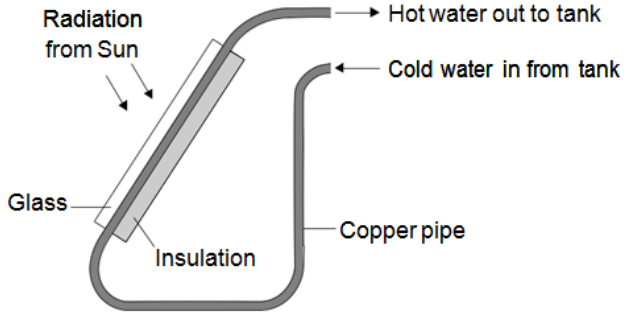
energy transferred (kilowatt-hour, kWh) = power (kilowatt, kW) × time (hour, h)

How much energy, in kWh, is transferred from the mains supply to the fan heater?

1)0.75
2)3.0
3)7.0
4)12.0

C Which of the following is an advantage of the fan heater compared with the other heaters?
1)The fan heater can make a room feel cooler in summer.
2)The fan heater has a power indicator light.
3)The fan heater has a safety overheat cut-out.
4)The fan heater has more than one heat setting.

Q:10 The diagram shows a solar panel fitted to the roof of a house.
The solar panel is used for heating water.



 The panel is 5 m long and 2 m wide.

 Each square metre of panel receives 0.6 kJ of solar energy each second when the Sun is shining.

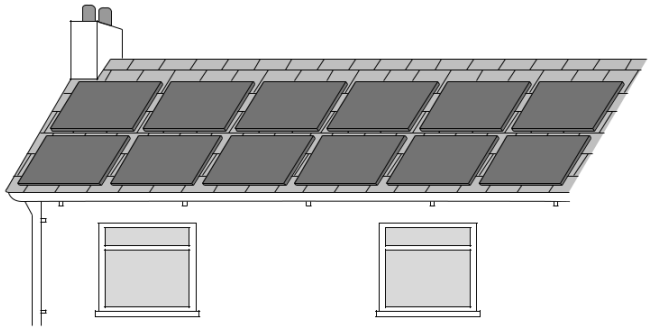
A The solar panel collects . . .
1)infra red radiation from the Sun and transforms it into electricity.
2)infra red radiation from the Sun and uses it to heat water.
3)light energy from the Sun and transforms it into electricity.
4)ultraviolet radiation from the Sun and uses it to heat water.

B The total amount of solar energy, in kJ, collected by the panel in 5 hours when the Sun is shining is . . .
1)1 800
2)10 800
3)21 600
4)108 000

C The pipe inside the solar panel has a black surface because . . .
1)black surfaces are good reflectors of radiation.
2)black surfaces are good absorbers of radiation.
3)black surfaces are good emitters of radiation.
4)black surfaces stay hot for longer.

D The hot water tank is placed higher than the solar panel.
This is because . . .
1)heated water contracts, and sinks.
2)heated water contracts, and rises.
3)heated water expands, and rises.
4)heated water expands, and sinks.

Q:11 The diagram shows a group of solar cells on the roof of a building.



A The energy transformation in a solar cell is . . .
1)electrical to light.
2)electrical to heat.
3)heat to electrical.
4)light to electrical.

B There are twelve 180 watt solar cells on the roof. The maximum power output of the group of solar cells is . . .

1)15 W
2)15 kW
3)2160 W
4)2160 kW

TOTAL MARKS=33