7I1 Energy transfers

Extra Help

Name _____ **Class** _____

For each of the energy transfers fill in the spaces using the words in the box.

(a) a clockwork car

movement **stored**

energy stored in my body

energy s _ _ _ _ _ _ _ in the wound-up spring

m _ _ _ _ _ _ _ _ energy of the clockwork car.

(b) a battery and lamp bulb

heat **stored** **light** **electrical**

energy s _ _ _ _ _ _ _ in the battery

e _ _ _ _ _ _ _ _ _ _ energy

l _ _ _ _ _ energy of the bulb.

h _ _ _ _ energy warming up the bulb.

(c) a battery and a buzzer

electrical **sound** **energy**

e _ _ _ _ _ _ stored in the battery

e _ _ _ _ _ _ _ _ _ _ energy

s _ _ _ _ _ energy of the buzzer.

(d) a Bunsen burner

light **heat** **gas**

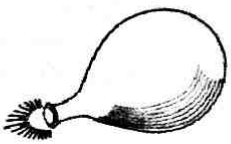
energy stored in the g _ _ _

l _ _ _ _ _ energy lighting up the room.

h _ _ _ _ energy of the flame.

(e) blow up a balloon and release it

stretched **body** **movement**



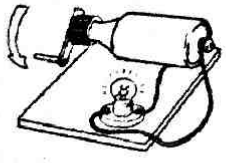
energy stored in my b _ _ _ _

energy stored in the s _ _ _ _ _ _ _ _ _ balloon

m _ _ _ _ _ _ _ _ energy of the balloon.

(f) a dynamo and a lamp

movement **heat** **energy** **light**



e _ _ _ _ _ _ stored in my body

m _ _ _ _ _ _ _ _ energy of the turning handle

l _ _ _ _ _ energy of the lamp.

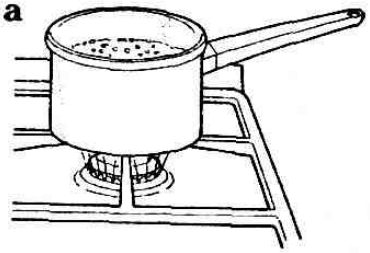
h _ _ _ _ energy warming up the bulb.

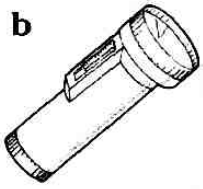
7I1 Energy changes

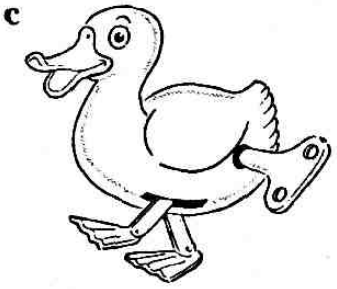
Extension Sheet

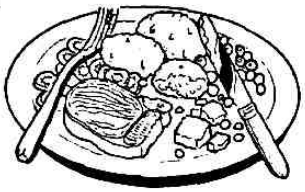
Name _____ **Class** _____

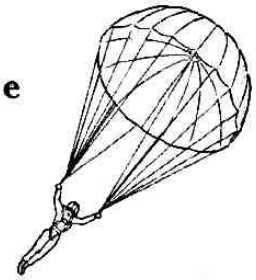
Here are some examples of energy transformations:

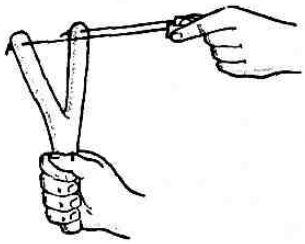
a 

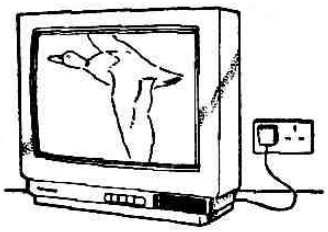
b 

c 

d 

e 

f 

g 

h 

i 

In the table below, put ticks in the boxes to show the main types of energy that are involved in each example.

In each case put a ring round the tick that shows the type of energy ***before*** the energy transfers.

The first one has been done for you.

Types of energy

	Example	*Chemical*	*Strain*	*Gravitational*	*Movement (kinetic)*	*Heat*	*Light*	*Sound*	*Electrical*
a	cooking on a gas oven	(✓)				✓	✓		
b	shining a torch								
c	a clockwork toy								
d	eating food								
e	a falling parachute								
f	a catapult								
g	a TV set								
h	a car going uphill								
i	a growing plant								

7I1 Energy transformations

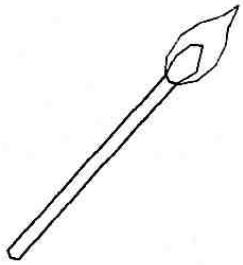
Extension Sheet

Energy can appear in several different forms:

kinetic **heat** **light** **sound** **electrical**

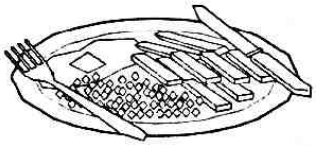
chemical **gravitational potential energy** **strain (elastic) potential energy**

The diagrams show some examples where the energy 'transforms' and changes from one form to other forms.

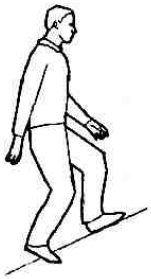


1. a burning match

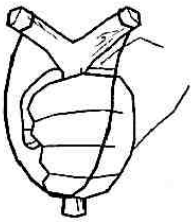
2. a falling parachute



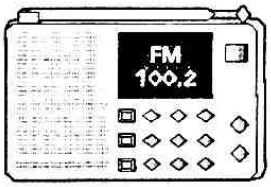
3. eating food



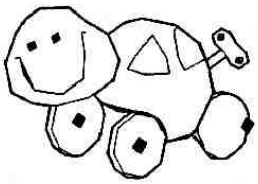
4. a man walking uphill



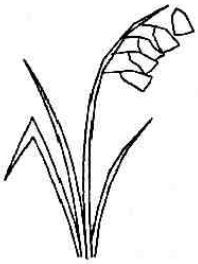
5. a catapult



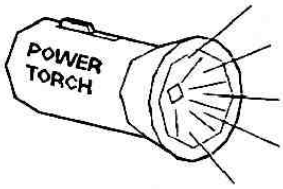
6. a battery-operated radio



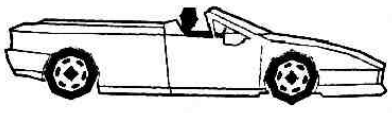
7. a clockwork toy



8. a growing plant



9. shining a torch



10. a car

For each example 1–10 write down:

a) the main form of energy ***before*** the change,

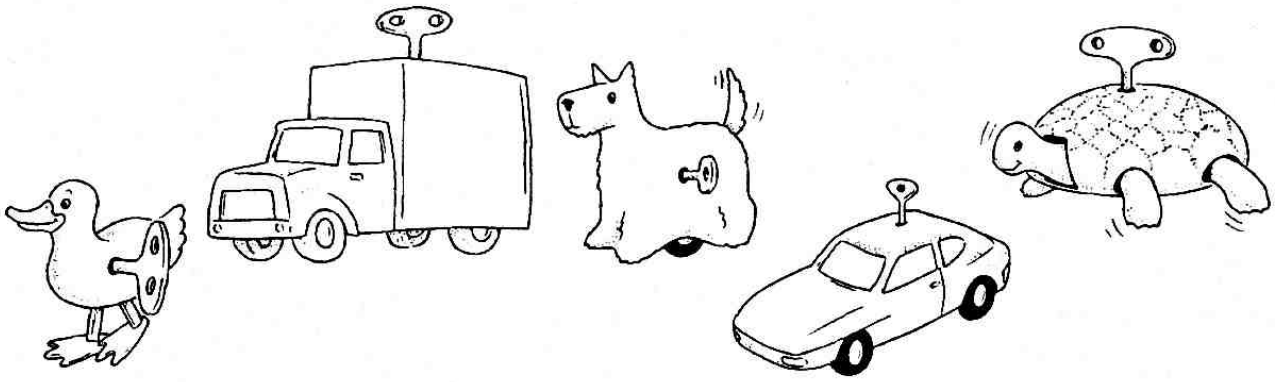
b) the main forms of energy ***after*** the change (there may be more than one form afterwards).

7I2 Predicting

Sc1 Skill Sheet 16

Name _____ **Class** _____

A group of pupils want to compare 5 different wind-up toys.
They want to find a toy that would be best for a young child.
The toy should be able to move at least 2 metres once it starts.



The table below gives some details of the wind-up toys:

Name of toy	*Diameter of winder (cm)*	*Maximum number of turns for winder*	*Distance travelled for each turn of the winder (cm)*	*Maximum distance toy can travel (cm)*
duck	2	25	4	
lorry	1.5	20	8	
dog	0.5	24	10	
car	0.5	10	15	
turtle	2	10	24	

1 Fill in the last column of the table.

2 Predict which toy you think would be easiest for a young child to wind up, so that it travels more than 2 metres.

_____

3 Write down two reasons for choosing your answer to question 2.

_____

_____

7I3 The energy crisis

LITERACY SHEET Extension

Name _____ Class _____

It has been known for a long time that we are running out of fossil fuels. Scientists across the globe have been carrying out research on finding alternative forms of energy.

SOLAR POWER IN OXFORD

Solar power has been the object of research for many scientists. A house in Oxford has been designed to require a minimum amount of energy for heating, cooking and lighting. At the same time the house has to maximise the amount of solar power without disrupting the comfort of the people who live there.

The main power supply is a system which absorbs solar power. The system is called Photo Voltaic (PV). The PV modules are put between the skylights on the roof. The modules are wired together in groups of three. However, power does need to come from other sources at night and in overcast conditions. To spread the electricity requirements of the house, careful timing and the use of low-consumption appliances is essential.

In summer, the house receives about four peak sun hours daily and energy surpluses are predicted to be round 12 kWh per day. In winter, the house receives only about 0.6 peak sun hours per day. However the house is expected to have an overall positive energy balance, as the summer surplus is greater than the winter deficit.

So far the solar house has been operating very well.

WIND POWER IN WALES

In Machynlleth in Wales 600kW wind turbines were erected close to the Centre for Alternative Technology. Each machine has three blades with a rotor attached to a gear box and a generator. As the wind turns the blades around, the rotor and gearbox turn and they in turn generate electricity. The electricity can be stored or used for domestic purposes in the nearby villages and towns.

HYDROPOWER IN WALES

The Garnedd Power Company is a venture to generate electricity by hydropower. It is sited in the Snowdonia National Park, in Wales, on a forest estate. Water is diverted from the River Conwy through an iron pipe underground to a 600kW twin jet turbine. Water is forced into the turbine, which is used to generate electricity.

1 Read the articles above about three projects on alternative energy sources.

2 Underline in **red** the forms of alternative energy.

3 Underline in **blue** the places where the projects are taking place.

4 Underline in **black** the amount of power being generated by each project.

Wind power

5 Underline in **green** the structure of the wind turbine.

Solar power

6 Underline in **green** the structure of the solar panels.

Hydropower

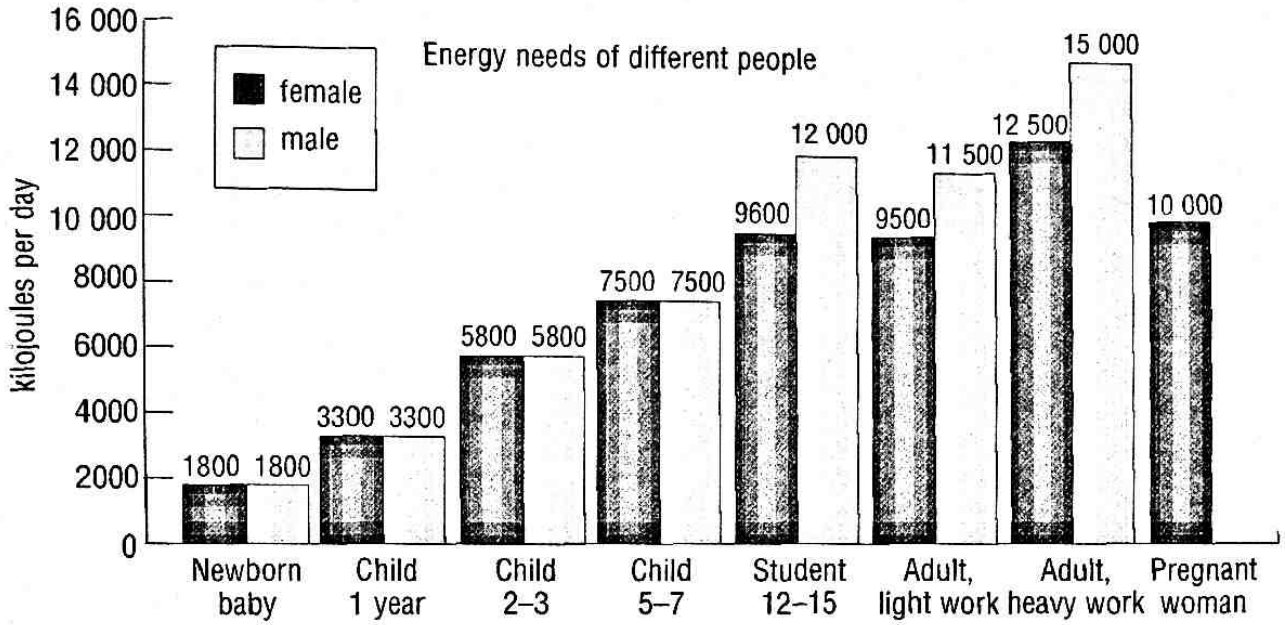
7 Underline in **green** the structure of the hydropower station.

8 For each form of energy, write down three important points that you have found out.

7I4 Energy from food

HOMEWORK SHEET
Handling data

Your body takes the energy it needs from the food you eat.
The energy needs of different people are shown in the bar-chart below.
It shows how many kilojoules of energy different people need each day.



1 a) What happens to people's energy needs as they get older?
b) Why do you think this happens?

2 a) What difference does it make to people's energy needs if they are doing heavy work?
b) Why do you think this is?

3 a) The energy needs of males and females are not always the same.
b) What similarities and differences do you notice and what do you think are the reasons for these?

4 a) How much energy does a pregnant woman need per day?
b) How much energy does an adult woman doing only light work need?
c) Why do you think they are different?

Mark scheme
You will receive 1 mark for each correct answer, with 2 extra marks available for question 3.

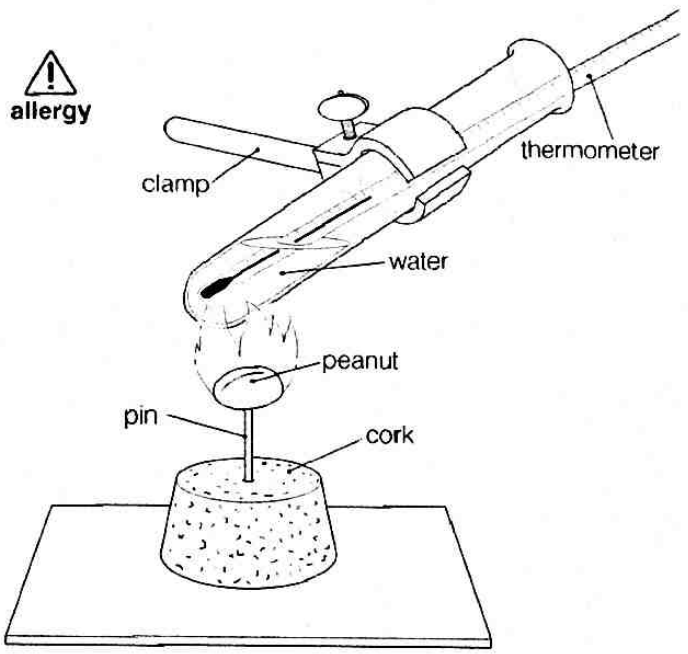
7I6 Investigating energy in food

Extension Sheet

One way of measuring the amount of energy in some food is to burn it.

As the food burns, it gives out energy. We can use this energy to heat up some water.

The more energy stored in the food, the more energy is released and the hotter the water gets.



Plan an investigation to compare the energy content of a peanut with that of a pea.

- What apparatus will you need?
- What measurements will you take?
- How will you record your results?

Remember you must make it a ***fair test***, and work safely.

When you have had your plan checked by your teacher, go ahead and do the investigation.

What do you find?

Questions

1 In your investigation, did all the energy from the peanut go to the water?

Was it a fair test?

What could you do to improve your investigation?

2 Look at the bar-chart:

It shows the energy content in kilojoules for one gram of each food.

a) Which food gives the most energy?

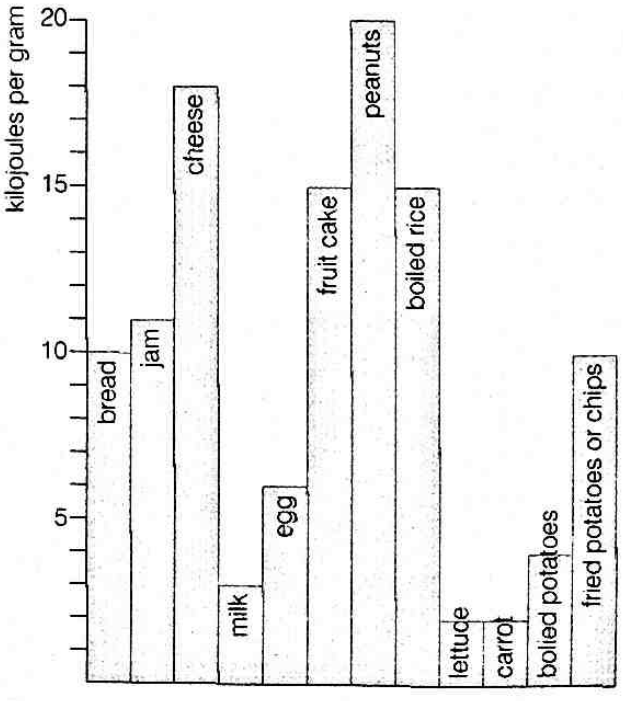
b) Which two foods give the least energy?

c) Which foods would you take with you on a long walk in the mountains?

d) Which foods would make a good meal for someone who wants to lose weight?

e) How much energy would you get from 1 gram of bread?

f) How much energy would you get from 2 grams of carrot?



7I6 Evaluating evidence

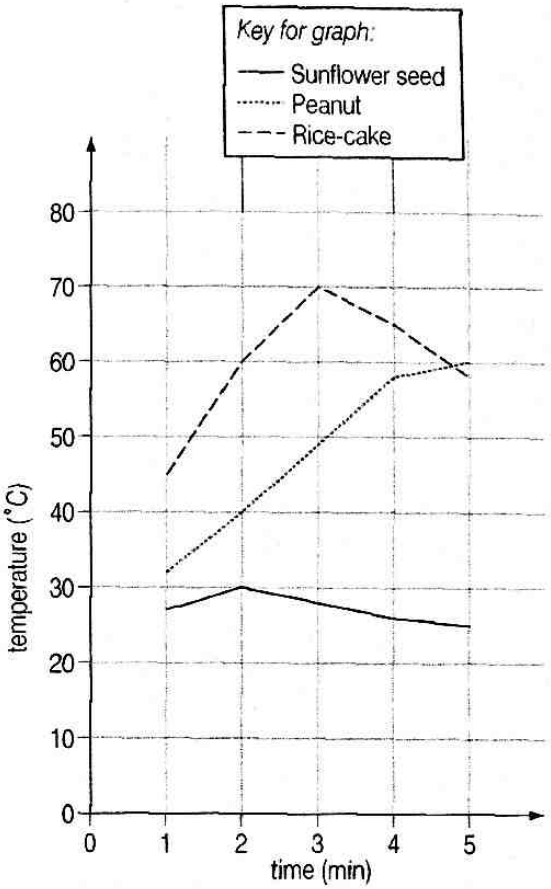
Sc1 Skill Sheet 18

Name _____ **Class** _____

Some pupils investigated which of three foods has the highest energy content.
They burned the different foods and used the energy released to heat up equal masses of water. They made sure that the water was at 25°C before each test.

Look at their results table and graph:

	Temperature of water (°C)		
Time (min)	*Sunflower seed (0.4 gram)*	*Peanut (0.7 gram)*	*Rice-cake 1.5 grams)*
1	27	32	45
2	30	40	60
3	28	49	70
4	26	58	65
5	25	60	58



In their conclusion the pupils decided that the best food for releasing energy was the rice-cake.

1 Why do you think that they made this conclusion?

_____

2 Was their conclusion correct? (*Hint:* think about the mass of food used in each test.) **Explain** your answer.

_____

_____

3 Suggest some changes to the investigation that would give better results to draw a conclusion from.

_____

_____

4 Look carefully at the data in the table. What can you say about the length of time that each fuel burned for?

_____

7I7 Energy for ever?

LITERACY SHEET Core

Name _____ Class _____

1 In a group of 3, read the information on page 132 of the pupil book. Look at the statements below and decide which heading they belong under in the table shown below.

Geothermal energy	Cold water is piped down a deep hole, and gets heated up by the heat energy underground	Wave energy
Tidal energy		Huge wind turbines use the wind energy to produce electricity
The wind causes waves which have a lot of energy	Water is stored in a dam, and when it is released, it turns a turbine to generate electricity	Hydro-electric energy
Wind energy		Sea-water is trapped behind a barrier and then released

A. Name of energy resource	*B. Information about the energy resource*

2 Explain why renewable energy is important. Include the words in the boxes if you wish.

I want to explain why	**renewable important energy**
The first reason is	**fossil fuels non-renewable and if**
This is because	**running out therefore energy**
Also	
Finally	

7I7 Renewable sources of energy

Help Sheet

Here are some facts to help you plan for Joule Island:

Source of energy	*For*	*Against*
***1* Biofuel (biomass)** • Plants, especially fast-growing trees, can be grown for fuel. • Rotting plants and animal manure can make methane gas (in a digester tank).	Plants are renewable – you can grow some more. It uses natural waste products.	Burning fuel makes some air pollution.
***2* Solar energy** • Solar cells transfer some of the Sun's energy into electricity. • Solar cookers and solar panels use the heat from the Sun.	The Sun's energy is freely available whenever the Sun is shining. Solar panels are a cheap way of supplying warm water.	It only works when the Sun shines. Solar cells do not produce much electricity. You may need a large area, and they are expensive.
***3* Geothermal energy** • Water in the ground can be heated by hot rocks inside the Earth.	The energy is free and available day and night.	It is only possible in parts of the world where the hot rocks are near the surface.
***4* Hydro-electric energy** • When water runs down-hill, its kinetic energy can turn a water-wheel or a turbine. This can be used to generate	electricity. Every time it rains, there is more water to provide energy.	It can only be used in wet hilly areas. Building a dam to flood a valley may damage the environment.
***5* Tidal energy** • Tidal water can be trapped behind a barrier, like a dam. Then it can be used like hydro-electric energy.	Wherever there are tides, free energy is provided.	It only works well in places where there are high tides.
***6* Wind energy** • The wind can be used to turn wind-mills and generators, to make electricity.	Whenever the wind blows, energy is provided.	It only works well in windy places. Many generators are needed to provide enough electricity for a town.
***7* Wave energy** • Waves are caused by the wind. The movement of floats can be used to make electricity.	Whenever there are waves, energy is provided.	It only works in places where there are usually big waves. Many kilometres of floats are needed to provide enough electricity for a town.

7I7

Hydroelectric energy

HOMEWORK SHEET
Reading for information

The boxes below show the different stages in the production of electricity from hydroelectric energy, but they are ***not*** in the right order.
Copy the sentences into your book in the right order,
or cut them out and paste them into your book in the right order.

A	Heat from the Sun evaporates water from the sea.
B	The turbines are used to drive generators.
C	Dams built in the mountains collect huge amounts of water.
D	Clouds are blown along by the wind.
E	The Sun shines on the Earth.
F	When clouds reach the mountains they cool, and the water in them falls as rain.
G	Generators produce electricity.
H	Water vapour rising from the sea cools, to form clouds.
I	The pressure of the water in the dam is used to turn turbines.
J	Water runs down the mountains and forms rivers and streams.