

# Energy resources/electrical circuits

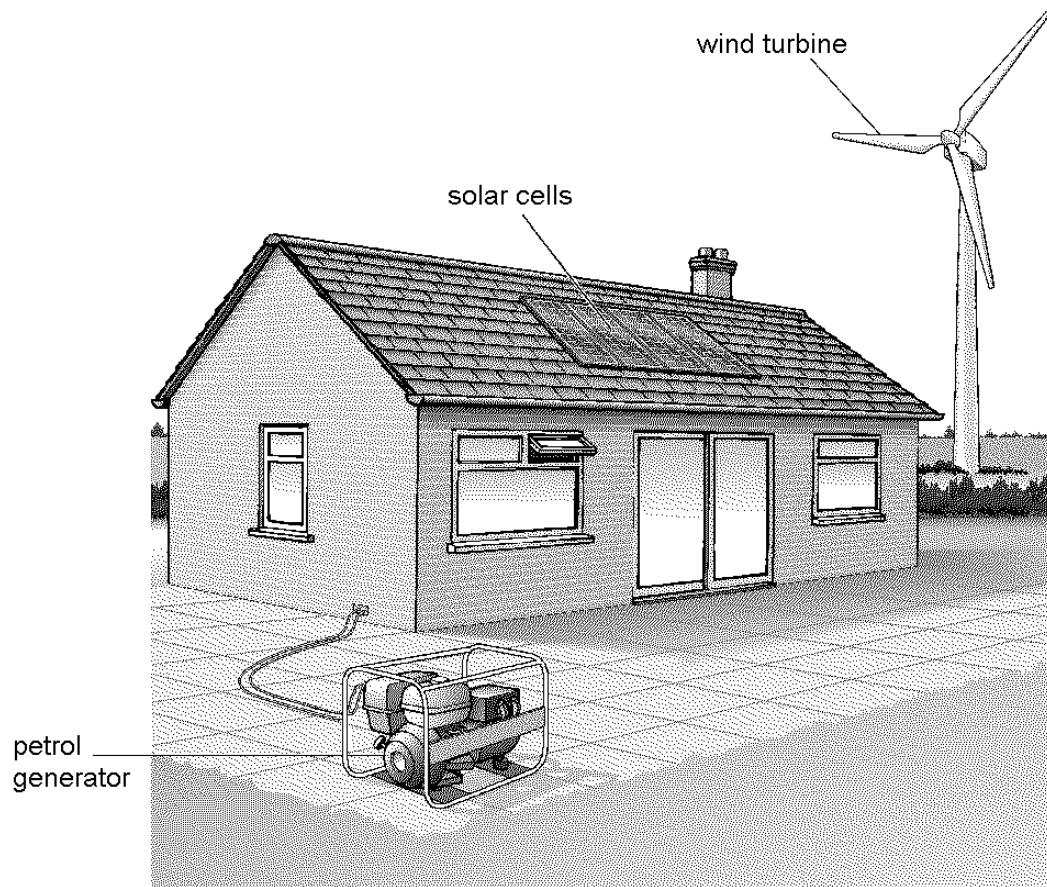
7I & 7J

31 min

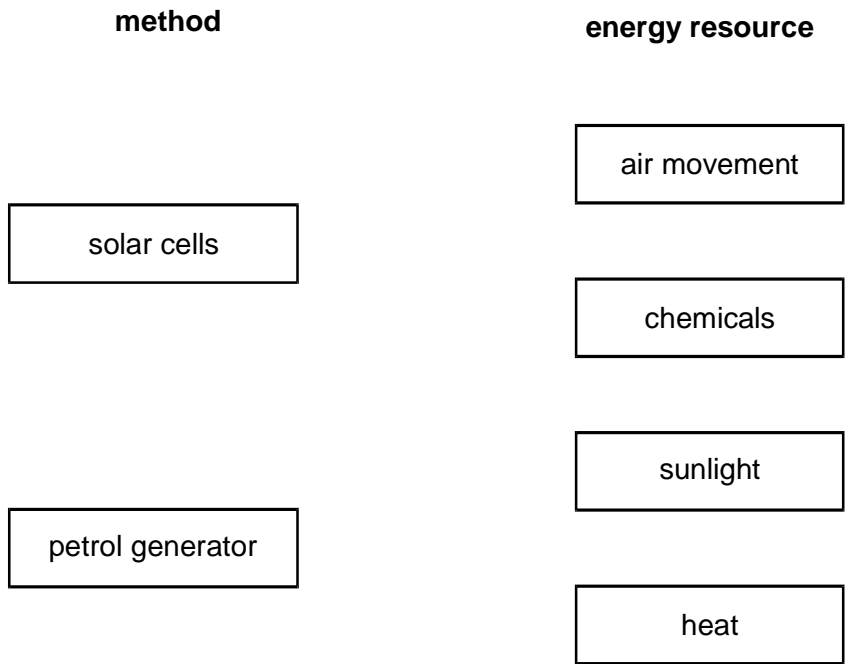
33 marks

*Q1-L3, Q2-L4, Q3-L4, Q4-L5, Q5-L5, Q6-L6*

1. The drawing shows Mark's house. He uses three methods to generate electricity.



- (a) Draw a straight line from each of the **two** methods below to the main energy resource used to generate electricity.  
Draw only **two** lines.



2 marks

- (b) (i) The solar cells **cannot** work at night.  
Give the reason for this.

.....  
.....

1 mark

- (ii) The wind turbine **cannot** generate electricity all the time.  
Give the reason for this.

.....  
.....

1 mark

Maximum 4 marks

2. The table below gives information about three fuels that can be used in cars.

✓ shows a substance is produced when the fuel burns.

X shows a substance is **not** produced when the fuel burns.

fuel	physical state	energy released, in kJ/kg	some of the substances produced when the fuel burns		
			carbon monoxide	sulphur dioxide	water
petrol	liquid	48 000	✓	✓	✓
hydrogen	gas	121 000	X	X	✓
ethanol (alcohol)	liquid	30 000	✓	X	✓

(a) Which fuel, in the table, releases the **least** energy per kilogram (kg)?

.....

1 mark

(b) Some scientists say that if hydrogen is burned as a fuel there will be less pollution.  
From the information in the table, give **one** reason why there will be less pollution.

.....  
.....

1 mark

(c) Which of the three **fuels** in the table can be compressed into a small container?

.....

1 mark

(d) Which gas in the air is needed for fuels to burn?  
Tick the correct box.

- carbon dioxide
- nitrogen
- oxygen
- water vapour

1 mark

(e) Petrol and ethanol are both fuels. Petrol is made from oil.  
Scientists say that oil could run out in 100 years.  
In some countries people plant sugar cane and use it to make ethanol.

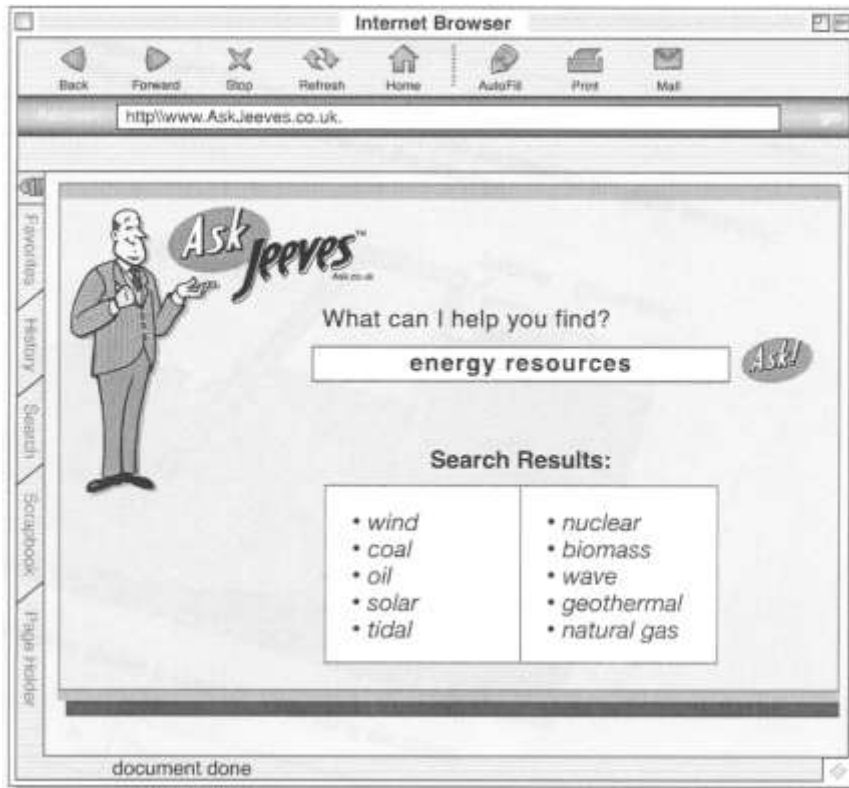
Sugar cane will **not** run out. Explain why.

.....  
.....

1 mark

Maximum 5 marks

3. Meera used the Internet to find out about energy resources. The drawing below shows what Meera saw on her computer screen.



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- (a) Coal is a fossil fuel.  
Give the names of **two** other fossil fuels in the list on the screen.

.....and.....

2 marks

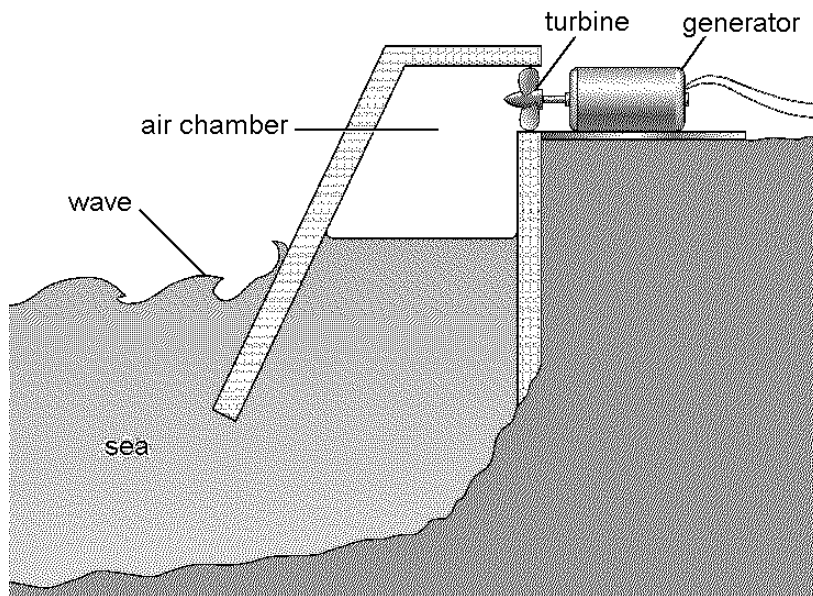
- (b) (i) Wave energy is an example of a renewable energy resource.

From the list on the screen above choose **two** other renewable energy resources.

..... and .....

2 marks

- (ii) Meera found out how wave energy can be used to generate electricity. She saw the diagram below on the Internet.



Each box below shows a stage in generating electricity.

- |   |  |
|---|--|
| A | The air turns the turbine.             |
| B | The turbine turns the generator.       |
| C | The waves move up the chamber.         |
| D | The generator produces electricity.    |
| E | The waves push the air up the chamber. |

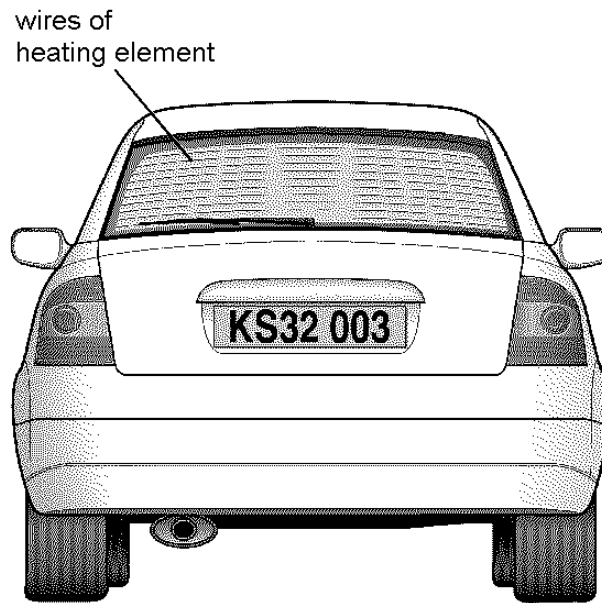
On the lines below write the letters of the stages in the correct order. Two have been done for you.

.....C.....                      .....A.....                      .....

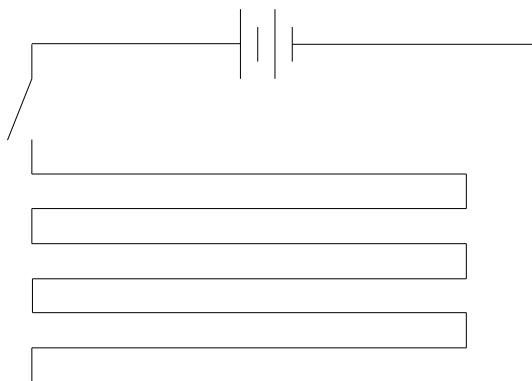
2 marks  
Maximum 6 marks

4. The back window of this car contains a heating element.

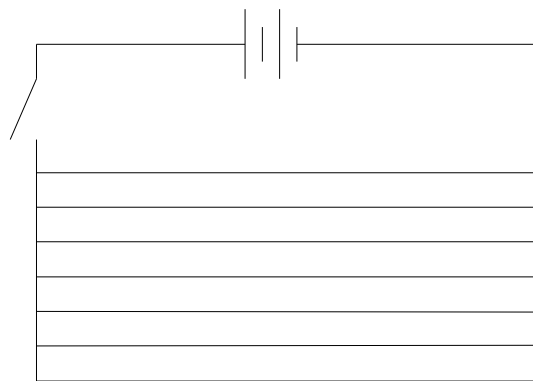
The heating element is part of an electrical circuit connected to the battery of the car.



The diagrams below show **two** ways of connecting the circuit of a heating element.



**circuit A**



**circuit B**

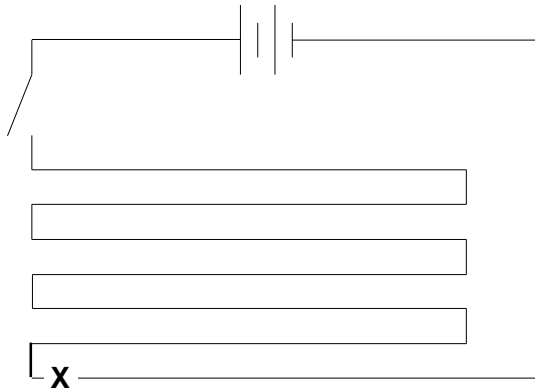
- (a) Give the name of each type of circuit:

circuit A .....

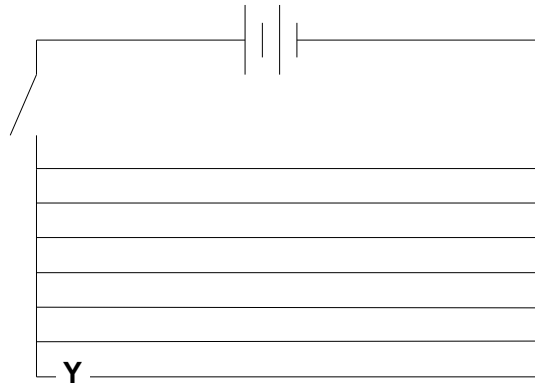
circuit B .....

1 mark

(b) A wire gets broken at point X on circuit A and at point Y on circuit B.



**circuit A**



**circuit B**

When the switch is closed, how does the broken wire affect the heating element in:

(i) circuit A? .....

.....

1 mark

(ii) circuit B? .....

.....

1 mark

(c) In very cold weather, ice may form on the back window of the car. When the heating element is switched on, the ice will disappear and the surface of the window will become clear and dry.

(i) Fill the gap below to show the energy transfer that takes place.

When the heater is switched on, ..... energy is transferred from the wires to the ice.

1 mark

(ii) As the window becomes clear and dry, physical changes take place in the ice.

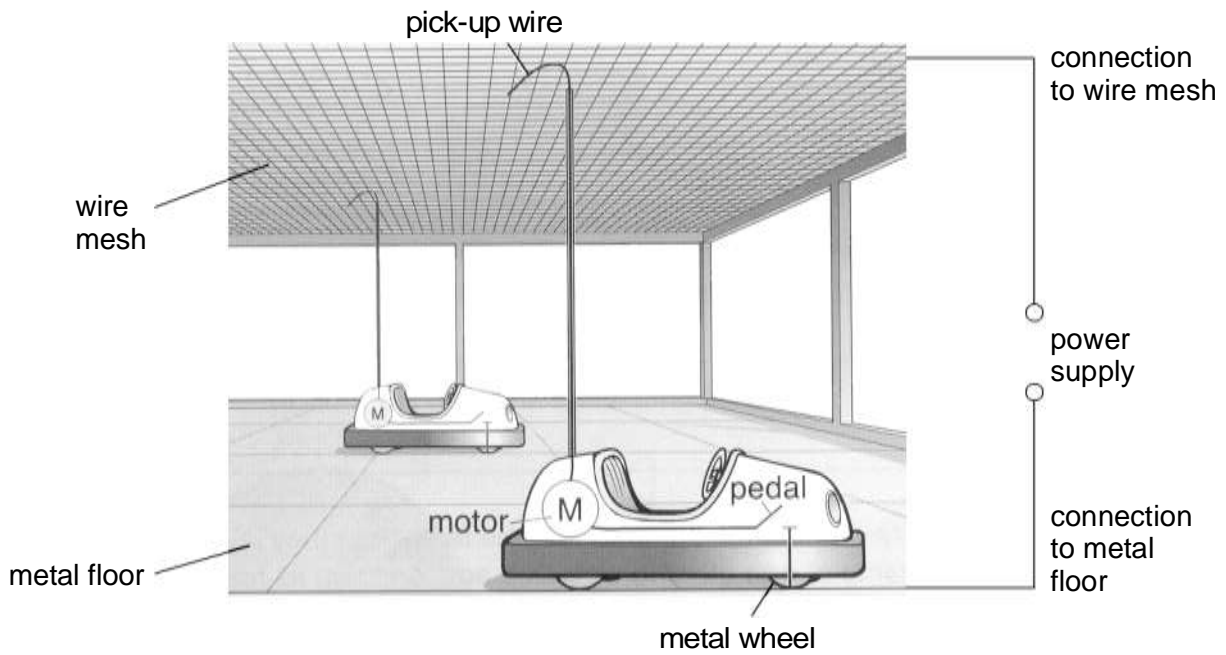
Fill the gaps below to show the physical changes which take place.

from ..... to ..... to .....

1 mark

Maximum 5 marks

5. The diagram shows two dodgem cars at a fairground. The circuit symbols for the motor and pedal for each dodgem car are shown on the diagram.





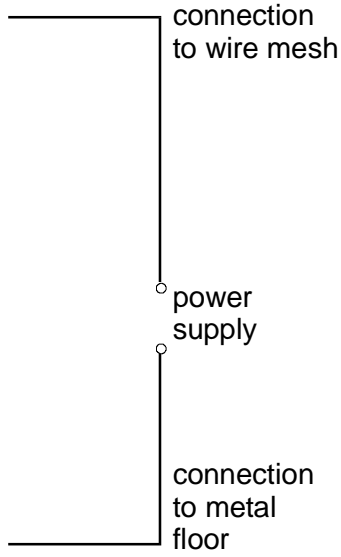
- (a) Complete the following sentence.

Each dodgem car is connected to the power supply through the ..... which is in contact with the wire mesh, and through the ..... which is in contact with the metal floor.

1 mark



- (b) Dodgem cars are connected using parallel circuits. Complete the circuit diagram below for the **two** dodgem cars. Use **two** motor symbols, , and **two** switch symbols, . The power supply for the circuit has been drawn for you.



2 marks

- (c) Even when the power supply is switched on, the dodgem car will **not** move until the pedal is pressed. Give the reason for this.

.....  
 .....

1 mark

- (d) A man looks after the dodgem cars during the rides. Why does the man **not** get an electric shock as he walks across the metal floor?

.....  
 .....

1 mark

(e) During one ride, the two dodgem cars are running. The pick-up wire on one car snaps off. Describe how this affects:

(i) the dodgem car with the broken pick-up wire;

.....

1 mark

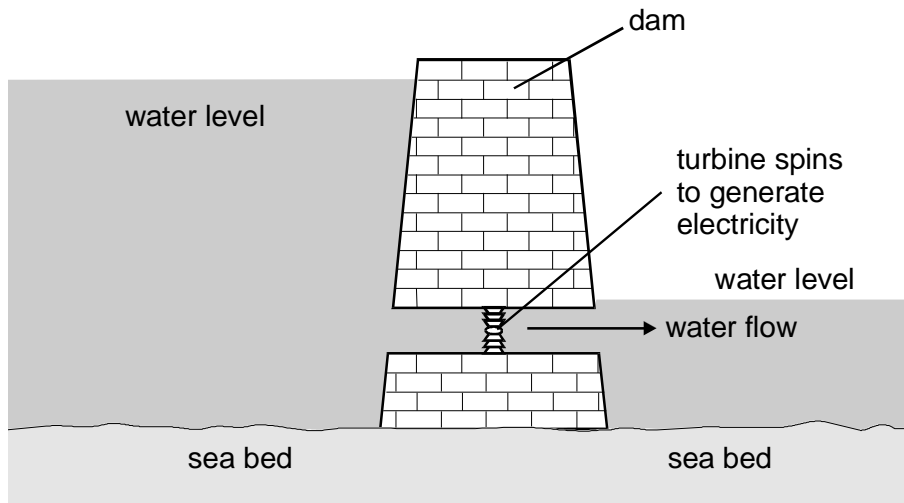
(ii) the other dodgem car.

.....

1 mark

Maximum 7 marks

6. The tides can be used to generate electricity. A dam is built across a river estuary, as shown below.



(a) The water is higher on one side of the dam than on the other. As the water begins to flow through the dam it turns a turbine. The turbine generates electricity. Describe the useful energy changes which take place in this process.

.....  
.....  
.....  
.....

2 marks

(b) Explain why tides are classified as a renewable energy source.

.....  
.....

1 mark

- (c) Give **one** way, **other** than from the tides, of generating electricity by using the sea.

.....

1 mark

- (d) Apart from cost, give **one** advantage and **one** disadvantage of an oil-fired power station compared with a tidal power station.

advantage .....

.....

disadvantage .....

.....

2 marks

Maximum 6 marks