

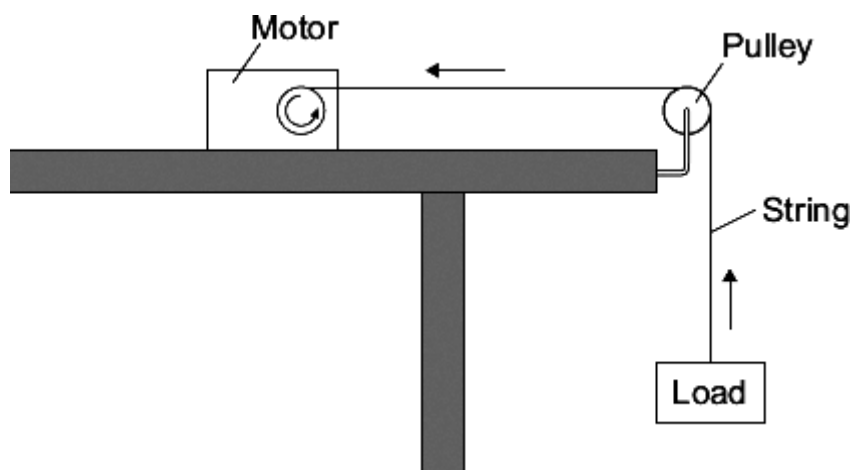
Name of the Student: _____

Max. Marks : 23 Marks

Time : 23 Minutes

Q1.

A student uses an electric motor to lift a load.



In the motor, the electrical energy is transferred into other types of energy. Some of this energy is useful and the rest of the energy is wasted.

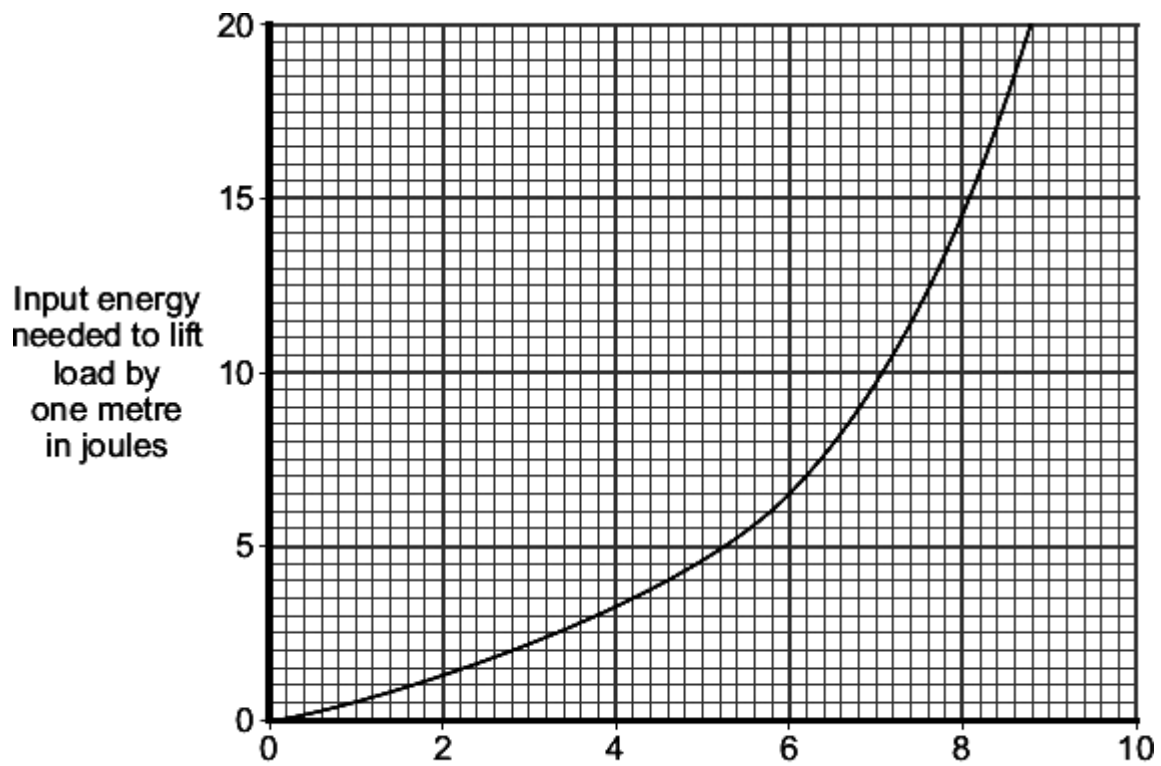
- (a) (i) Name the useful energy output from the electric motor.

(1)

- (ii) What eventually happens to the wasted energy?

(1)

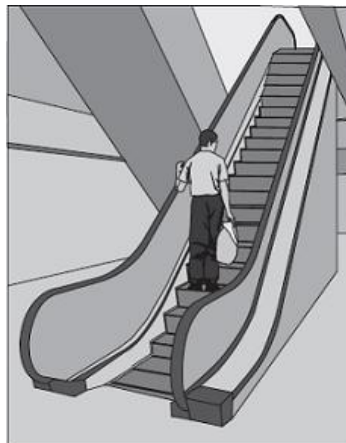
- (b) The graph shows the input energy the motor needs to lift different loads by one metre.



What can you conclude from the graph about the relationship between the load lifted and the input energy needed?

(2)

- (c) A shop uses escalators to lift customers to different floor levels. The escalators use electric motors. When the shop is not busy some escalators are turned off. A sign tells the customers that the escalators are turned off to save energy.



- (i) Each escalator has one motor with an average power of 4000 W. The motor is turned on for an average of 8 hours each day, 6 days each week. Electricity costs 15 pence per kilowatt-hour.

Calculate the cost of the electricity used in an average week to run **one** escalator.

Show clearly how you work out your answer.

Cost = _____ pence

(3)

- (ii) Give **one** environmental advantage to turning off electrical appliances when they are not being used.

(1)

(Total 8 marks)

Q2.

A farmer has installed a biogas electricity generator on his farm. This device generates electricity by burning the methane gas produced from rotting animal waste. Methane is a greenhouse gas. When methane burns, carbon dioxide and water are produced.

The animal waste rots in an anaerobic digester. The digester and the generator are kept inside a farm building and cannot be seen from the outside.

- (a) The animal waste used in the anaerobic digester is a *renewable* energy source.

What is meant by an energy source being *renewable*?

(1)

- (b) Suggest **one** reason why farmers have been encouraged to install their own biogas generators.

(1)

- (c) The farmer's monthly electricity bill using the mains electricity supply was £300. The biogas generator cost the farmer £18 000 to buy and install.

Assuming the biogas generator provides all of the farmer's electricity, what is the pay-back time for the generator?

Pay-back time = _____

(1)

- (d) It would have been cheaper for the farmer to have bought and installed a small wind turbine.

Give **two** advantages of using the biogas generator rather than a wind turbine, to generate the electricity used on the farm.

1. _____

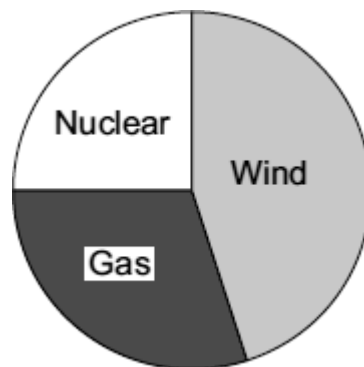
2. _____

(2)
(Total 5 marks)

Q3.

- (a) An electricity company claims to generate all of its electricity from environmentally friendly energy sources.

The energy sources used by the company are shown in the pie chart.



Do you think that the claim made by the company is correct?

Draw a ring around your answer.

Yes No Maybe

Explain the reasons for your answer.

(2)

- (b) The government is committed to increasing the amount of electricity generated from renewable sources. A newspaper reported that:

More wind farms, wave powered generators, solar generators and nuclear power stations would need to be built

Why is the statement made in the newspaper incorrect?

(1)
(Total 3 marks)

Q4.

(a) By 2023, nearly all of the existing nuclear power stations in the UK will be closed down.

- (i) Before a nuclear power station can be demolished, the remaining nuclear fuel, radioactive waste materials and reactor must be carefully removed.

What is this process called?

Put a tick (✓) in the box next to your answer.

decommissioning

☐

decontaminating

☐

dismantling

☐

(1)

- (ii) The workers are exposed to radiation as they remove the reactor. One of the biggest risks is from the isotope cobalt-60, which has a half-life of 5.3 years.

Explain the advantage of waiting 11 years after a nuclear power station has closed down before starting to remove the reactor.

(2)

(b) It is almost certain that new nuclear power stations will be built in the UK.

The table shows the results of surveys asking people in the UK whether they were in favour of, or against, the building of new nuclear power stations.

	2001	2005	2007
Percentage (%) in favour	20	41	65

Percentage (%) against	60	28	20
Percentage (%) not sure	20	31	15

- (i) From these surveys, how did public opinion on the building of new nuclear power stations change between 2001 and 2007?

(1)

- (ii) Suggest a reason why some people may think that the results from these surveys are unreliable.

(1)

- (iii) Give **one** reason in favour of building new nuclear power stations.

(1)

- (c) The government of one Middle Eastern country has decided to build its first nuclear power station. The oil that would have been used to generate electricity can then be sold to other countries.

On what is this decision based?

Put a tick (✓) in the box next to your answer.

economic issues

☐

ethical issues

☐

social issues

☐

(1)

(Total 7 marks)