

Changes in Energy

Question Paper

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.1 Energy
Sub-Topic	Changes in Energy
Difficulty Level	Silver Level
Booklet	Question Paper

Time Allowed: 20 minutes

Score: /19

Percentage: /100

Grade Boundaries:

Q1.Figure 1 shows a battery operated remote control car.

Figure 1



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- (a) The car's battery contains a store of energy.

As the car moves, energy from one store is transferred to another store.

Describe how different stores of energy change as the car moves.

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(2)

- (b) The car has a top speed of 12 m / s and a mass of 800 g.

Write down the equation that links kinetic energy, mass and speed.

Equation

(1)

- (c) Calculate the maximum kinetic energy of the car.

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Maximum kinetic energy = J

(2)

- (d) Explain why having a more efficient motor increases the top speed of the car.

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(2)

- (e) **Figure 2** shows an electric car being charged.

Figure 2



By Alan Trotter Electric Car Charging [CC-BY-2.0]via Flickr

A driver wishes to buy a new car.

The table below gives some data about an electric car and one with a petrol engine.

	Electric car	Petrol engine car
Cost (£)	27 000	15 000
Running cost per year (£)	250	2 000
Average lifetime (years)	12	12

Which car would be the most economic over its 12 year lifetime?

Use data from the table above to support your answer.

You should include the difference in cost in your answer.

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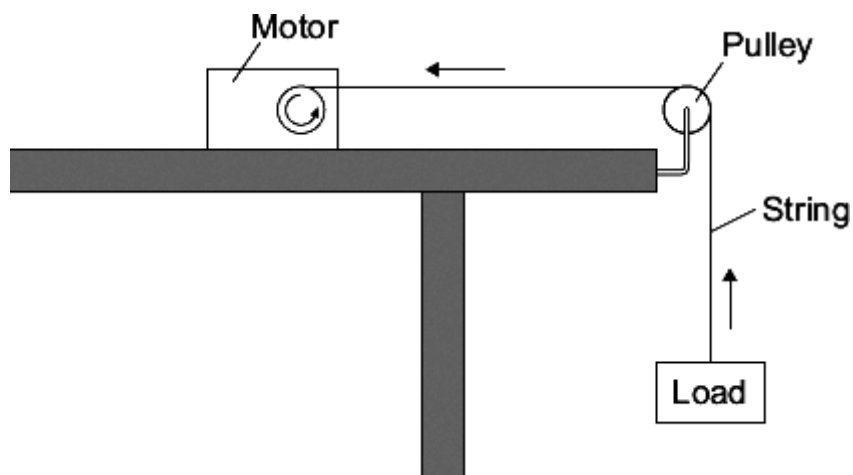
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(4)
(Total 11 marks)

Q2. 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.

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(1)

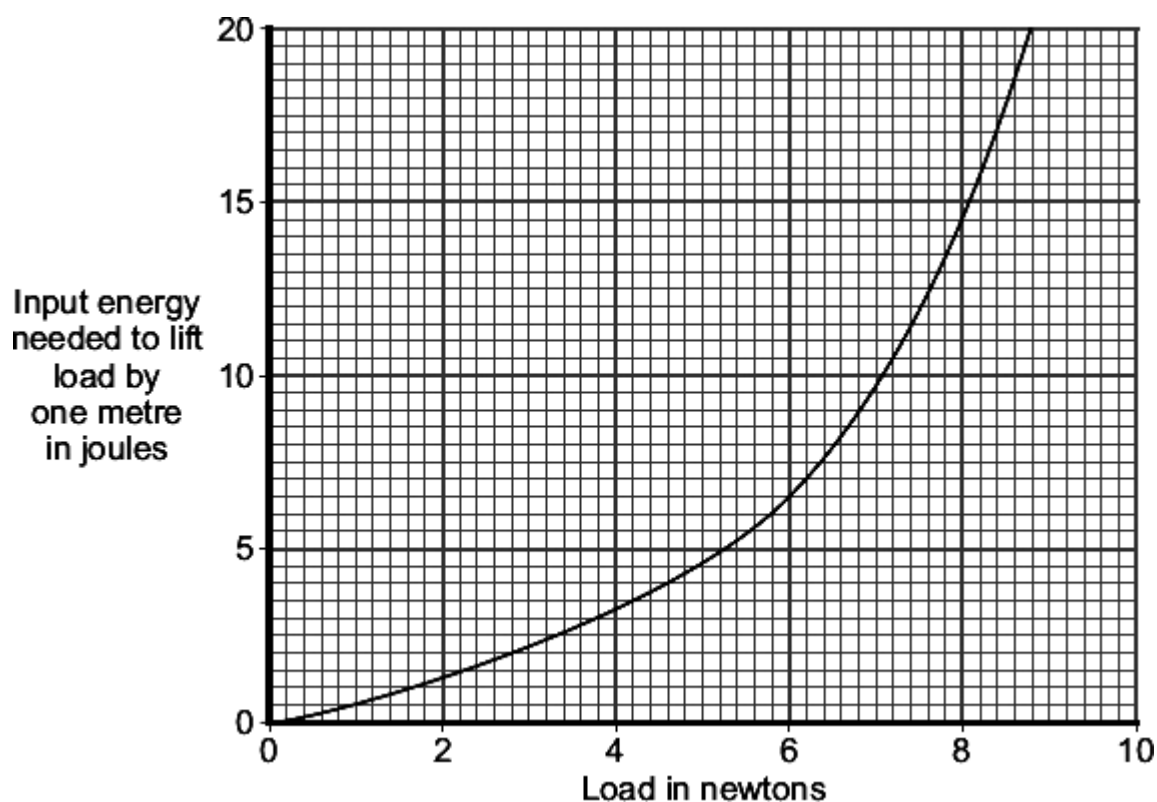
- (ii) What eventually happens to the wasted energy?

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(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?

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(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.

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Cost = pence

(3)

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

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(1)

(Total 8 marks)