Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic: Energy (Low Demand)

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Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

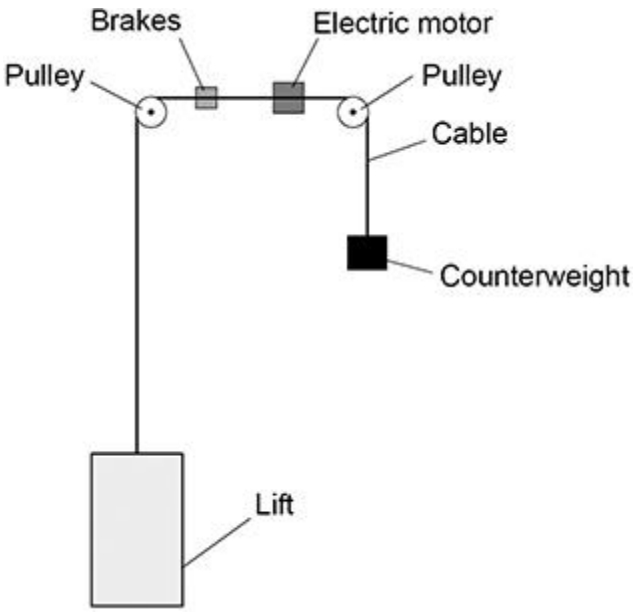
Q1.

The diagram below shows a lift near the bottom of a building.

The lift is attached by a cable to a counterweight.

An electric motor moves the lift.

The lift is moving up.



(a) As the lift moves up, how far does the counterweight move down?

Tick (✓) **one** box.

A shorter distance than the lift. ☐

The same distance as the lift. ☐

A longer distance than the lift. ☐

(1)

(b) What happens to the gravitational potential energy of the counterweight as it moves down?

Tick (✓) **one** box.

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It decreases ☐

It stays the same ☐

It increases ☐

(1)

(c) Calculate the change in gravitational potential energy of the lift when it moves up 4.0 m

The mass of the lift is 1300 kg

gravitational field strength = 9.8 N/kg

Use the equation:

gravitational potential energy = mass × gravitational field strength × height

_____

_____

_____

_____

Change in gravitational potential energy = _____ J

(2)

(d) Complete the sentences.

Choose answers from the box.

chemical	**elastic potential**	**gravitational potential**
internal	**kinetic**	

Friction between the brakes and the cable causes the speed of the lift to decrease.

As the speed decreases, there is a decrease in the _____

energy of the lift.

As the speed decreases, there is an increase in the _____

energy of the brakes.

(2)

(e) The motor transfers different amounts of energy each time people use the lift.

Which factors affect the amount of energy transferred by the motor as the lift moves?

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Tick (✓) **two** boxes.

The distance moved by the lift	☐
The height of the building	☐
The length of the steel cable	☐
The maximum power of the motor	☐
The weight of the people in the lift	☐

(2)

(f) The weight of the lift and the counterweight stretch the cable by 0.015 m

The cable acts like a spring with a spring constant of 880 000 N/m

Calculate the elastic potential energy of the stretched cable.

Use the equation:

$$\text{elastic potential energy} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$

_____

_____

_____

_____

Elastic potential energy = _____ J

(2)

(g) A lift system using a counterweight is more efficient than a lift system that does not use a counterweight.

How does having a more efficient system affect the energy transferred by the motor?

Tick (✓) **one** box.

Less energy is transferred.	☐
The same amount of energy is transferred.	☐
More energy is transferred.	☐

(1)

(Total 11 marks)

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Q2.

Figure 1 shows a swimmer wearing a wetsuit.

The wetsuit helps to keep the swimmer warm.

Figure 1

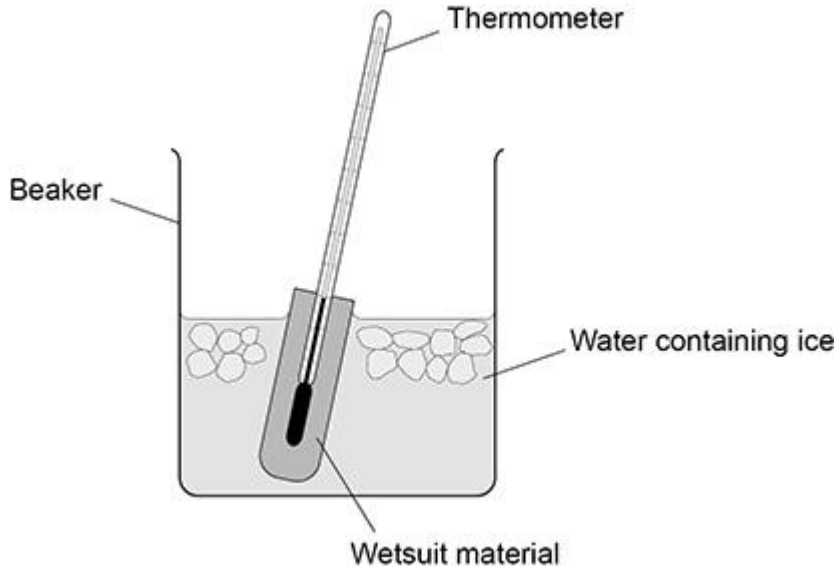


A swimmer wearing a wetsuit © OSTILL / iStock

A student wrapped a thermometer in a piece of wetsuit material and placed the thermometer in water containing ice.

Figure 2 shows the apparatus.

Figure 2



(a) After 30 seconds in the water the temperature of the thermometer had decreased by 7.5 °C

Calculate the average decrease in temperature each second.

_____

_____

_____

Average decrease in temperature each second = _____ °C

(2)

The student recorded the temperature of the thermometer after 30 seconds for four materials. Each

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piece of material was the same size and thickness.

In each test the starting temperature of the thermometer was 21.0 °C

Table 1 shows the results.

Table 1

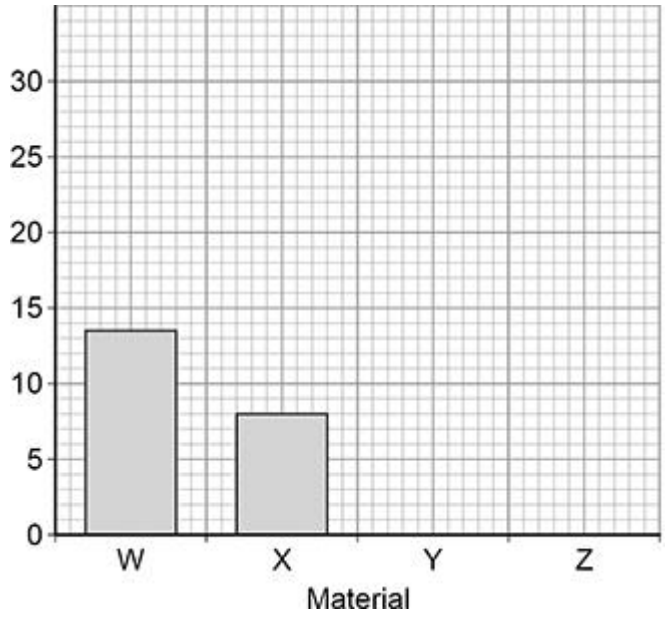
Material	W	X	Y	Z
Temperature in °C	13.5	8.0	16.0	12.0

(b) Complete **Figure 3** using the data in **Table 1**.

You should:

- label the *y*-axis
- draw the bars for materials Y and Z.

Figure 3



(2)

(c) Which material is the best thermal insulator?

Give a reason for your answer.

Tick (✓) **one** box.

W ☐ **X** ☐ **Y** ☐ **Z** ☐

Reason _____

_____

(2)

(d) The student tested a new material with a greater thermal conductivity than material Z.

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The piece of new material was the same size and thickness as the piece of material Z.

What was the temperature of the thermometer after 30 seconds?

Tick (✓) **one** box.

Less than 12.0 °C ☐

Exactly 12.0 °C ☐

Greater than 12.0 °C ☐

(1)

(e) During the investigation 0.0150 kg of the ice melted. The temperature of the water and ice did not change.

specific latent heat of fusion of ice = 334 000 J/kg

Calculate the energy needed to melt the ice.

Use the equation:

energy to melt the ice = mass × specific latent heat

_____

_____

_____

_____

Energy needed to melt the ice = _____ J

(2)

The student wanted to determine the density of a wetsuit material.

The student measured the length of one side of a cube of wetsuit material with:

- a micrometer
- a ruler.

Table 2 shows the results.

Table 2

Equipment	**Length in cm**		
	Measurement 1	**Measurement 2**	**Measurement 3**
Micrometer	0.581	0.557	0.576
Ruler	0.6	0.6	0.6

(f) Complete the sentence.

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Choose the answer from the box.

calibration	**precision**	**reproducibility**	**resolution**

The results show that compared to the ruler the micrometer has a higher

_____.

(1)

Use the Physics Equations Sheet to answer parts (g) and (h).

(g) Write down the equation that links density (ρ), mass (m) and volume (V).

_____

_____

(1)

(h) The student calculated the volume of the cube of wetsuit material to be 0.186 cm^3

The density of the cube was 0.300 g/cm^3

Calculate the mass of the cube.

Give your answer in grams.

_____

_____

_____

_____

_____

_____

Mass = _____ g

(3)

(Total 14 marks)

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