AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.1.1.1

Energy stores and systems

Past-paper questions

Tier	**Foundation**
Question groups	**25**
Available paper years	**2018–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

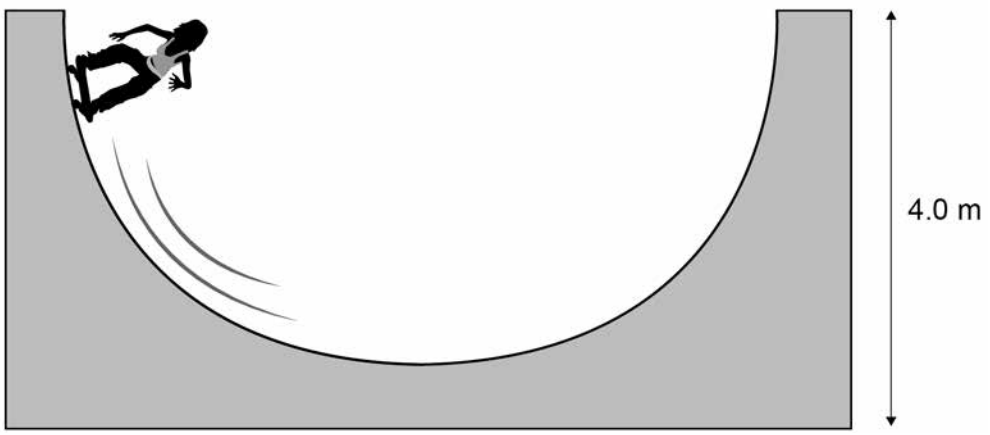
6.1.1.1 Energy stores and systems

Question 01

June 2018 | 8464/P/1F | Original Q3

0 3 **Figure 5** shows a girl skateboarding on a semi-circular ramp.

Figure 5



The girl has a mass of 50 kg

0 3 . 1 Calculate the gravitational potential energy (g.p.e.) of the girl at the top of the ramp.

Use the equation:

g.p.e. = mass × gravitational field strength × height

gravitational field strength = 9.8 N/kg

[2 marks]

g.p.e. = _____ J

0 3 . 2 The girl has a speed of 7 m/s at the bottom of the ramp.

Calculate the kinetic energy of the girl at the bottom of the ramp.

Use the equation:

kinetic energy = 0.5 × mass × $(\text{speed})^2$

[2 marks]

Kinetic energy = _____ J

6.1.1.1 Energy stores and systems

Question 01 · continued

June 2018 | 8464/P/1F | Original Q3

0 3 . 3 Not all of the g.p.e. has been transferred to kinetic energy.

Which **two** statements explain why?

[2 marks]

Tick **two** boxes.

- Some energy is wasted. ☐
- The mass of the girl is too low. ☐
- The ramp is not high enough. ☐
- The g.p.e. of the girl is not zero. ☐
- The speed of the girl is too great. ☐

0 3 . 4 Explain how lubricating the wheels of the skateboard can increase the speed of the girl.

Use ideas about energy in your explanation.

[3 marks]

9

6.1.1.1 Energy stores and systems

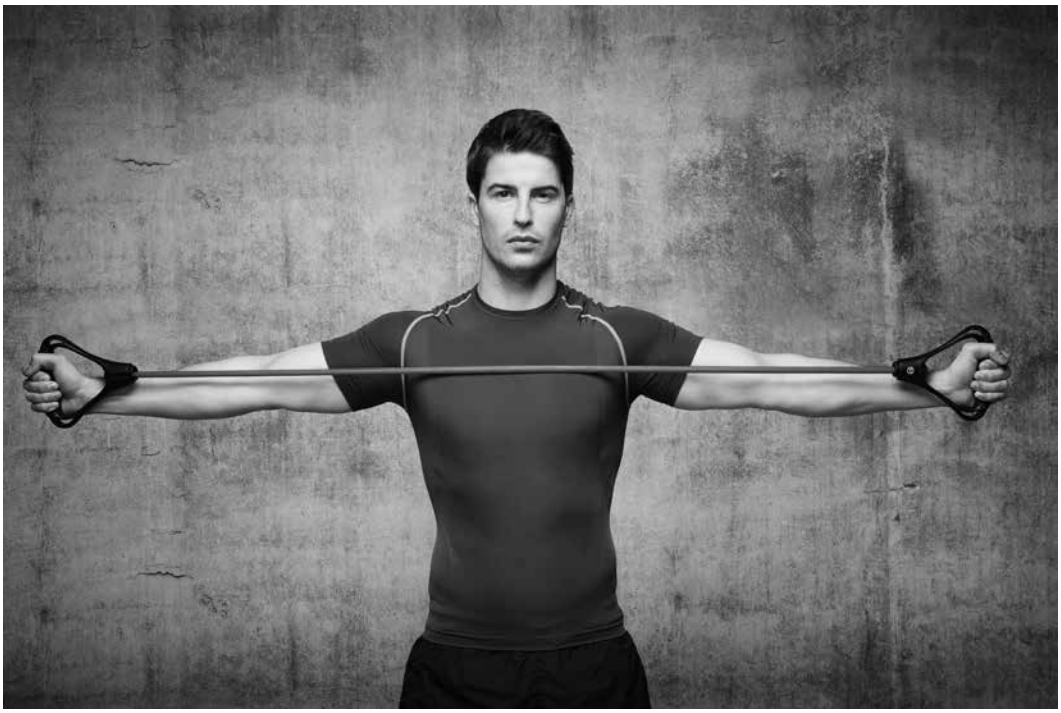
Question 02

June 2018 | 8464/P/2F | Original Q5

0 5 **Figure 6** shows a man using a resistance band when exercising.

The resistance band behaves elastically.

Figure 6



0 5 . 1 What happens to the store of elastic potential energy of the resistance band when the band is stretched?

[1 mark]

0 5 . 2 Explain what happens to the resistance band as it is released.

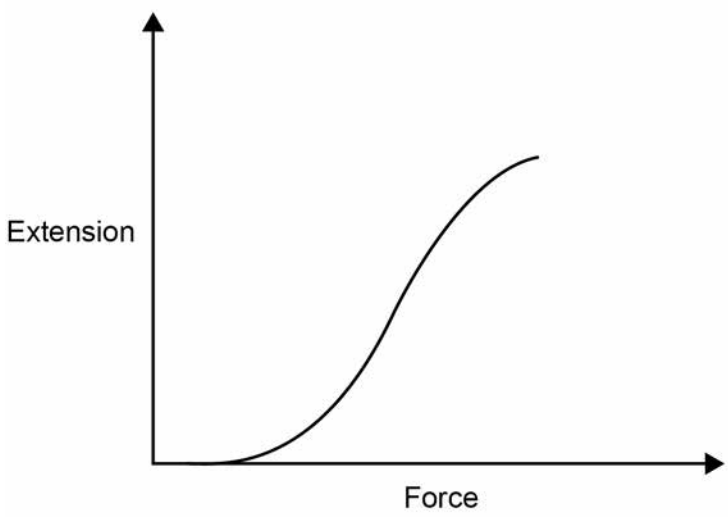
[2 marks]

6.1.1.1 Energy stores and systems

Question 02 · continued

0 5 . 3 **Figure 7** shows how the extension of the resistance band changes as the force applied changes.

Figure 7



Describe the trend shown in the graph.

[2 marks]

Question 5 continues on the next page

6.1.1.1 Energy stores and systems

Question 02 · continued

Figure 8 shows a chest expander.

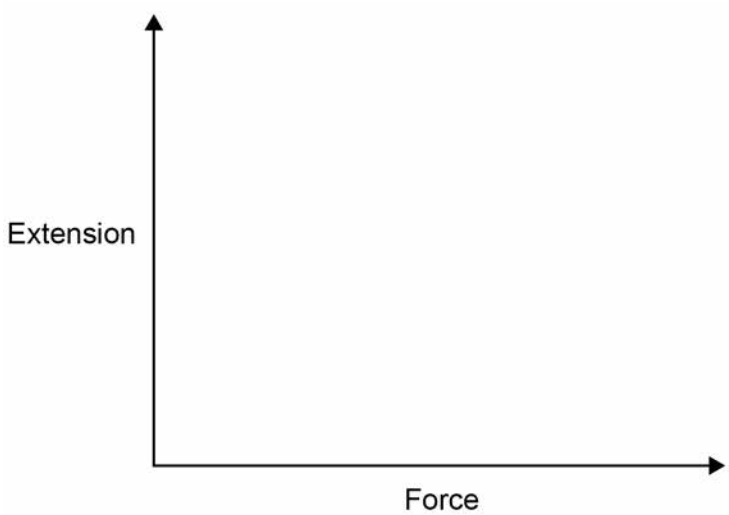
Figure 8



0 5 . 4 Sketch a graph on **Figure 9** to show how the extension of a spring in the chest expander changes as the force applied changes.

[2 marks]

Figure 9



6.1.1.1 Energy stores and systems

Question 02 · continued

When a force is applied to a spring, the spring extends by 7.5 cm

0 5 . 5 Write down the equation that links extension, force and spring constant.

[1 mark]

0 5 . 6 Calculate the force applied to the spring.

The spring has a spring constant of 1 600 N/m

Use your equation from question **05.5**

[3 marks]

Force = _____ N

11

6.1.1.1 Energy stores and systems

Question 03

June 2019 | 8464/P/1F | Original Q2

0 2 A student investigated how the area of a solar panel affected the output potential difference of the solar panel.

The student placed different sized solar panels under a lamp.

Figure 3 shows a solar panel under a lamp.

Figure 3



0 2 . 1 Which variable should be controlled?

[1 mark]

Tick (✓) **one** box.

The area of the solar panels ☐

The brightness of the lamp ☐

The output potential difference of the solar panels ☐

6.1.1.1 Energy stores and systems

Question 03 · continued

0 2 . 2 The student measured the output potential difference using a voltmeter.

When the voltmeter was **not** connected, the reading on the voltmeter was 0.7 V

What name is given to this type of error?

[1 mark]

Tick (✓) **one** box.

Zero error ☐

Random error ☐

Measurement error ☐

Question 2 continues on the next page

Question 03 · continued

Table 1 shows the results of the investigation.

Table 1

Solar panel	Area of solar panel in cm^2	Output potential difference in volts			
		Test 1	Test 2	Test 3	Mean
A	10	2.5	2.4	2.6	2.5
B	20	5.0	5.0	4.9	5.0
C	30	7.5	11.9	7.5	7.5
D	50	12.4	12.6	12.5	12.5

0 2 . 3 The readings for which solar panel show an anomalous result?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 2 . 4 The student did **not** have a solar panel with an area of 40 cm^2

Determine the most likely value for the mean output potential difference of a 40 cm^2 solar cell.

[1 mark]

Mean output potential difference = _____ V

6.1.1.1 Energy stores and systems

Question 03 · continued

0 2 . 5 The total input energy transfer to one of the solar panels was 8.0 joules.

The useful output energy transfer was 0.96 joules.

Calculate the efficiency of the solar panel.

Use the equation:

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

[2 marks]

Efficiency = _____

0 2 . 6 Solar power is a renewable energy resource.

Complete the sentence.

Choose the answer from the box.

[1 mark]

burned	**replenished**	**consumed**

A renewable energy resource is one that is _____ as it is used.

Question 2 continues on the next page

6.1.1.1 Energy stores and systems

Question 03 · continued

0 2 . 7 Some homes have solar panels which generate electricity.

On a sunny day the potential difference across a solar panel is 31 volts.

A charge of 490 coulombs flows through the solar panel.

Calculate the energy transferred by the solar panel.

Use the equation:

energy transferred = charge flow × potential difference

Give your answer to 2 significant figures.

[3 marks]

Energy transferred = _____ J

0 2 . 8 Why do solar panels on homes help reduce the environmental impact of using electrical devices?

[1 mark]

Tick (✓) **one** box.

Less electricity is used in the home. ☐

Less fossil fuel is burned. ☐

The electricity from the solar panels is cheaper. ☐

11

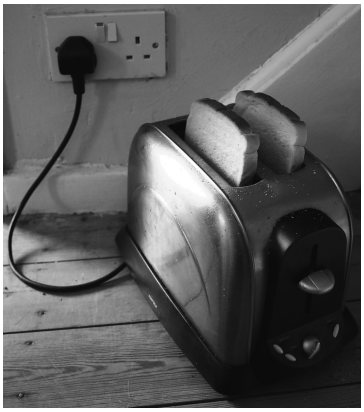
6.1.1.1 Energy stores and systems

Question 04

June 2019 | 8464/P/1F | Original Q5

0 5 **Figure 7** shows a toaster.

Figure 7



The toaster is connected to the mains supply using a three-core cable.

0 5 . 1 What is the function of the earth wire inside the cable?

[1 mark]

Tick (✓) **one** box.

To carry the current from the supply to the toaster ☐

To complete the circuit in the toaster ☐

To melt if a fault occurs inside the toaster ☐

To stop the metal case of the toaster becoming live if a fault occurs ☐

0 5 . 2 Complete the sentences.

Choose answers from the box.

[3 marks]

blue	**brown**	**orange**	**white**	**yellow**

The insulation around the earth wire is green and _____ .

The insulation around the live wire is _____ .

The insulation around the neutral wire is _____ .

6.1.1.1 Energy stores and systems

Question 04 · continued

0 5 . 3 The toaster is switched on for 120 seconds.

The power of the toaster is 850 watts.

Calculate the energy transferred by the toaster.

Use the equation:

energy transferred = power × time

[2 marks]

Energy transferred = _____ J

0 5 . 4 Complete the sentences.

Choose answers from the box.

[2 marks]

chemical	**elastic potential**	**kinetic**	**thermal**

When bread is lowered into the toaster, a spring is stretched. The stretched spring stores _____ energy.

After the bread is toasted, the spring makes the toast move upwards. As the speed of the toast increases, the _____ energy of the toast increases.

6.1.1.1 Energy stores and systems

Question 04 · continued

June 2019 | 8464/P/1F | Original Q5

0 5 . 5 Write the equation which links gravitational field strength, gravitational potential energy, height and mass.

[1 mark]

0 5 . 6 The toast was moved upwards by the spring.

The change in gravitational potential energy of the toast was 0.049 J

The mass of the toast was 0.050 kg

gravitational field strength = 9.8 N/kg

Calculate the change in height of the toast.

[3 marks]

Change in height = _____ m

12

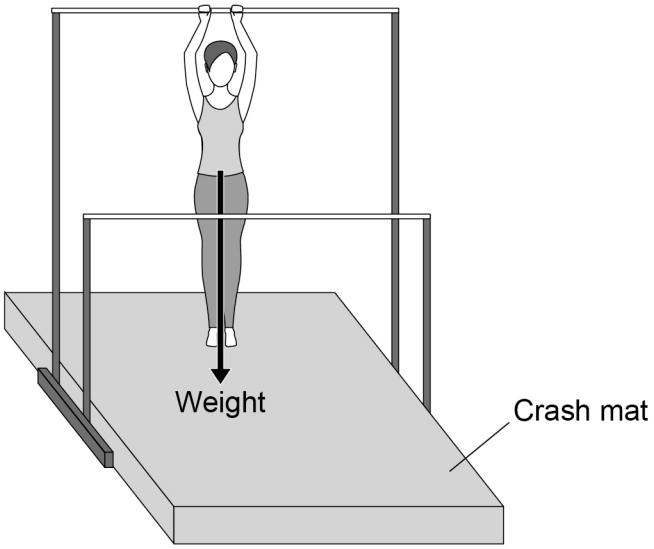
6.1.1.1 Energy stores and systems

Question 05

0 2 **Figure 3** shows a gymnast on a piece of gymnastic equipment.

The equipment consists of two bars at different heights.

Figure 3



0 2 . 1 The gymnast exerts a downward force on the bar.

What is the size of the upward force acting on the gymnast from the bar?

[1 mark]

Tick (✓) **one** box.

It is greater than the downward force. ☐

It is less than the downward force. ☐

It is the same size as the downward force. ☐

6.1.1.1 Energy stores and systems

Question 05 · continued

0 2 . 2 Why is the weight of the gymnast represented by an arrow?

[1 mark]

Tick (✓) **one** box.

Weight is a constant. ☐

Weight is a scalar. ☐

Weight is a unit. ☐

Weight is a vector. ☐

0 2 . 3 **Figure 3** shows the weight of the gymnast acting from a point.

What name is given to this point?

[1 mark]

Tick (✓) **one** box.

Centre of force ☐

Centre of mass ☐

Centre of tension ☐

Centre of weight ☐

Question 2 continues on the next page

6.1.1.1 Energy stores and systems

Question 05 · continued

0 2 . 4 The gymnast has a mass of 45 kg

gravitational field strength = 9.8 N/kg

Calculate the weight of the gymnast.

Use the equation:

weight = mass × gravitational field strength

[2 marks]

Weight = _____ N

0 2 . 5 The gymnast swings from one bar to the other bar several times.

Describe how the gravitational potential energy store and the kinetic energy store of the gymnast change as she moves between the bars.

[4 marks]

6.1.1.1 Energy stores and systems

Question 05 · continued

0 2 . 6 Falling on the crash mat reduces the average deceleration of the gymnast compared with falling on a hard surface.

Explain why reducing the deceleration is important to the gymnast.

[2 marks]

11

Turn over for the next question

6.1.1.1 Energy stores and systems

Question 06

November 2020 | 8464/P/1F | Original Q4

0 4 A scientist had a balloon which was filled with air.

0 4 . 1 Which statement describes how air particles move?

[1 mark]

Tick (✓) **one** box.

At random speeds in random directions ☐

At random speeds in the same direction ☐

At the same speed in random directions ☐

At the same speed in the same direction ☐

The temperature of the air was 19 °C

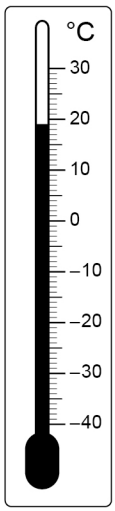
The scientist dipped the balloon into liquid nitrogen.

The temperature of the liquid nitrogen was −196 °C

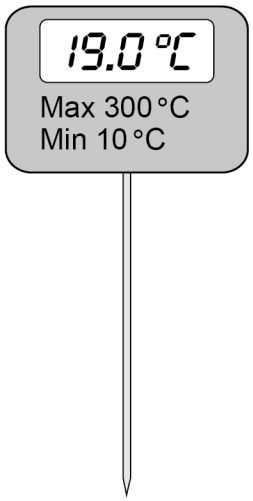
0 4 . 2 Which thermometer could be used to measure the temperature of the liquid nitrogen?

[1 mark]

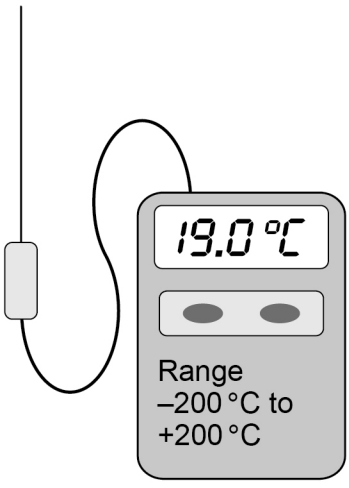
Tick (✓) **one** box.



☐



☐



☐

0 4 . 3 The scientist wore special insulating gloves when putting the balloon into the liquid nitrogen.

Suggest why.

[1 mark]

0 4 . 4 When the balloon was put into liquid nitrogen the temperature of the air in the balloon decreased.

Complete the sentences.

Choose answers from the box.

Each answer may be used once, more than once or not at all.

[2 marks]

decreased	**stayed the same**	**increased**

As the air in the balloon cooled down, the speed of the particles

_____ . This is because the kinetic energy of the

particles _____ .

Question 4 continues on the next page

0 4 . 5 The air in the balloon had a mass of 0.00320 kg

The temperature of the air in the balloon decreased by 215 °C

The change in thermal energy of the air in the balloon was 860 J

Calculate the specific heat capacity of the air in the balloon.

Use the Physics Equations Sheet.

[3 marks]

Specific heat capacity = _____ J/kg°C

0 4 . 6 The liquid nitrogen boiled.

What happens to the temperature of nitrogen as it boils?

[1 mark]

Tick (✓) **one** box.

- Temperature decreases ☐
- Temperature increases ☐
- Temperature stays the same ☐

6.1.1.1 Energy stores and systems

Question 06 · continued

The scientist recorded measurements to calculate the specific latent heat of vaporisation of nitrogen.

0 4 . 7 What is meant by vaporisation?

[1 mark]

Tick (✓) **one** box.

A change of state from liquid to gas ☐

A change of state from solid to gas ☐

A change of state from solid to liquid ☐

0 4 . 8 The mass of nitrogen that vaporised was 0.0072 kg

1440 J of energy was transferred to the nitrogen as it vaporised.

Calculate the specific latent heat of vaporisation of nitrogen.

Use the Physics Equations Sheet.

[3 marks]

Specific latent heat of vaporisation = _____ J/kg

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6.1.1.1 Energy stores and systems

Question 07

November 2020 | 8464/P/2F | Original Q1

0 1 **Figure 1** shows a girl bowling a ball along a ten-pin bowling lane.

Figure 1



The girl is trying to knock down the ten pins at the end of the bowling lane.

As the ball travels along the lane the velocity of the ball decreases.

0 1 . 1 Velocity is a vector.

Which statement describes a vector?

[1 mark]

Tick (✓) **one** box.

Vectors have direction only. ☐

Vectors have magnitude and direction. ☐

Vectors have magnitude only. ☐

6.1.1.1 Energy stores and systems

Question 07 · continued

0 1 . 2 Why does the velocity of the ball decrease as the ball travels along the lane?

[1 mark]

Tick (✓) **one** box.

The force of gravity slows the ball down. ☐

There are no forces acting on the ball. ☐

There is a resultant force acting on the ball. ☐

0 1 . 3 The ball travels along the lane at an average speed of 4.5 m/s

It takes the ball 4.0 seconds to travel the length of the lane.

Calculate the length of the lane.

Use the equation:

distance travelled = speed × time

[2 marks]

Length of the lane = _____ m

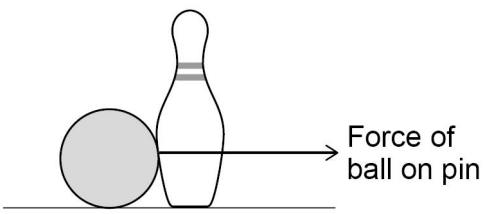
Question 1 continues on the next page

6.1.1.1 Energy stores and systems

Question 07 · continued

Figure 2 shows the ball hitting one of the pins.

Figure 2



0 1 . 4 Draw an arrow on **Figure 2** to show the force of the pin on the ball.

[2 marks]

0 1 . 5 The velocity of the pin changes from 0 to 12 m/s

It takes 0.15 seconds for the velocity to change.

Calculate the acceleration of the pin.

Use the equation:

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

[2 marks]

Acceleration = _____ m/s^2

6.1.1.1 Energy stores and systems

Question 07 · continued

0 1 . 6 When the pin is struck it accelerates.

Complete the sentences.

Choose answers from the box.

Each answer can be used once, more than once, or not at all.

[3 marks]

decreases	**increases**	**stays the same**

The displacement of the pin from the girl _____ .

The mass of the pin _____ .

The kinetic energy of the pin _____ .

11

Turn over for the next question

6.1.1.1 Energy stores and systems

Question 08

0 2 In a sport called far-leaping, an athlete uses a long pole to cross a river.

Figure 4 shows an athlete far-leaping.

Figure 4

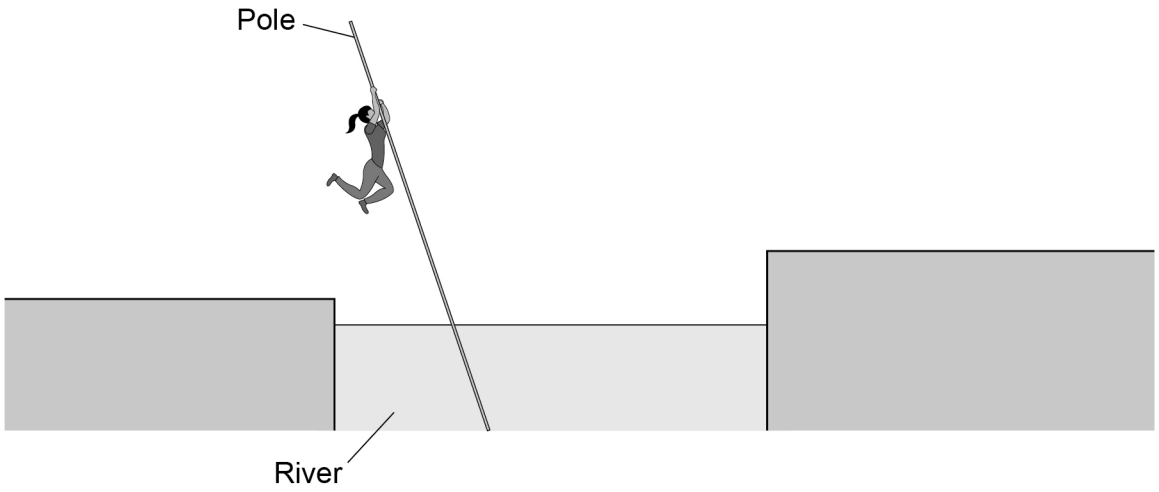
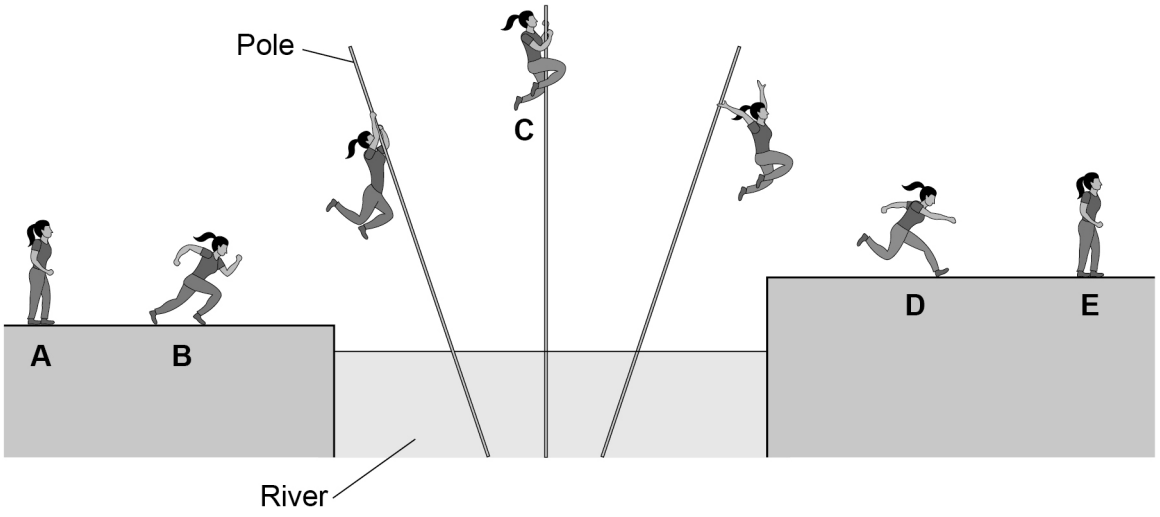


Figure 5 shows the athlete in different stages of far-leaping.

Figure 5



Question 08 · continued

0 2 . 1 Complete the sentence.

Choose answers from the box.

[2 marks]

chemical	**nuclear**	**kinetic**
elastic potential		**gravitational potential**

Between positions **A** and **B** the athlete speeds up. There is

an increase in the athlete's _____ energy and

a decrease in the athlete's _____ store of energy.

0 2 . 2 Between positions **B** and **C** the athlete jumps to the pole and climbs up it.

Which statement describes a change in the athlete's energy between positions **B** and **C**?

[1 mark]

Tick (✓) **one** box.

- Elastic potential energy decreases. ☐
- Elastic potential energy increases. ☐
- Gravitational potential energy decreases. ☐
- Gravitational potential energy increases. ☐

Question 2 continues on the next page

Question 08 · continued

0 2 . 3 The pole falls over from position **C**. The athlete lets go of the pole and lands at position **D**.

The change in height of the athlete between positions **C** and **D** is 3.0 m.

mass of athlete = 50 kg

gravitational field strength = 9.8 N/kg

Calculate the change in gravitational potential energy of the athlete between positions **C** and **D**.

Use the equation:

change in gravitational potential energy = mass × gravitational field strength × change in height

[2 marks]

Change in gravitational potential energy = _____ J

6.1.1.1 Energy stores and systems

Question 08 · continued

0 2 . 4 The kinetic energy of the athlete at position **D** is 1600 J.

mass of athlete = 50 kg

Calculate the speed of the athlete at position **D**.

Use the equation:

$$\text{speed} = \sqrt{\frac{2 \times \text{kinetic energy}}{\text{mass}}}$$

Choose the unit from the box.

[3 marks]

m/s	J/kg	J/s

Speed = _____ Unit _____

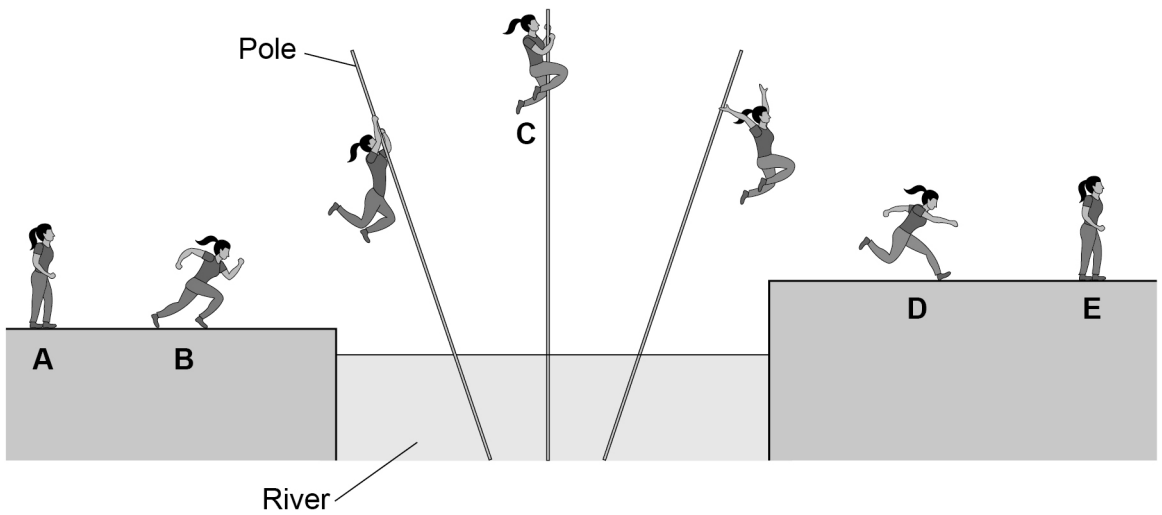
Question 2 continues on the next page

6.1.1.1 Energy stores and systems

Question 08 · continued

Figure 5 is repeated below.

Figure 5



0 2 . 5 At positions **A** and **E**, the athlete is standing still.

Why does the athlete have less energy in position **E** than in position **A**?

[1 mark]

Tick (✓) **one** box.

Energy has been transferred from the athlete to the air. ☐

The air temperature has decreased. ☐

The height of the athlete above the water has increased. ☐

6.1.1.1 Energy stores and systems

Question 08 · continued

0 2 . 6 Athletes have a large power output when they are far-leaping.

What is meant by the power of an athlete?

[1 mark]

Tick (✓) **one** box.

The rate at which the athlete transfers energy. ☐

The size of the maximum force exerted by the athlete. ☐

The total energy transferred by the athlete. ☐

0 2 . 7 A second athlete crossed the same river by far-leaping.

The second athlete had less power than the first athlete when running between position **A** and position **B**.

Complete the sentences.

Choose answers from the box.

Each answer may be used once, more than once or not at all.

[2 marks]

less than	**the same as**	**more than**

Two factors that could explain why the second athlete had less power than the first athlete are:

1. The time taken by the second athlete to run between position **A** and position **B**

was _____ the first athlete.

2. The work done by the second athlete was _____

the first athlete.

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6.1.1.1 Energy stores and systems

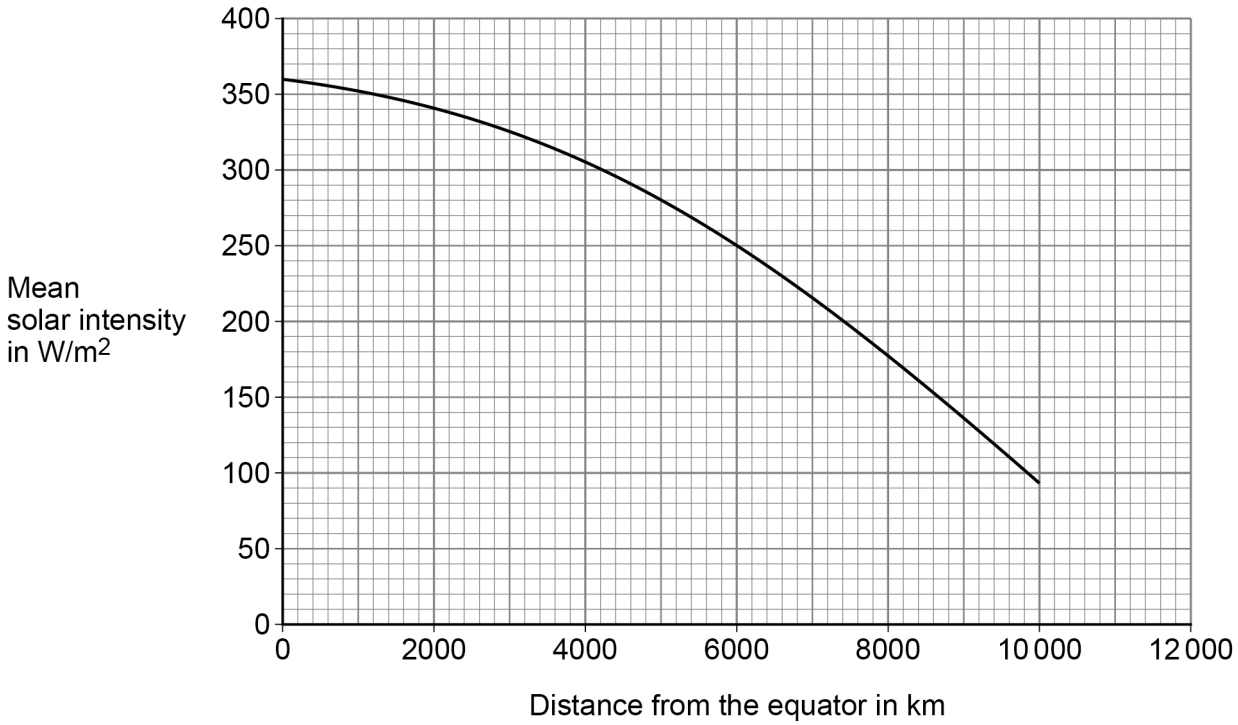
Question 09

November 2021 | 8464/P/1F | Original Q4

0 4 Solar intensity is a measure of the radiation received from the Sun at the surface of the Earth.

Figure 7 shows how the mean solar intensity changes with the distance from the equator.

Figure 7



0 4 . 1 The city of Athens is 4200 km from the equator.

What is the mean solar intensity in Athens?

[1 mark]

Mean solar intensity = _____ W/m^2

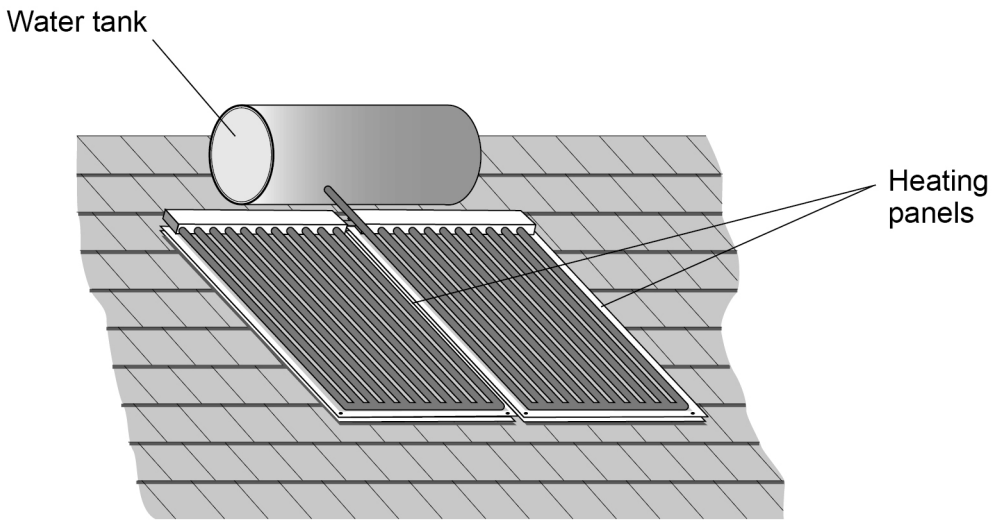
Question 09 · continued

Solar water heaters use radiation from the Sun to heat water.

The heated water is stored in a water tank.

Figure 8 shows a solar water heater on the roof of a building.

Figure 8



0 4 . 2 Cities closer to the equator have many more buildings with solar water heaters than cities further away from the equator.

Suggest why.

[1 mark]

0 4 . 3 The use of solar water heaters may reduce the need to burn fossil fuels.

Complete the sentence.

Choose the answer from the box.

[1 mark]

carbon dioxide	**nitrogen**	**oxygen**

Burning fossil fuels contributes to global warming because there is an increase in the amount of _____ in the atmosphere.

6.1.1.1 Energy stores and systems

Question 09 · continued

0 4 . 4 The efficiency of the solar water heater is 0.61

Calculate the useful power output when the total power input to the solar water heater is 1100 W.

Use the equation:

useful power output = efficiency × total power input

[2 marks]

Useful power output = _____ W

0 4 . 5 Different solar water heaters have different sized heating panels.

Suggest how the size of the heating panels affects the input power to a solar water heater.

[1 mark]

0 4 . 6 Water has a high specific heat capacity.

What is meant by the specific heat capacity of water?

[1 mark]

Tick (✓) **one** box.

- The energy required to change the state of 1 kg of water from liquid to gas. ☐
- The energy required to increase the temperature of 1 kg of water by 1 °C. ☐
- The power required to change the state of 1 kg of water from liquid to gas. ☐
- The power required to increase the temperature of 1 kg of water by 1 °C. ☐

6.1.1.1 Energy stores and systems

Question 09 · continued

0 4 . 7 The water tank contained 80 kg of water.

The change in thermal energy of the water was 8 400 000 J.

specific heat capacity of water = 4200 J/kg °C

Calculate the temperature change of the water.

Use the Physics Equations Sheet.

[3 marks]

Temperature change = _____ °C

0 4 . 8 The water tank is thermally insulated.

How does thermal insulation affect the rate of energy transfer from the water in the tank?

[1 mark]

Tick (✓) **one** box.

- Thermal insulation decreases the rate of energy transfer. ☐
- Thermal insulation does not change the rate of energy transfer. ☐
- Thermal insulation increases the rate of energy transfer. ☐

Question 4 continues on the next page

6.1.1.1 Energy stores and systems

Question 09 · continued

0 4 . 9 **Table 1** shows information about different materials.

Table 1

Material	Thermal conductivity in arbitrary units
A	3
B	2
C	8
D	4

Which material in **Table 1** is the best thermal insulator?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

12

6.1.1.1 Energy stores and systems

Question 10

November 2021 | 8464/P/1F | Original Q5

0 5 **Figure 9** shows a mobile phone with its battery removed.

Figure 9



A student measured the potential difference across the battery and then put the battery into the phone.

0 5 . 1 What is the equation linking current (I), potential difference (V) and resistance (R)?

[1 mark]

Tick (✓) **one** box.

- $I = V R$ ☐
- $R = I V$ ☐
- $V = I R$ ☐
- $V = I^2 R$ ☐

Question 5 continues on the next page

6.1.1.1 Energy stores and systems

Question 10 · continued

0 5 . 2 The current in the electronic circuit in the mobile phone was 0.12 A.

The potential difference across the battery was 3.9 V.

Calculate the resistance of the electronic circuit in the mobile phone.

[3 marks]

Resistance = _____ Ω

6.1.1.1 Energy stores and systems

Question 10 · continued

0 5 . 3 Write down the equation which links energy (*E*), power (*P*) and time (*t*).

[1 mark]

0 5 . 4 The battery was fully charged when it was put into the mobile phone.

The battery discharged when the mobile phone was switched on.

The average power output of the battery as it discharged was 0.46 watts.

The time taken to fully discharge the battery was 2500 minutes.

Calculate the energy transferred by the battery.

[3 marks]

Energy transferred = _____ J

Question 5 continues on the next page

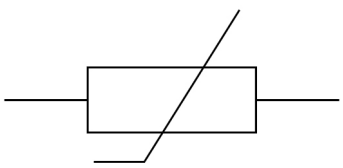
6.1.1.1 Energy stores and systems

Question 10 · continued

The mobile phone includes a sensor to monitor the temperature of the battery.

Figure 10 shows the circuit symbol for a component used in the sensor.

Figure 10



0 5 . 5 What component does the circuit symbol shown in **Figure 10** represent?

[1 mark]

0 5 . 6 The temperature of the component in **Figure 10** increases.

The potential difference across the component remains constant.

Explain what happens to the current in the component.

[2 marks]

11

6.1.1.1 Energy stores and systems

Question 11

November 2021 | 8464/P/2F | Original Q3

0 3 The stopping distance of a car is the sum of the thinking distance and the braking distance.

0 3 . 1 The thinking distance is affected by the reaction time of the driver.

Which **two** of the following can affect the reaction time of the driver?

[2 marks]

Tick (✓) **two** boxes.

- Damaged brakes ☐
- Taking drugs ☐
- Tiredness ☐
- Wet roads ☐
- Worn tyres ☐

6.1.1.1 Energy stores and systems

Question 11 · continued

Scientists measured the reaction time for drivers of different ages.

Figure 6 shows the results.

Figure 6



0 3 . 2 At what age did the drivers have the lowest mean reaction time?

[1 mark]

Age = _____ years

0 3 . 3 What was the lowest mean reaction time?

[1 mark]

Time = _____ seconds

Question 3 continues on the next page

6.1.1.1 Energy stores and systems

Question 11 · continued

The braking distance of a car is the distance travelled between the driver applying the brakes and the car stopping.

0 3 . 4 Complete the sentences.

Choose answers from the box.

Each answer may be used once, more than once or not at all.

[2 marks]

decreases	**stays the same**	**increases**

When the brakes are applied, the kinetic energy of the

car _____ .

The temperature of the brakes _____ .

6.1.1.1 Energy stores and systems

Question 11 · continued

0 3 . 5 A car is travelling at a speed of 12 m/s.

The driver applies the brakes and the car decelerates at a constant 3.0 m/s^2.

Calculate the braking distance of the car.

Use the equation:

$$\text{braking distance} = \frac{(\text{speed})^2}{2 \times \text{deceleration}}$$

Choose the unit from the box.

[3 marks]

m	kg	s

Braking distance = _____ Unit _____

0 3 . 6 To pass the UK driving test, people must know the typical stopping distance of a car at certain speeds.

Suggest **one** reason why.

[1 mark]

10

6.1.1.1 Energy stores and systems

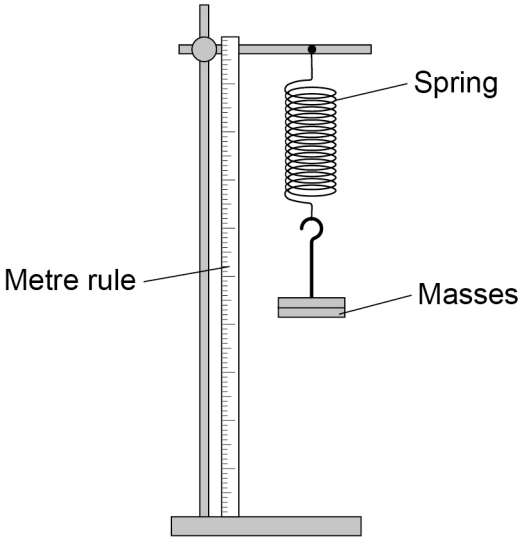
Question 12

November 2021 | 8464/P/2F | Original Q6

0 6 **Figure 8** shows a stretched spring.

The spring is elastically deformed.

Figure 8



0 6 . 1 What is meant by 'elastically deformed'?

[1 mark]

Tick (✓) **one** box.

As the force on the spring increases the length of the spring increases. ☐

Only a very small force is needed to stretch the spring. ☐

The force on the spring causes it to change shape. ☐

The spring will return to its original length when the force is removed. ☐

6.1.1.1 Energy stores and systems

Question 12 · continued

0 6 . 2 Describe a method to determine the extension of the spring.

[2 marks]

0 6 . 3 The extension of the spring is 80 mm.

spring constant = 40 N/m

Calculate the elastic potential energy of the spring.

Use the Physics Equations Sheet.

[3 marks]

Elastic potential energy = _____ J

Question 6 continues on the next page

6.1.1.1 Energy stores and systems

Question 12 · continued

0 6 . 4 Write down the equation which links extension (*e*), force (*F*) and spring constant (*k*).

[1 mark]

0 6 . 5 A force of 300 N acts on a different spring.

The force causes the spring to extend by 0.40 m.

Calculate the spring constant of the spring.

[3 marks]

Spring constant = _____ N/m

10

6.1.1.1 Energy stores and systems

Question 13

June 2022 | 8464/P/1F | Original Q2

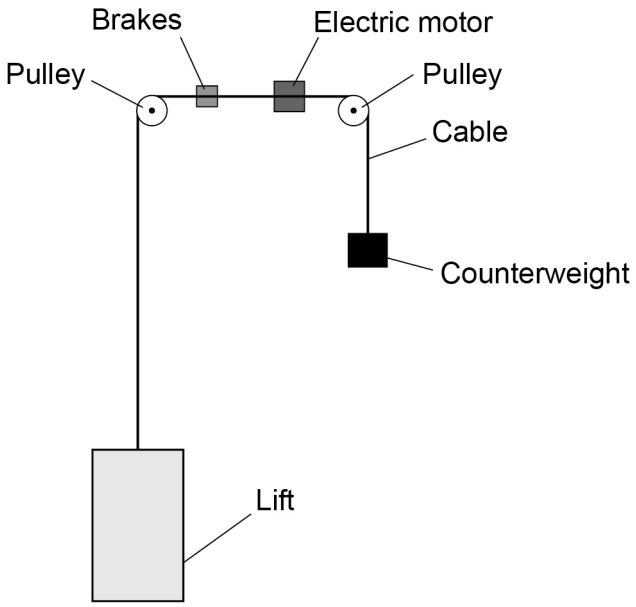
0 2 **Figure 3** shows a lift near the bottom of a building.

The lift is attached by a cable to a counterweight.

An electric motor moves the lift.

The lift is moving up.

Figure 3



0 2 . 1 As the lift moves up, how far does the counterweight move down?

[1 mark]

Tick (✓) **one** box.

A shorter distance than the lift. ☐

The same distance as the lift. ☐

A longer distance than the lift. ☐

6.1.1.1 Energy stores and systems

Question 13 · continued

0 2 . 2 What happens to the gravitational potential energy of the counterweight as it moves down?

[1 mark]

Tick (✓) **one** box.

It decreases ☐

It stays the same ☐

It increases ☐

0 2 . 3 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

[2 marks]

Change in gravitational potential energy = _____ J

Question 2 continues on the next page

Question 13 · continued

0 2 . 4 Complete the sentences.

Choose answers from the box.

[2 marks]

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.

0 2 . 5 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?

[2 marks]

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 ☐

6.1.1.1 Energy stores and systems

Question 13 · continued

0 2 . 6 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:

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

[2 marks]

Elastic potential energy = _____ J

0 2 . 7 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?

[1 mark]

Tick (✓) **one** box.

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

11

6.1.1.1 Energy stores and systems

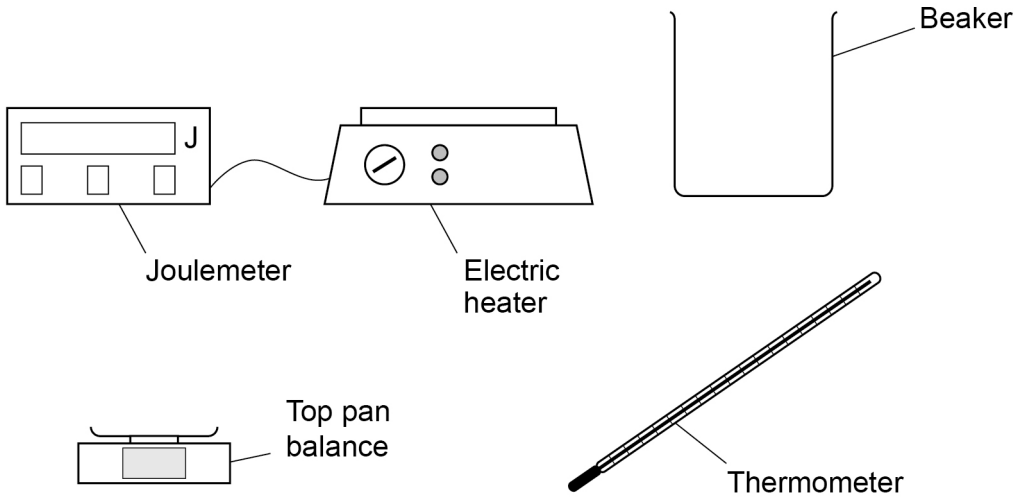
Question 14

June 2022 | 8464/P/1F | Original Q6

0 6 A student made measurements to determine the specific heat capacity of vegetable oil.

Figure 10 shows the equipment used.

Figure 10



0 6 . 1 Describe how the student could use the equipment shown in **Figure 10** to determine the specific heat capacity of vegetable oil.

[6 marks]

6.1.1.1 Energy stores and systems

Question 14 · continued

0 6 . 2 Give **one** risk when using the equipment in **Figure 10**.

[1 mark]

A different student did not have a joulemeter and calculated the energy transferred by the electric heater.

Use the Physics Equations Sheet to answer questions **06.3** and **06.4**.

0 6 . 3 Write down the equation linking energy transferred (*E*), power (*P*) and time (*t*).

[1 mark]

0 6 . 4 The electric heater had a power output of 50 watts.

Calculate the time taken for the electric element to transfer 4750 joules of energy to the vegetable oil.

[3 marks]

Time taken = _____ s

Question 6 continues on the next page

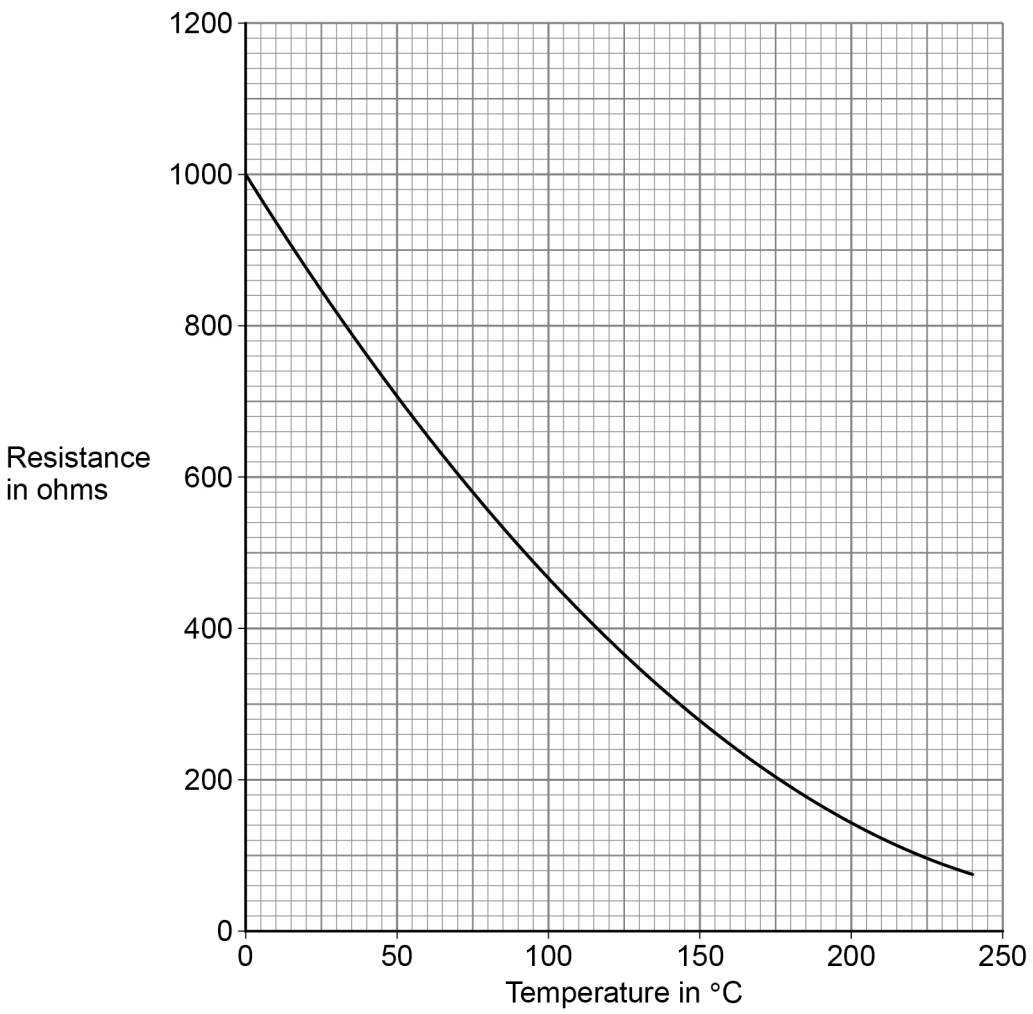
Question 14 · continued

In a deep fryer, vegetable oil is heated by an electric heating element. Food is then cooked in the hot vegetable oil.

The deep fryer contains an electrical component to monitor the temperature of the vegetable oil.

Figure 11 shows how the resistance of this electrical component changes with temperature.

Figure 11



0 6 . 5 What electrical component is used to monitor the temperature of the vegetable oil?

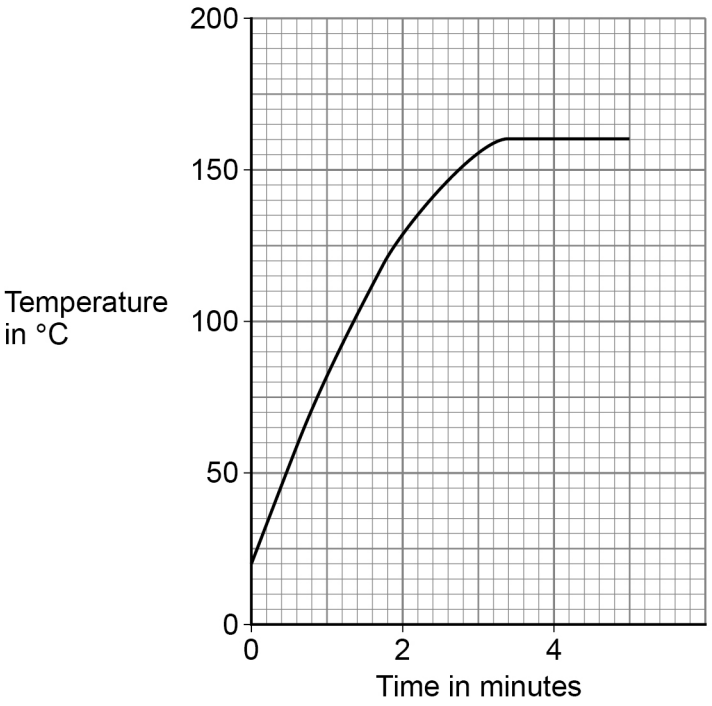
[1 mark]

Question 14 · continued

0 6 . 6 The electric heating element in the deep fryer automatically switches off when the vegetable oil reaches a certain temperature.

Figure 12 shows how the temperature of the vegetable oil changed after the deep fryer was switched on.

Figure 12



Determine the resistance of the electrical component when the electric heating element automatically switched off.

Use **Figure 11** and **Figure 12**.

[2 marks]

Resistance = _____ Ω

Question 6 continues on the next page

6.1.1.1 Energy stores and systems

Question 14 · continued

0 6 . 7 Some chips were put in the deep fryer.

In the deep fryer, water in the chips underwent a physical change and became steam.

Why is this a physical change?

[1 mark]

Tick (✓) **one** box.

- All water can change to steam. ☐
- No chemicals are involved when water changes to steam. ☐
- The change from water to steam can be detected visually. ☐
- The water will recover its original properties if the steam is cooled. ☐

15

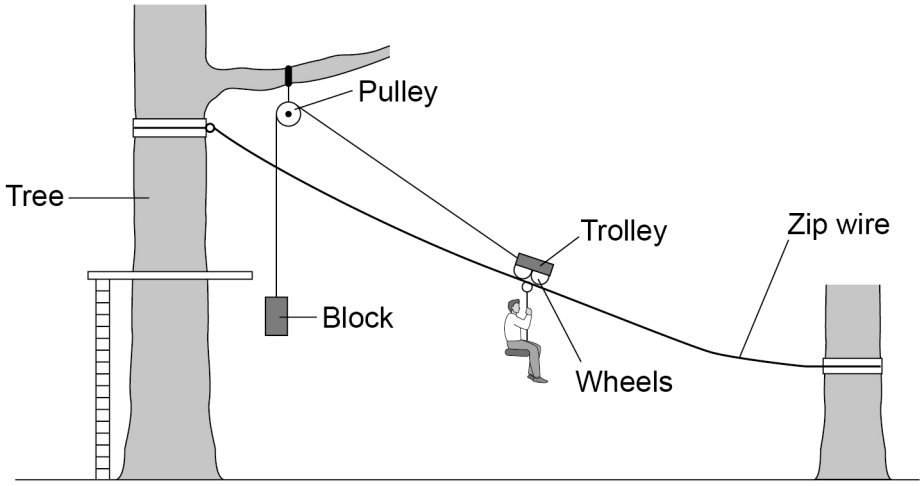
6.1.1.1 Energy stores and systems

Question 15

June 2023 | 8464/P/1F | Original Q2

0 2 **Figure 3** shows a person using a zip wire to move from a tree to the ground.

Figure 3



As the person moves down the zip wire, the block moves upwards.

0 2 . 1 What happens to the gravitational potential energy of the person as the person accelerates down the zip wire?

[1 mark]

Tick (✓) **one** box.

Decreases ☐

Stays the same ☐

Increases ☐

6.1.1.1 Energy stores and systems

Question 15 · continued

0 2 . 2 What happens to the kinetic energy of the person as the person accelerates down the zip wire?

[1 mark]

Tick (✓) **one** box.

Decreases ☐

Stays the same ☐

Increases ☐

0 2 . 3 The block is 3.4 m above the ground when the person is at the bottom of the zip wire.

mass of block = 2.5 kg

gravitational field strength = 9.8 N/kg

Calculate the gravitational potential energy of the block.

Use the equation:

gravitational potential energy = mass × gravitational field strength × height

[2 marks]

Gravitational potential energy = _____ J

Question 2 continues on the next page

Question 15 · continued

The trolley is a seat suspended from wheels which can roll along the zip wire.

0 2 . 4 When the person reaches the end of the zip wire, the person gets off the trolley.

The block falls downwards pulling the trolley back to the top of the zip wire.

maximum speed of block = 4.8 m/s

mass of block = 2.5 kg

Calculate the maximum kinetic energy of the block.

Use the equation:

$$\text{kinetic energy} = 0.5 \times \text{mass} \times (\text{speed})^2$$

[2 marks]

Maximum kinetic energy = _____ J

0 2 . 5 As the trolley moves, work is done against friction.

What is the effect of this?

[1 mark]

Tick (✓) **one** box.

- Some energy is destroyed. ☐
- Some energy is transferred to the surroundings. ☐
- The total energy of the block and trolley increases. ☐

6.1.1.1 Energy stores and systems

Question 15 · continued

0 2 . 6 The person oils the wheels on the trolley.

Explain how this will affect the speed of the person down the zip wire.

[2 marks]

9

Turn over for the next question

6.1.1.1 Energy stores and systems

Question 16

June 2023 | 8464/P/1F | Original Q5

0 5 Wind power and solar power are both renewable energy resources used to generate electricity for the National Grid.

0 5 . 1 Which of the following is also a renewable energy resource?

[1 mark]

Tick (✓) **one** box.

- Geothermal ☐
- Natural gas ☐
- Nuclear fuel ☐

0 5 . 2 The energy transferred by the National Grid in one second was 36 gigajoules (GJ).

Which of the following is the same as 36 gigajoules?

[1 mark]

Tick (✓) **one** box.

- 36×10^3 J ☐
- 36×10^6 J ☐
- 36×10^9 J ☐
- 36×10^{12} J ☐

Question 5 continues on the next page

Question 16 · continued

0 5 . 3 **Figure 6** shows how the mean power output from solar and wind energy resources in the UK varied between 2014 and 2019.

Figure 6

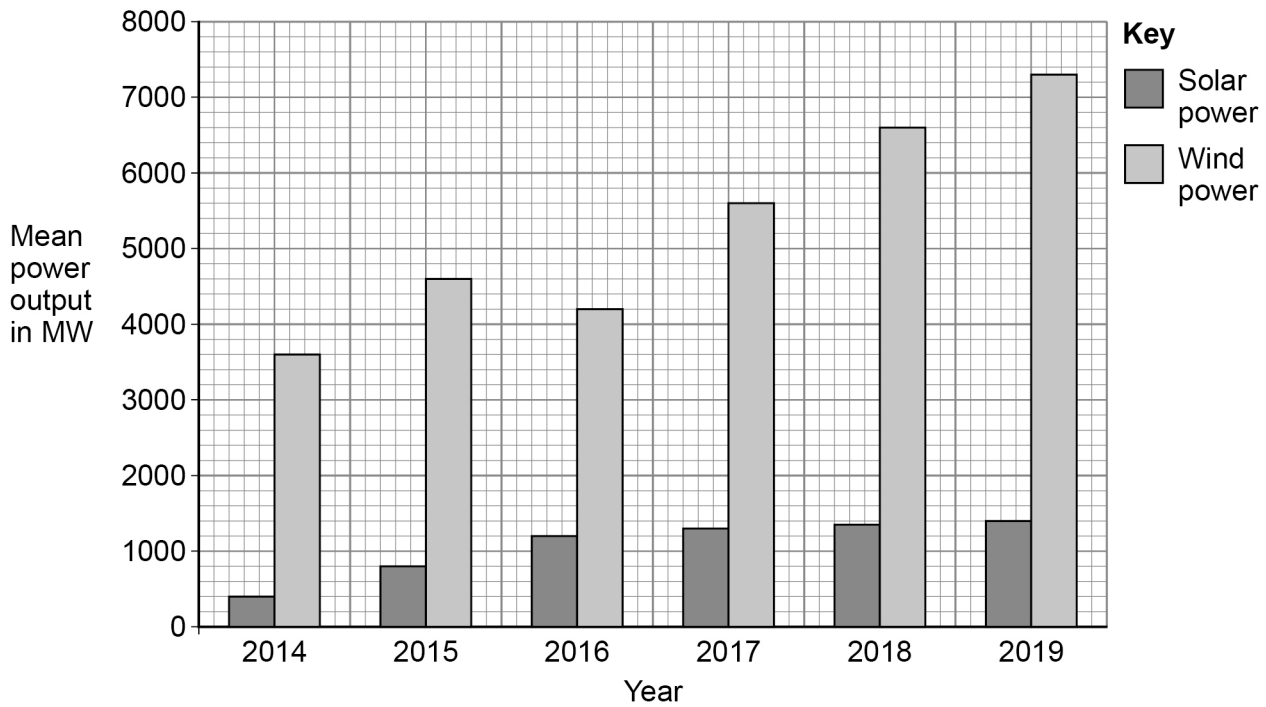
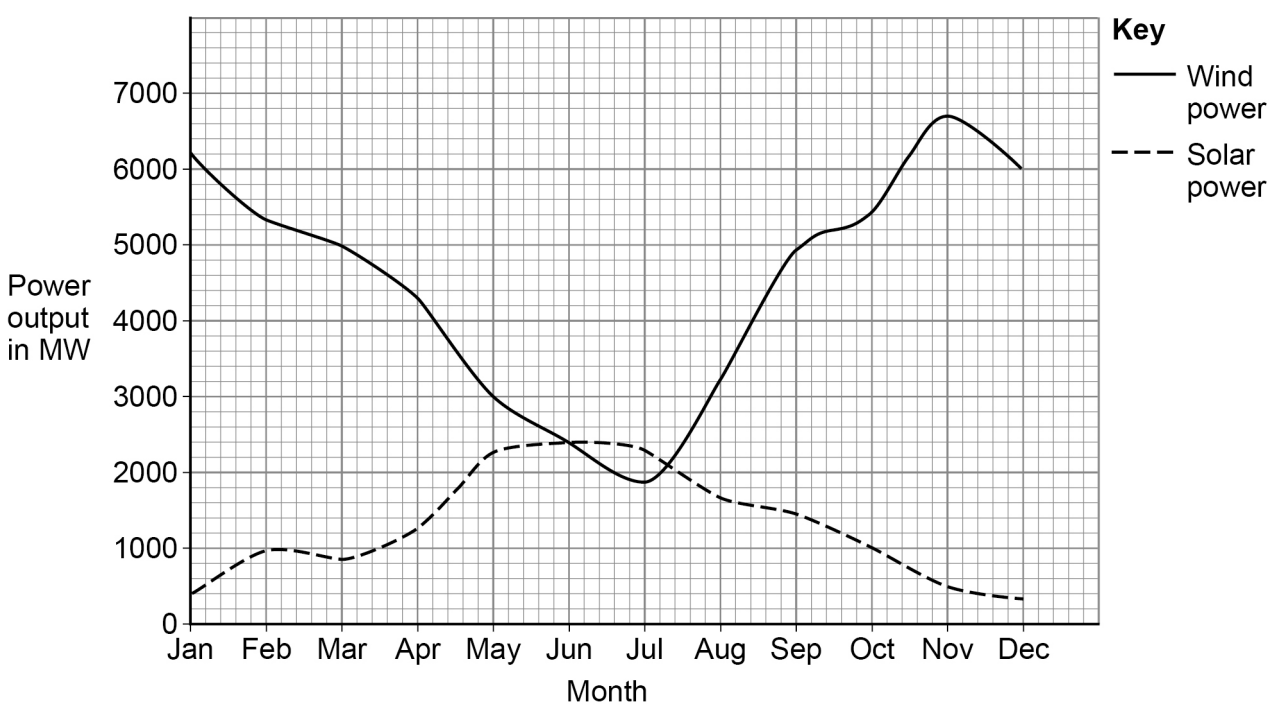


Figure 7 shows how the power output from solar and wind energy resources varies in a typical year.

Figure 7



6.1.1.1 Energy stores and systems

Question 16 · continued

June 2023 | 8464/P/1F | Original Q5

Explain the changes in power output from solar and wind energy resources between 2014 and 2019.

You should include an explanation of the change in power output during a typical year.

[6 marks]

8

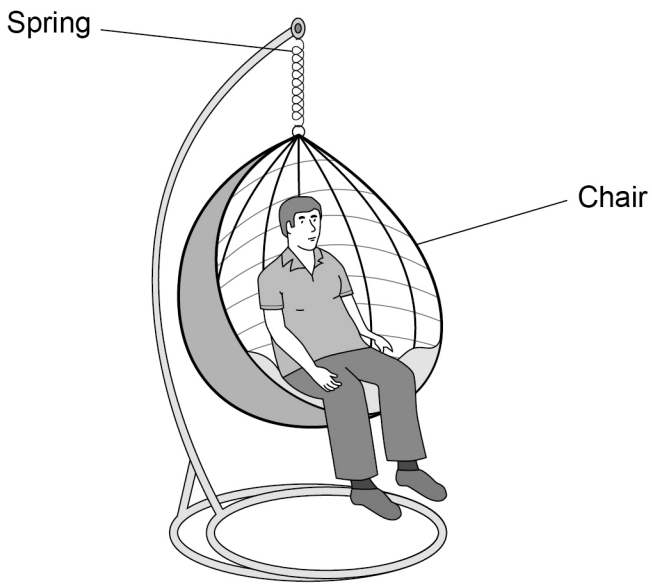
6.1.1.1 Energy stores and systems

Question 17

June 2023 | 8464/P/2F | Original Q1

0 1 **Figure 1** shows a garden chair hanging from a spring.

Figure 1



The weight of the person causes the spring to extend.

0 1 . 1 Why does the weight of the person cause the spring to extend?

[1 mark]

Tick (✓) **one** box.

- Weight acts downwards ☐
- Weight acts in all directions ☐
- Weight acts upwards ☐

6.1.1.1 Energy stores and systems

Question 17 · continued

0 1 . 2 Complete the sentence.

Choose the answer from the box.

[1 mark]

a gravitational	**a frictional**	**an electrostatic**

The weight of the person in **Figure 1** is _____ force.

Question 1 continues on the next page

6.1.1.1 Energy stores and systems

Question 17 · continued

The weight of the person causes an extension in the spring of 0.070 m.

The spring constant of the spring is 12 000 N/m.

0 1 . 3 Calculate the weight of the person.

Use the equation:

weight = spring constant × extension

[2 marks]

Weight = _____ N

0 1 . 4 Calculate the elastic potential energy stored in the extended spring.

Use the equation:

elastic potential energy = 0.5 × spring constant × (extension)^2

[2 marks]

Elastic potential energy = _____ J

6.1.1.1 Energy stores and systems

Question 17 · continued

0 1 . 5 If there is more than one person on the chair, the spring could become inelastically deformed.

What is meant by 'inelastically deformed'?

[1 mark]

Tick (✓) **one** box.

- The spring extends more when two or more forces act on it. ☐
- The spring will not go back to its original length when the force is removed. ☐
- The spring extends so that it is twice as long as its original length. ☐

Question 1 continues on the next page

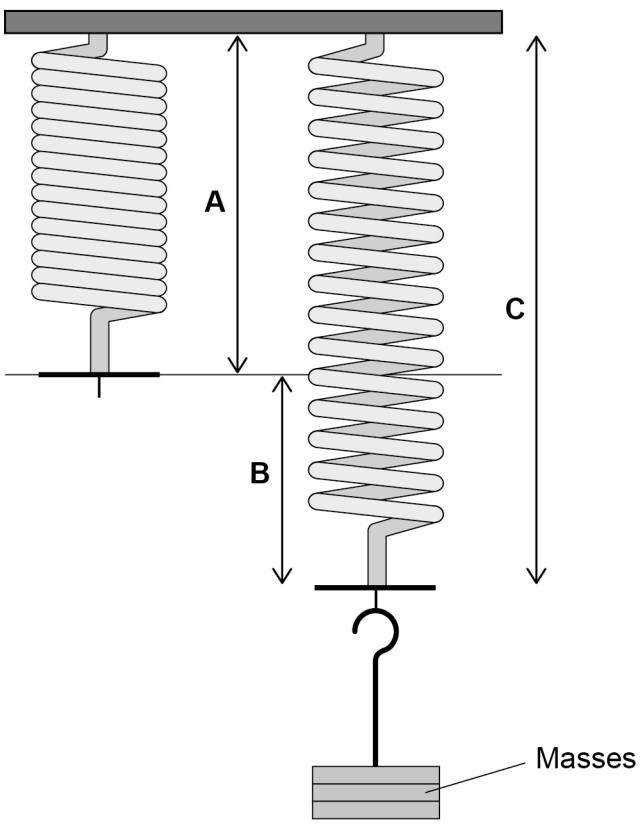
Question 17 · continued

The manufacturer of the chair investigated the extension of a new spring.

0 1 . 6 **Figure 2** shows slotted masses hanging from the spring.

The weight of the masses extends the spring.

Figure 2



Which length in **Figure 2** represents the extension of the spring?

[1 mark]

Tick (✓) **one** box.

A ☐ B ☐ C ☐

6.1.1.1 Energy stores and systems

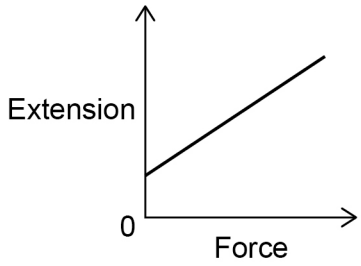
Question 17 · continued

0 1 . 7 Which graph shows that the extension of the spring is directly proportional to the force applied to the spring?

[1 mark]

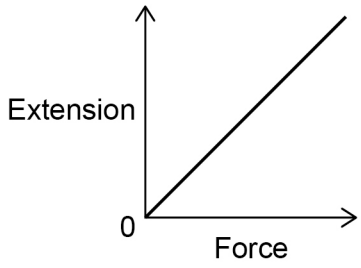
Tick (✓) **one** box.

A



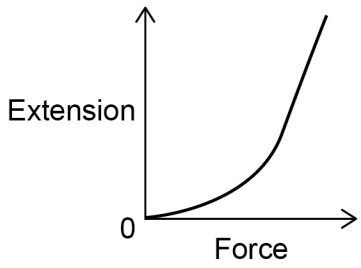
☐

B



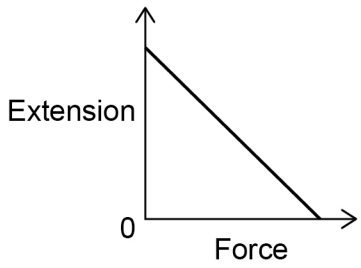
☐

C



☐

D



☐

Question 1 continues on the next page

6.1.1.1 Energy stores and systems

Question 17 · continued

0 1 . 8 **Table 1** shows the results of the manufacturer's investigation.

Table 1

Force in newtons	Extension in metres
100	0.008
200	0.016

Suggest **two** improvements to the investigation.

[2 marks]

1 _____

_____

2 _____

_____

11

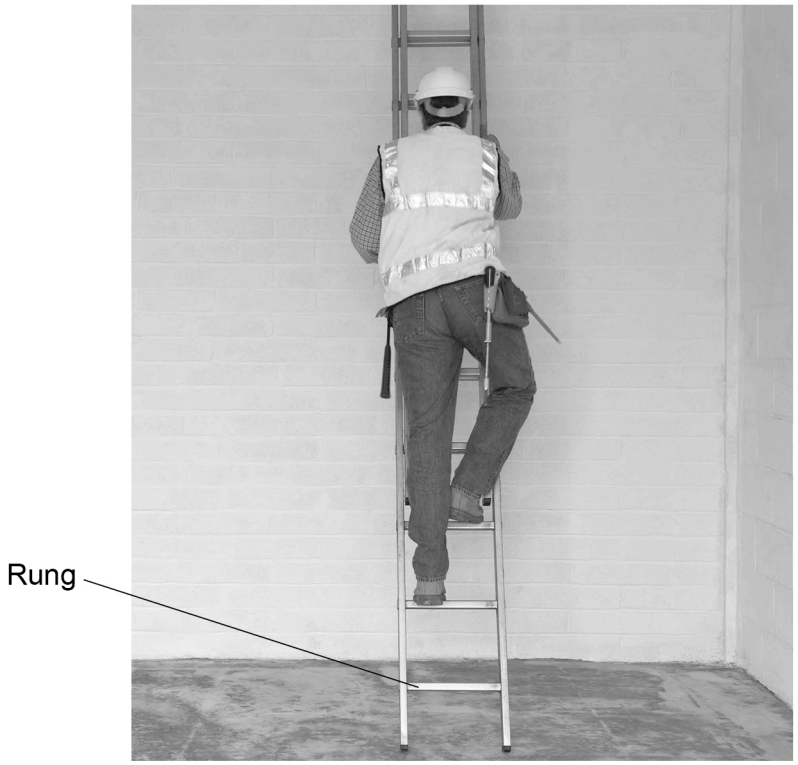
6.1.1.1 Energy stores and systems

Question 18

June 2023 | 8464/P/2F | Original Q5

0 5 **Figure 13** shows an engineer climbing up a ladder.

Figure 13



The distance between each rung on the ladder is 30 cm.

0 5 . 1 What is 30 cm in metres?

[1 mark]

Tick (✓) **one** box.

0.030 m ☐ 0.30 m ☐ 3.0 m ☐ 30 m ☐

6.1.1.1 Energy stores and systems

Question 18 · continued

0 5 . 2 The engineer has a weight of 710 N.

Calculate the work done when climbing up one rung of the ladder.

Use your answer to Question **05.1** and the equation:

work done = force × distance

[2 marks]

Work done = _____ Nm

0 5 . 3 The engineer climbs the ladder carrying some equipment.

Give the reason why carrying equipment increases the work done by the engineer when climbing the ladder.

[1 mark]

Question 5 continues on the next page

6.1.1.1 Energy stores and systems

Question 18 · continued

0 5 . 4 The engineer is stationary at the top of the ladder.

Which energy stores of the engineer increase due to the engineer climbing the ladder?

[2 marks]

Tick (✓) **two** boxes.

- Chemical ☐
- Elastic potential ☐
- Gravitational potential ☐
- Kinetic ☐
- Thermal ☐

6.1.1.1 Energy stores and systems

Question 18 · continued

Use the Physics Equations Sheet to answer questions **05.5** and **05.6**.

0 5 . 5 Write down the equation that links gravitational field strength (*g*), mass (*m*) and weight (*W*).

[1 mark]

0 5 . 6 The engineer has a weight of 710 N.

gravitational field strength = 9.8 N/kg

Calculate the mass of the engineer.

Give your answer to 2 significant figures.

[4 marks]

Mass (2 significant figures) = _____ kg

11

6.1.1.1 Energy stores and systems

Question 19

June 2024 | 8464/P/1F | Original Q2

0 2 **Figure 2** shows an outdoor swimming pool.

The water in the swimming pool comes from the sea.

Figure 2



The water in the pool is heated using a geothermal energy resource.

0 2 . 1 Which of the following describes a geothermal energy resource?

[1 mark]

Tick (✓) **one** box.

A non-renewable energy resource with high carbon emissions. ☐

A non-renewable energy resource with low running costs. ☐

A renewable energy resource that uses hot rocks underground. ☐

A renewable energy resource that uses the tides. ☐

Question 19 · continued

0 2 . 2 15 kg of seawater is heated before it is added to the pool.

specific heat capacity of seawater = 3800 J/kg °C

Calculate the change in thermal energy of 15 kg of seawater when its temperature is increased by 9.0 °C.

Use the equation:

change in thermal energy = mass × specific heat capacity × temperature change

[2 marks]

Change in thermal energy = _____ J

0 2 . 3 The energy transferred from 1.0 m^2 of the surface of the pool to the air is 80 J each second.

The surface area of the pool is 120 m^2.

Calculate the energy transferred from the whole surface of the pool to the air each second.

[1 mark]

Energy transferred each second = _____ J

Question 2 continues on the next page

6.1.1.1 Energy stores and systems

Question 19 · continued

0 2 . 4 Which of the following units is the same as 1 J/s?

[1 mark]

Tick (✓) **one** box.

1 N ☐

1 Pa ☐

1 W ☐

0 2 . 5 The pool is above sea level.

5.0 kg of water is pumped from sea level into the pool.

The water gains 196 J of gravitational potential energy.

gravitational field strength = 9.8 N/kg

Calculate the height of the pool above sea level.

Use the equation:

$$\text{height} = \frac{\text{gravitational potential energy}}{\text{mass} \times \text{gravitational field strength}}$$

[2 marks]

Height = _____ m

6.1.1.1 Energy stores and systems

Question 19 · continued

0 2 . 6 The water in some swimming pools is heated by burning fossil fuels.

Explain **one** environmental **disadvantage** of burning fossil fuels.

[2 marks]

9

Turn over for the next question

6.1.1.1 Energy stores and systems

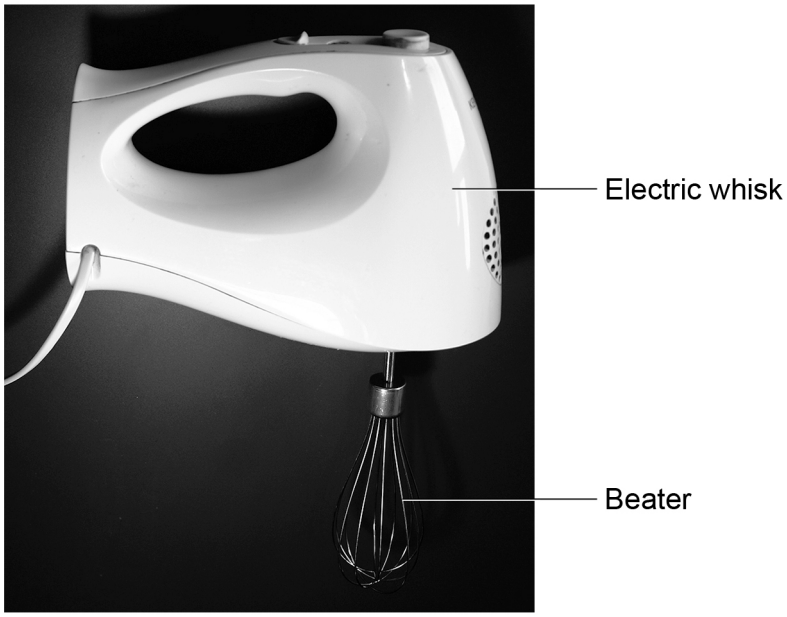
Question 20

June 2024 | 8464/P/1F | Original Q6

0 6 **Figure 10** shows an electric whisk that plugs into the mains electricity supply.

The whisk can mix food by spinning a beater.

Figure 10



0 6 . 1 Give **two** energy stores that increase when the whisk is switched on.

[2 marks]

1 _____

_____

2 _____

_____

6.1.1.1 Energy stores and systems

Question 20 · continued

Use the Physics Equations Sheet to answer questions **06.2** and **06.3**.

0 6 . 2 Work is done by the whisk when it is used to mix food.

Write down the equation that links power (*P*), time (*t*) and work done (*W*).

[1 mark]

0 6 . 3 The power output of the whisk is 92 W.

Calculate the time for the whisk to do 23 000 J of work.

[3 marks]

Time = _____ s

Question 6 continues on the next page

6.1.1.1 Energy stores and systems

Question 20 · continued

Use the Physics Equations Sheet to answer questions **06.4** and **06.5**.

0 6 . 4 Which equation links current (I), power (P) and resistance (R)?

[1 mark]

Tick (✓) **one** box.

$P = \frac{I}{R^2}$ ☐

$P = I R^2$ ☐

$P = \frac{I^2}{R}$ ☐

$P = I^2 R$ ☐

0 6 . 5 The current in the whisk is 500 mA.

The resistance of the whisk is 640 Ω.

Calculate the power of the whisk.

[3 marks]

Power = _____ W

6.1.1.1 Energy stores and systems

Question 20 · continued

The whisk has several settings that allow the beater to spin at different speeds.

A faster beater speed needs a greater power input from the mains electricity supply.

0 6 . 6 What is the potential difference between the live wire and neutral wire in the mains electricity supply?

[1 mark]

_____ V

0 6 . 7 Changing the beater speed does **not** change the potential difference between the live wire and neutral wire.

The power input to the whisk changes because the current in the whisk changes.

Complete the sentence.

[1 mark]

When the beater speed increases, the current in the whisk increases because the resistance of the whisk _____.

12

6.1.1.1 Energy stores and systems

Question 21

June 2024 | 8464/P/2F | Original Q7

0 7 **Figure 12** shows an Olympic gymnast performing a floor routine.

Figure 12



The floor contains springs.

When the gymnast lands on the floor, a force compresses the springs in the floor.

0 7 . 1 When a spring is compressed, the elastic potential energy of the spring increases.

Explain why compressing the springs in the floor helps the gymnast to jump higher.

Use ideas about energy in your answer.

[2 marks]

Question 7 continues on the next page

6.1.1.1 Energy stores and systems

Question 21 · continued

0 7 . 2 When the gymnast lands on the floor, one of the springs compresses by 1.2 cm.

spring constant = 8500 N/m

Calculate the elastic potential energy stored in the spring.

Use the Physics Equations Sheet.

Give the unit.

[4 marks]

Elastic potential energy = _____ Unit _____

6.1.1.1 Energy stores and systems

Question 21 · continued

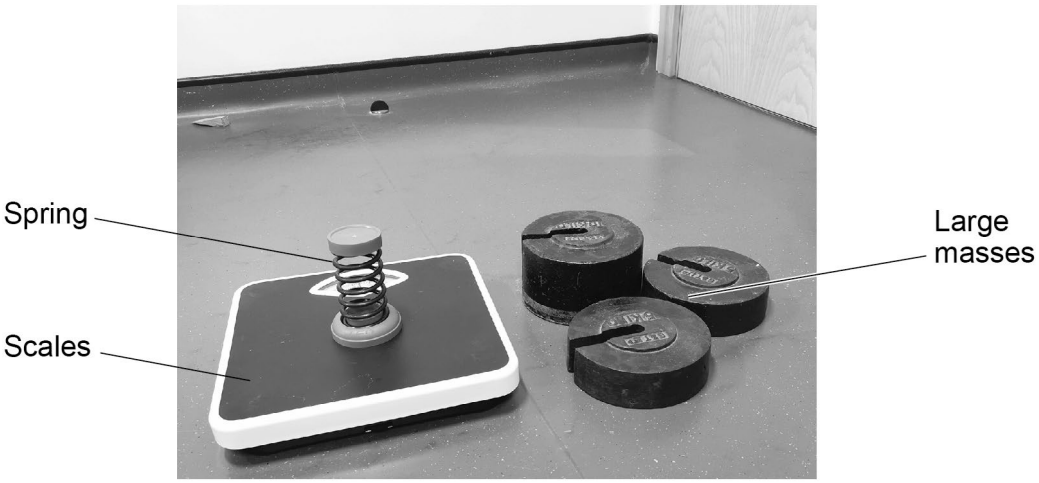
A student investigated a spring with a different spring constant.

When masses are placed on the spring it compresses.

The student measured the compression of the spring for different masses.

Figure 13 shows some of the equipment used.

Figure 13



0 7 . 3 Describe how the compression of the spring could be determined.

[2 marks]

0 7 . 4 Explain why the investigation should be done on the laboratory floor rather than on a table.

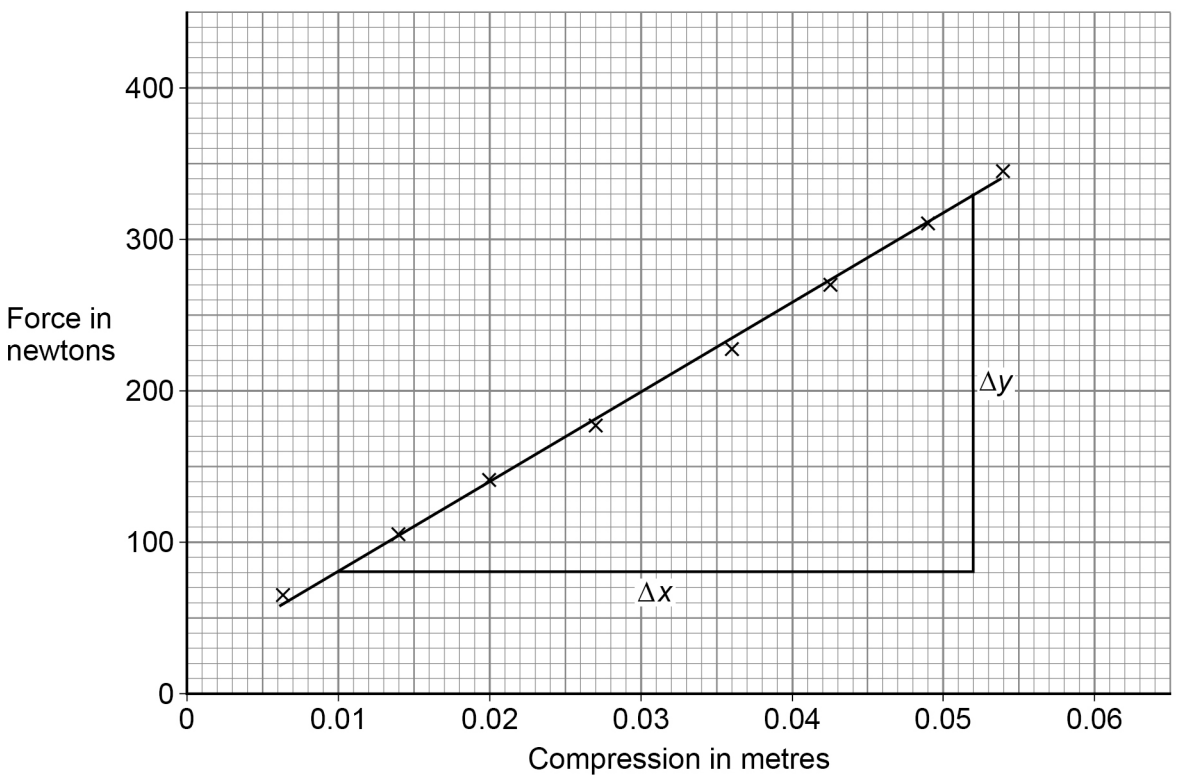
[2 marks]

6.1.1.1 Energy stores and systems

Question 21 · continued

Figure 14 shows the results.

Figure 14



6.1.1.1 Energy stores and systems

Question 21 · continued

The spring constant is the gradient of the line of best fit shown on **Figure 14**.

0 7 . 5 Determine the value Δy on **Figure 14**.

[1 mark]

$\Delta y =$ _____ N

0 7 . 6 Determine the value Δx on **Figure 14**.

[1 mark]

$\Delta x =$ _____ m

0 7 . 7 Determine the spring constant of the spring.

Use your answers to Question **07.5** and Question **07.6**.

Give your answer to 3 significant figures.

[2 marks]

Spring constant (3 significant figures) = _____ N/m

14

6.1.1.1 Energy stores and systems

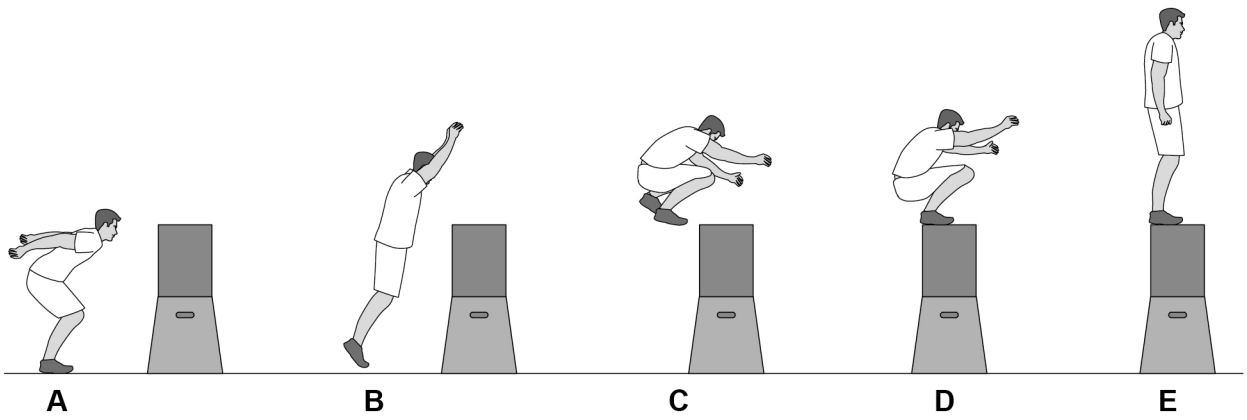
Question 22

June 2025 | 8464/P/1F | Original Q3

0 3 A person performs a 'vertical box jump'.

Figure 4 shows five different stages, **A**, **B**, **C**, **D** and **E**, of the jump.

Figure 4



0 3 . 1 Complete the sentences.

Choose answers from the box.

[2 marks]

A	**B**	**C**	**D**	**E**

The person has the least gravitational potential energy at stage _____.

The person has the greatest kinetic energy at stage _____.

6.1.1.1 Energy stores and systems

Question 22 · continued

0 3 . 2 The person in **Figure 4** has a mass of 60 kg.

The person leaves the ground with a speed of 5.5 m/s.

Calculate the kinetic energy of the person.

Use the equation:

$$\text{kinetic energy} = 0.5 \times \text{mass} \times (\text{speed})^2$$

[2 marks]

Kinetic energy = _____ J

0 3 . 3 The person has a mass of 60 kg.

The height of the jump is 1.5 m.

gravitational field strength = 9.8 N/kg

Calculate the gravitational potential energy of the person at a height of 1.5 m.

Use the equation:

gravitational potential energy = mass × gravitational field strength × height

[2 marks]

Gravitational potential energy = _____ J

Question 3 continues on the next page

6.1.1.1 Energy stores and systems

Question 22 · continued

0 3 . 4 The person jumps onto a box higher than the one in **Figure 4**, on page 12.

To jump onto a higher box, the person's speed when leaving the ground is different.

Explain how the speed is different when jumping onto a higher box.

You should answer in terms of gravitational potential energy and kinetic energy.

[3 marks]

0 3 . 5 Suggest **one** reason why a person is more likely to be injured when falling off a higher box.

[1 mark]

10

6.1.1.1 Energy stores and systems

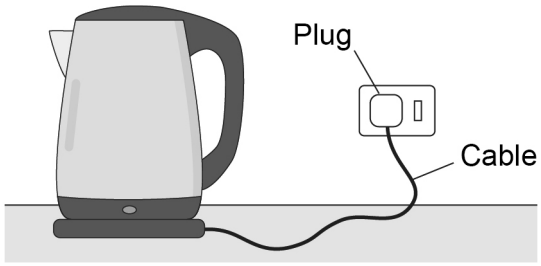
Question 23

June 2025 | 8464/P/1F | Original Q4

0 4 **Figure 5** shows a plastic kettle.

The kettle is connected to the mains electricity supply.

Figure 5



0 4 . 1 What is the frequency of the UK mains electricity supply?

[1 mark]

Tick (✓) **one** box.

25 Hz ☐

50 Hz ☐

75 Hz ☐

100 Hz ☐

Question 4 continues on the next page

6.1.1.1 Energy stores and systems

Question 23 · continued

0 4 . 2 The cable that connects the kettle to the plug contains two insulated wires.

Draw **one** line from each wire to the colour of the insulation on the wire.

[2 marks]

Wire	Colour of insulation
Live	Blue
Neutral	Brown
	Green and yellow stripes

Use the Physics Equations Sheet to answer questions **04.3** and **04.4**.

0 4 . 3 Write down the equation that links current (I), potential difference (V) and power (P).

[1 mark]

6.1.1.1 Energy stores and systems

Question 23 · continued

0 4 . 4 The power of the heating element in the kettle is 2100 W.

The potential difference across the heating element is 230 V.

Calculate the current in the heating element.

Give your answer to 2 significant figures.

[4 marks]

Current (2 significant figures) = _____ A

0 4 . 5 The kettle is designed to switch off when the water reaches boiling point.

Before the kettle switches off, 0.0080 kg of water changes state.

The energy transferred to change the state of the water is 18 000 J.

Calculate the specific latent heat of vaporisation of the water.

Use the Physics Equations Sheet.

[3 marks]

Specific latent heat of vaporisation = _____ J/kg

6.1.1.1 Energy stores and systems

Question 23 · continued

0 4 . 6 A different kettle is used to heat some water.

The useful output energy transferred to the water is 75 600 J.

The total input energy transferred by the kettle is 84 000 J.

Calculate the efficiency of the kettle.

Use the equation:

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

[2 marks]

Efficiency = _____

0 4 . 7 Explain **one** advantage of electrical appliances having a high efficiency.

[2 marks]

15

6.1.1.1 Energy stores and systems

Question 24

June 2025 | 8464/P/1F | Original Q5

0 5 Fossil fuels are burned in car engines and in power stations.

0 5 . 1 Describe how different energy stores change in a car engine when a fossil fuel is burned.

[2 marks]

0 5 . 2 Some car engines burn a fuel that is produced using plants.

Name a fuel produced using plants.

[1 mark]

0 5 . 3 Some cars do **not** contain an engine that burns a fuel.

Suggest how cars that do **not** burn a fuel are powered.

[1 mark]

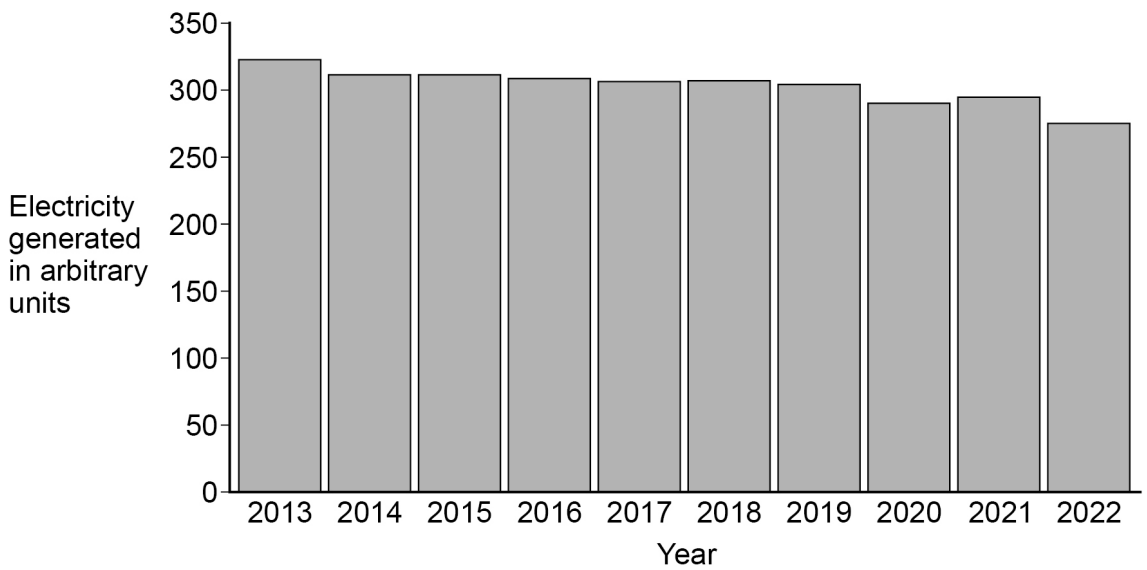
Question 5 continues on the next page

6.1.1.1 Energy stores and systems

Question 24 · continued

Figure 6 shows how the total amount of electricity generated in the UK has changed with time.

Figure 6



0 5 . 4 The proportion of electricity that is generated using renewable energy resources has increased since the year 2013.

Which conclusion is correct?

Use **Figure 6**.

[1 mark]

Tick (✓) **one** box.

The amount of fossil fuel that is burned to generate electricity each year has decreased. ☐

The concentration of carbon dioxide in the atmosphere has decreased. ☐

The rate of increase of the mean temperature of the atmosphere has decreased. ☐

6.1.1.1 Energy stores and systems

Question 24 · continued

0 5 . 5 The UK plans to stop burning fossil fuels to generate electricity.

Explain **one** reason why it will take many years before all electricity is generated using renewable resources.

[2 marks]

0 5 . 6 Renewable energy resources can have a negative impact on the environment.

Give **one** negative environmental impact of hydro-electric power and of wind power.

[2 marks]

Hydro-electric power _____

Wind power _____

9

6.1.1.1 Energy stores and systems

Question 25

June 2025 | 8464/P/1F | Original Q6

0 6 A student investigated the specific heat capacity of aluminium.

The student used an electric heater to increase the temperature of an aluminium block.

The student measured the:

- mass of the block
- energy transferred to the block
- temperature change of the block.

Table 2 shows the results.

Table 2

Mass in kilograms	0.75
Energy transferred in joules	13 800
Temperature change in °C	20

0 6 . 1 Calculate the specific heat capacity of aluminium.

Use the Physics Equations Sheet.

[3 marks]

Specific heat capacity = _____ J/kg °C

6.1.1.1 Energy stores and systems

Question 25 · continued

0 6 . 2 Describe a method the student could have used to obtain the results in **Table 2**.

[6 marks]

Extra space

Question 6 continues on the next page

6.1.1.1 Energy stores and systems

Question 25 · continued

0 6 . 3 Wrapping the aluminium block in insulation makes the value for the specific heat capacity of aluminium more accurate.

Which are **two** reasons why?

[2 marks]

Tick (✓) **two** boxes.

- The amount of wasted energy is less. ☐
- The energy transferred to the aluminium block is greater. ☐
- The insulation heats the aluminium block. ☐
- The power of the electric heater increases. ☐
- The temperature increase of the aluminium block is greater. ☐

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