

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B651/01

GATEWAY SCIENCE

PHYSICS B

Unit 1 Modules P1 P2 P3 (Foundation Tier)

FRIDAY 28 MAY 2010: Morning

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

**Candidates answer on the Question Paper
A calculator may be used for this paper**

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil

Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Answer ALL the questions.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [] at the end of each question or part question.**
- **A list of physics equations is printed on page three.**
- **The total number of marks for this paper is 60.**

EQUATIONS

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

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

$$\text{speed} = \frac{\text{distance}}{\text{time taken}}$$

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

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

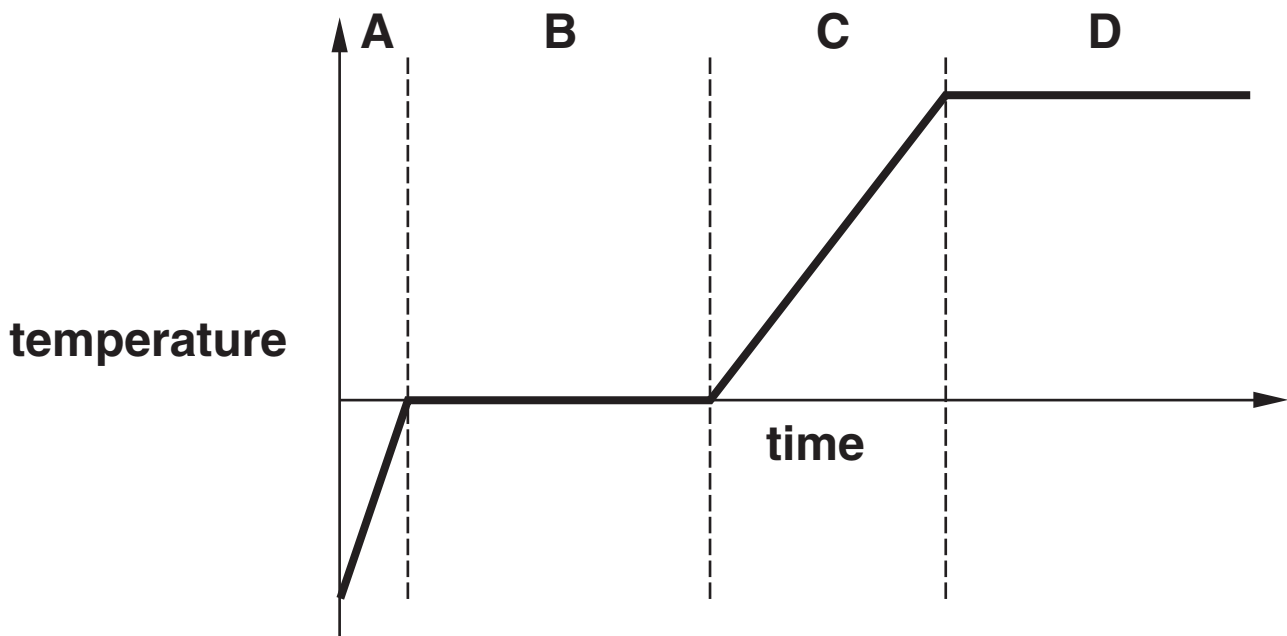
Answer ALL the questions.

SECTION A – MODULE P1

1 Dan heats some ice using a Bunsen burner.

He measures the temperature until the ice turns to water and boils.

Look at the graph of his results.



(a) Which part of the graph shows the FASTEST increase in temperature?

Choose from: A B C D

answer _____ [1]

(b) Which part of the graph shows the ice MELTING?

Choose from: A B C D

answer _____ [1]

(c) Time is measured in seconds (s).

(i) What is TEMPERATURE measured in?

Choose from: J N °C W

answer _____ [1]

(ii) What is ENERGY measured in?

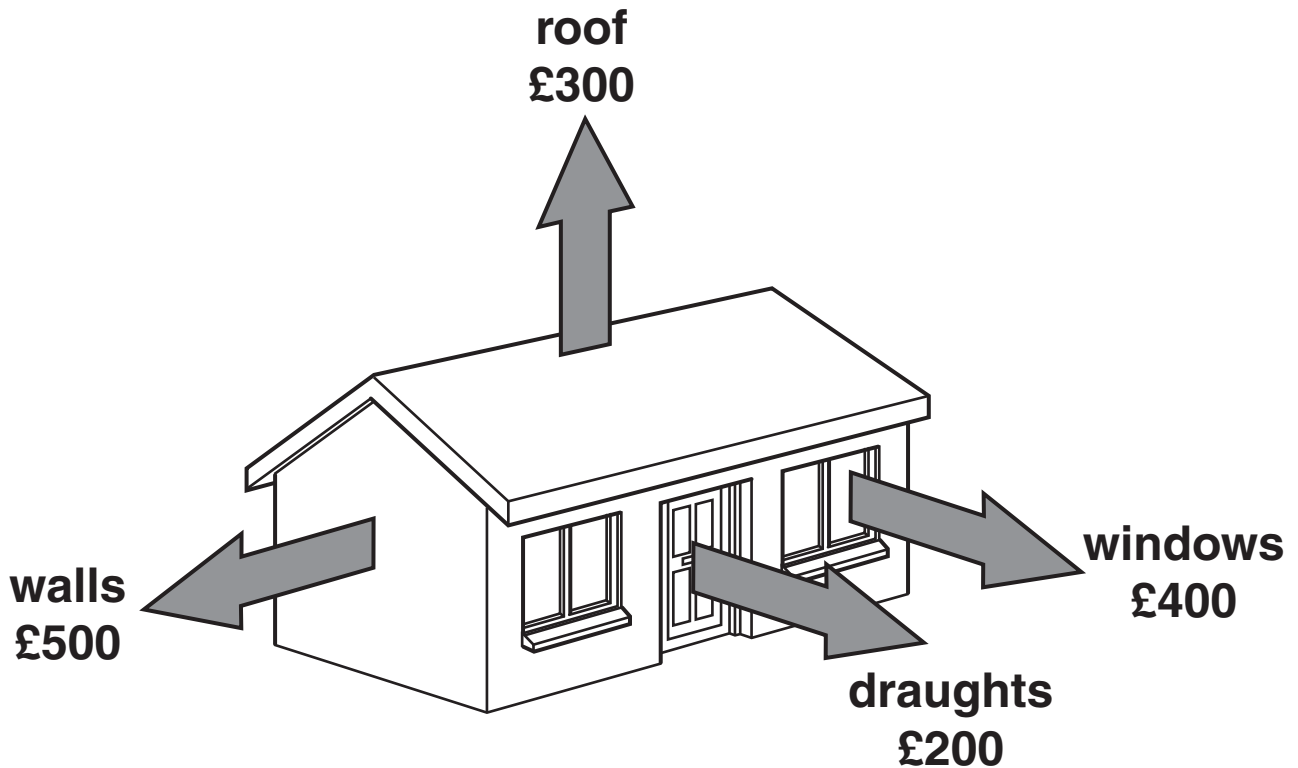
Choose from: J N °C W

answer _____ [1]

[Total: 4]

2 Jake's house costs a lot to heat.

The diagram shows the cost of heat escaping from his house per year.



(a) Where does most heat escape through?

Choose from:

DRAUGHTS

ROOF

WALLS

WINDOWS

answer _____ [1]

(b) Jake can reduce heat loss from his house.

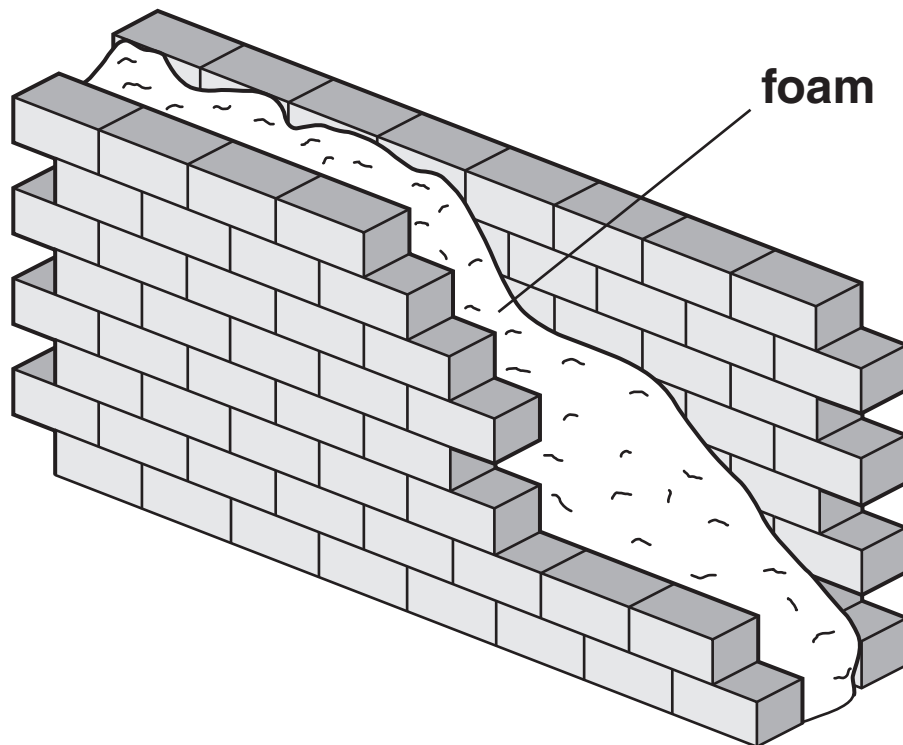
(i) How can Jake reduce heat loss through the WINDOWS?

_____ [1]

(ii) How can Jake reduce heat loss through the ROOF?

[1]

(c) Jake has cavity wall insulation fitted.



(i) The foam in the wall contains small air bubbles.

Why is the AIR in the foam important?

[1]

(ii) Cavity wall insulation costs £1200 to fit.

This reduces Jake's heating bill by £300 every year.

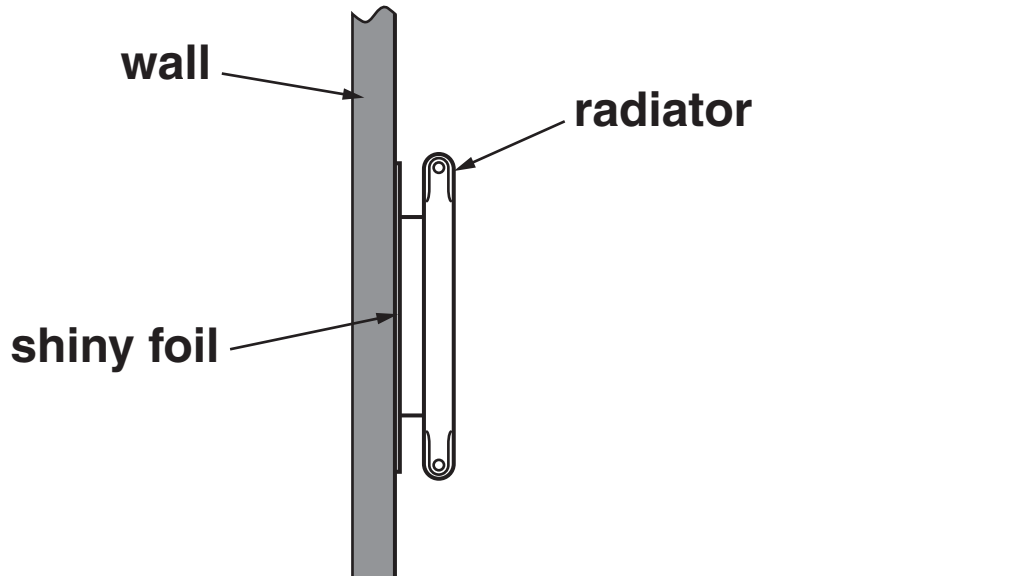
Calculate the payback time for cavity wall insulation.

answer _____ years [1]

(d) Jake puts shiny foil behind each radiator.

This reduces heat loss.

Look at the diagram.



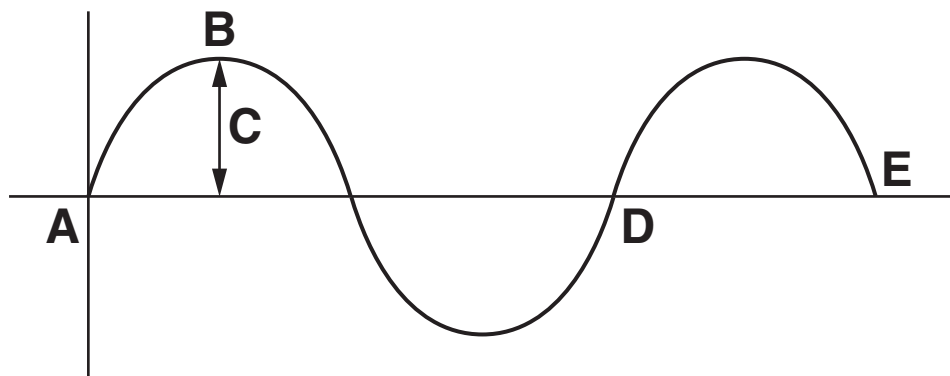
Explain how the foil reduces his heating bills.

[2]

[Total: 7]

3 Waves carry energy.

(a) Look at the diagram of a water wave.



Complete the sentences.

The amplitude is shown by letter _____ .

The wavelength is the DISTANCE between letters

_____ and _____ .

[2]

(b) There are different types of wave.

Look at the list.

GAMMA

INFRARED

MICROWAVE

RADIO

ULTRAVIOLET

(i) Which type of wave causes a SUNTAN?

Choose from the list.

answer _____ [1]

(ii) Which type of wave is used to send a text message from a mobile phone?

Choose from the list.

answer _____ [1]

(c) A wave has a frequency of 0.2 Hz.

(i) Explain what FREQUENCY means.

_____ [1]

(ii) The wave has a wavelength of 5 m.

Its frequency is 0.2 Hz.

Calculate the SPEED of the wave.

The equations on page 3 may help you.

answer _____ m/s [2]

[Total: 7]

4 The average temperature of the Earth is increasing.

This is called GLOBAL WARMING.

Describe TWO possible CAUSES of global warming.

[2]

[Total: 2]

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SECTION B – MODULE P2

5 This question is about electrical power.

Look at the table of electrical appliances.

APPLIANCE	POWER RATING IN W	TIME USED PER WEEK IN HOURS
hair dryer	1500	0.5
iron	2000	3
microwave oven	1000	1
toaster	1500	2
vacuum cleaner	1900	1

(a) The iron costs the most to use per week.

There are TWO reasons why the iron costs the most to use.

Write down the two reasons.

1 _____

2 _____ [1]

- (b) (i) The power rating of the toaster is 1500 watts (W).

When converted to KILOWATTS (kW) the power rating is 1.5 kW.

Calculate how many kilowatt hours (kWh) of electrical energy are used by the toaster in two hours.

The equations on page 3 may help you.

answer _____ kWh [2]

- (ii) The cost of a kilowatt hour of electrical energy is 12 pence.

Calculate the cost of the electrical energy used by the toaster in two hours.

answer _____ pence [1]

[Total: 4]

6 The Sun transfers energy to the Earth.

(a) Complete the following sentence.

The two main types of energy transferred from the Sun to the Earth are

_____ energy and

_____ energy. **[2]**

(b) Energy from the Sun can produce CONVECTION CURRENTS in the air.

Convection currents have energy in them.

Explain how the energy can be harnessed and converted to useful energy.

_____ **[2]**

- (c) (i) The Sun gives out rapid bursts of ionising radiation.**

The ionising radiation is ejected at high speed from the Sun.

The radiation interferes with signals from artificial satellites.

What are these rapid bursts of ionising radiation called?

_____ [1]

- (ii) Write down one USE of an artificial satellite.**

_____ [1]

[Total: 6]

7 There are three types of nuclear radiation.

- **alpha (α)**
- **beta (β)**
- **gamma (γ)**



(a) Which type of nuclear radiation has the greatest penetrating power?

_____ [1]

(b) Nuclear radiation can pass through substances.

The radiation can collide with atoms in the substance.

What happens to these atoms?

_____ [1]

(c) Background radiation is all around us in the atmosphere.

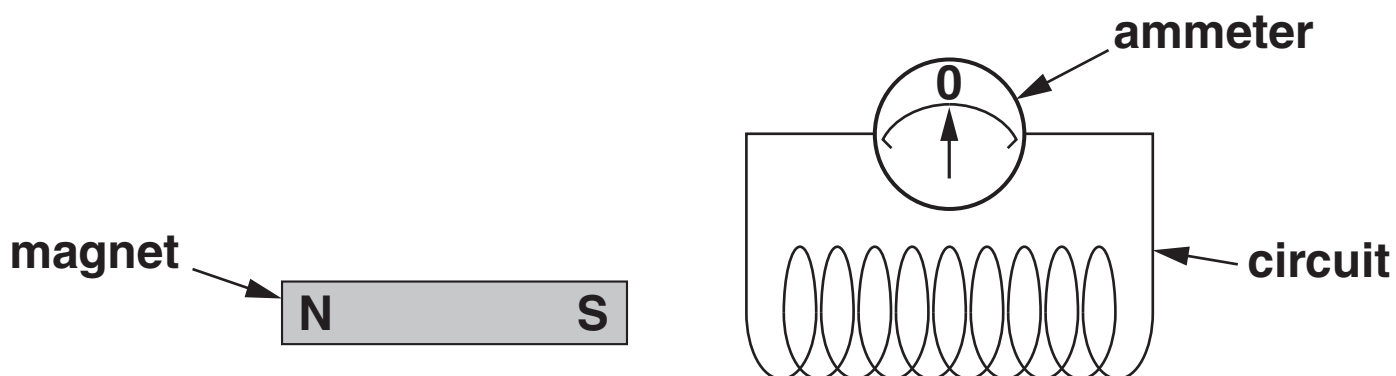
What causes background radiation?

_____ [1]

[Total: 3]

8 Emily is investigating the DYNAMO EFFECT.

She sets up the experiment shown in the diagram.



(a) How can Emily make a current flow in the circuit?

_____ [1]

(b) A dynamo produces ALTERNATING current (AC).

What type of current does a BATTERY produce in a circuit?

_____ [1]

[Total: 2]

9 This question is about the Solar System and the Universe.

(a) There are many objects in the Universe.

Some are shown below.

ASTEROID

BLACK HOLE

COMET

EARTH

MOON

STAR

Draw a straight line from each OBJECT to its correct DESCRIPTION. One has been done for you.

OBJECT	DESCRIPTION
asteroid	orbits the Earth
black hole	started as a gas cloud
comet	a planet
Earth	has a tail made of debris
Moon	a rock in space
star	light cannot escape from it

[4]

(b) How did the Universe begin?

[1]

[Total: 5]

SECTION C – MODULE P3

10 Gina does an experiment to find out the speeds of cars along a road.

She takes measurements using some apparatus.

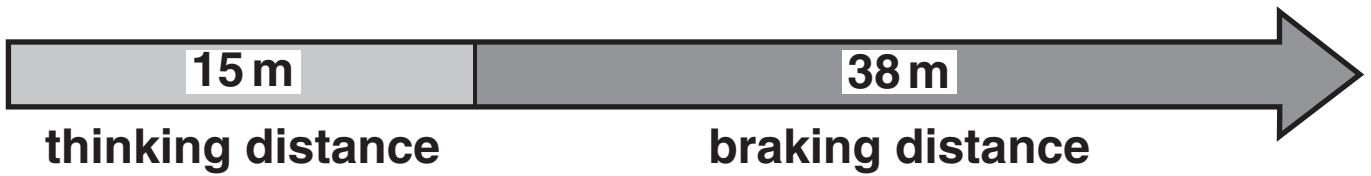
Complete the table about her experiment.

MEASUREMENT	APPARATUS	UNITS
_____	tape measure	m
time	_____	s
speed	speed gun	_____

[3]

[Total: 3]

11 Look at the information on the STOPPING distance for a car.



(a) Calculate the STOPPING distance for this car.

answer _____ m [1]

(b) (i) What does THINKING distance mean?

(ii) Higher speed increases thinking distance.

Write down one other thing that INCREASES THINKING distance.

 [1]

(c) TRACTION CONTROL can make driving safer.

Suggest how.

 [1]

[Total: 5]

12 Most road vehicles use fuels made from a fossil fuel.

(a) Name TWO main fuels used by cars, buses or lorries.

_____ and _____ [2]

(b) Look at the information on the fuel economy of some vehicles.

VEHICLE	FUEL ECONOMY IN KILOMETRES PER LITRE	NUMBER OF PEOPLE CARRIED
saloon car	15	5
sports car	18	2
bus	5	60
motorbike	25	1
van	8	2

All the vehicles travel a distance of 50 km.

(i) Which VEHICLE uses the LEAST fuel?

Choose from:

SALOON CAR

SPORTS CAR

MOTORBIKE

VAN

answer _____ [1]

(ii) The bus uses the most fuel.

Look at the table.

Calculate how much fuel the bus uses travelling 50 km.

answer _____ litres [1]

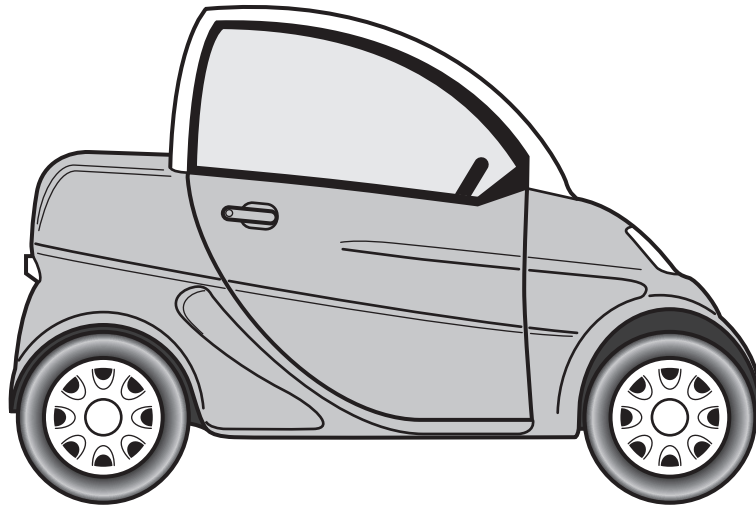
(iii) The sports car uses less fuel than the bus.

Suggest why using the bus is a more sensible use of fuel.

[1]

(c) Some cars do not use fuels.

They are powered by electricity.



Explain how electric cars get their energy.

[1]

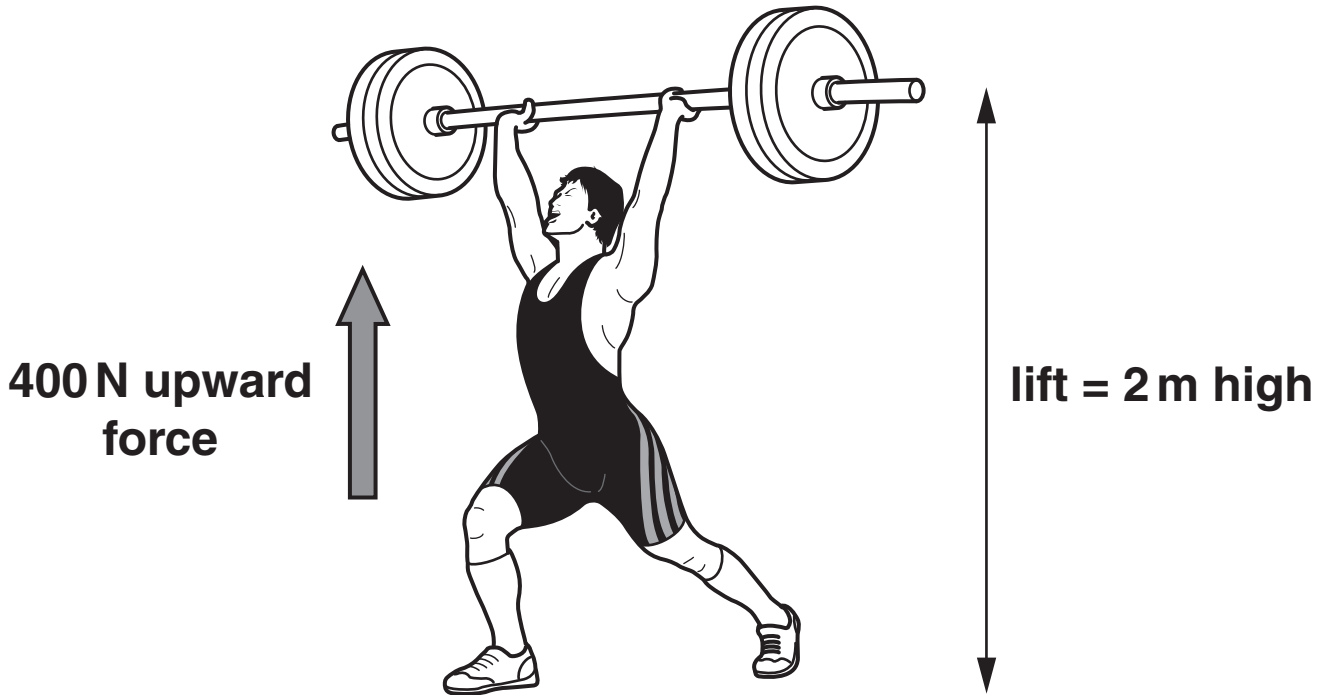
[Total: 6]

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13 Neil works out in the gym.

He lifts the bar from the floor to above his head.

Look at the diagram.



(a) Neil does work when he lifts the bar.

He pushes up with a force of 400 N.

He lifts the bar 2 m.

Calculate the WORK DONE on the bar.

The equations on page 3 may help you.

answer _____ J [2]

(b) Neil holds the bar ABOVE his head.

He holds it STILL.

What type of energy does the bar have?

_____ [1]

(c) Neil drops the bar. It ACCELERATES to the floor.

(i) What does accelerate mean?

_____ [1]

(ii) A FORCE causes the bar to fall to the floor.

Write down the NAME of this force.

_____ [1]

(iii) What type of energy INCREASES as the bar falls?

_____ [1]

[Total: 6]

END OF QUESTION PAPER

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