For more awesome GCSE and A level resources, visit us at www.savemyexams.co.uk/

Powering Earth

Question Paper 2

Level	GCSE
Subject	Physics (Gateway Science)
Exam Board	OCR
Topic	Global Challenges
Sub Topic	Powering Earth
Booklet	Question Paper 2

Time Allowed: 76 minutes

Score: /63

Percentage: /100

For more awesome GCSE and A level resources, visit us at www.savemyexams.co.uk/

1 Wendy's mobile phone charger contains a transformer.

Look at the information about the transformer.

Input voltage	230 V AC
Input current	50 mA
Output voltage	5V

Describe, in detail, the construction of the transformer and explain how applying a 230V input produces a 5V output.

Include a diagram and a calculation in your answer.



The quality of written communication will be assessed in your answer to this question.

 [6]

[Total: 6]

2 Car tyres grip the road when braking.

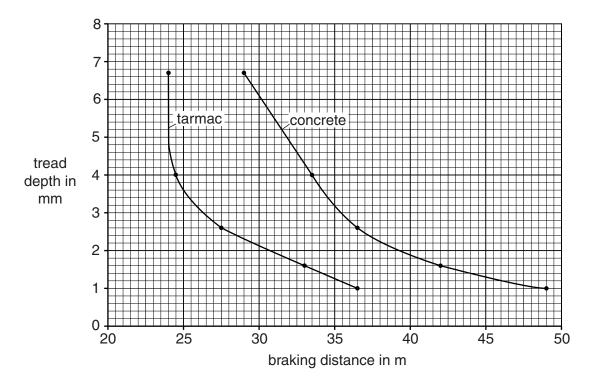
Tyres have a tread that wears away slowly with use.

New tyres have a tread that is 9 mm deep. The tread helps to move water away from the tyre when the road is wet.

This increases friction forces and improves braking.

(a) Look at the graph. It shows braking distances for tyres of different tread depths.

The data is for two different road surfaces on a wet day.



(i)	Road safety experts recommend changing tyres when the tread depth reduces to 3	mm.
	Why is this more important for concrete surfaces rather than for tarmac surfaces?	
		[11]

(11)	The data in the graph was collected using sets of tyres with different tread depths.
	The driver fits each set of tyres to the same car.
	Suggest other things the driver needs to do to ensure the results can be compared in a fair way.
	[2
(iii)	The braking distance increases as the tread depth decreases.
	Manjit calculates the percentage increase in braking distance for the tarmac.
	She finds that reducing the tread depth from 6.7 mm to 1.6 mm changes the braking distance from 24 m to 33 m.
	This is a 38% increase in braking distance.
	Steve thinks that on concrete, for the same reduction in tread depth, the percentage increase in braking distance will double.
	Is Steve correct?
	Use a calculation to explain your answer.
	[3

(b)	The	minimum legal tread depth is 1.6 mm in the UK.
	Mar	njit has some tyres that have a tread depth of 6.7 mm.
	The	e garage tells her that, for normal driving, the tread should wear by 0.17 mm per 1000 km.
	(i)	Calculate how many kilometres she can expect to travel before the tyres are illegal.
		answer km [3]
	(ii)	It is unwise for Manjit to use the tyres for the distance calculated before replacing them.
		Use the graph to explain why.
		[1]

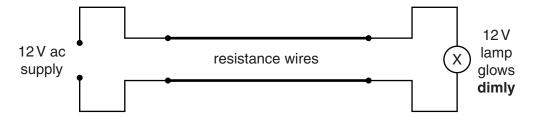
[Total: 10]

For more awesome GCSE and A level resources, visit us at <u>www.savemyexams.co.uk/</u>

3 Ian is learning about power transmission and the National Grid.

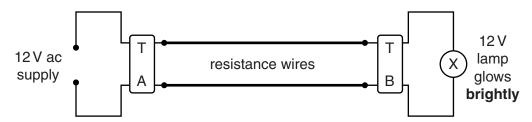
His teacher demonstrates how power loss can be reduced in a model transmission line.

She first sets up a system like this and the light glows dimly.



She adds two transformers (TA and TB) before and after the resistance wires.

The lamp now glows brightly.



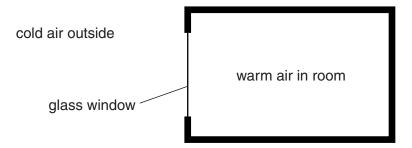
Explain these observations, and how this type of arrangement is used to reduce energy losses in the National Grid.

The quality of written communication will be assessed in your answer to this question.
[6

[Total: 6]

For more awesome GCSE and A level resources, visit us at www.savemyexams.co.uk/

- 4 Bilhar has high fuel bills. His house has poor insulation.
 - (a) Look at the diagram of a window in his house.



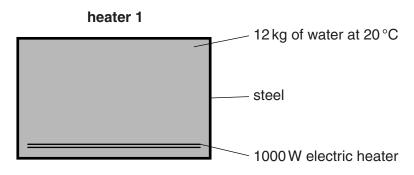
A lot of energy is lost through the window.

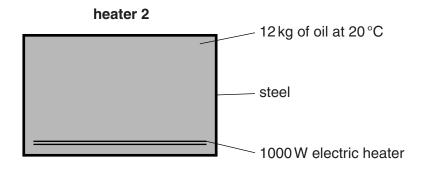
Explain, in terms of particles, how the energy is transferred from the warm air inside the house to the cold air outside the house.

The quality of written communication will be assessed in your answer to this question
[6

(b) Bilhar has two types of heater. They are filled with different liquids.

Look at the diagrams of Bilhar's heaters.





Heater 1 is filled with water. Heater 2 is filled with oil.

/i\	The water	in	heater 1	l ic	at 20	$^{\circ}C$
(I <i>I</i>	THE Water	1111	HEALEI I	เอ	al ZU	U.

(ii)

Bilhar switches on heater 1. The electric heater heats the water.

The heater supplies 2100000J of energy to the 12kg of water.

The specific heat capacity of water is 4200 J/kg°C.

Calculate the maximum **temperature** of the water.

answer°C	[3:
It is unlikely the water will get to this temperature. Suggest why.	[0]

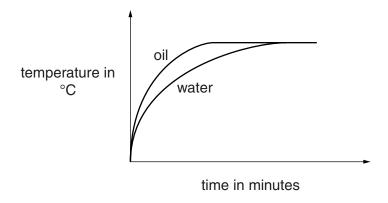
For more awesome GCSE and A level resources, visit us at www.savemyexams.co.uk/

(c) Bilhar switches on heater 2.

The specific heat capacity of oil is 1670 J/kg°C.

The liquids in the two heaters are heated to a temperature of 50 °C.

Look at the graph of the temperatures of the liquids in the heaters.



Water filled heaters are more useful for heating Bilhar's house.

se the graph to help you explain why.	
	••••
	••••
	[3

[Total: 13]

For more awesome GCSE and A level resources, visit us at www.savemyexams.co.uk/

5 Most scientists agree that the greenhouse effect causes global warming.

However, other scientists disagree about the causes of global warming.

The changes in the climate that we've seen are due to a natural cycle. Humans are not to blame.



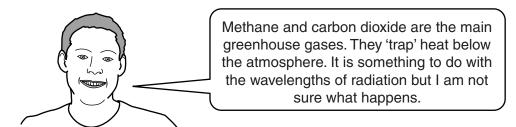
Global warming is caused by humans. We've increased the amount of CO₂ in the atmosphere.



(a)	Suggest reasons why scientists may disagree on the causes of global warming.
	[2
	L ,

For more awesome GCSE and A level resources, visit us at www.savemyexams.co.uk/

(b) Josh tries to explain what the greenhouse effect is.



Explain in more detail the role of radiation in the greenhouse effect.

The quality of written communication will be assessed in your answer	er to this question.
	[0]

[Total: 8]

6	Amy wants to reduce the cost of using electricity in her flat.			
	She is thinking of changing electricity supplier to a cheaper one.			

Distas Electricity Company

Cost per unit = 16 p

Calculate the power of the TV in kW.

Skinner Electricity Company

Cost per unit = 14 p

		Oost per unit = 10p			t per unit = 14p	
(a)	Her main	use for electricity is her	central heatin	g.		
	The avera	age power of her centra	heating is 65	00W.		
	It is on fo	r 4 hours each day.				
	She char	nges her supply from Dis	tas to Skinne	Electric	city Company.	
	The cost	per unit is the cost for o	ne kilowatt ho	ur of ene	ergy.	
	How muc	ch money will she save o	ach day on he	er centra	I heating costs?	
						[3]
(b)	Amy has	a TV. It has a label on it	but it does no	t tell he	r about the power ir	n kW.
	Look at the	ne label.				
		CL	rrent = 3A			
		VC	Itage = 230V			
]	

answer kW

[2]

(c)	Amy reads about using off-peak electricity in her home. This will be cheaper.
	Give one disadvantage to Amy of changing to off-peak electricity.
	[1]
	[Total: 6]

7 Zack uses many appliances in his home.

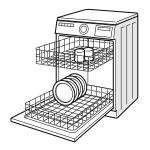
Look at the information about the appliances he uses the most.



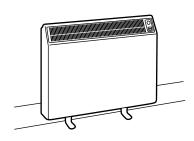
kettle used for 0.5 hours during the day current of 9 amps



vacuum cleaner used for 0.25 hours during the day current of 6 amps



dishwasher used for 1.5 hours during the day current of 9 amps



heater used for 12 hours at night current of 9 amps



cooker used for 1 hour during the day current of 14 amps



fridge-freezer on for 12 hours during the day and 12 hours at night current of 1.8 amps

All the appliances use the 230V mains voltage. The currents shown are average values.

(a) The heater is only used at night.

(i)	Calculate the power rating for the heater in kilowatts.		
	power rating kilowatts	[2	

	(ii)	Calculate the total energy supplied to the heater in one night in kilowatt hours .	
		total energy supplied kilowatt hours	[2]
(b)	Zac	ck pays 12p per kilowatt hour for electricity he uses during the day.	
	He	pays 6p per kilowatt hour for electricity he uses during the night .	
	He i	is considering switching to the same cost for day and night of 10p.	
	This	s would not save him money.	
	Sug	ggest reasons why.	
			[2]
		Γ	Total: 6]

Amrit spends a lot of money on her electricity bills. One of her appliances is an iron.

8	(a)	Am	rit uses the iron for 0.5 hours. Its power is 1500W. Electricity costs 18 pence per unit.	
		Cald	culate the number of kilowatt hours used by the iron and how much this will cost.	
		nun	nber of kWh =	
		cos	t of using the iron =pence	[3]
	(b)	Am	rit has a fan heater. It has a power rating of 1955W and a voltage of 230V.	
		The	fuse in the plug states a 'maximum current of 13A'.	
		Am	rit wants to find out whether the fuse is suitable.	
		Cal	culate the current in the fan heater.	
		ans	wer A	[2]
	(c)	Am	rit decides to change to off-peak electricity.	
		Off-	peak electricity has advantages for producers and consumers.	
		(i)	Write down one advantage and one disadvantage of off-peak electricity for Amrit.	
			advantage	
			disadvantage	[2]
		(ii)	Power stations produce electricity 24 hours a day.	
			Producers sell off-peak electricity. This increases their profit.	
			Explain how using more off-peak electricity can benefit energy supply .	
				[1]

[Total: 8]