

2

EQUATIONS

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

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

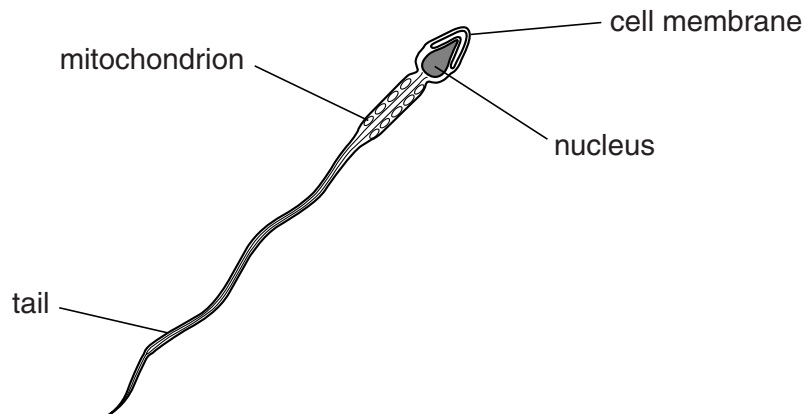
$$\text{power} = \text{voltage} \times \text{current}$$

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

3

Answer **all** the questions.**Section A – Module B1**

- 1** The diagram shows a sperm cell.



- (a)** Which part of the sperm cell contains chromosomes?

Choose from the labels on the diagram.

..... [1]

- (b)** Chromosomes contain genes.

What chemical are genes made from?

..... [1]

- (c)** Sperm cells swim to egg cells and they join together.

What is the name of the process when sperm cells and egg cells join together?

..... [1]

[Total: 3]

4

- 2 It is night time. Cathy walks into her house and puts the light on.

The bright light makes her pupils go smaller.

This happens very quickly.

The diagram shows Cathy's eyes **before** she puts the light on.



The diagram shows Cathy's eyes **after** she puts the light on.



- (a) Cathy's pupils getting smaller is an example of a **reflex** action.

Write down **two** things which show that this is a reflex.

1

.....

2

..... [2]

- (b) During reflex actions information travels quickly along nerve cells.

In what form does the information travel?

..... [1]

5

(c) Cathy has green eyes.

How is the colour of Cathy's eyes controlled?

Put a tick (✓) in the box next to the correct answer.

environment

☐

genes

☐

environment and genes

☐

[1]

(d) Cathy has two glasses of wine.

The alcohol makes her sleepy.

Is this an example of a short term effect of alcohol or a long term effect?

.....

Explain your answer.

.....

..... [1]

[Total: 5]

6

- 3 Tom is investigating how exercise affects his pulse rate.

He measures his pulse rate while sitting down. It is 62 pulses per minute.

He then runs as fast as he can for one minute.

Then he sits down again and measures his pulse rate every minute for five minutes.

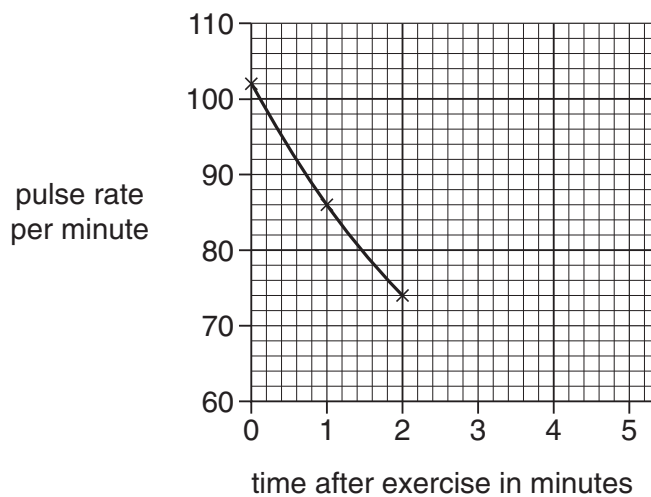
The table shows his results.

	pulse rate per minute
pulse rate immediately after exercising	102
pulse rate 1 minute after exercising	86
pulse rate 2 minutes after exercising	74
pulse rate 3 minutes after exercising	66
pulse rate 4 minutes after exercising	62
pulse rate 5 minutes after exercising	62

- (a) Complete the graph of Tom's results.

The first three points have been plotted for you.

Finish the graph by plotting the last three points and then continue the line.



[3]

7

(b) Tom's pulse rate increases when he exercises.

Explain why.

.....

.....

.....

..... [3]

[Total: 6]

4 Elloise is ill and has a high temperature.

(a) A high temperature can damage the body.

(i) Write down **one** way that a high temperature can damage the body.

.....
..... [1]

(ii) Elloise sweats.

This helps her body to cool down.

Describe how sweating helps her body to cool down.

.....
..... [1]

(iii) Sweating to cool down is an example of **homeostasis**.

What is meant by homeostasis?

.....
..... [1]

(b) Elloise takes a pain killer.

Look at the list of drugs.

anabolic steroid

aspirin

caffeine

nicotine

temazepan

Write down the name of **one** pain killer.

Choose your answer from the list.

..... [1]

- (c) Elloise goes to her doctor.

She asks for some antibiotics to treat her illness.

The doctor tells her that her illness is caused by a virus.

Should the doctor give Elloise antibiotics?

.....

Explain your answer.

.....

..... [1]

- (d) After a few days Elloise recovers from her illness.

This is because her white blood cells produce chemicals.

These chemicals lock onto the viruses and destroy them.

Look at the list.

antibody

antigen

gene

toxin

vector

Which part of a virus do the chemicals from white blood cells lock onto?

Choose your answer from the list.

..... [1]

[Total: 6]

10
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Section B – Module C1

5 This question is about food additives.

(a) Look at the list. It shows the main types of food additives.

antioxidant

emulsifier

flavour enhancer

food colour

(i) Which additive stops food from reacting with oxygen?

Choose from the list.

answer [1]

(ii) Which additive helps oil and water to mix and not separate out?

Choose from the list.

answer [1]

(b) Write down **one** food that contains an emulsifier.

..... [1]

(c) Monosodium glutamate (MSG) is a flavour enhancer.

It is added to potato crisps.

Explain why.

.....

..... [1]

[Total: 4]

6 This question is about fuels.

(a) Crude oil is a **fossil fuel**.

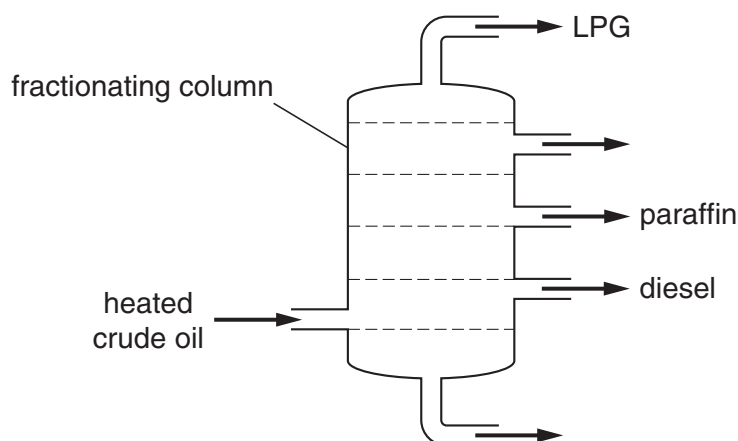
Write down the name of one **other** fossil fuel.

..... [1]

(b) Crude oil can be separated into fractions.

The process is called fractional distillation.

Look at the diagram. It shows how crude oil is separated.



(i) Place an **X** on the diagram to show the **coldest** part in the fractionating column.

Your **X** should be **inside** the fractionating column.

[1]

(ii) LPG, paraffin and diesel are **fractions** from crude oil.

Write down the name of one **other** fraction.

..... [1]

(c) Cracking is another process used to make fuels.

Cracking changes large molecules into smaller molecules.

Why is cracking done?

.....

What are the conditions used?

.....
 [2]

[Total: 5]

13

7 This question is about removing nail varnish.

(a) Some solvents can dissolve nail varnish.

Look at the list of words about dissolving.

Draw a straight line to match each word to its meaning.

Draw only **three** lines.

insoluble

a dissolved solid in a solution

solute

a solid that does not dissolve in a liquid

solvent

a liquid that dissolves a solid

[2]

(b) Finchfield Pharmaceuticals make a new nail varnish remover.

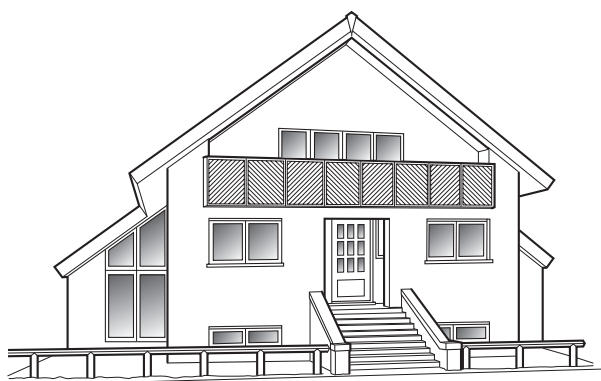
It must be tested before it can be used by humans.

Explain why.

..... [1]

[Total: 3]

- 8 Phil wants to choose a fuel to heat his house.



- (a) Two factors Phil needs to think about when choosing a fuel are

- the cost of the fuel
- the energy released by the fuel.

Write about **other** factors which Phil needs to think about.

.....

.....

.....

..... [2]

- (b) Phil decides to use natural gas (methane) to heat his house.

Look at the word equation.

It shows what happens during the **complete combustion** of methane.

methane + oxygen $\rightarrow$ + water

Finish the word equation.

[1]

- (c) Phil uses a water heater.

Phil's water heater does not work properly.

When methane burns in the heater, **incomplete combustion** happens.

Explain why this is a problem.

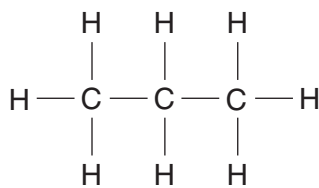
.....

..... [1]

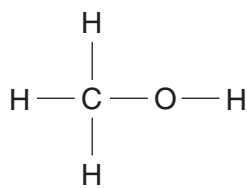
[Total: 4]

- 9 This question is about carbon compounds.

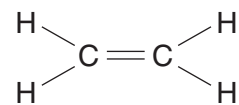
Look at the displayed formulas.



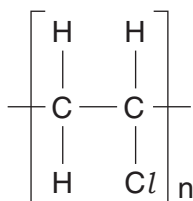
propane



methanol



ethene



poly(chloroethene)



carbon dioxide

- (a) Ethene is a hydrocarbon.

Write down the names of the two elements present in a hydrocarbon.

..... and [1]

- (b) Which compound is an **alkane**?

Choose from the list.

..... [1]

- (c) Which displayed formula contains only three carbon atoms?

Choose from the list.

..... [1]

- (d) The molecular formula of ethene is C_2H_4 .

Write down the molecular formula of methanol.

..... [1]

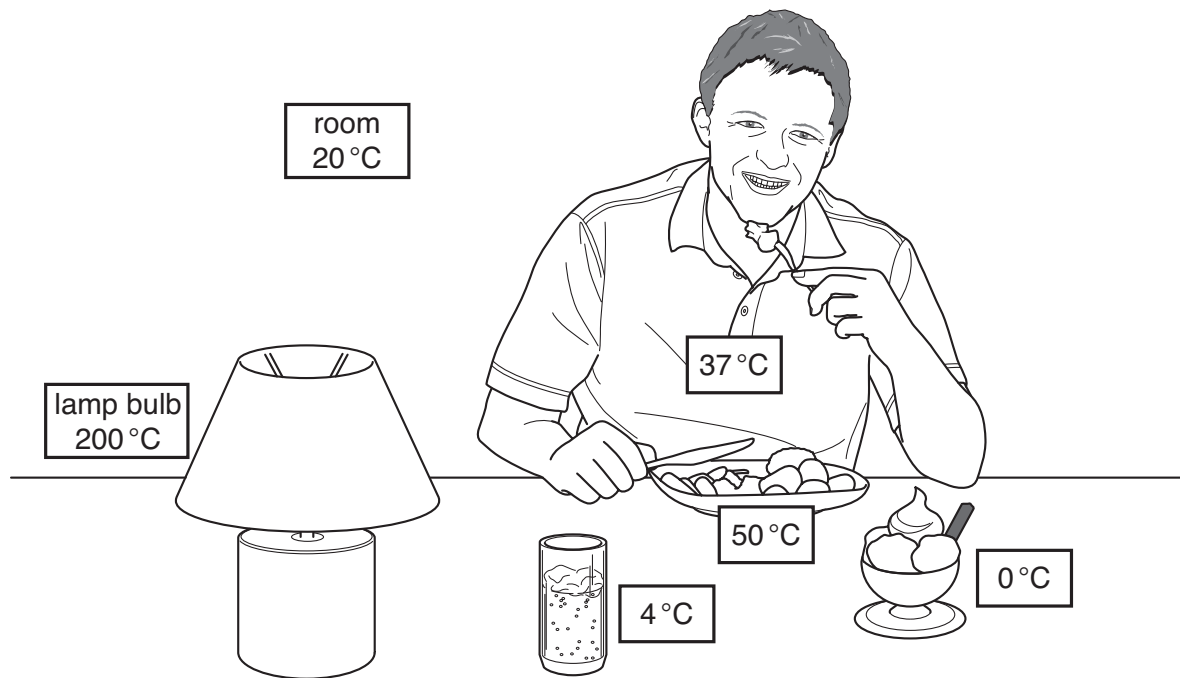
[Total: 4]

Section C – Module P1

10 Justin is eating a meal.

The temperature of the **room** is **20 °C**.

Look at the diagram.



(a) The temperatures of the five objects in the room are

meal = 50 °C

Justin = 37 °C

drink = 4 °C

ice cream = 0 °C

lamp bulb = 200 °C

Put **all** of the objects into the table to show the

- objects that **gain** heat
- objects that **lose** heat.

objects that gain heat	objects that lose heat

17

(b) Temperature is measured in **units** of degrees Celsius ($^{\circ}\text{C}$).

Heat is a form of energy.

What are the units of heat?

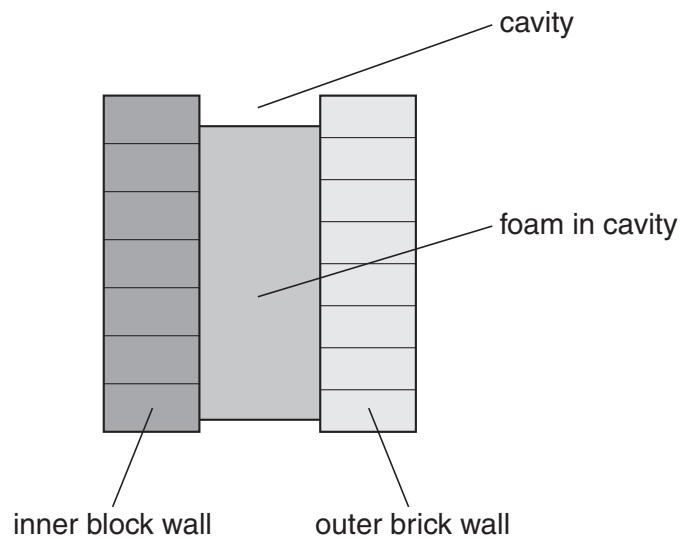
..... [1]

[Total: 4]

18

- 11 The outer and inner walls of a house have a gap between them.

The gap is called the **cavity**.



- (a) The cavity is often filled with **foam**.

This reduces the heat loss from the house.

Explain how.

.....

.....

..... [2]

- (b) New houses have foam **blocks** in the cavity.

The foam blocks have **shiny** foil on both surfaces.

How does the shiny foil reduce heat loss?

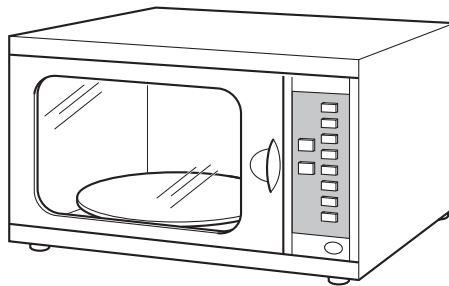
.....

..... [1]

[Total: 3]

19

- 12 (a) Microwaves are used to cook food in a microwave oven.



Which substance in the food absorbs the microwaves?

..... [1]

- (b) **Infrared** waves are also used for cooking.

Explain how infrared waves cook food.

.....
.....
..... [2]

- (c) (i) Infrared waves can **also** be used to transmit data.

State **one** other use of infrared waves.

..... [1]

- (ii) Two types of signal are used to transmit data.

One type is digital.

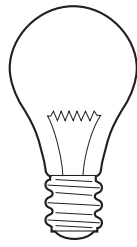
What is the other type?

..... [1]

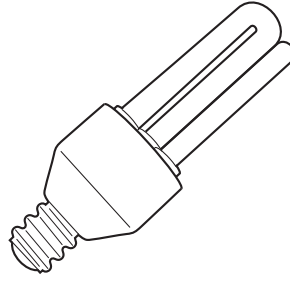
[Total: 5]

13 There are many ways of saving energy in the home.

Diane has two types of electric light bulbs in her house.



filament bulb



low energy bulb

(a) Low energy bulbs are an example of an energy saving method in the home.

Which **two** are energy saving methods in the home?

Choose from

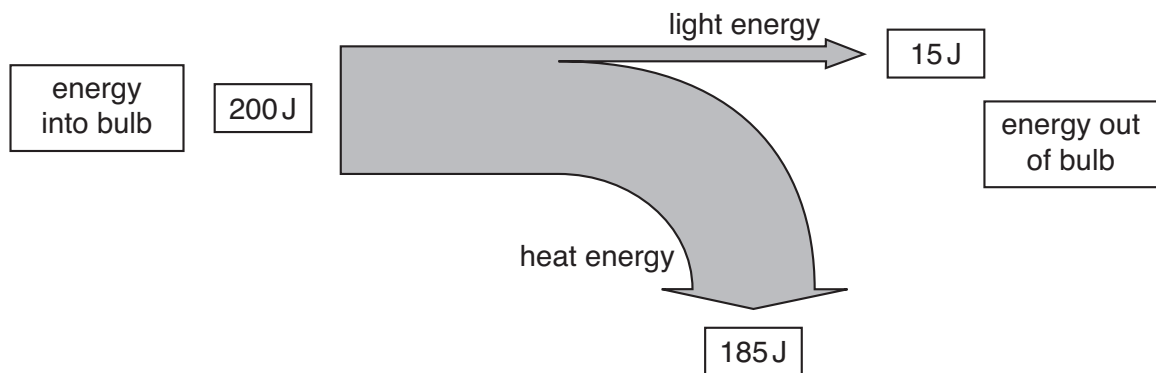
- A** leaving light bulbs on all night
- B** closing the curtains at night
- C** putting insulation in the loft
- D** leaving the TV on stand-by all night
- E** leaving curtains open at night

answer and **[1]**

21

(b) Diane finds this diagram from a website.

It shows the energy **into** and **out of** a filament bulb.



Calculate the **efficiency** of the filament bulb.

The equations on page 2 may help you.

.....

.....

.....

answer

[2]

[Total: 3]

14 This question is about electromagnetic waves.

(a) Wireless technology uses electromagnetic waves for communication.

Look at the statements about wireless technology.

Put a tick (✓) in the box beside the statement if it is **true**.

Put a cross (X) in the box beside the statement if it is **false**.

Two have been done for you.

can always be used in remote locations	☐
available 24 hours a day	☐
no wiring is needed	☒
an aerial is needed to pick up the signals	☒
it is portable and convenient	☐

[2]

(b) Microwaves are used for wireless communication.

Look at this information about microwaves

- a microwave has a **wavelength** of 0.1 metres
- it also has a **frequency** of 3000 000 000 hertz.

Calculate the **speed** of the microwaves.

The equations on page 2 may help you.

.....

.....

.....

answer metres per second [2]

(c) Some other electromagnetic waves are

- ultraviolet
- radio
- X-rays.

What do you know about the speed of **all** electromagnetic waves?

..... [1]

[Total: 5]

END OF QUESTION PAPER

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The Periodic Table of the Elements

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24

1	2	Key										3	4	5	6	7	0	
		relative atomic mass atomic symbol name atomic (proton) number																
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10	
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18	
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36	
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54	
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86	
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated							

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.