Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

GENERAL CERTIFICATE OF SECONDARY EDUCATION

B621/01

GATEWAY SCIENCE

SCIENCE B

Unit 1 Modules B1 C1 P1

(Foundation Tier)

THURSDAY 4 JUNE 2009: 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

DC (LEO/SW) OV90662 10010/1

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, however additional paper may be used if necessary.**

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 Periodic Table is printed on the back page.**
- **The total number of marks for this paper is 60.**

EQUATIONS

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

wave speed = frequency × wavelength

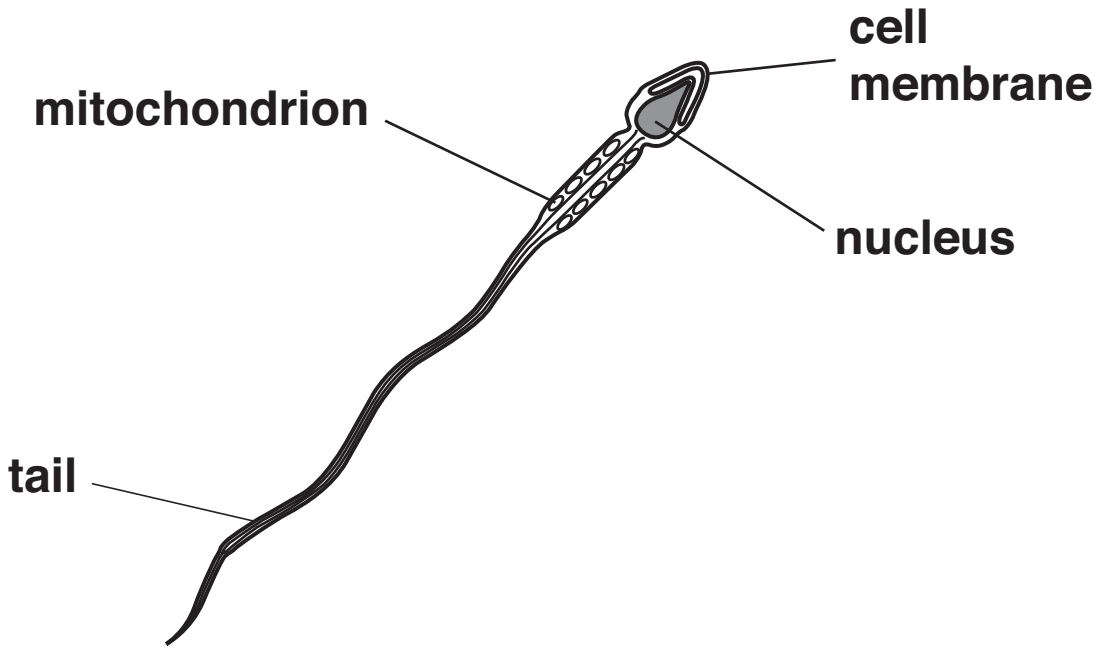
power = voltage × current

energy (kilowatt hours) = power (kW) × time (h)

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]

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 <u>BEFORE</u> she puts the light on.

The diagram shows Cathy's eyes <u>AFTER</u> she puts the light on.

(a) Cathy's pupils getting smaller is an example of a <u>REFLEX</u> action.

Write down <u>TWO</u> 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]**

(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]

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.

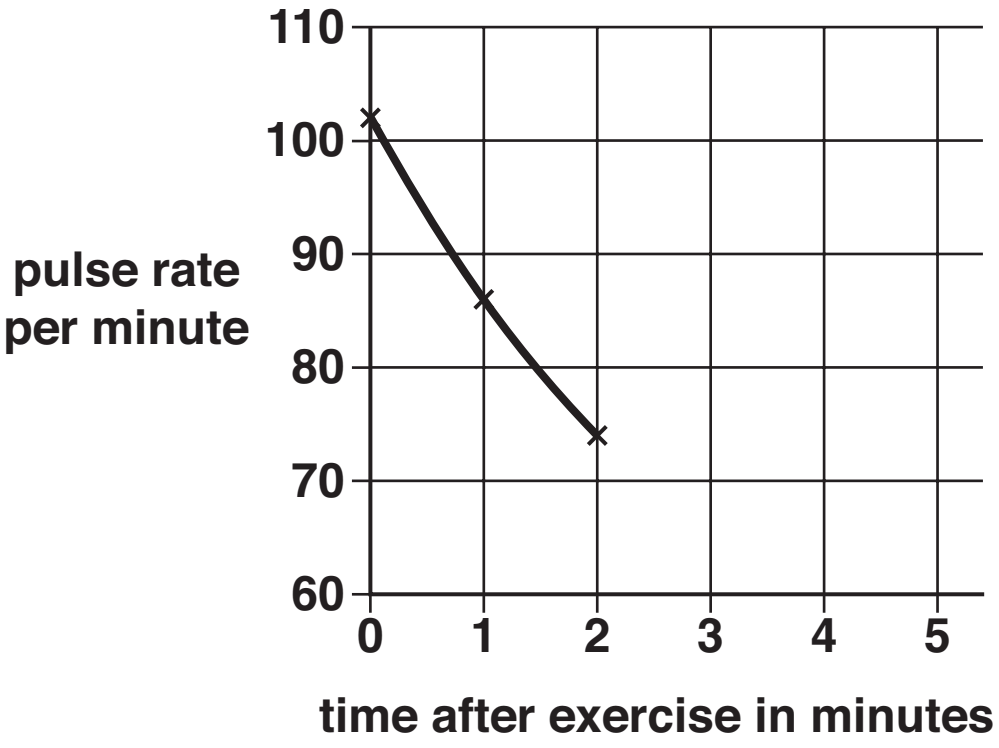
The table shows his results.

	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]

(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 <u>ONE</u> 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 <u>HOMEOSTASIS</u>.

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]

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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 <u>FOSSIL FUEL</u>.

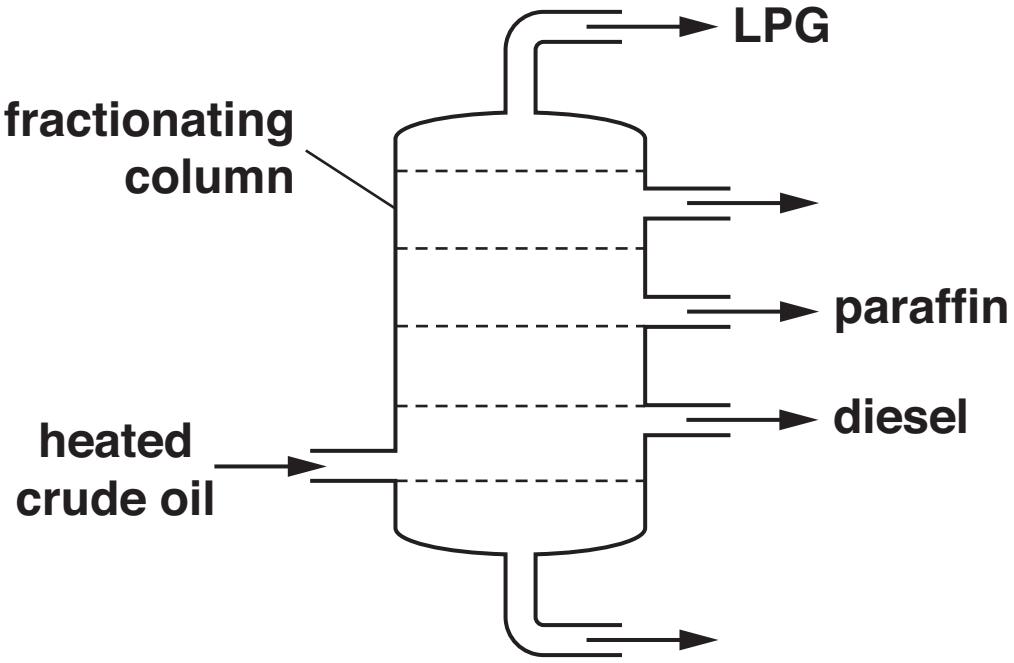
Write down the name of one <u>OTHER</u> fossil fuel.

_____ **[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 <u>X</u> on the diagram to show the <u>COLDEST</u> part in the fractionating column.

Your <u>X</u> should be <u>INSIDE</u> the fractionating column. **[1]**

(ii) LPG, paraffin and diesel are <u>FRACTIONS</u> from crude oil.

Write down the name of one <u>OTHER</u> 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]

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 <u>THREE</u> 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.

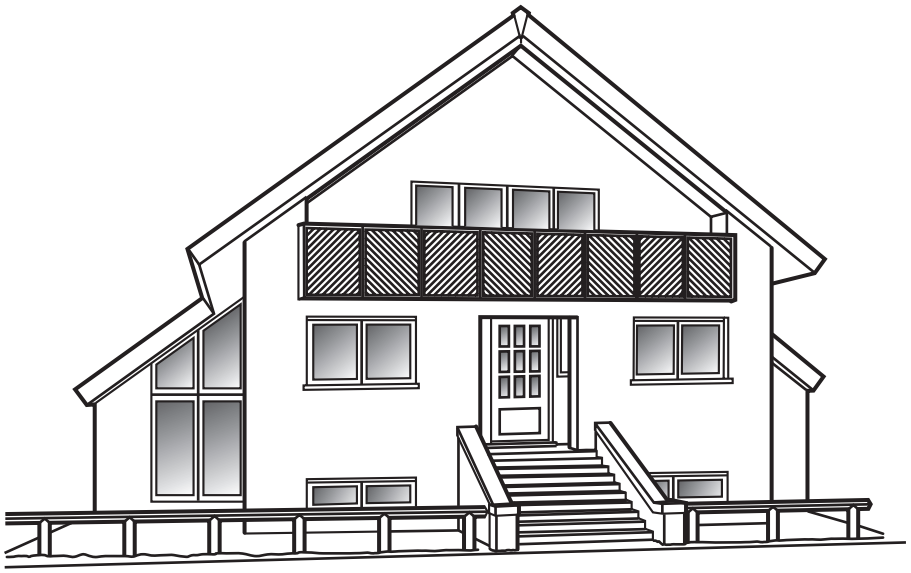
It must be tested before it can be used by humans.

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 <u>OTHER</u> 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 → _____ + 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.

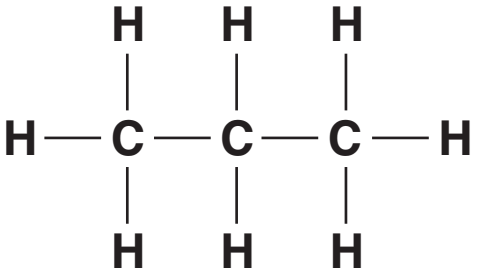
_____

_____ **[1]**

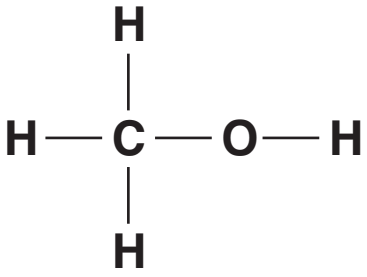
[Total: 4]

9 This question is about carbon compounds.

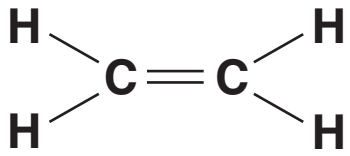
Look at the displayed formulas.



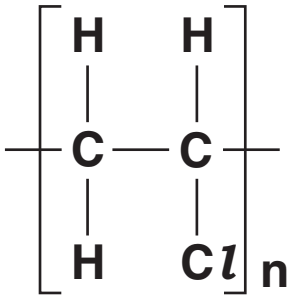
propane



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 <u>ALKANE</u>?

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.

(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

[3]

(b) Temperature is measured in <u>UNITS</u> of degrees Celsius (°C).

Heat is a form of energy.

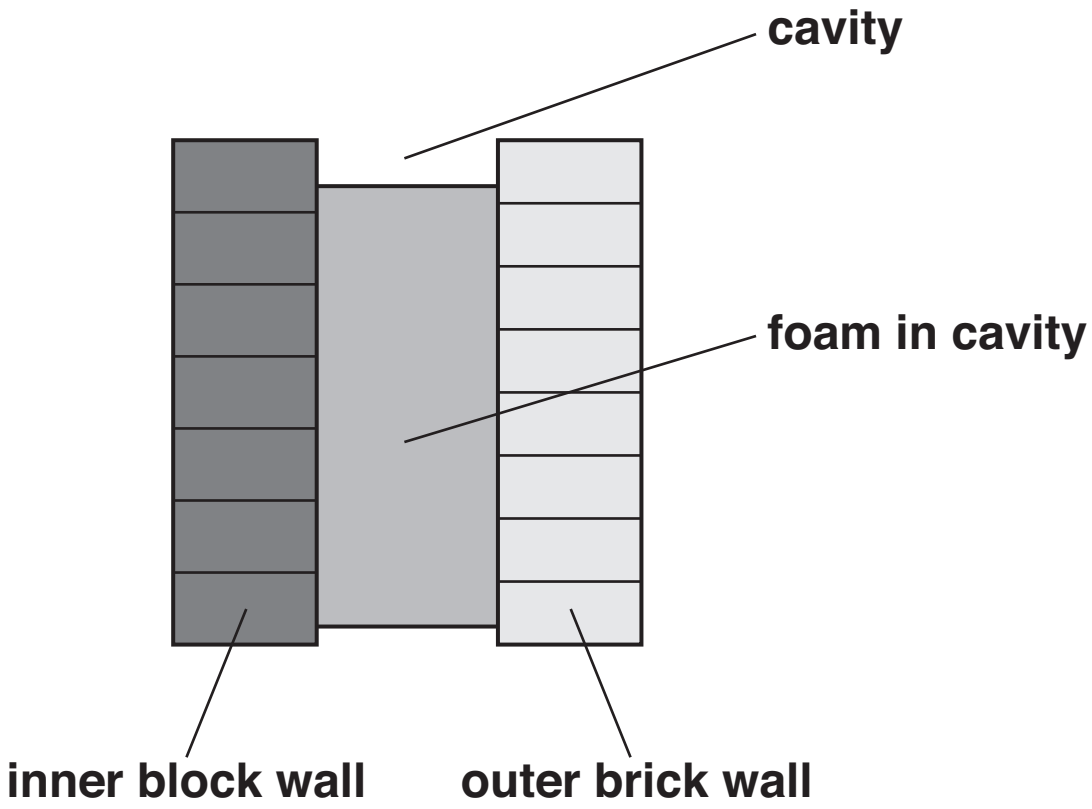
What are the units of heat?

_____ **[1]**

[Total: 4]

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

The gap is called the <u>CAVITY</u>.



(a) The cavity is often filled with <u>FOAM</u>.

This reduces the heat loss from the house.

Explain how.

_____

_____

_____ **[2]**

(b) New houses have foam <u>BLOCKS</u> in the cavity.

The foam blocks have <u>SHINY</u> foil on both surfaces.

How does the shiny foil reduce heat loss?

_____

_____ **[1]**

[Total: 3]

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

Which substance in the food absorbs the microwaves?

_____ **[1]**

(b) <u>INFRARED</u> waves are also used for cooking.

Explain how infrared waves cook food.

_____

_____

_____ **[2]**

(c) (i) Infrared waves can <u>ALSO</u> be used to transmit data.

State <u>ONE</u> other use of infrared waves.

_____ **[1]**

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

One type is digital.

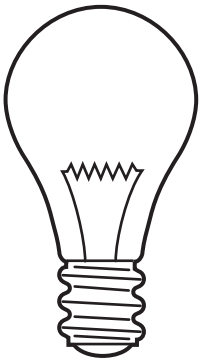
What is the other type?

_____ **[1]**

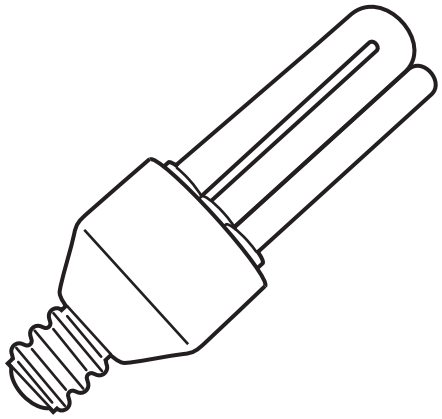
[Total: 5]

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]

(b) Diane finds the diagram opposite 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 3 may help you.

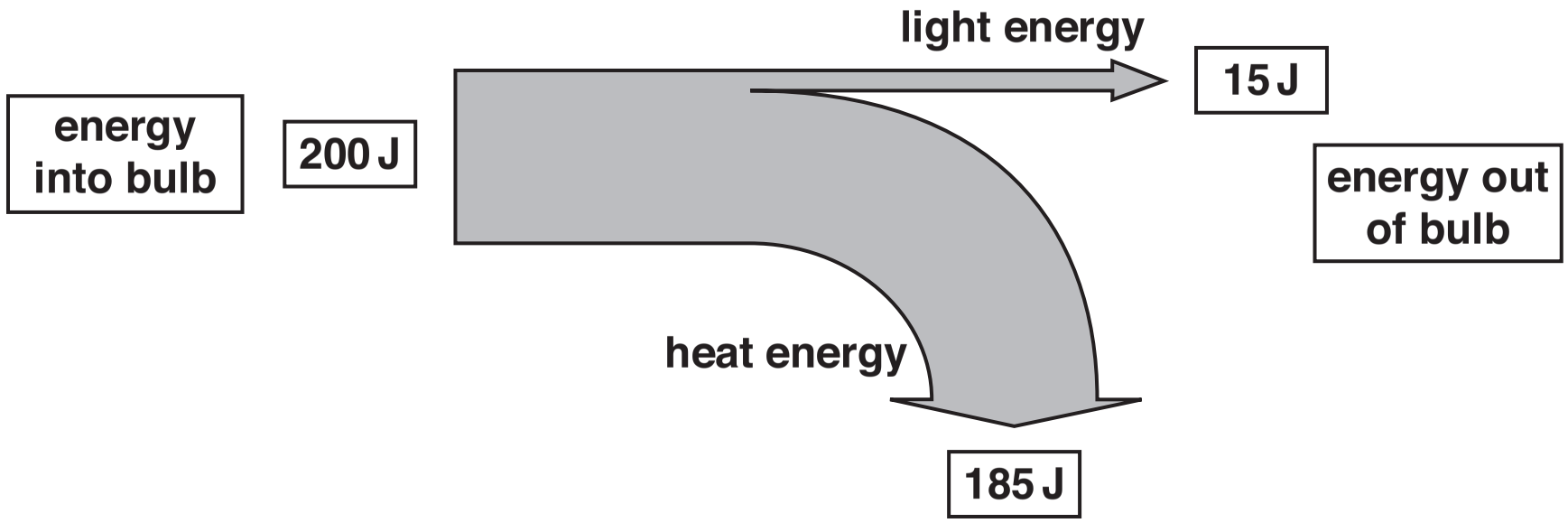
_____

_____

_____

answer _____ [2]

[Total: 3]


energy into bulb
200 J
light energy
15 J
energy out of bulb
heat energy
185 J

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 (✗) 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 3 000 000 000 hertz.**

Calculate the SPEED of the microwaves.

The equations on page 3 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

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
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						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** 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.