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Answer ALL the questions. Write your answers in the spaces provided.

1. Modern communications systems contain many devices.
Each has its own function or job.
Draw a line from each device to its main function.

| device | function |
|--|--|
| <input type="text" value="aerial"/> | <input type="text" value="converts electrical signal to sound"/> |
| <input type="text" value="amplifier"/> | <input type="text" value="receives radio signal"/> |
| <input type="text" value="modulator"/> | <input type="text" value="changes the carrier wave"/> |
| <input type="text" value="loudspeaker"/> | <input type="text" value="makes an electrical signal larger"/> |

(Total 3 marks)

Q1

2. This is a list of particles.
Some are fundamental and some are not fundamental.
Put a tick against the particles which are fundamental.

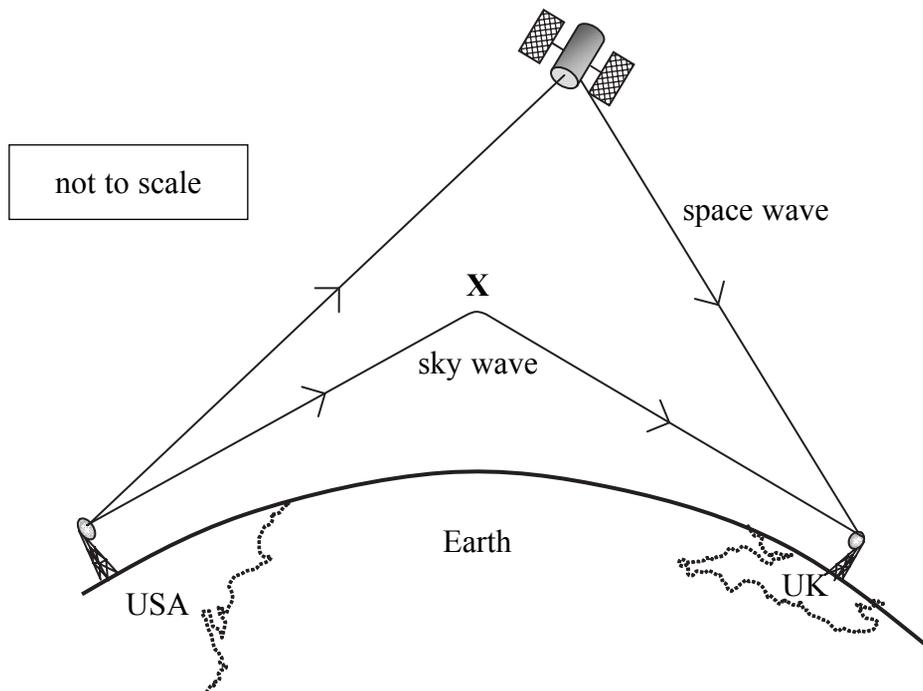
| | |
|-----------|--|
| electrons | |
| protons | |
| neutrons | |
| quarks | |

(Total 2 marks)

Q2



3. The diagram shows the path of sky and space waves.



(a) Complete the diagram to show the path of a ground wave.

(1)

(b) State and explain what happens to the sky wave at X.

.....
.....

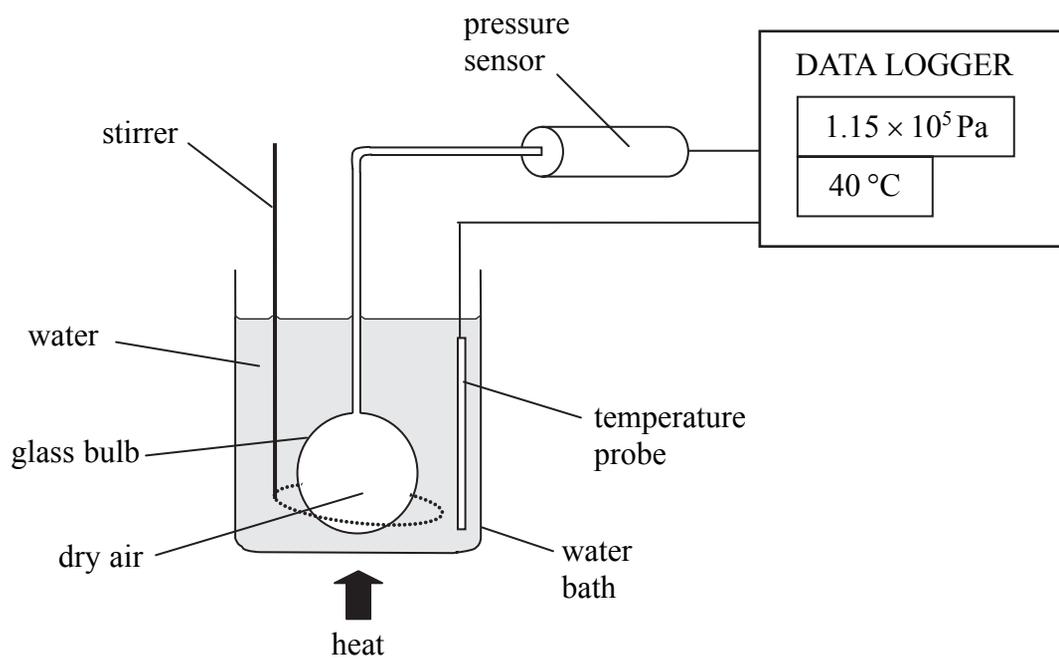
(2)

(Total 3 marks)

Q3



4. Philip is investigating how changing the temperature affects the pressure of some dry air. He uses the equipment as shown below.



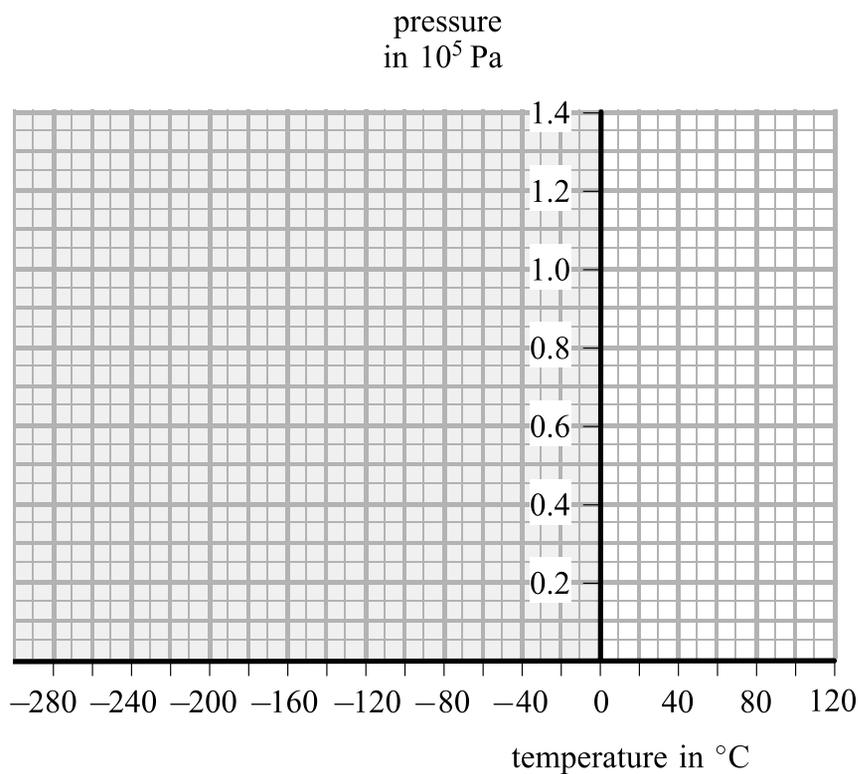
Philip fills the water bath with ice.
 He records the temperature and pressure.
 Then he heats the water bath gently.
 The ice melts and he takes readings until the water boils.

- (a) These are his results.

| temperature in $^\circ\text{C}$ | pressure in 10^5 Pa |
|---------------------------------|-------------------------------|
| 0 | 1.00 |
| 20 | 1.05 |
| 40 | 1.15 |
| 60 | 1.20 |
| 80 | 1.30 |
| 100 | 1.35 |



(i) Draw a graph of these results on the grid below.



(2)

(ii) Draw a line of best fit.

(1)

(iii) Extend your line into the shaded area on the left hand side of the grid.
What would the temperature be, if the pressure fell to 0 Pa?

..... (1)

(iv) What is the name given to this temperature?

..... (1)

(b) The pressure of the gas increased as the temperature increased.
Explain why.

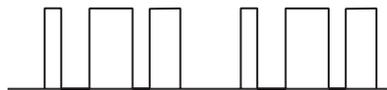
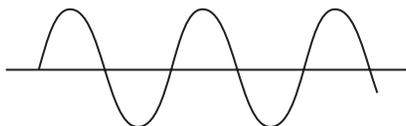
.....
.....
..... (2)

(Total 7 marks)

Q4



5. (a) The diagram below shows two types of signal.



Signals can be attenuated or affected by noise.

Draw over the diagrams below to show what happens when each of the signals is:

(i) attenuated



(2)

(ii) affected by noise



(2)

(b) Rifi wants to buy a new radio.

He has a choice of AM, FM or DAB (**digital** audio broadcast).

(i) Explain what is meant by AM and FM.

You may choose to draw a diagram to help your explanation.



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.....

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.....

.....

(3)



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(ii) Rifi found this in a leaflet about the new radios:

- FM and DAB both use VHF radio waves.
- AM radios use medium and long waves.

Put **one** tick in each row of the table below to show which radio signal matches the stated property.

| property | AM | FM | DAB |
|----------------------------|----|----|-----|
| greatest range | | | |
| most susceptible to noise | | | |
| can be regenerated | | | |
| most information in signal | | | |

(2)

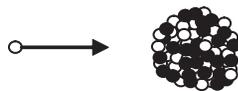
Q5

(Total 9 marks)

6. In a nuclear reactor, neutrons hit uranium-235 nuclei.

key

- neutron
- proton



(a) Sometimes a nucleus absorbs a neutron.

(i) Describe what happens to the uranium-235 nucleus after the neutron is absorbed.

You may choose to add to the diagram if this helps your answer.

.....
.....
.....
.....

(3)

(ii) Reactors are designed so that a chain reaction occurs.

Explain what a chain reaction is.

.....
.....
.....

(1)



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(b) The government is worried about global warming and atmospheric pollution. There is also concern that some ways of producing energy can use up fuel reserves. Some people think that nuclear reactors produce 'clean' or 'ecologically friendly' energy. Other people think that nuclear reactors produce 'dirty' energy.

(i) Suggest a reason why nuclear reactors can be considered to be 'ecologically friendly'.

.....
.....
(1)

(ii) Suggest a reason why nuclear reactors can be considered to be 'dirty'.

.....
.....
(1)

(Total 6 marks)

Q6

TOTAL FOR PAPER: 30 MARKS

END

