

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

1. Radioactive sources are used in hospitals to treat some patients. Radioactive sources can emit alpha, beta and gamma radiation.

(a) Complete the table to show the properties of the three types of radiation.

type of radiation	relative mass	charge	amount of ionisation produced
alpha particle	4		very high
beta particle	almost 0	-1	
gamma ray		0	low

(3)

(b) Radioactive sources often remain dangerous after they have been used. Describe one way in which technicians in a hospital could deal with radioactive waste safely.

.....

(1)

Q1

(Total 4 marks)

2. (a) NASA plans to send a robot lander called 'Phoenix' to Mars.



Source: www.nssdc.gsfc.nasa.gov

Phoenix is designed to search for water or ice.

(i) Suggest a reason why NASA scientists want to find out if there is any water or ice on Mars.

.....

(1)



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(ii) NASA scientists do not plan to send people to Mars in the near future.
One reason that they prefer to send robot landers rather than astronauts, is that
people would need to exercise.
Suggest two other reasons.



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(3)

(b) Other scientists work for SETI (the Search for Extra-Terrestrial Intelligent life).
State how these scientists search for extra-terrestrial life.

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(1)

(c) In 1781, an astronomer named William Herschel discovered the planet Uranus.
In 2005, Mike Brown discovered a tenth planet, code-named 2003UB313.
Suggest how Herschel and Brown communicated their discoveries to other scientists
throughout the world.

William Herschel

Mike Brown

(2)

(Total 7 marks)

Q2



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3. A kettle for use in a caravan has this label.

- 5 A
- 60 W
- 2.4Ω

Calculate the correct supply voltage for this kettle. Show your working.

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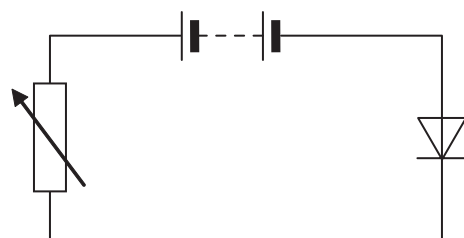
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(Total 3 marks)

Q3

4. (a) William investigates how the current varies with voltage in a diode. Complete the diagram to show how he should connect an ammeter and a voltmeter in the circuit.



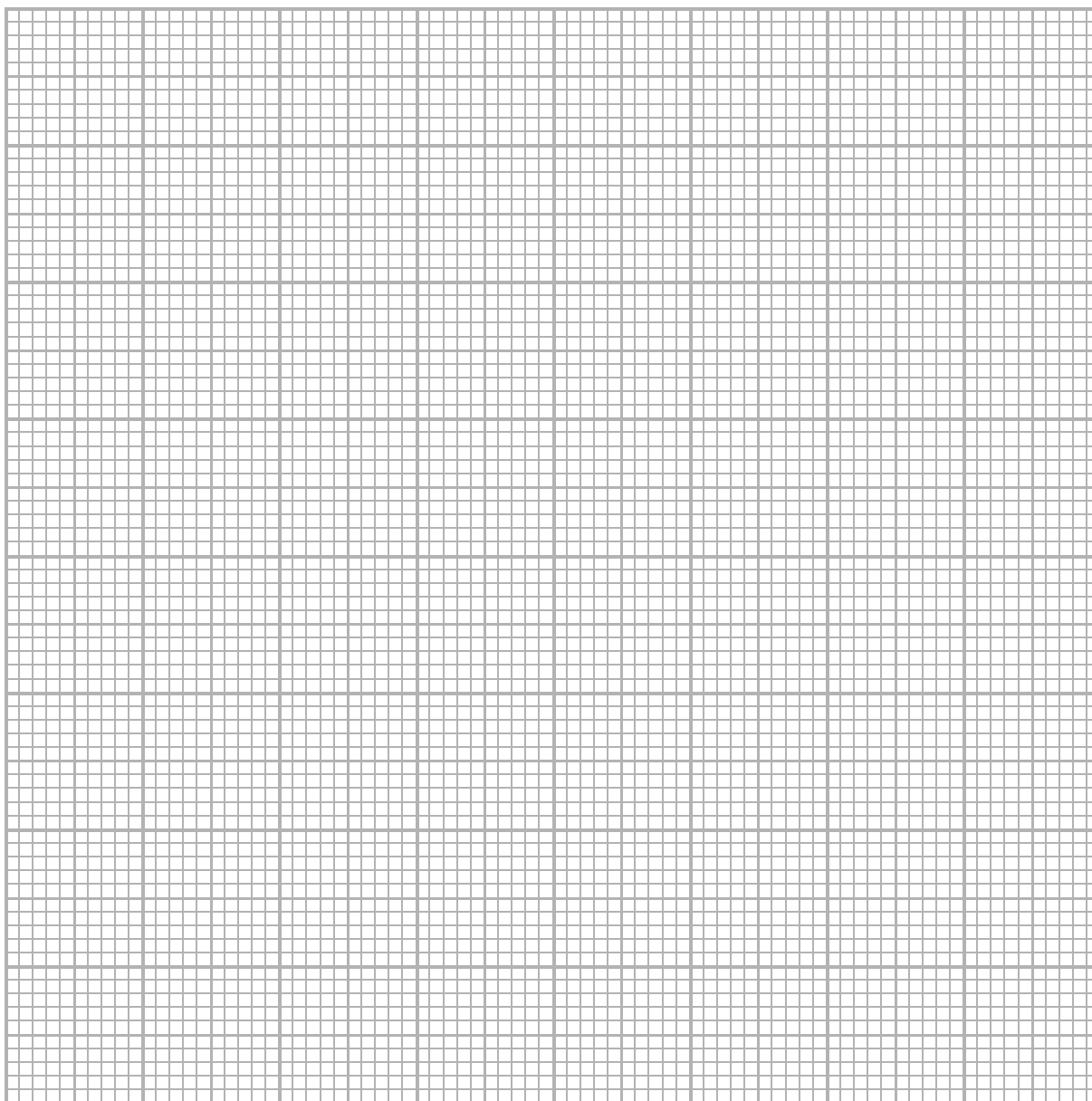
(2)



Leave blank

- (b) These are the results that William recorded.
Plot a graph of his results.
You should include a line of best fit.

voltage (V)	-1.0	-0.5	0	0.5	1.0	1.5	2.0
current (mA)	0	0	0	0.2	3.5	14.0	24.5



(3)

- (c) Explain why the current is 0 A when the voltage is reversed.

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(1)

Q4

(Total 6 marks)



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5. Freya wants to make her house more energy efficient.
She decides to add some extra insulation.

(a) Suggest how extra fibre glass in the loft would improve the energy efficiency of the house.

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(1)

(b) Explain why fibre glass is a good insulator.

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(2)

(Total 3 marks)

Q5

6. Mains appliances use alternating current.

(a) Explain what is meant by alternating current (a.c.).

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(1)

(b) Mains appliances can be made safer by using a fuse and an earth lead, or a residual current circuit breaker (RCCB) and double insulation.

Explain two advantages of using an RCCB instead of a fuse.

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(2)

(Total 3 marks)

Q6



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7. (a) Doctors can use ultrasound to locate a gall stone in a patient's body.
Ultrasound is a longitudinal wave.

(i) Explain the difference between a longitudinal and a transverse wave.
You may draw a diagram if this helps your explanation.

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(1)

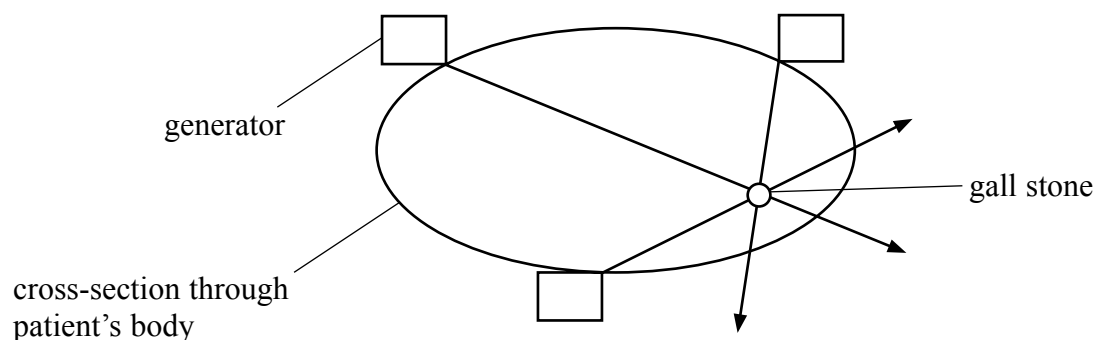
(ii) When ultrasound enters a patient's body, the wave is refracted **away** from the normal.
Explain why this occurs.

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(1)

QUESTION 7 CONTINUES OVERLEAF



(b) Doctors can shatter a gall stone using ultrasound.
The diagram below shows how this can be achieved without harming the patient.



Using your knowledge of energy transfer,

(i) suggest why the arrangement of generators shown in the diagram is used.

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(1)

(ii) suggest why the gall stone shatters.

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(1)

Q7

(Total 4 marks)

TOTAL FOR PAPER: 30 MARKS

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