

FOR OFFICIAL USE

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Total Marks

3220/401

NATIONAL
QUALIFICATIONS
2008

FRIDAY, 23 MAY
9.00 AM – 10.30 AM

PHYSICS
STANDARD GRADE
General Level

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

Reference may be made to the Physics Data Booklet.

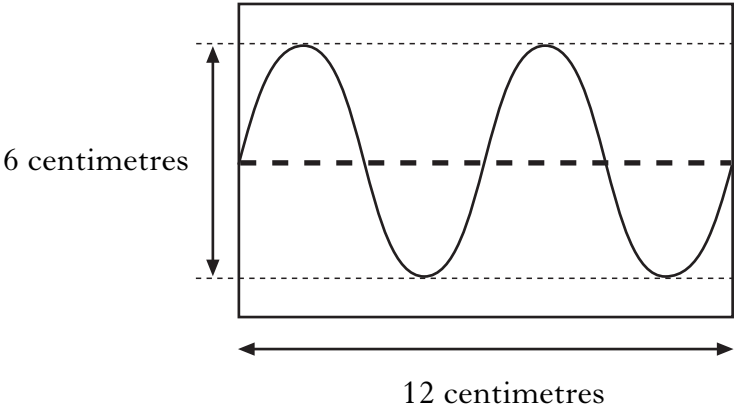
- 1 All questions should be answered.
- 2 The questions may be answered in any order but all answers must be written clearly and legibly in this book.
- 3 For questions 1–5, write down, in the space provided, the letter corresponding to the answer you think is correct. There is only **one** correct answer.
- 4 For questions 6–20, write your answer where indicated by the question or in the space provided after the question.
- 5 If you change your mind about your answer you may score it out and replace it in the space provided at the end of the answer book.
- 6 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.



Marks

6. (continued)

(b) Electrical signals are displayed as waves on an oscilloscope.



(i) Calculate the wavelength of the waves.

Space for working and answer

1

(ii) Calculate the amplitude of the waves.

Space for working and answer

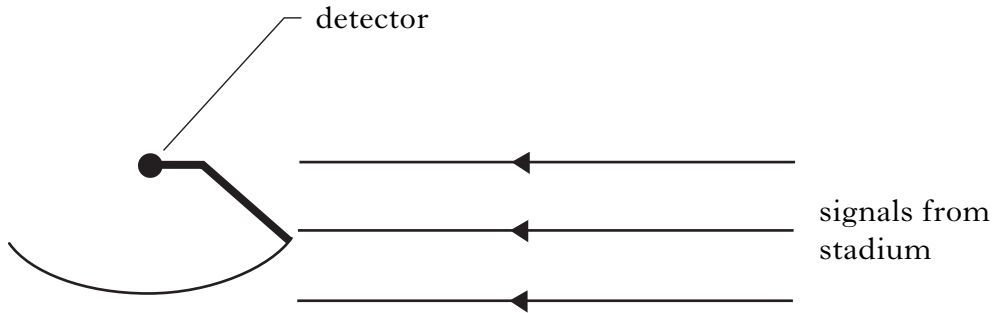
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Marks

7. (continued)

(b) During the match, strong winds cause the reflector to move to a new position as shown.



State the effect this has on the signal received at the detector.

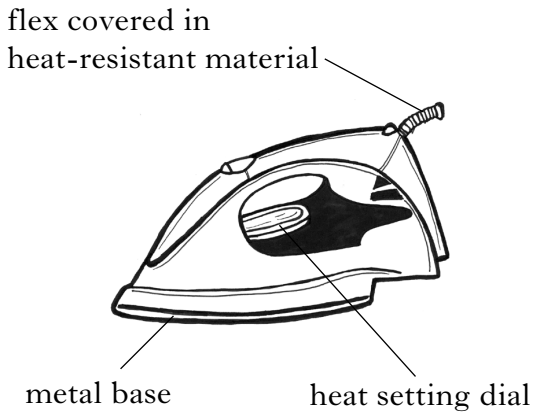
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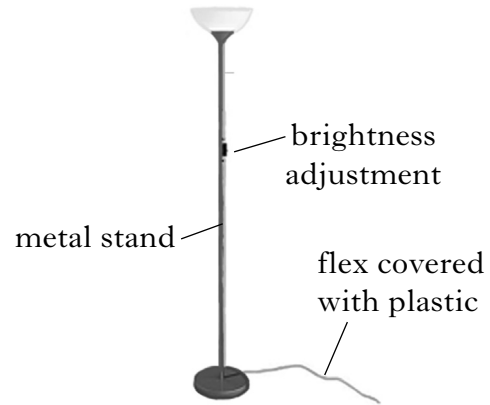
Marks

8. Two household electrical appliances, a 1500 watt electric iron and a 300 watt uplighter lamp, are shown below.

electric iron



uplighter lamp



- (a) The brightness of the uplighter lamp can be changed.
State an electrical component that could be used to change the brightness of the uplighter lamp.

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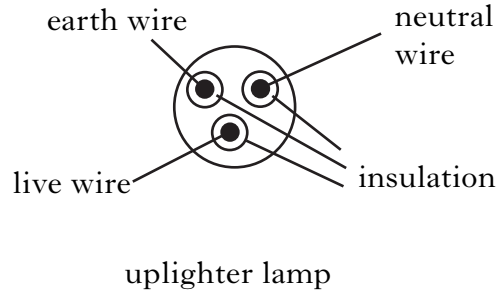
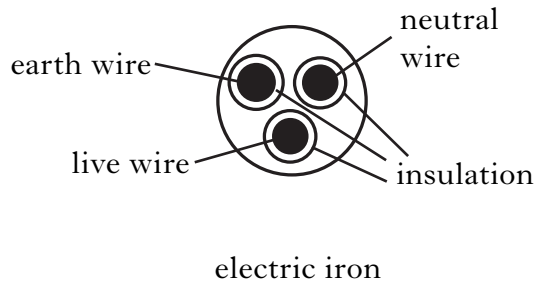
- (b) Explain why the flex for the iron is covered with a heat-resistant material.

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Marks

8. (continued)

(c) A cross-section of the flex for each appliance is shown.



(i) State the colour of the insulation on the live wire.

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(ii) State the purpose of the earth wire.

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(iii) Explain why the wires in the flex for the electric iron are thicker than those for the uplighter lamp.

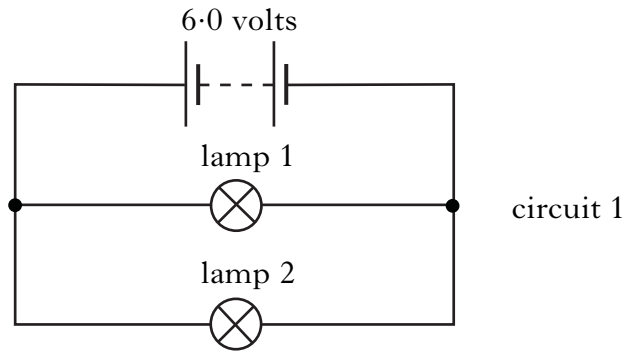
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9. Two identical lamps are connected to a 6.0 volt battery as shown in circuit 1.

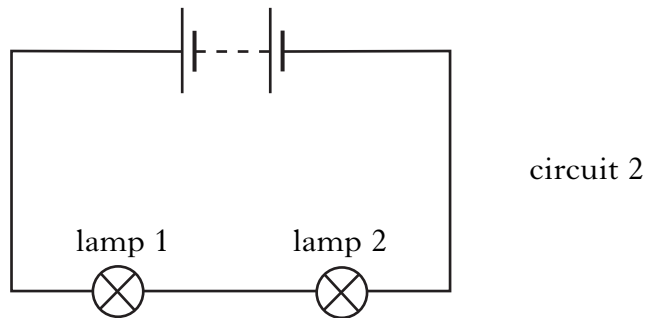


- (a) The battery supplies a current of 0.40 ampere to the circuit.
Complete the following table to show the current in each lamp and the voltage across each lamp.

	Lamp 1	Lamp 2
Current (amperes)		
Voltage (volts)		

2

- (b) The two lamps are now connected as shown in circuit 2.



State the voltage of the battery required to light the lamps with the same brightness as in circuit 1.

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- (c) In which of the two circuits, circuit 1 or circuit 2, would lamp 2 still be on when lamp 1 is removed?

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10. (a) A drummer in a rock band is exposed to sound levels of up to 110 decibels.

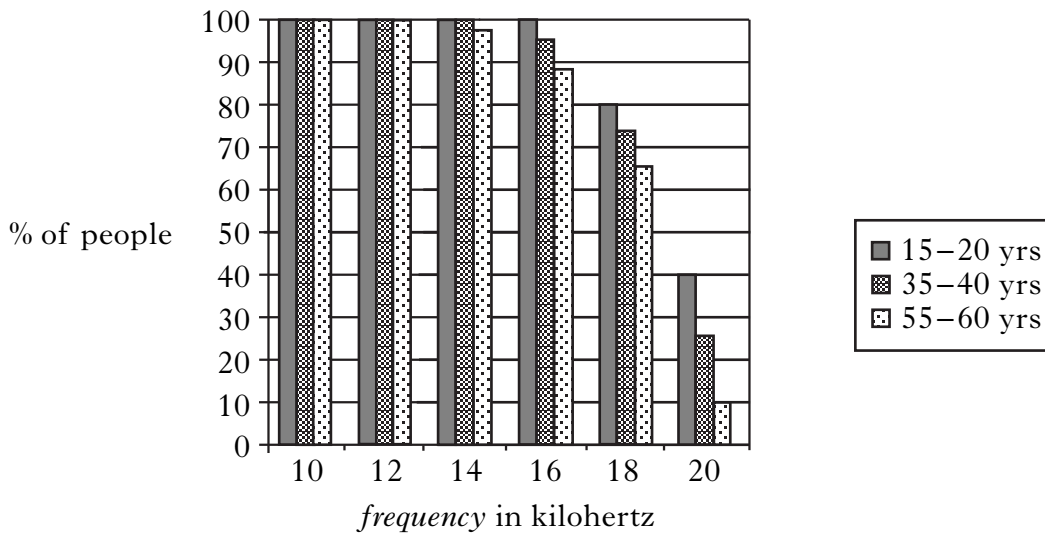


Explain why ear protectors are used to reduce the sound level experienced by the drummer.

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1

- (b) A medical researcher is measuring the upper range of hearing of people in different age groups.
The bar graph shows the frequencies of sound detected by these people.



- (i) State **two** conclusions which can be made from this bar graph about the hearing of different age groups.

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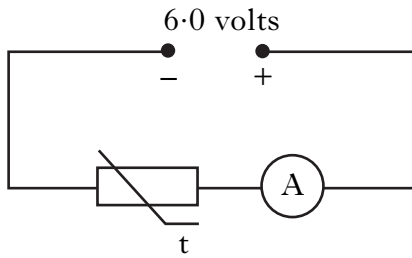
- (ii) What name is given to sound frequencies greater than 20 kilohertz?

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11. (a) A thermistor is connected to a 6.0 volt supply in circuit 1. The table gives some information about the thermistor.



circuit 1

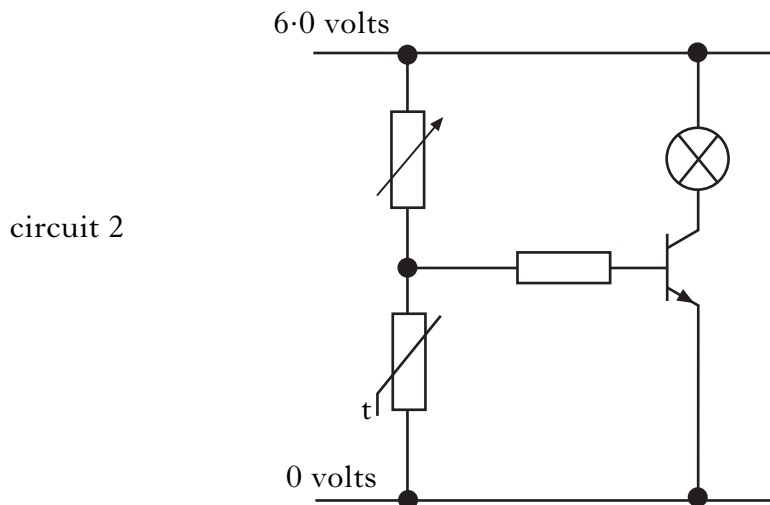
<i>temperature</i> (degrees Celsius)	<i>resistance</i> (ohms)
20	1000
30	600
40	400

Calculate the reading on the ammeter when the thermistor is placed in a beaker of water at 40 degrees celsius.

Space for working and answer

3

- (b) The thermistor is now connected as shown in circuit 2 and placed in a tropical fish tank. The circuit provides a warning when the temperature of the water in the tank becomes too low.



circuit 2

- (i) What is the purpose of the transistor in circuit 2?

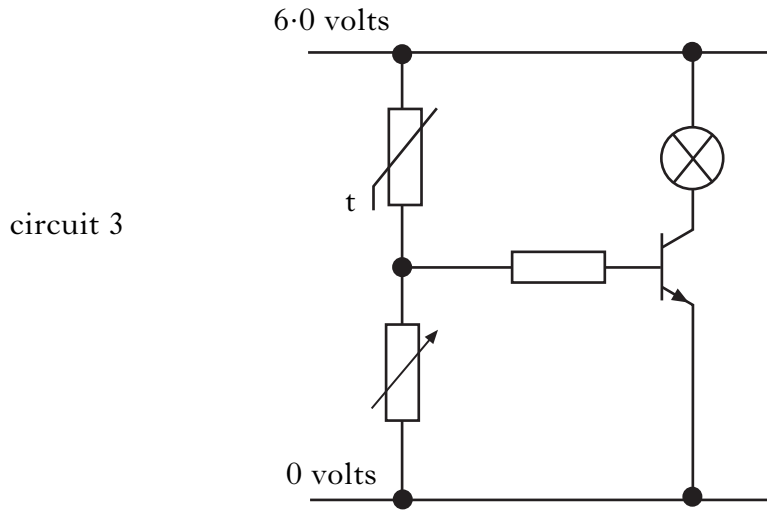
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11. (b) (continued)

(ii) The same components are used to construct circuit 3.



State how the operation of circuit 3 differs from the operation of circuit 2.

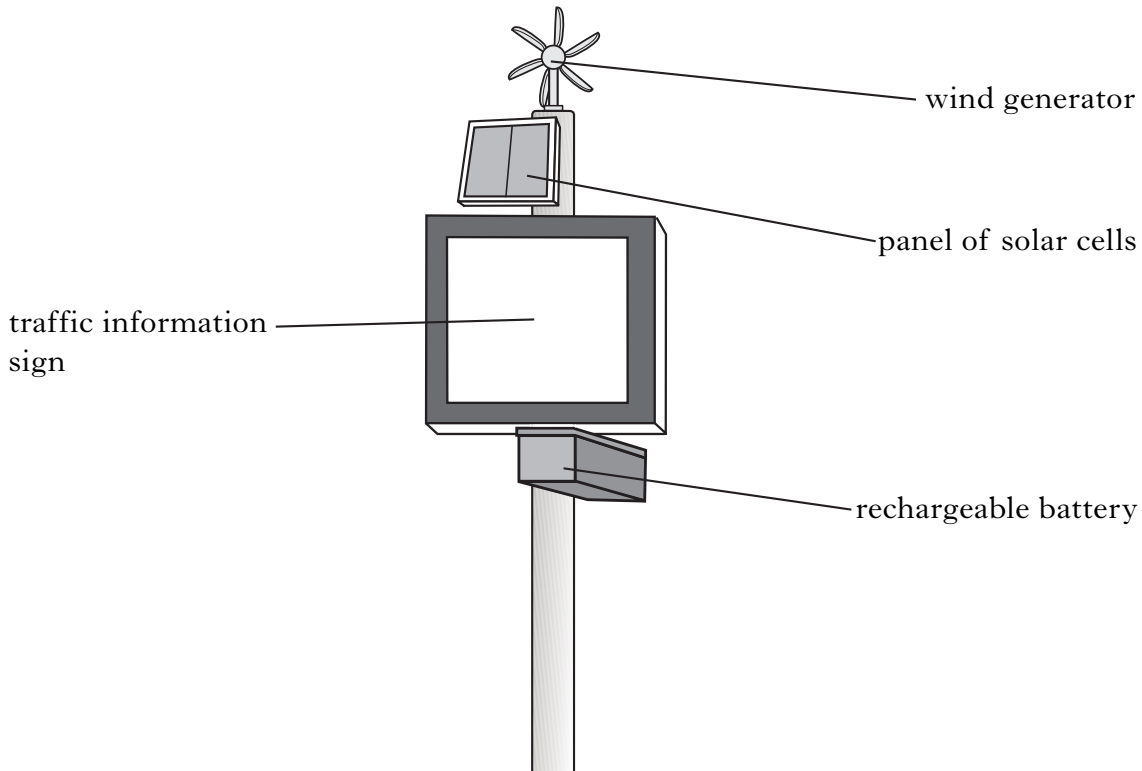
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16. A traffic information sign is located in a remote area. The sign is supplied with energy by both a panel of solar cells and a wind generator. The panel of solar cells and the wind generator are connected to a rechargeable battery.



- (a) One square metre of solar cells can generate up to 80 watts. The panel of solar cells has an area of 0.4 square metres.

(i) State the energy change that takes place in the solar cells.

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(ii) Calculate the maximum power produced by the panel of solar cells.

Space for working and answer

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YOU MAY USE THE SPACE ON THIS PAGE TO REWRITE ANY ANSWER YOU HAVE DECIDED TO CHANGE IN THE MAIN PART OF THE ANSWER BOOKLET. TAKE CARE TO WRITE IN CAREFULLY THE APPROPRIATE QUESTION NUMBER.

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