

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE  
General Certificate of Secondary Education



CYD-BWYLLGOR ADDYSG CYMRU  
Tystysgrif Gyffredinol Addysg Uwchradd

237/01

SCIENCE

FOUNDATION TIER (Grades G-C)

PHYSICS 1

A. M. MONDAY, 25 June 2007

(45 minutes)

<b>For Examiner's use only</b>	
<b>Total Marks</b>	

### ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

### INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

### INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

**A list of equations is printed on page 2 of the examination paper.** In calculations you should show all your working.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

**EQUATIONS**

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

$$\text{energy transfer} = \text{power} \times \text{time}$$

$$\text{units used} = \text{power (kW)} \times \text{time (h)}$$

$$\text{cost} = \text{units used} \times \text{cost per unit.}$$

$$\text{efficiency} = \frac{\text{useful energy transfer}}{\text{total energy input}} \times 100\%$$

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

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

*Answer all questions.*

**1.** Electricity can be generated using different energy sources.

Some of these energy sources are:

**coal      wind      hydroelectric      gas      nuclear      solar.**

From these energy sources,

- (i) name an energy source that is unreliable, ..... [1]
- (ii) name an energy source that pollutes the atmosphere, ..... [1]
- (iii) name an energy source that could not be used at night, ..... [1]
- (iv) name an energy source that has no fuel costs, ..... [1]
- (v) name an energy source that would need planning permission to flood a large area of land.  
..... [1]

5

**Turn over.**

**2.** Scientific knowledge and ideas often change over time.

- (a) (i) Scientists in the 19<sup>th</sup> Century thought that the Sun was powered by chemical energy.

This is an example of

- A** making observations
- B** a theory or model
- C** a prediction

Select an answer and write the letter in the box.

[1]

- (ii) In the 20<sup>th</sup> Century, when scientists studied the light from the Sun, they found it was made mainly from hydrogen.

This is an example of

- A** making observations
- B** a theory or model
- C** a prediction

Select an answer and write the letter in the box.

[1]

- (iii) Early astronomers thought that the surface temperature of the planets would decrease as distance from the Sun increased.

This is an example of

- A** making observations
- B** a theory or model
- C** a prediction

Select an answer and write the letter in the box.

[1]

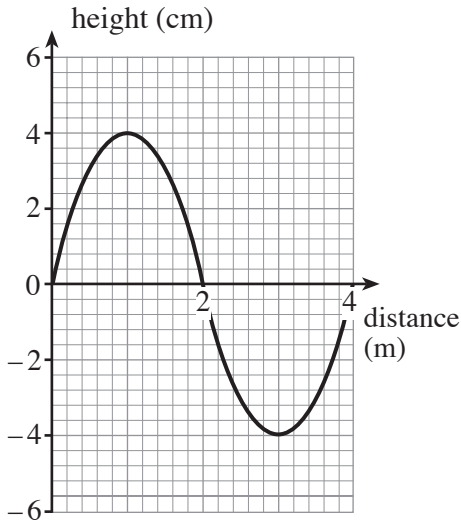
- (b) The table below shows the surface temperatures for some of the planets and their distance from the Sun.

Planet	Mercury	Venus	Earth	Mars
Surface temperature (units)	480	720	290	220
Distance from Sun (units)	0.4	0.7	1.0	1.5

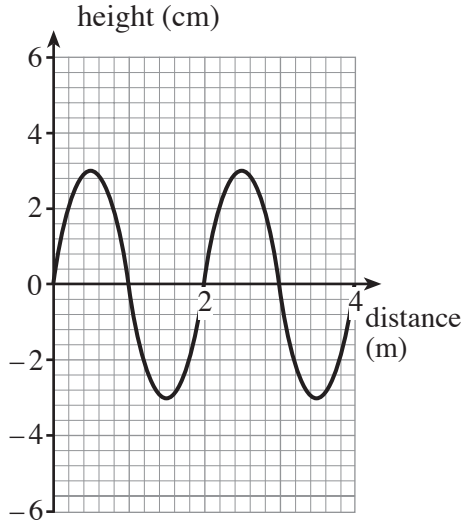
- (i) Early astronomers thought the surface temperature of planets would be lower the further they were from the Sun.  
Name the planet that does not follow this pattern. .... [1]
- (ii) Name the fifth planet from the Sun. .... [1]
- (iii) Estimate a value for the surface temperature of this fifth planet.  
..... units [1]

6

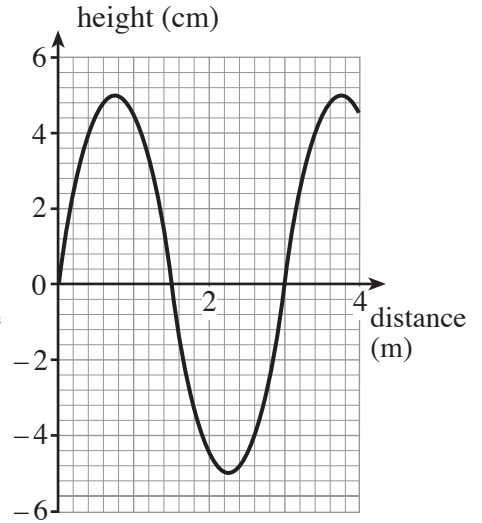
3. The diagrams show three different waves A, B and C.



**A**



**B**



**C**

(a) Fill in the gaps in the table below.

[2]

Diagram	Wavelength (m)	Amplitude (cm)
<b>A</b>	4	4
<b>B</b>	2	.....
<b>C</b>	.....	5

(b) (i) The frequency of wave A is 75 Hz.

Use the equation

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

to calculate the wave speed of wave A.

[2]

wave speed = .....

(ii) The three waves A, B and C all travel at the same speed.

State which wave has the lowest frequency. ....

[1]

5

4. Read this article about mobile phones, which is taken from a national newspaper.

**Will using a mobile phone damage your health?**

Radiation from mobile phones is like sunlight, and on a sunny day, the energy from sunlight striking your head is more than from a mobile phone.

Scientists have measured the temperature rise from using a mobile phone to be only 0.1°C.

In 1990, there were 500 000 mobile phone users in Britain. Now there are over 40 million users.

There has been no overall rise in the percentage of people with brain cancers.

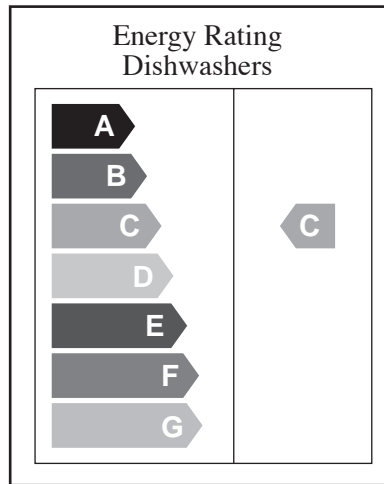
A Swedish study has suggested that mobile phone users are more likely to get cancer of the brain.

A German study has found evidence of an increase in cancer around transmitters.

- (a) Use only the information in the article to answer these questions.
- (i) How many mobile phone users are there in Britain today? ..... [1]
- (ii) State the evidence that suggests that using a mobile phone will **not** damage your health. [1]
- .....
- (iii) State the value of the measurement in the article that could only be checked by other scientists. [1]
- .....
- (iv) State the evidence that suggests that transmitters should not be placed near schools. [1]
- .....
- (b) Tick the box next to the statement that correctly completes the sentence below. [1]
- The link between using a mobile phone and increasing the risk of getting cancer has been proved,
- will never be proved,
- needs more research to be certain.

5. Scientists calculate the electrical power used by dishwashers.

They label each dishwasher with a letter from A to G.



Dishwashers labelled **A** are cheaper to run than those labelled **G**.

The following table gives information about dishwashers labelled **A**, **B** and **C**.

Dishwasher Label	Voltage (V)	Current (A)	Units of energy used per year (kWh)
<b>A</b>	230	4	210
<b>B</b>	230	6	320
<b>C</b>	230	8	420

(a) Use the equation

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

to calculate the power of dishwashers **labelled C**.

[2]

Power = ..... kW



(b) A homeowner buys a dishwasher **labelled B**.

(i) Use the equation

$$\text{Cost} = \text{units used} \times \text{cost per unit}$$

to find the cost of using this dishwasher for a year. [2]

One unit of electricity costs 8p.

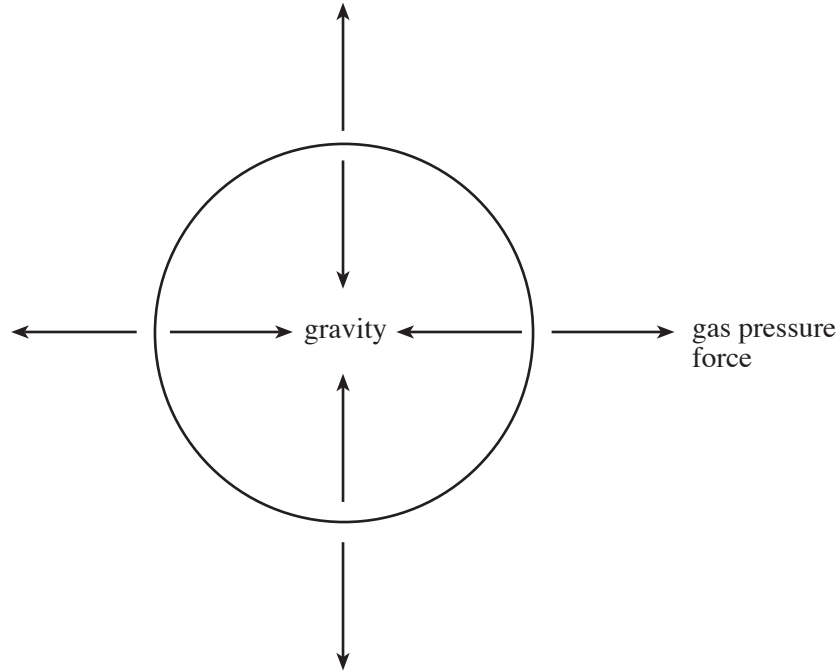
Cost = £ .....

(ii) How many units of energy would the homeowner have saved if they had bought a dishwasher labelled **A** instead of a dishwasher labelled **B**? [1]

Energy saved = ..... units

5

6. (a) A star has two forces acting upon it.  
One of these is caused by gravity.  
The other force is mainly caused by gas pressure.

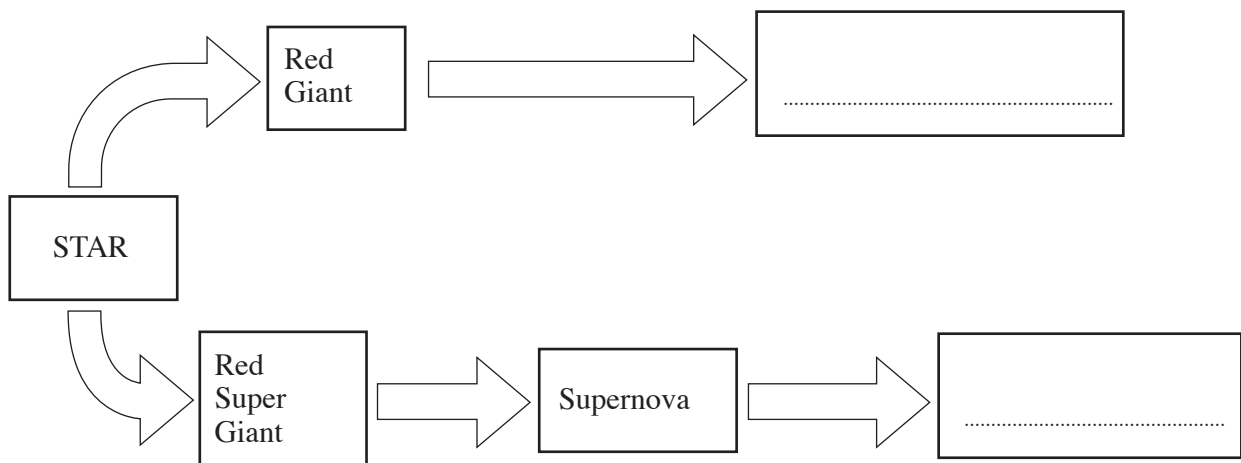


What can you say about these forces when the star is in its stable state.

[1]

- (b) Stars go through a series of changes after the stable state.  
These changes depend on the size of the star.

Possible changes are shown in the diagram below.



Fill in the gaps in the diagram.

[2]

3

7. (a) Fill in the gaps in this diagram of the electromagnetic spectrum.

Choose words from this list:

[2]

**Water waves**

**X-rays**

**Sound waves**

**Microwaves**

Radio waves	.....	Infrared waves	Visible light	Ultraviolet rays	.....	Gamma rays
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(b) Give one use of infra red waves. ....

[1]

(c) (i) Gamma rays are an **ionising** radiation.

Write down the names of two other types of ionising radiation.

[2]

1 .....

2 .....

(ii) Give a reason why ionising radiations are harmful.

[1]

.....

6

8. The table below gives information about heat loss from a house.

It also shows how this heat loss can be reduced by using different types of insulation.

House part	Type of insulation	Heat loss per second (W)		Energy saving per second (W)
		Without insulation	With insulation	
Windows & doors	Double glazing	500	200	300
Outside walls	Cavity insulation	4000	.....	3500
Floors	Carpet underlay	1500	700	800
Roof	Loft insulation	8000	4600	.....

(a) Complete the table. [2]

(b) (i) Name the house part through which heat is lost by convection. .... [1]

(ii) Give a reason why double glazing reduces heat loss through windows and doors. [1]

.....  
.....

(iii) State which type of insulation is most effective in reducing heat loss. [1]

.....

9. Some information about the power sources that can be used in cars is shown in the table.

Power source	Input energy (J)	Useful output energy (J)	'Wasted' energy (J)	Distance covered	Cost
Battery	500	400	100	60 km per charge	90p / charge
Petrol	500	150	350	8 km per litre	90p / litre
Gas	500	230	270	7 km per litre	45p / litre

- (i) **Write down** an equation from page 2 and **use it** to find the efficiency of using gas as the power source. [3]

Equation: .....

.....

Calculation:

Efficiency = ..... %

- (ii) Use information from the table to explain why the battery is the **most efficient** power source. [1]

.....

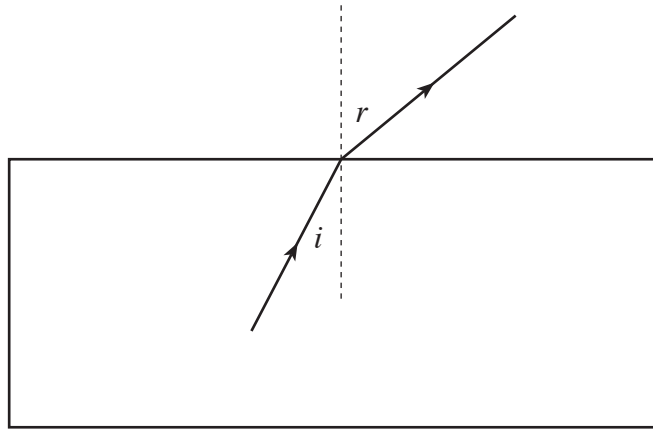
.....

- (iii) Use information from the table to explain why the battery is the **cheapest** power source. [1]

.....

.....

10. The diagram shows what happens to a beam of light as it emerges from a glass block.



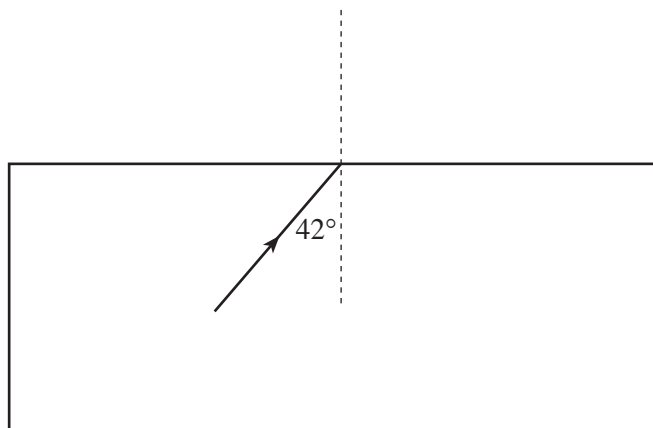
(a) (i) Name this effect. .... [1]

(ii) Give a reason why the beam changes direction. [1]

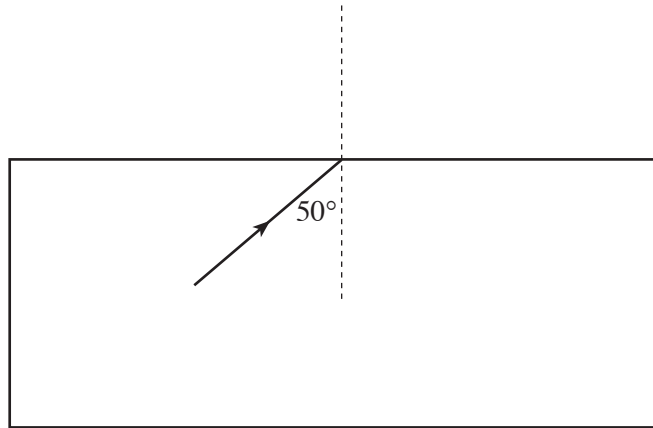
.....

.....

(b) When angle  $i$  is  $42^\circ$  angle  $r$  is  $90^\circ$ .  
Show this on the diagram below. [1]



- (c) (i) In the space below, complete the diagram to show what happens to the beam of light if angle  $i$  is  $50^\circ$ . [1]



- (ii) What is the name given to this effect? ..... [1]