![OCR logo] **OCR**
RECOGNISING ACHIEVEMENT

GCSE

PHYSICS B

Physics B Unit 1 Modules P1, P2, P3

Specimen Paper

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

F **B651/01**

1 hour

Candidate
Name

Centre
Number

Candidate
Number

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.
- Do not write in the bar code. Do not write in the grey area between the pages.
- DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60.**

This specimen paper consists of 27 printed pages.

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Answer all questions.

Section 1

1. Danni is sunbathing.

   She makes sure that she has sunscreen rubbed onto her back.

   (a) What type of radiation causes sun tan?

   Put a (ring) around the correct answer.

   gamma   infrared   ultraviolet   X-rays

   [1]

   (b) Write down **two** possible effects of over-exposure to the sun.

   ....

   ....[2]

   (c) Danni is using a sunscreen with a high sun protection factor (SPF) number.
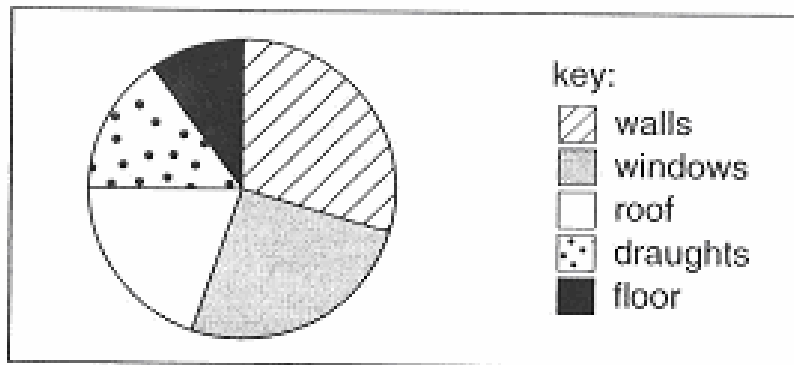   How does this affect the length of time she can stay in the sun safely?

   ....[1]

(d) Danni's friend, Joshua, has a darker coloured skin.

Explain why he can stay in the sun for longer without getting burnt.

....

....[1]

[Total: 5]

2. Tina is investigating how energy is lost from houses.

She looks at a pie chart.

Look at the pie chart.

(a) Finish the sentences by choosing the best words from this list.

      fibreglass   **lead**   **draughts**

   **shiny foil**   **walls**   **floor**

    Most energy is lost from the ....[1]

    Least energy is lost from the ....[1]

The amount of energy lost from the roof can be reduced by lining the loft with

  ....[1]

    Energy loss through walls can be reduced by placing ....[1]

behind radiators.

(b) Houses are built with cavity walls, a gap between the outside and inside wall. This

cavity is now often filled with insulation material. Cavity wall insulation is made from foam.
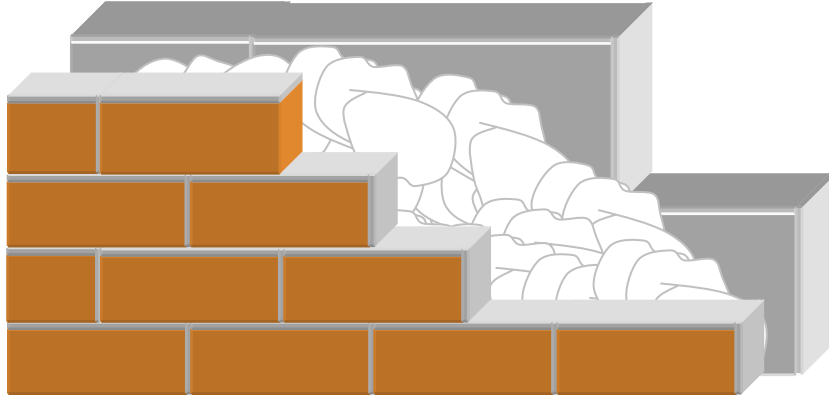
Why does cavity wall insulation reduce energy loss by conduction?

....

....[1]
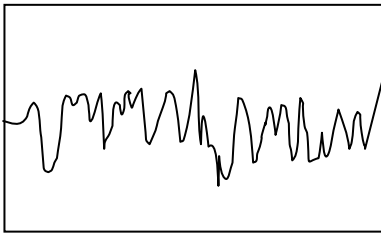
[Total: 5]

3. (a) Infrared radiation is emitted by many household devices.

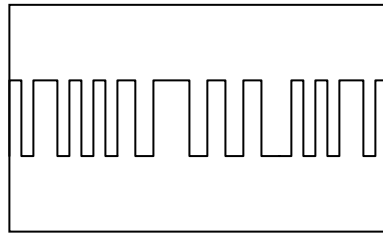Put ticks (✓) in the boxes next to the **two** devices which work by emitting infrared radiation.

toaster	
microwave	
radio/CD player	
remote controller	
satellite aerial	

[2]

(b) The diagrams show two signals.

Analogue

Digital

Use your ideas about analogue and digital signals to describe the difference between them.

....

....[2]

(c) Signals can be sent along an optical fibre.
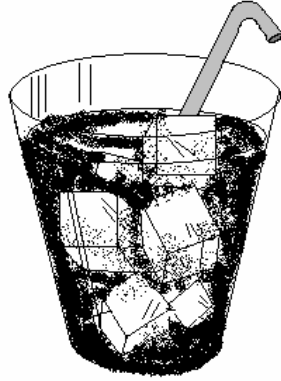The diagram shows the path of a ray of light entering an optical fibre.
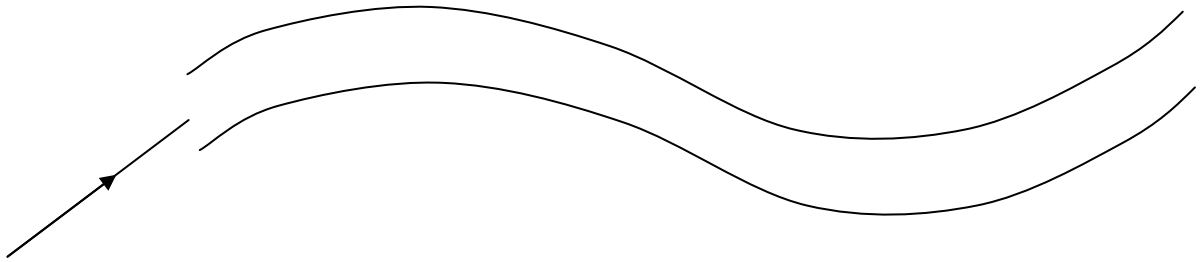
(i) Continue the path of the ray through the optical fibre by total internal reflection. [1]

(ii) Finish this sentence.
Total internal reflection occurs when the angle of incidence is larger than the

. ...angle [1]

[Total: 6]

4. Fred puts ice cubes into his drink to cool it down.
   The ice cubes melt.

(a) Why does the drink cool down? Put a tick (✓) in the box next to the correct answer.

The ice cools down as it melts.	

The ice is cooler than the drink so energy flows from the drink to the ice.	

The ice is cooler then the drink so energy flows from the ice to the drink.	

[1]

(b) The specific latent heat of ice is 330 J/g.

   Fred has added 15g of ice to the drink.

   Calculate the energy transferred from the drink to the ice as it melts.

   You are advise to show how you work out your answer.

   ....

   ....

   Energy transferred = ...J [3]

[Total: 4]

Section 2

5. Liz was watching a comet with a pair of binoculars. Her friend said it might be a **near Earth object**.

    (a)   Liz is worried that the comet might be a near Earth object.

    Suggest why she is worried?

    ....

    ....[2]

    (b)   The comet only has a tail when it is close to the Sun.

    Suggest a reason for this?

    ....

    ....

    ....[2]

    [Total: 4]

6. The first spacecraft to visit the Moon were unmanned robots. By 1969 humans had landed on the Moon.

(a) Suggest **two reasons** why manned spacecraft are not used to explore other planets?

1 ....

2 ....[2]

(b) It costs a large amount of money to send spacecraft to other planets. Scientists often have to persuade governments that this is a good way to spend money.

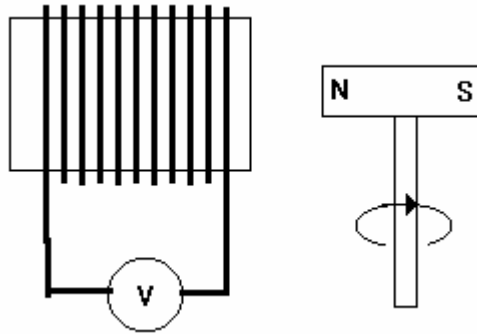Suggest **two reasons** scientists might give to persuade governments that it is worthwhile.

1 ....

....

2 ....

....[2]

[Total: 4]

7. Most of the electricity generated in the UK is made using a turbine and a generator. A model of this is shown to Sarah.

Sarah makes some electricity by slowly spinning the magnet

(a) Write down **two** things she can do to increase the amount of electricity generated

1 ....

2 ....[2]

(b) Electricity is distributed around the country through the National Grid.

(i) What name is given to the wires that carry the electricity from power stations around the country?

....[1]

(ii) Heat energy is lost when electricity is distributed around the country.

How can this heat loss be reduced?

Put a **ring** around the correct answer.

decrease the voltage   **decrease the current**   **decrease the power**

[1]

(c) Sarah's teacher then shows her some values for a mobile electrical generator.

For every 45 MJ of diesel burnt the amount of energy produced is 20 MJ

(i) Where does the rest of the energy go?

....[1]

(ii) Calculate the efficiency of the electrical generator.

$$\text{Efficiency} = \frac{\text{Useful energy out}}{\text{Total energy in}}$$

....

....

....[3]

[Total: 6]

8. Adrian visits a South American village, near to the equator that wants to produce electricity.

The villagers could use a photocell to collect energy from the Sun.

(a) One advantage of using the Sun is that it is a **renewable energy source**. What does **renewable energy source** mean?

....

....[1]

(b) State one other **advantage** and one **disadvantage** of using photocells to produce electricity.

Advantage ....

Disadvantage ....[2]

(c) What **type** of electrical current is produced from the photocell?

Tick (✓) the correct box.
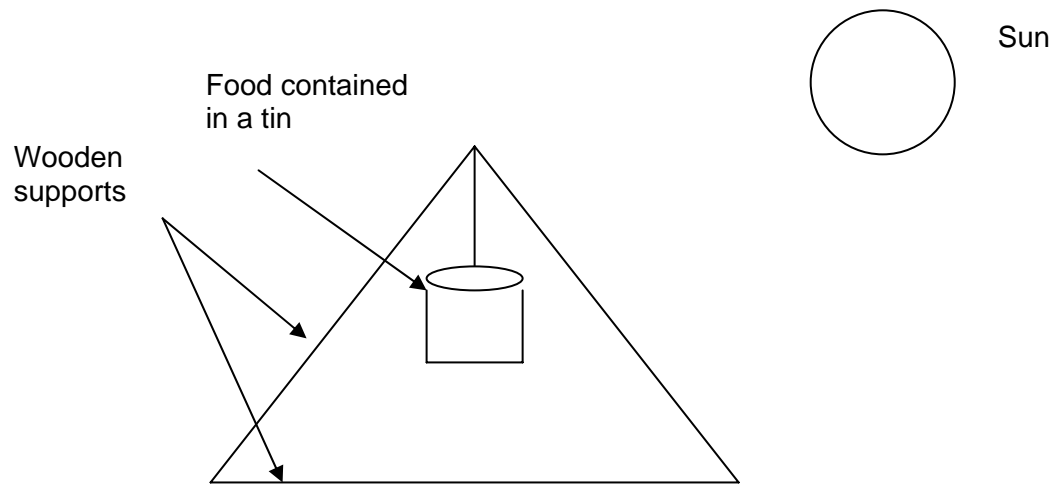
Alternating	
Direct	
Earth	

[1]

[Total: 4]

(d) Adrian finds that some villagers use a solar cooker to cook food.

Finish the diagram to show the mirror in the solar cooker.

Sun

Food contained
in a tin

Wooden
supports

[2]

[Total: 6]

Section 3

9. **(a)** Helen investigates the speeds of cars outside her school.

What two **measurements** does she take?

1st measurement...

2nd measurement...[2]

(b) Helen watches racing cars.

Five cars are in a race. The race is 2 laps of the track.

Helen investigates their average speeds for each lap. She measures the times for each lap.

Look at her table of results.

Car	1st lap time in seconds	2nd lap time in seconds	total time in seconds
BMW	50	70	120
Citroen	50	50	100
Fiat	60	60	120
Ford	50	40	90
Rover	40	100	140

(i) Which car **wins** the race?

Choose from:

BMW   **Citroen**   **Fiat**   **Ford**   **Rover**

....[1]

(ii) Which **two** cars race at **steady** average speeds?

Choose from:

   BMW   **Citroen**   **Fiat**   **Ford**   **Rover**

....[1]

(iii) Which **two** cars complete the second lap **slower** than the first lap?

Choose from:

   BMW   **Citroen**   **Fiat**   **Ford**   **Rover**

....[1]

(iv) Which car completes the second lap **faster** than the first lap?

Choose from:

   BMW   **Citroen**   **Fiat**   **Ford**   **Rover**

....[1]

(c) Look at the information about stopping distances for a car.

Speed of car in m/s	Thinking distance in m	Braking distance in m	Stopping distance in m
10	5	5	10
20	10	20	30
40	20	80	100

(i) What do we **mean** by **thinking** distance?

....

....[2]

(ii) Higher speed makes the **braking distance** longer.

Write down 2 **other** factors that make the braking distance longer.

1st factor ....

2nd factor...[2]

(iii) How can you calculate stopping distance?

....[1]

[Total: 11]

10. Cars have **safety features**.

These safety features help reduce injuries in a crash.

(a) One safety feature in cars is **crumple zones**.

Look at the diagram.

Rear crumple
zone ←——————→ ⟵ Front crumple
zone

Microsoft ©
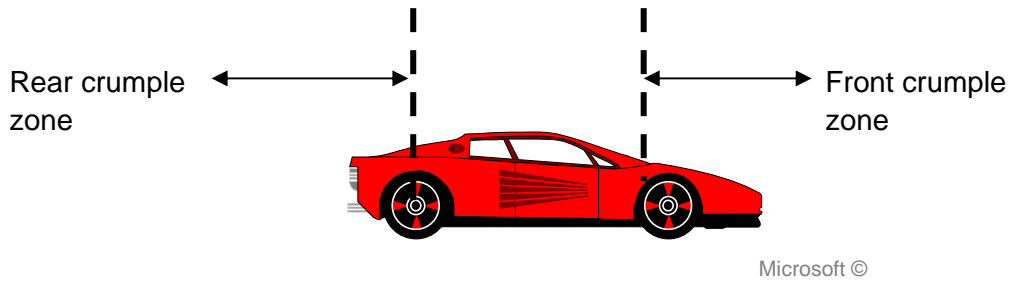
How do crumple zones help reduce injuries in a crash?

....

....[1]

(b) Another safety feature in cars is **safety belts**.

After a crash the car needs to be repaired. What should happen to safety belts **after** a crash?

....[1]

(c) Name one **other** safety feature in cars.

....[1]

[Total: 3]

11. Look at the diagram.
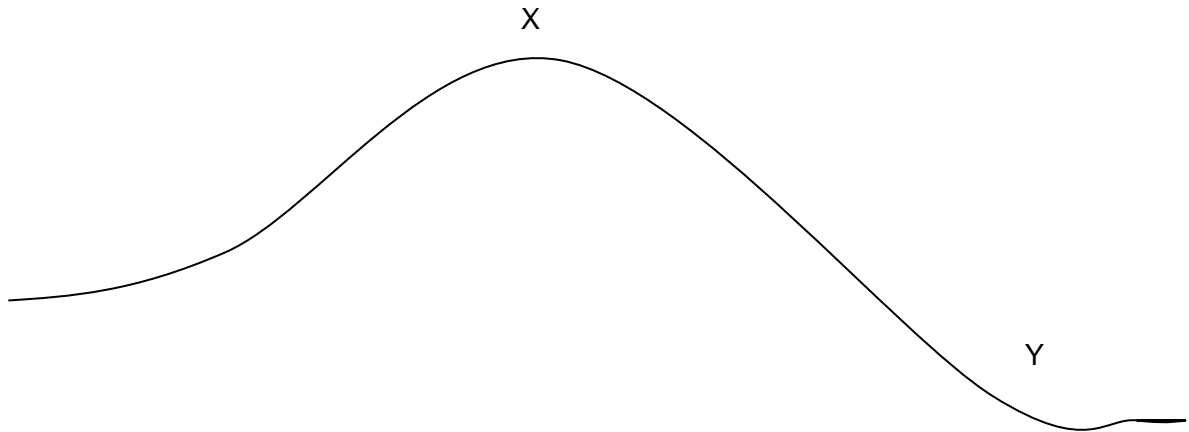
(a) A ball is lifted to position X.

The height of the lift is 20m. The force used is 10 000N.

(i) Calculate the work done on the ball when it is lifted to position X.

....

....

answer...J[3]

(ii) The ball is at position X. It is still.

What type of energy does the ball have at position X?

....[1]

(b) The ball starts to roll down the hill. It passes part **Y**.

This is the **fastest** part of the journey.

(i) What type of energy does the ball have at position **Y**?

....[1]

(ii) Suggest why point **Y** is the **fastest** part of the journey.

In your answer use the idea of energy.

....

....[1]

[Total: 6]

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This specimen mark scheme consists of 4 printed pages.

Question Number	Answers	Max Mark
Section 1		
1(a)	Ultraviolet	**[1]**
1(b)	sunburn ;	**[2]**
	skin cancer ;	
	eye damage **(any two)**	
1(c)	can stay in the sun longer;	**[1]**
1(d)	more radiation absorbed by skin;	**[1]**
	Total marks	**[5]**
2(a)	Walls;	**[1]**
	Floor;	**[1]**
	Fibreglass;	**[1]**
	shiny foil.	**[1]**
2(b)	air is an insulator / poor conductor;	**[1]**
	Total marks	**[5]**
3(a)	toaster;	**[1]**
	remote controller;	**[1]**
3(b)	analogue – continually variable;	**[1]**
	digital – either on or off / 0 or 1;	**[1]**
3(c)(i)	correct path by eye;	**[1]**
3(c)(ii)	critical;	**[1]**
	Total marks	**[6]**
4(a)	The ice is cooler than the drink so energy flows from the drink to the ice;	**[1]**
4(b)	Energy = mass x specific latent heat;	**[1]**
	15 x 330;	**[1]**
	4950;	**[1]**
	Total marks	**[4]**

Section 2		
5(a)i	It might hit the earth;	**[1]**
	(causing) floods / death/ destruction	**[1]**
	(allow any reasonable disaster)	
5(b)	Trail of debris owtte;	**[1]**
	(Caused by) heat from the sun;	**[1]**
	Total marks	**[4]**
6(a)	Robots don't need water/food / oxygen/ can survive more harsh conditions;	**[2]**
	(Any 2 marking points)	
6(b)	To find other life forms/ to advance technology/ to find new mineral deposits;	**[1]**
	(Other sensible reasons)	**[1]**
	Total marks	**[4]**
7(a)	More coils;	**[1]**
	Spin (magnet) faster	**[1]**
	(Accept use stronger magnet and move coils closer to magnet)	
7(b)(i)	Transmission lines;	**[1]**
7(b)(ii)	Ring around decrease the current;	**[1]**
7(c)i	Lost as heat; (into the environment);	**[1]**
7(c)ii	44.4%; working correct but answer incorrect = 1	**[1]**
	Total marks	**[6]**
8(a)	Idea of being replaced quickly;	**[1]**
	(Allow never runs out)	
8(b)	Idea of no chemical pollution/no fuel costs;	**[1]**
	Expensive to set up/only works in the day/	
8(c)	**(Other sensible reason)**	**[1]**
	Direct (current) **(Allow D.C.);**	**[1]**
8(d)	Drawing of a <u>curved</u> mirror underneath food container	**[2]**
	Total marks	**[6]**

Section 3		
9(a)	Distance **(accept length)** (1);	**[2]**
	Time (1);	
9(b)i	Ford;	**[1]**
9(b)ii	Citroen **and** Fiat **(both needed)**;	**[1]**
9(b)iii	BMW **and** Rover **(both needed)**;	**[1]**
9(b)iv	Ford;	**[1]**
9(c)i	Idea of **distance (not time / how long)**;	**[2]**
9(c)ii	(car moves) while driver reacts / AW;	
	Any **one** road condition from:	
	Icy / wet / muddy / oily road / AW **(accept slippy road)**;	
	Any **one** car condition from:	
	Worn tyres / worn brakes / AW **(accept poor suspension / greater load / AW)**;	**[2]**
9(c)iii	The idea of:	
	Thinking distance + braking distance / AW;	**[1]**
	Total marks	**[11]**

10(a)	Any one from:	
	Absorb energy;	
	Accept also higher level answers such as: Less acceleration;	
	so less force (needed);	
	Longer stopping time;	
	longer stopping distance;	**[1]**
10(b)	Seatbelts need replacing;	**[1]**
10(c)	Any reasonable safety feature:	**[1]**
	Safety cage / air bags / side impact bars / ABS breaks / traction control **(not crumple zone / safety belts)**;	
	Total marks	**[3]**

11(a)i	W = F X D;	
	W = 10 000 X 20;	
	W = 200 000 (J);	**[3]**
11(a)ii	Potential energy / PE **(accept gravitational)**;	**[1]**
11(b)i	Kinetic / KE / movement;	**[1]**
11(b)ii	At X – Most KE / Least PE / all PE is converted / AW;	**[1]**
	Total marks	**[6]**
	Overall marks	**[60]**