OCR
RECOGNISING ACHIEVEMENT

GCSE

PHYSICS B

F B652/01

Physics B Unit 2 Modules P4, P5, P6

Specimen Paper

1 hour

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

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 31 printed pages.

 Registered Charity Number: 1066969

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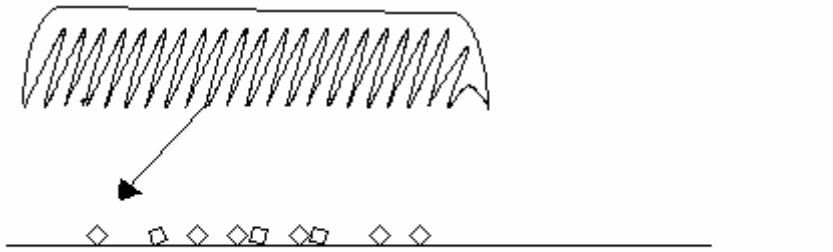
 Registered Charity Number: 1066969

Section 1

1. (a) Noelle combs her hair.

Look at the diagram



She holds the comb near to some small pieces of paper.

What happens to the paper?

.....

.....[1]

(b) Noelle walks on a nylon carpet.

She touches a radiator.

Write down what might happen.

.....

.....[1]

(c) Static electricity is used by doctors to restart a patients heart when it has stopped.

Describe how.

In your answer you should:

- describe what the doctor does
- describe any safety precautions taken

.....

.....

.....

.....[3]

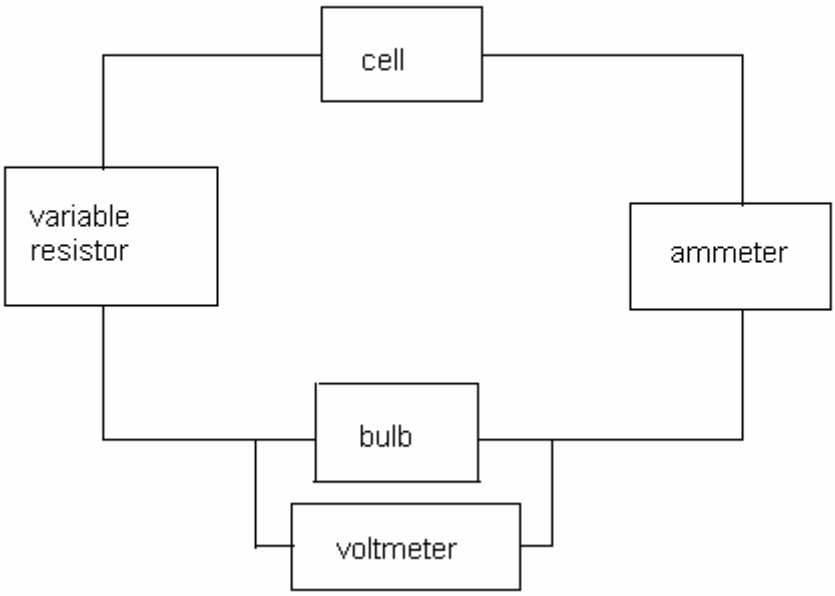
[Total: 5]

2. **(a)** Jamie does an experiment with electricity.

He makes a circuit.

He measures the current and pd (voltage) across the bulb.

Look at the diagram.



The pd (voltage) across the bulb is 12V when the current is 2A.

Calculate the resistance of the bulb

.....

.....

.....

Answer .....ohms [3]

(b) Jamie's reading lamp has three wires in the cable.

Complete the table below.

wire	**colour**
live	brown
neutral	
	green and yellow

[2]

(c) The reading lamp has a fuse and a plug.

Why is the fuse important?

.....

.....[1]

(d) Jamie has a playstation.

It is double insulated.

It has two wires in the plug.

What are the **names** of these two wires?

.....and.....[2]

[Total: 8]

3. Radioactive atoms give out radiation.

Two types of radiation are alpha radiation and beta radiation.

(a) Which part of the atom gives out these types of radiation?

.....[1]

(b) The radiation from radioactive elements can be useful or harmful.

(i) Write down **one use** of this radiation

.....[1]

(ii) Write down **one harmful effect** of this radiation

.....[1]

(c) Kelly is measuring the count rate from a radioactive substance.

At the start of the experiment the count rate is 2500 counts per minute (cpm).

At the end of the experiment she measured the count rate again.

Look at the list of counts per minute.

0

2000

2500

3000

5000

What is the most likely count rate at the end of the experiment.

Choose from the list.

.....[1]

(d) Kelly measured the background radiation before she started the experiment.

What is **background radiation**?

.....

.....

.....

.....[2]

(e) Nuclear fuel is used in some power stations.

Write down the name of **one** nuclear fuel.

.....

.....[1]

[Total: 7]

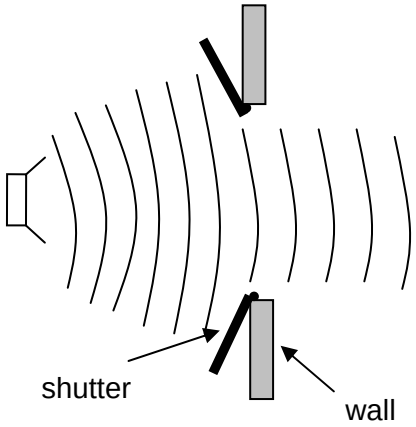
Section 2

4. (a) Sam is listening to his CD player in his room.

He has the window open and the sound waves pass to the outside of his room.

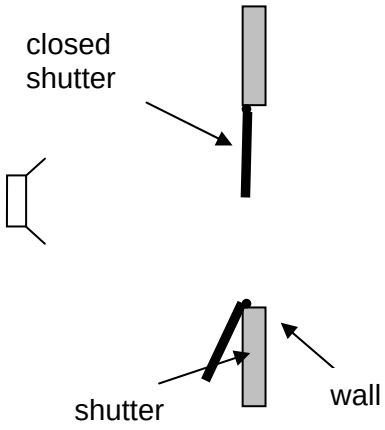
The wavelength of the sound waves is much smaller than the size of the open window.

The diagram shows how the sound waves pass through the open window.



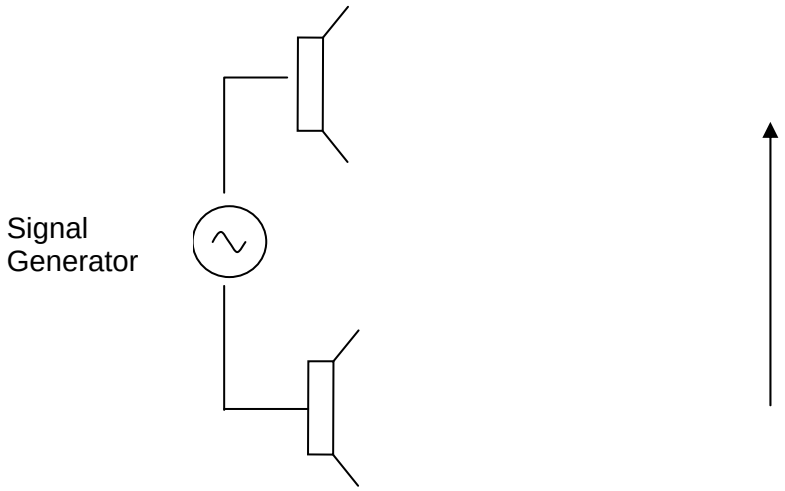
Sam then closes one of the shutters so that the size of the gap is very much smaller.

Complete the diagram below to show how the wavefronts pass through the gap in the shutters.



[2]

(b) Sam connects two speakers to the same source of sound (signal generator). Sound is produced from both speakers.



Sam walks past in the direction shown by the arrow.

He hears the volume of the sound increase and decrease.

Explain why.

In your answer use your ideas about interference.

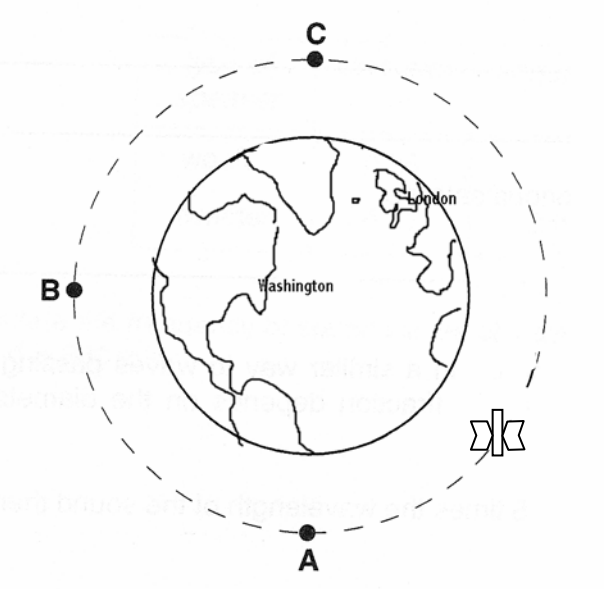
.....

.....

.....[2]

[Total: 4]

5. The diagram shows the orbit of a communications satellite around the Earth.
It is 40 000 km above the Earth.



(a) What force keeps the satellite in orbit around the Earth?

.....[1]

(b) This satellite is in a **Geostationary Orbit**.
How long does it take to orbit the Earth?

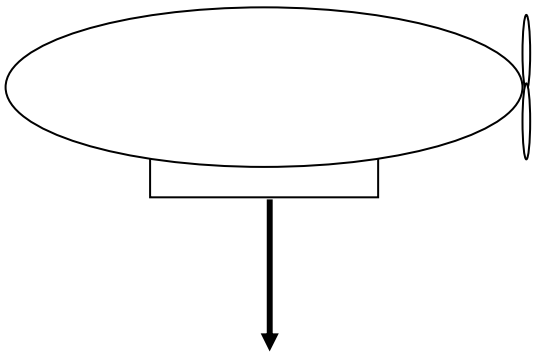
.....[1]

(c) A news reporter wishes to send a live broadcast from Washington to London.
His message is broadcast to the satellite from the transmitter using **microwave radiation.**
What piece of equipment does he need to **send** the signal to the satellite?

.....[1]

[Total: 3]

6. Sarah is given a model airship for her birthday.
It is filled with helium.
It moves by the fan pushing air backwards at a fast speed.
The mass of the airship plus helium is 2 kg.



(Every second, 0.5 kg of air is pushed back at a speed of 5 m/s.)

(a) The air moves backwards but the airship moves forward. Why?

.....[1]

(b) The momentum is calculated using:
Momentum = mass X velocity.
Calculate the momentum gained by the air as it is pushed backwards.

.....

.....

momentum = ...[2]

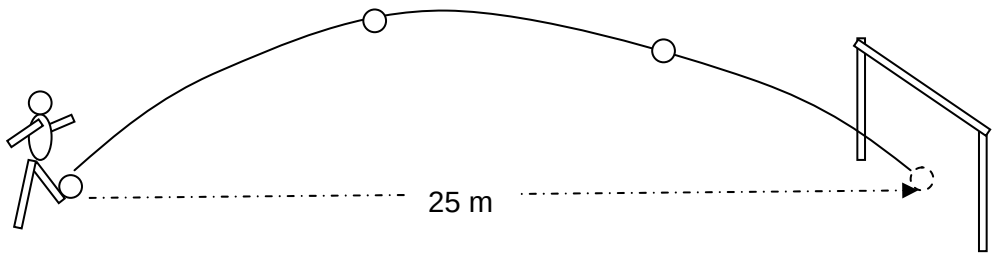
(c) Newton's 3rd law states that all forces have an equal and opposite reaction.
The airship floats in air because the helium provides enough buoyancy to balance the airship.

Gravity pulls the airship towards the Earth.
What is the equal and opposite reaction?

.....[1]

[Total: 4]

7. David kicks the ball towards the goal from 25 m away.



(a) The diagram shows the path of the ball.
What is this type of trajectory called?

.....[1]

(b) At the top of its trajectory the ball's vertical velocity is 0 m/s.
It takes 1.7 seconds to fall back to the ground.
Calculate its **vertical velocity** as it hits the ground.
Use the equation below.

v = u + at

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

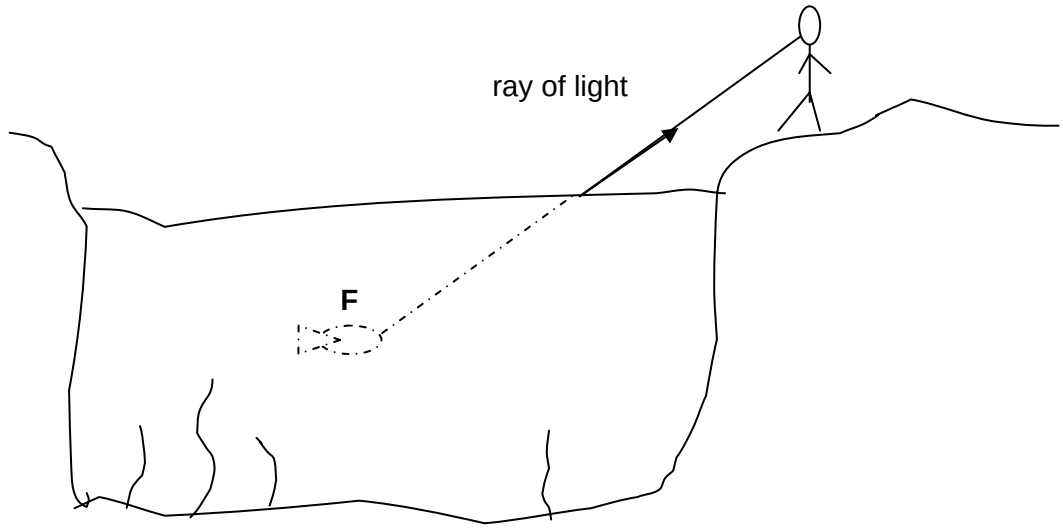
vertical velocity = ...

.....

..... m/s [2]

[Total: 3]

8. Donna watches a fish swimming in a pond.



The fish <u>appears</u> to be at the position shown.

But, the fish is not really there.

It seems to be there due to the refraction of light as it passes from the water into the air.

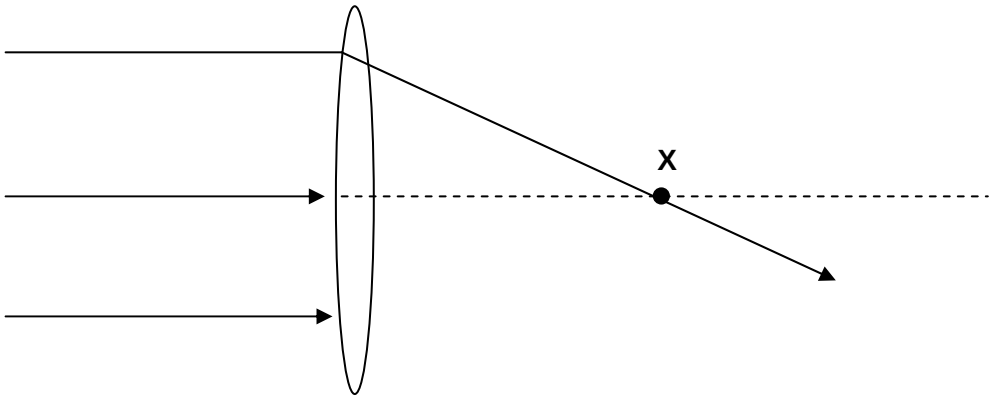
(a) Write the letter X on the diagram to show the actual position of the fish. [1]

(b) Draw a ray of light from the <u>actual</u> position of the fish to show how Donna sees the fish [2]

[Total: 3]

9. Lenses are used in lots of optical instruments.

The most common type of lens is shown below.



(a) What is this type of lens called?

.....[1]

(b) Complete the paths of the other two rays of light as they pass through the lens. [1]

(c) What is the name of point X?

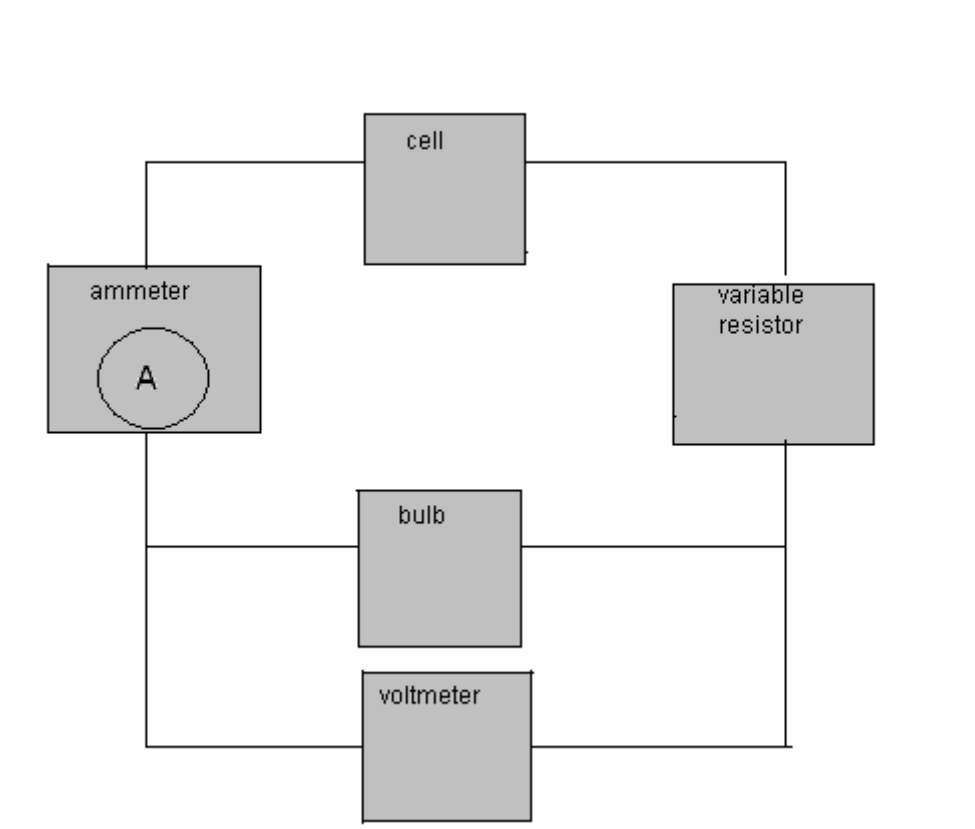
.....[1]

[Total: 3]

Section 3

10. Michelle connects an electrical circuit.
She wants to find out how the current and voltage in a circuit change when she alters the brightness of a bulb.

(a) The diagram shows where she connects different devices.
Draw the correct circuit symbol in each shaded box.
The ammeter has been done for you.



[4]

(b) Michelle knows that the unit of voltage is the volt.
Write down the unit of current.

.....[1]

[Total: 5]

11. There are three types of transformer; step-up, step-down and isolating
Transformers have a number of uses.
Four uses are listed below.
Finish the table by writing each use in the correct column.

Uses

bathroom shaver socket

child's train set

feeding national grid from power station

mobile phone charger

step-down	step-up	isolating

[4]

[Total: 4]

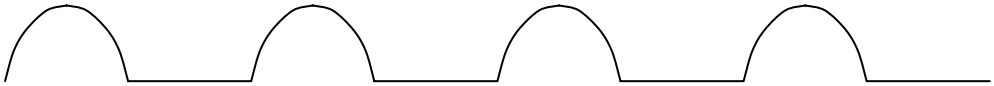
12. (a) Which statement best describes a capacitor?

Put a tick (✓) in the box next to the correct answer.

A capacitor changes direct current into alternating current.	
A capacitor generates electricity when passed through a magnetic field.	
A capacitor shines in the dark.	
A capacitor stores charge.	

[1]

(b) A single diode produces half-wave rectification.



(i) Describe how four diodes can be used to produce full-wave rectification.

You are advised to draw a diagram to help you answer this question.

.....

.....

.....

.....

.....[3]

(ii) Some devices need a more steady output than this.
Write down the name of the device that can smooth the rectified output.

.....[1]

[Total: 5]

13. Alan is building a logic circuit.

(a) What is the approximate value for the low voltage input signal to a logic gate?

Put a (ring) around the correct answer.

0V **0.5V** **5V** **230V** **40 000V**

[1]

(b) What is the approximate value for the high voltage input signal to a logic gate?

Put a (ring) around the correct answer.

0V **0.5V** **5V** **230V** **40 000V**

[1]

(c) He knows that truth tables are important when designing logic circuits.

(i) Finish the truth table for a NOT gate by writing in the shaded boxes.

input	**output**
0	
1	

[2]

(ii) Finish the truth table for an OR gate by writing in the shaded boxes.

input A	input B	output
0	0	
0	1	
1	0	
1	1	

[2]

[Total: 6]

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GCSE

PHYSICS B

F B652/01

Physics B Unit 2 Modules P4, P5, P6

Specimen Mark Scheme

1 hour

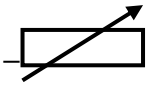
Maximum mark for this paper is [60]

This specimen mark scheme consists of 5 printed pages.

Registered Charity Number: 1066969

Question Number	Answers	Max Mark
Section 1		
1(a)	moves/attracted to comb;	**[1]**
1(b)	get a shock;	**[1]**
1(c)	paddles charged; good electrical contact; with patients chest /aw; charge passed through patient; to make heart contract; care taken not to shock operator; **(Any 3)**	**[3]**
	Total marks	**[5]**
2(a)	R = V ÷ I; = 12 ÷ 2; = 6; **(Correct answer on own gains 3)**	**[3]**
2(b)	Blue; earth;	**[2]**
2(c)	Safety/ AW	**[1]**
2(d)	Live; Neutral; **(any order (NOT colours))**	**[2]**
	Total marks	**[8]**
3(a)	Nucleus;	**[1]**
3(b)i	Smoke detectors/sterilizing/thickness gauges/tracers/ treating cancer;	**[1]**
3(b)ii	Damage cells;	**[1]**
3(c)	2000;	**[1]**
3(d)	radiation that is always present; in the atmosphere/environment;	**[2]**
3(e)	uranium;	**[1]**
	Total marks	**[7]**

Question Number	Answers	Max Mark
Section 2		
4(a)	more spread out / bends; greater diffraction; Wave length approx. constant. Max 2.	**[2]**
4(b)	Moves through points where the waves from <u>each speaker overlap</u> or; Reinforce (loud) Cancel (quiet) Max 2. (Waves from both speakers interfere scores 1) **Total marks**	**[2]** **[4]**
5(a)	Gravity;	**[1]**
5(b)	24 hours;	**[1]**
5(c)	24 GHz Aerial; **Total marks**	**[1]** **[3]**
6(a)	Every action has an opposite reaction / there is a force forward / forward thrust / AW;	**[1]**
6(b)	= 0.5 x 5 = 2.5 (kg m/s);(2.5 = 2 marks)	**[2]**
6(c)	pull of the airship on the earth (Allow upthrust) **Total marks**	**[1]** **[4]**
7(a)	a parabola;	**[1]**
7(b)	v = u + at = 0 + 10 x 1.7; v = 17 (m/s); **Total marks**	**[2]** **[3]**
8(a)	Lower;	**[1]**
8(b)	Correct ray from fish to surface; Refraction shown; **Total marks**	**[1]** **[1]** **[3]**

9(a)	convex / converging	**[1]**
	middle ray straight through lens	
9(b)	lower ray straight to lens then bends up towards point where other two rays meet. (Both needed)	**[1]**
9(c)	Focal point / focus	**[1]**
	Total marks	**[3]**
Section 3		
10(a)	cell – 	**[1]**
	variable resistor – 	**[1]**
	bulb – 	**[1]**
	voltmeter – 	**[1]**
10(b)	amp; Reject A	**[1]**
	Total marks	**[5]**
11	bathroom shaver socket --> isolating;	**[1]**
	child's train set --> step-down;	**[1]**
	feeding national grid from power station --> step-up;	**[1]**
	mobile phone charger --> step-down;	**[1]**
	Total marks	**[4]**
12(a)	a capacitor stores charge;	**[1]**
12(b)i	bridge circuit ;	**[1]**
	input / output opposite sides ;	**[1]**
	diode directions correct;	**[1]**
12(b)ii	capacitor;	**[1]**
	Total marks	**[5]**

13(a)	0V;	**[1]**
13(b)	5V;	**[1]**
13(c)i	1;	**[1]**
	0;	**[1]**
13(c)ii	0 correct ;	**[1]**
	1s correct	**[1]**
	Total marks	**[6]**
	Overall marks	**[60]**