

New  
Specification



*Rewarding Learning*

**General Certificate of Secondary Education  
2012–2013**

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**Science: Single Award**

Unit 3 (Physics)

Higher Tier

[GSS32]

**WEDNESDAY 14 NOVEMBER 2012**

**1.30 pm–2.45 pm**

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**MARK  
SCHEME**

			AVAILABLE MARKS		
1	(a) (i)	longitudinal	[1]	8	
	(ii)	vibrate/move backwards and forwards [1] in same direction as hand movement/parallel to direction of hand movement [1] [parallel to direction of energy flow/wave travel = 2]	[2]		
	(iii)	0.1 m	[1]		
	(iv)	0.3 m	[1]		
	(b)	4	[1]		
	(c)	20 × 90 [1] 1800 m/s [2]	[2]		
2	(a)	Refracted by lens [1] Image forms on retina [1]	[2]		
	(b) (i)	Lens too strong/eyeball too long [1] Can see near things clearly/Cannot see far things clearly [1] Light focused in front retina [1]	[3]		
	(ii)	Diverging lens/concave lens	[1]		6

## 3 (a) Indicative Content:

- Place sheet of lead/aluminium/paper in front of source
- Make sure distance between the source and sheet is constant
- Make sure distance between the radiation counter and sheet is constant
- Measure the amount of radiation which passes through
- If radiation stopped by lead it is gamma
- If radiation stopped by aluminium it is beta
- If radiation stopped by paper it is alpha
- Same thickness of material

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe and explain fully (using <b>five or more</b> of the above points) the experiment in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
B	Candidates use some appropriate specialist terms to describe and explain the experiment (using <b>three or four</b> of the above points) in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates describe/explain the experiment using <b>one or two</b> of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms. The form and style are of a limited standard.	[1–2]
D	Response not worthy of credit	[0]

[6]

(b) (i) time it takes [1]  
for the radiation/radioactivity count to fall by half [1] [2]

(ii) B [1]

Beta can be stopped by certain thicknesses of aluminium/  
appropriate reference to either alpha or gamma [1]

has a long half-life [1]

Implied

[2]

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			AVAILABLE MARKS	
4	(a)	(i) 40 cm [1] shortest time [over same distance] [1]	[2]	8
		(ii) Repeat the test	[1]	
		(iii) the average speed of a car is the speed over a given distance/ period of time [1] Instantaneous speed is the speed of a car at any one point in time [1]	[2]	
	(b)	(i) 51 mins and 60 mins	[1]	
		(ii) Same average speed [1] travelled the same distance in same amount of time [1]	[2]	
5	(a)	(i) ↓	[1]	9
		(ii) Same length of wire/same type of wire	[1]	
		(iii) Volume control/cooker knob/dimmer switch	[1]	
	(b)	(i) All points plotted correctly [1] straight line [1]	[2]	
		(ii) As the cross-sectional area increases so does the current.	[1]	
		(iii) current – allow 1.6 – 1.65 A	[1]	
		(iv) resistance = $3.2/1.65$ (allow error from above) [1] $1.94 \Omega$ [2]	[2]	

## 6 (a) Indicative Content:

- fossil fuels contain chemical energy
- chemical energy in fuel burned to produce heat
- thermal energy used to turn water to steam
- thermal energy converted to kinetic energy [in the turbine]
- magnet moves inside a coil
- turbine drives the generator/kinetic energy changed to electric energy in the turbine
- generator produces electrical energy when moved

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe and explain fully (using <b>five to seven</b> of the above points) the energy changes in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
B	Candidates use some appropriate specialist terms to describe and explain the energy changes (using <b>three or four</b> of the above points) in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates describe/explain the energy changes using <b>one or two</b> of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms. The form and style are of a limited standard.	[1–2]
D	Response not worthy of credit	[0]

[6]

## (b) Gas [1]

low cost to build [1]

low output [1]

[3]

## (c) They are running out/non-renewable

[1]

## (d) Steps up/increases voltage [1]

low current [1]

reduces energy losses/heat production [1]

[3]

AVAILABLE  
MARKS

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		AVAILABLE MARKS
7	(a) (i) The forces are balanced [1] car is moving at a steady speed. [1]	[2]
	(ii) 18,000 N	[1]
	(b) Apply the brakes [1] reduces speed/decelerates [1]	[2]
	(c) Belt now goes over driver's shoulder prevents the driver/passenger upper torso being flung forward in crash.	[2]
	(d) 6,720/600 [1] 11.2 m/s [2]	[2]
	(e) air bag [1] crumple zone [1] impact bars [1] (any two)	[2]
	(f) They have a greater range [1] occupy less volume in the car. [1] A big increase in range [1] for a small increase in volume [1] (any two)	[2]
8	(a) (i) It started with a singularity [1] the Universe is still expanding. [1]	[2]
	(ii) 14 billion years	[1]
	(iii) Steady State Theory	[1]
	(b) Galaxy A [1] increased wavelength [1] red-shift [1]	[3]
<b>Total</b>		<b>75</b>