



Rewarding Learning

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

Science: Single Award

Unit 3 (Physics)

Higher Tier

[GSS32]

THURSDAY 23 MAY 2013, MORNING

**MARK
SCHEME**

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

		AVAILABLE MARKS
1	(a) Any 2 from	
	<ul style="list-style-type: none"> ● more children now wear seat belts ● greatest increase in 10–13 year olds wearing seat belts ● older children are less likely to wear seat belts 	[2]
	(b) Not all children are wearing seat belts	[1] 3
2	(a) less current [1] more current [1]	[2]
	(b) (i) Any 3 from	
	<ul style="list-style-type: none"> ● at wind speeds up to 4 m/s no power is produced ● rapid increase up to 14 m/s ● from 14–24 power produced remains constant ● no power produced after 24 m/s 	[3]
	(ii) Wind turbine shuts down to prevent damage	[1]
	(c) Any 2 from	
	<ul style="list-style-type: none"> ● renewable source of energy ● saves fossil fuels ● produces no air pollution 	[2]
	(d) Wind turbines are a visual eyesore/noise.	[1] 9
3	(a) (i) Radiation which is always around us	[1]
	(ii) Increased radon levels [1] causes cancer [1]	[2]
	(b) Any 2 from	
	<ul style="list-style-type: none"> ● alpha and beta cannot pass through/gamma can pass through ● the soil ● more water present, gamma is in high concentration 	[2] 5
4	(a) LED spotlight	[1]
	(b) Energy saving bulb	[1]
	(c) 0.6×11 [1] 6.6J [1]	[2]
	(d) $11 - 6.6 = 4.4$	[1]
	(e) More energy is wasted using filament light	[1] 6

5 Indicative Content:

- lens too weak/eyeball too short/lens too thin
- light not refracted enough by the lens/cornea
- light would be focused behind the retina
- near images are not clear/blurry
- far images are clear
- convex lens used to correct
- this converges light more

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe and explain fully (using five or more of the above points) long sight in a logical sequence. They use good spelling, punctuation and grammar and form and style are of a high standard.	[5–6]
B	Candidates use some appropriate specialist terms to describe and explain long sight (using three or four 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 long sight (using one or two 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]

6

6 (a) Dust clouds [1]

would be sent high into atmosphere, reducing sunlight [1]
causing plants and eventually animals to die [1]

[3]

- (b) (i) Chances of being hit low [1]
small diameter [1]

[2]

(ii) 2012 TY52

[1]

6

7	(a) Any 3 from		
	<ul style="list-style-type: none"> ● Microwaves can penetrate food ● Microwaves carry energy ● Wavelength of microwaves is one which is best absorbed by water ● Microwaves cause water molecules in food to vibrate 	[3]	
	(b) $3 \times 10^8/0.15$ [1]		
	2×10^9 [1]	[2]	
	(c) High frequency [1]		
	carry more energy [1]	[2]	
	(d) (i) Any 3 from		
	<ul style="list-style-type: none"> ● large distance ● Flash lights and horn at same time ● start time when lights flash and stop when horn heard ● speed = distance/time 	[3]	
	(ii) Windy day/reaction times	[1]	11
8	(a) Voltmeter in parallel over resistor	[1]	
	(b) (i) 4 points correct [2]		
	2–3 points correct [1]		
	straight line [1]	[3]	
	(ii) as voltage increases so does the current	[1]	
	(iii) 0.825 A	[1]	
	(iv) $\frac{4}{2.5}$ [1]		
	1.6 [1]	[2]	
	(c) Voltage decreases [1]		
	current increases [1]		
	reduces energy losses/heat production [1]	[3]	11
9	(a) (i) 0	[1]	
	(ii) Stationary [1]		
	steady speed [1]	[2]	
	(b) Slows down/decelerates/backwards	[1]	
	(c) Gravity overcomes friction [1]		
	gravity pulls car down [1]		
	forces unbalanced [1]	[3]	
	(d) Using a small amount of ethanol increases power [1]		
	Adding too much reduces power [1]	[2]	
	(e) hydrogen/biodiesel	[1]	10

10 (a) Indicative Content:

- Universe started as a singularity
- 14 Billion years ago
- Universe was created from a large explosion
- after millions of years gravity pulled this matter together
- to form stars/galaxies/planets
- graph begins from origin
- graph shows it expands with time

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe and explain fully (using five or more of the above points) the formation of the Universe in a logical sequence. They use good spelling, punctuation and grammar and form and style are of a high standard.	[5–6]
B	Candidates use some appropriate specialist terms to describe and explain the formation of the Universe (using three or four 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 formation of the Universe (using one or two 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) Red shift

[1]

(ii) Moving away from us/moving faster

[1]

8

Total**75**AVAILABLE
MARKS