



Rewarding Learning

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

Science: Single Award

Unit 3 (Physics)

Higher Tier

[GSS32]

WEDNESDAY 27 FEBRUARY 2013

9.30 am–10.45 am

**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) (i) Any two from more batteries = more volts more volts = more current more batteries = more current		[2]
		(b) (i) brightness is maximum using 3 batteries [1] extra batteries do not increase brightness/saves money [1]	[2]
		(ii) 4.5×0.3 [1] 1.35 [1] (allow 1.4)	[2]
2	(a) (i) 150		[1]
		(ii) the longer the time, the lower the activity	[1]
		(iii) 5 days	[1]
	(b) protons and neutrons [1] disintegrate/split/unstable [1]		[2]
		(c) gamma penetrates body [1] to kill cancer/cells [1]	[2]
			7
3	indicative content		
	● remains of animals + plants		
	● lived millions of years ago		
	● pressure		
	● fossil fuels are running out/non-renewable/ alternative sources are renewable/will not run out		
	● developing alternative sources will save fossil fuels		
	● named fossil fuel/named alternative source		
	● relevant environmental impact for alternatives		

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to explain fully, in a logical sequence, what fossil fuels are and why we need to find alternative energy sources (using 6 or 7 of the above points). 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 partially explain, in a logical sequence, what fossil fuels are and why we need to find alternative energy sources (using 4 or 5 of the above points). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates explain what fossil fuels are and why we need to find alternative energy sources (using 1 to 3 of the above points). However these are not 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

- 4 (a)** as wavelength increases, energy decreases [1]
- (b)** ultraviolet [1]
infrared [1] [2]
- (c) (i)** $\frac{300,000,000}{1000}$ [1]
300,000 [1] [2]
- (ii)** frequency decreases [1]
- (d) (i)** use of microwave oven/satellite TV + radio/wireless computer connection [1]
- (ii)** X-rays have more energy [1]
although the exposure time is far less [1] [2]
- (iii)** cancer/sunburn [1]

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			AVAILABLE MARKS			
5	(a)	(i) resistance increases with length [1]	[1]	9		
		(ii) some points not on line [1]	[1]			
		(iii) diagonal line drawn below [1] through (0,0) [1]	[2]			
	(b)	(i) highest resistance (per metre) [1]	[1]			
		(ii) ADG [1] same cross-sectional area [1] makes results valid/fair test [1]	[3]			
		(iii) 7.5 cm [1]	[1]			
6	(a)	(i) 80 to 120s [1]	[1]	6		
		(ii) 960/160 [1] 6 [1]	[2]			
		(iii) 32 seconds [1]	[1]			
	(b)	crumple zone [1] air bag [1]	[2]			
	7	(a)	geocentric [1] Sun at the centre of heliocentric [1] more planets in heliocentric [1]		[3]	10
			(b)		(i) table shows that further galaxies are moving faster [1] this shows expansion [1] Big Bang states that the Universe is still expanding [1]	
(ii) red shift/background radiation [1]				[1]		
(iii) 14 billion years ago (± 0.5) [1]		[1]				
(iv) distance [1] light travels in one year [1]		[2]				

- 8 (a) (i) 30/100 [1]
30% [1] [2]
- (ii) it uses less input electricity/less efficient [1]
halogen would cost more for 30,000 hours/LED cheaper [1] [2]
- (b) energy cannot be created or destroyed [1]
can only be transformed from one type to another [1] [2]
- 9 (a) (i) 70×15 [1]
1 050 [1] [2]
- (ii) kgm/s [1]
- (b) the average speed is across a period of time [1]
Instantaneous is at any moment [1] [2]
- (c) indicative content
- in picture A the forces are balanced
 - cyclist is stationary/moving at constant speed
 - in picture B forces unbalanced
 - in picture B resultant = 50N
 - cyclist is accelerating in picture B

AVAILABLE
MARKS

6

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to explain fully, in a logical sequence, (using ALL of the above points) the forces and their effects in the two pictures. 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 partially explain, in a logical sequence, (using 3 or 4 of the above points) the forces and their effects in the two pictures. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates explain the forces and their effects in the two pictures (using 1 or 2 of the above points). However these are not 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]

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- 10 (a)** lens too strong/too much refraction in lens/cornea/too thick/eyeball too long [1]
 focus before retina [1]
 near vision clear/far vision blurry [1] [3]
- (b)** concave/diverging lens/laser surgery [1] [1]

Total

AVAILABLE MARKS	
	4
	75