



Rewarding Learning

**General Certificate of Secondary Education
2013–2014**

Science: Single Award

Unit 3 (Physics)

Higher Tier

[GSS32]

FRIDAY 15 NOVEMBER 2013, AFTERNOON

**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)	5 points correct = 2 marks correct line = 1 mark	[3]	8
	(ii)	As speed increases, braking distance increases	[1]	
	(iii)	Line starting from 0,0 and with greater gradient	[1]	
	(b)	More alcohol increases risk of crashing [1] as it slows reactions/increasing thinking distance [1] legal levels of alcohol still increased risk [1]	[3]	
2	(a)	0.8	[1]	8
	(b) (i)	Wavelength decreases	[1]	
	(ii)	Hertz/Hz	[1]	
	(c) (i)	Frequency [1] too high for humans to hear/above 20 kHz [1]	[2]	
	(ii)	330×0.4 [1] 330×0.2 [2] 66 m [3]	[3]	
3	(a) (i)	150 million km	[1]	6
	(ii)	Any 3 from		
		<ul style="list-style-type: none"> ● Neptune further ● By 4400 million km ● Mercury is faster ● By 38 km/s 	[3]	
	(b)	Geocentric has earth in middle/Heliocentric has sun at centre [1] Heliocentric has more planets [1]	[2]	

4 Indicative content

- blue wire connects to pin A
- brown wire connects to pin B
- green/yellow wire connects to pin C
- name blue wire/pin A as neutral
- name brown wire/pin B as live
- name green/yellow wire or pin C as earth
- naming 1 other safety feature from:
Cable grip/plastic cover/fuse
- correct explanation of safety feature

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe fully, in a logical sequence how to wire a 3-pin plug safely including another safety feature (using at least seven 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 describe, in a logical sequence, how to wire a 3-pin plug safely including another safety feature (using four to six 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 describe how to wire a 3-pin plug safely including another safety feature (using one to three 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

		AVAILABLE MARKS	
5	(a) (i) Electrical/National/power grid	[1]	9
	(ii) High + low voltage marked correctly [1] Step up + step down transformer marked correctly [1]	[2]	
	(iii) High voltage = less current [1] less heat/energy loss/thinner wire [1]	[2]	
	(b) Generator	[1]	
	(c) (i) As speed increases, so does current [1] up to a maximum 5 mA [1]	[2]	
	(ii) Strength of magnet/number of coils	[1]	
6	(a) Microwaves absorbed by molecules [1] molecules vibrate faster [1]	[2]	10
	(b) (i) Same amount of water [1] same starting temperature [1]	[2]	
	(ii) 6/60 converting minutes to hours [1] 2500/1000 converting watts to kilowatts [1] 2.5 × 0.1 [2] 0.25 [3]	[3]	
	(iii) Less energy/less power [1] Less cost [1] Not significantly slower [1]	[3]	

- 7 (a) B [1]
 Gamma penetrates skin [1]
 (Short half life means) radiation is inside body less time [1] [3]
- (b) (i) 10 mins [1]
 (ii) 2048 [1]
- (c) (i) 615 ± 2 [1]
 (ii) Alpha [1]
 Stops within 10–14 cm/short distance [1]
 Beta/Gamma would travel much further [1] [3]
- (iii) Background radiation [1]

AVAILABLE
 MARKS

10

8 (a) **Indicative content**

- coal/oil/gas named as fossil fuel
- petrol/diesel made from oil/fossil fuels
- remains of plants and animals
- made millions of years ago/compression
- fossil fuels are running out/non-renewable/finite resource
- hybrid engines powered by electricity/batteries + petrol/diesel
- more mpg from hybrid engines
- less fossil fuels used, longer they will last

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe fully, in a logical sequence, fossil fuels, hybrid engines and how a hybrid car can help reduce our reliance on fossil fuels (using seven or eight 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 describe, in a logical sequence, fossil fuels, hybrid engines and how a hybrid car can help reduce our reliance on fossil fuels (using at least four to six 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 describe fossil fuels, hybrid engines and how a hybrid car can help reduce our reliance on fossil fuels (using one to three 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]

(b) **Any 2 from**

- biodiesel
- hydrogen fuel cells
- methanol/gasohol
- alcohol extenders
- regenerative braking systems
- stop-start technology
- other appropriate response

[2]

(c) Same amount of energy in [1]

Prius gives more useful energy out/more movement energy [1]

[2]

10

9	(a) (i)	1.2×14 [1]	16.8 [2]	[2]	AVAILABLE MARKS
	(ii)	kgm/s or Ns		[1]	
	(b) (i)	Any 3 from			
		● force A is greater than C/A and C are unbalanced			
		● producing a resultant forward force			
		● force B is greater than D/B and D are unbalanced			
		● producing a resultant upward force/causing lift		[3]	
	(ii)	A = C [1]			
		B = D [1]		[2]	8
				Total	75