



*Rewarding Learning*

**General Certificate of Secondary Education  
2014–2015**

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**Science: Single Award**

Unit 3 (Physics)

Higher Tier

**[GSS32]**

**FRIDAY 14 NOVEMBER 2014, MORNING**

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**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	
<b>1</b>	<b>(a) (i)</b> Any <b>one</b> from: <ul style="list-style-type: none"> <li>• they all travel at the speed of light</li> <li>• all carry energy</li> <li>• all transverse</li> </ul>	[1]	5	
		<b>(ii)</b> Galaxy Evolution Explorer		[1]
		<b>(iii)</b> Hot gas		[1]
	<b>(b)</b> Unable to survive for the length of time to reach the planet/distance too great [1] cannot carry sufficient food/water/fuel/oxygen [1]	[2]		
<b>2</b>	<b>(a) (i)</b> Background	[1]	7	
	<b>(ii)</b> Carrots	[1]		
	<b>(b)</b> It would only reduce their life expectancy 2100 seconds per year makes little difference.	[1]		
	<b>(c) (i)</b> Count decreases with time [1] faster decrease at start [1]	[2]		
	<b>(ii)</b> $1.25/(1.2 - 1.3)$	[1]		
	<b>(iii)</b> $\frac{1}{4}$	[1]		
<b>3</b>	<b>(a)</b> 3 m	[1]	4	
	<b>(b) (i)</b> 4 m	[1]		
	<b>(ii)</b> $\frac{330}{4}$ [1] 82.5 [1]	[2]		

- 4 (a) Dead plants/animals [1]  
compressed/under pressure/high temperature [1]  
for millions of years [1] [3]
- (b) (i) Coal, oil and gas [1]
- (ii) Total generated has decreased over time [1]  
the fossil fuels oil/gas have decreased [1]  
the renewables wind, wave and solar have increased [1] [3]
- (c) **Indicative content**
- renewable
  - good for economy/creates jobs
  - reduce use of fossil fuels
  - no gas (CO<sub>2</sub>) emissions/no polluting gases
  - unreliable – not always windy or switch off at high speeds
  - hazard to shipping/destroys habitats
  - expensive to build
  - unsightly
  - expensive to get electricity from farm to main-land

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe fully, in a logical sequence, the advantages and disadvantages of using offshore wind farms (using at least <b>seven</b> 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, the advantages and disadvantages of using offshore wind farms (using <b>three to six</b> 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 the advantages and disadvantages of using offshore wind farms (using <b>one to two</b> 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]

AVAILABLE  
MARKS

13

			AVAILABLE MARKS
<b>5</b>	<b>(a)</b>	<b>(i)</b> All points plotted correctly [1] smooth curve [1] [2]	10
		<b>(ii)</b> 73 m [1]	
	<b>(b)</b>	1. No effect [1] 2. Increase braking distance [1] less friction [1] [3]	
		<b>(c)</b> Longer reaction times/slower reactions [1] increase thinking distance/stopping distance [1] [2]	
	<b>(d)</b> Less fatalities in dark compared to the light [1] fewer cars on the road in the dark/drivers more cautious when dark [1] [2]		
<b>6</b>	<b>(a)</b> Any 3 from: • Decreases the current [1] • increase voltage [1] • smaller diameter cables required [1] • cables are cheaper [1] • wastes less energy/less heat wasted in power transmission [1] [3]		
	<b>(b)</b> Chemical to thermal [1] thermal to kinetic [1] kinetic to electrical [1] [3]	6	
<b>7</b>	<b>(a)</b> 4140/115 [1] 36 m/s [1] [2]		
	<b>(b)</b> Gravity pulls the bobsleigh down [1] overcoming friction [1] providing an unbalanced force [1] [3]	5	

- 8 (a) (i) Hears the sound travelling directly from the whistle to the ear [1]  
also hears the reflection of the whistle off the wall [1] [2]
- (ii)  $330 \times 1.2$  [1]  
 $330 \times 0.6$  [1]  
198 m [1] [3]

(b) **Indicative content**

- car and person over a measured distance
- 1 km apart/long distance
- beep horn and flash lights at same time
- start watch when lights seen
- stop watch when horn heard
- use speed = distance/time
- repeat the experiment
- same person measures the time
- car and timer reverse positions to reduce error caused by wind

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe fully, in a logical sequence, the flash-bang method (using at least <b>seven</b> 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, the flash-bang method (using <b>four to six</b> 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 the flash-bang method (using <b>one to three</b> 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]

AVAILABLE  
MARKS

11

			AVAILABLE MARKS	
9	(a) (i)	The greater the distance of the galaxy from Earth the faster it is moving.	[1]	5
	(ii)	It would have a greater red shift.	[1]	
	(b)	(Too small to see from Earth hence) had not been discovered.	[1]	
	(c)	The Big Bang started at a single point [1] It is still expanding/size increasing [1] (allow converse)	[2]	
10	(a)	Any <b>three</b> from: <ul style="list-style-type: none"> <li>• microwave can penetrate food</li> <li>• microwaves carry energy</li> <li>• wavelength of microwaves is one which is absorbed by water</li> <li>• microwaves cause water molecules in food to vibrate faster</li> <li>• increased vibrations raise the temperature of the food</li> </ul>	[3]	4
	(b)	$9.37 \times 10^{-6} \text{ m}$	[1]	
11	(a)	The longer the wire [1] the higher the resistance [1] the less current flows [1]	[3]	5
	(b)	As the diameter increases the resistance decreases [1] Copper wires (of the same diameter) less resistance than nichrome/ copper wires are better conductors [1]	[2]	
<b>Total</b>				<b>75</b>