



*Rewarding Learning*

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

---

**Science: Single Award**

Unit 3 (Physics)

Higher Tier

**[GSS32]**

**THURSDAY 26 FEBRUARY 2015, 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	
<b>1</b>	<b>(a)</b>	<b>(i)</b> 14 cpm	[1]	9
		<b>(ii)</b> 2 days	[1]	
		<b>(iii)</b> 5 cpm	[1]	
	<b>(b)</b>	Nucleus is unstable [1]	[2]	
		due to the combination of protons and neutrons [1]		
		<b>(c)</b>	<b>(i)</b> D [1]	
gamma radiation most penetrating [1]				
lasts a long time/doesn't need replacing [1]				
<b>(ii)</b> Food preservation/sterilising surgical instruments/tracers/smoke alarm	[1]			
<b>2</b>	<b>(a)</b>	<b>(i)</b> 10 s	[1]	6
		<b>(ii)</b> 24 s	[1]	
		<b>(iii)</b> 225–135 [1]	[2]	
	90 [1]			
	<b>(b)</b>	Friction is reduced [1]	[2]	
increasing braking distance [1]				

**3 (a) Indicative content**

- message sent to nearest mast
- area around mast is called a cell
- masts act as repeater stations
- signals are microwaves
- microwaves are absorbed by cells
- causing cancer/tumour
- shorter calls
- text rather than call/use loudspeaker

**AVAILABLE  
MARKS**

<b>Band</b>	<b>Response</b>	<b>Mark</b>
A	Candidates must use appropriate specialist terms throughout to describe fully how mobile phones operate, the dangers associated and how these dangers can be reduced (using at least <b>6</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 how mobile phones operate, the dangers associated and how these dangers can be reduced (using <b>4 or 5</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 how mobile phones operate, the dangers associated and how these dangers can be reduced (using <b>1 to 3</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]

- (b) (i)** Depth = 210 [1]
- (ii)** Any 2 correct distance/time figures from table [1]  
1500 [1] [2]
- (iii)** Return time will be less [1]

10

			AVAILABLE MARKS	
4	(a) (i)	Long sight [1]		
		lens too weak/thin/eyeball too small [1]		
		focus behind the retina/blurred image on retina (for near objects) [1]	[3]	
	(ii)	Near objects/reading	[1]	
(b)		Refraction = bending of light [1]		
		cornea + lens [1]		
		most refraction takes place in the cornea [1]	[3]	7
5	(a) (i)	13.5–14 billion years	[1]	
		Galaxies are moving apart [1]		
		further galaxies are moving faster [1]	[2]	
	(iii)	Red shift/cosmic background radiation	[1]	
(b)		Light year is the distance light travels in 1 year [1]		
		light left these stars 4.3/8.6/10.8 years ago/ so light we see is 4.3/8.6/10.8 years old [1]	[2]	6
6	(a) (i)	Ohm	[1]	
		6/1.6 [1]		
		3.75/3.8 [1]	[2]	
	(iii)	As cross-sectional area increases, resistance decreases	[1]	
(b) (i)		As voltage increases, current increases for both [1]		
		current increase is steady for wire/changing for bulb [1]	[2]	
	(ii)	Resistance is constant	[1]	7
7	(a) (i)	600/2500 [1]		
		24%/0.24 [1]	[2]	
		(ii)	You cannot get more energy out than you put in/waste energy	[1]
	(iii)	Ends up as heat [1]		
		making our surroundings warmer [1]	[2]	
(b) (i)		Extenders = methanol/ethanol/alcohol [1]		
		substitutes = hydrogen/biodiesel [1]	[2]	
		Extenders are added to petrol/diesel [1]		
		substitutes are used instead of petrol/diesel [1]	[2]	
	(iii)	Saves fossil fuels	[1]	10

			AVAILABLE MARKS	
8	(a)	Speed has no effect on weight [1] as speed increases, air resistance increases [1]	[2]	
	(b)	(i) Parachutist is accelerating [1] as weight > air resistance [1] creating an unbalanced force [1]	[3]	
		(ii) Travelling at steady/constant speed [1] due to balanced forces [1]	[2]	
	(c)	(i) 120/80 [1] 1.5 [1]	[2]	
		(ii) Zero momentum [1] zero velocity [1]	[2]	11

**9 (a) Indicative content**

- generator contains a magnet + coil of wire
- relative movement between magnet + coil
- energy change = kinetic --- electrical
- step up transformers increase voltage
- decreases current
- producing less heat in power lines/less energy lost in power lines
- less money wasted

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe how electricity is made in a generator and changed by a transformer (using <b>six or 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 describe how electricity is made in a generator and changed by a transformer (using <b>4 or 5</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 how electricity is made in a generator and changed by a transformer (using <b>1, 2 or 3</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]

**(b) (i)** Step-down transformers have fewer turns on the secondary/  
step-up transformers have fewer turns on primary [1]

**(ii)** Step-up – more turns on secondary [1]

**(c)** Kilowatt hours/kWh [1]

**Total**

9

**75**

**AVAILABLE  
MARKS**