



**General Certificate of Secondary Education  
2017–2018**

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**Science: Single Award**

Unit 3 (Physics)

Higher Tier

**[GSS32]**

**FRIDAY 23 FEBRUARY 2018, 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)</b>	<b>(i)</b> C [1]	8	
		<b>(ii)</b> A [1]		
	<b>(b)</b>	<b>(i)</b> At right angles to wave travel [1]		
		<b>(ii)</b> Longitudinal [1]		
	<b>(c)</b>	<b>(i)</b> As (air) temperature rises, speed of sound increases [1]		
		<b>(ii)</b> 330 ÷ 0.02 [1] 16 500 [2]		2
<b>(iii)</b> Hertz/Hz [1]				
<b>2</b>	<b>(a)</b>	<b>(i)</b> 54 [1]	7	
		<b>(ii)</b> Friction [1]		
		<b>(iii)</b> Lubricant or named [1]		
	<b>(b)</b>	<b>(i)</b> 82 – 88 [1]		
		<b>(ii)</b> Oil/rain/snow/ice [1]		
		<b>(iii)</b> As speed increases, distance travelled increases [1] poor road conditions increases distance travelled [1]		2
<b>3</b>	<b>(a)</b>	<b>(i)</b> Alpha and beta [1]	6	
		<b>(ii)</b> Would not penetrate lead [1]		
	<b>(b)</b>	<b>(i)</b> As lead thickness increases, activity decreases [1] activity stops decreasing at 30 mm/5 cps [1]		2
		<b>(ii)</b> Same source [1] same distance between source and the lead/detector and lead [1]		2

- 4 (a) Indicative content:
- renewable = will not run out
  - renewable = hydroelectric and wind
  - non-renewable = fossil fuels
  - any valid comparison, e.g. hydroelectric/wind lower than fossil fuel
  - all sources increase
  - wind = ugly/noisy
  - hydroelectric = flooding/destroy habitats
  - fossil fuels = global warming

	Response	Mark
<b>A</b>	Candidates must use appropriate specialist terms throughout to compare, name and describe the use of 2 sources from the graph (using <b>at least 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>B</b>	Candidates use some appropriate specialist terms to partially compare, name and describe the use of 2 sources from the graph (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]
<b>C</b>	Candidates compare, name or describe the use of 2 sources from the graph (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]
<b>D</b>	Response not worthy of credit.	[0]

[6]

- (b) Magnet and coil [1]  
relative movement [1]

[2]

8

AVAILABLE  
MARKS

			AVAILABLE MARKS
<b>5</b>	<b>(a) (i)</b> Crater	[1]	12
	<b>(ii)</b> • Large clouds of dust • block out sun/less photosynthesis • extinction of species	[3]	
	<b>(iii)</b> It is a very rare occurrence	[1]	
	<b>(b)</b> Decreasing temperature and increasing orbit time	[1]	
	<b>(c)</b> Clouds of hydrogen/nebulae [1] are pulled together by gravity [1] nuclear fusion begins [1]	[3]	
	<b>(d)</b> $3 \times 10^8 \times 10^5 / 10^5 \times 3.2 \times 10^7$ [1] $3 \times 10^8 \times 10^5 \times 3.2 \times 10^7$ [1] $9.6 \times 10^{20}$ [1]	[3]	
<b>6</b>	<b>(a) (i)</b> Earth (wire)	[1]	9
	<b>(ii)</b> Case made from plastic/metal parts enclosed [1] if live wire touches case, electricity cannot flow to the user [1]	[2]	
	<b>(b) (i)</b> $1200 \div 230$ [1] 5.2 A [1]	[2]	
	<b>(ii)</b> 13 A fuse	[1]	
	<b>(c)</b> Conventional had electricity flowing from positive to negative/actual is current flow from negative to positive [1] actual is the flow of electrons [1] electrons are negatively charged [1]	[3]	

- 7 (a) Indicative content:
- mention cornea and lens
  - naming convex lens
  - refraction = bending of light rays
  - lens refracts/bends light
  - cornea refracts/bends light
  - cornea refracts **more** light
  - (convex) lens converges/bends light inward
  - to form a **clear** image on retina

	Response	Mark
<b>A</b>	Candidates must use appropriate specialist terms throughout to explain fully the formation of perfect sight in the human eye (using <b>at least 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>B</b>	Candidates use some appropriate specialist terms to partially explain the formation of perfect sight in the human eye (using <b>4 to 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]
<b>C</b>	Candidates describe some knowledge of the formation of a perfect image in the eye (using <b>1 to 2</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]
<b>D</b>	Response not worthy of credit.	[0]

[6]

- (b) Caused by lens being too strong/too thick [1]  
 rays of light focus before the retina [1]  
 corrected using a concave/diverging lens [1] [3]

9

- 8 (a) (i) Longer the length of wire [1]  
 the higher the resistance [1]  
 the lower the current [1] [3]

- (ii) Dimmer switch/volume control [1]

- (b) (i) As temperature increases, resistance increases [1]  
 platinum increases fastest (any valid comparison) [1] [2]

- (ii) Area/width [1]  
 as area increases, resistance decreases [1] [2]

8

AVAILABLE  
MARKS

9	(a)	(i)	As speed increases, air resistance increases [1] but speed has no effect on weight [1]	[2]	<b>AVAILABLE MARKS</b>
		(ii)	440 [1] skydiver continues to accelerate [1]	[2]	
		(iii)	Steady speed [1] balanced forces [1]	[2]	
	(b)		Reduces velocity/speed [1] less change in momentum [1]	[2]	8
			<b>Total</b>		<b>75</b>

