Rewarding Learning

General Certificate of Secondary Education
2017–2018

Science: Single Award

Unit 3 (Physics)

Higher Tier

[GSS32]

WEDNESDAY 23 MAY 2018, 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)	Energy which will not run out	[1]	
		(ii)	Blade spins [1] in turbine magnet and coil of wire [1] implied movement [1]	[3]	
		(iii)	Expensive to build/set up	[1]	
	(b)	(i)	Gas and coal	[1]	
		(ii)	500 – 200 [1] 300 [1]	[2]	
		(iii)	Wind is unreliable	[1]	9

2 (a) Indicative content:

- lens, cornea, retina
- lens too weak/eyeball too short/lens too thin
- light not refracted enough by the lens/cornea
- light would be focused behind the retina
- near images are not **clear/blurry**
- far images are **clear**
- convex lens used to correct
- this converges light **more**

	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe and explain fully long sight (using **five or more** of the above points) in a logical sequence. 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 and explain long sight (using **three or four** of the above points) in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe/explain long sight (using **one or two** of the above points). However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made little use of specialist scientific terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

(b) (i) All 5 points [2]
4 points [1]
Line [1] [3]

(ii) As object distance increases, image distances decreases [1] 10

					AVAILABLE MARKS
3	(a)	(i)	Beta [1] passes through paper (+ air) [1] stopped by aluminium (+ lead) [1]	[3]	
		(ii)	Radiation which is all around us	[1]	
		(iii)	Cosmic rays	[1]	
	(b)		As **radon** increases, % chance of lung cancer increases Radon gives smokers more chance of lung cancer	[1]	
	(c)	(i)	3.6 to 3.8 days	[1]	
		(ii)	$\frac{1}{4}$	[1]	8
4	(a)	(i)	At the legal limit you are still **4 ×** more likely to have a crash	[1]	
		(ii)	Increased reaction time/slower reactions [1] increased thinking distance/stopping distance [1]	[2]	
	(b)		More people **caught** at midnight [1] more drivers are **caught** drink driving on Saturday and Sunday [1] or other suitable	[2]	5
5	(a)		Nitrogen should be hydrogen [1] pushed/gravity pushes should be pulls [1] nuclear fission should be fusion [1]	[3]	
	(b)		They had not been discovered	[1]	
	(c)		Holmberg 11 moves away faster [1] it is furthest from Milky Way [1]	[2]	
	(d)	(i)	14 billion years 13.8 → 14	[1]	
		(ii)	Steady State theory	[1]	8
6	(a)	(i)	As (cross-sectional) area increases resistance decreases [1] the greater the cross-sectional area the less the drop in resistance [1]	[2]	
		(ii)	1.8	[1]	
		(iii)	Graph the same shape [1] above the curve for nichrome [1]	[2]	
	(b)		Length/temperature	[1]	6

AVAILABLE MARKS

7 (a) Indicative content:

- unbalanced force
- forward force greater than frictional force
- **resultant** force = 0.005 N
- block accelerate
- forces become balanced
- block moving at a steady speed/block stationary
- **resultant** force = 0

	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe and explain fully (using **six or seven** of the above points) the motion of the block. They use good spelling, punctuation and grammar and form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe and explain (using **three to five** of the above points) the motion of the block. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe/explain the motion of the block using **one to two** of the above points. However, these are not presented 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) 3800 ÷ 1000 [1]
3.8 m/s [1] [2]

(ii) Crumple zone [1]

9

				AVAILABLE MARKS
8	(a)	Visible light	[1]	
	(b)	Microwaves pass into food [1] water molecules vibrate (more) [1] **collisions** of molecules cause heat [1]	[3]	
	(c)	C [1] highest frequency [1] carry more energy [1]	[3]	
	(d)	1100 W = 1.1 kW [1] 3 minutes = 0.05 hr [1] 1.1 × 0.05 = 0.055 kWh [3]	[3]	
	(e) (i)	Step-down (transformer)	[1]	
	(ii)	A	[1]	12
9	(a)	6930 ÷ 900 [1] 7.7 m/s [1]	[2]	
	(b) (i)	Instantaneous measures speed at one point [1] average speed is over a given distance [1]	[2]	
	(ii)	Average speed camera – **(speeding) at stage C**	[1]	
	(c) (i)	10% extenders increase the power of an engine [1] **too much** extender reduces the power of the engine [1]	[2]	
	(ii)	Substitutes	[1]	8
			Total	**75**