Rewarding Learning

General Certificate of Secondary Education
2017–2018

Science: Single Award

Unit 3 (Physics)

Higher Tier

[GSS32]

FRIDAY 10 NOVEMBER 2017, 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
1	**(a)**	Any 1 symbol correct [1] 2 symbols in correct place [2] correct circuit diagram [3]	[3]	
	(b)	**(i)** Series	[1]	
		(ii) More bulbs = lower voltage	[1]	
		(iii) Any **one** from: • dimmer bulbs • cooler bulbs • less current/amps • more resistance	[1]	6
2	**(a)**	**(i)** Diagram B	[1]	
		(ii) Light rays focus before retina [1] too much refraction/lens too strong/eyeball too long [1]	[2]	
	(b)	**(i)** **Close** objects appear **clear**/far objects appear blurry	[1]	
		(ii) Concave/diverging	[1]	5
3	**(a)**	**(i)** 62 [1] 38 [1]	[2]	
		(ii) Any **two** from: • same amount of **water** • same distance between **fuel + water** • same amount of fuel/burning time	[2]	
		(iii) Highest temperature **rise** [1] produces steam faster [1]	[2]	
	(b)	Millions of years ago [1] remains of plants/animals [1] compressed together [1]	[3]	9

AVAILABLE MARKS

4 (a) Indicative content

- higher the (blood) **alcohol** levels, more crashes
- younger people have more crashes for the same amount of alcohol
- alcohol slows down the brain/slower reactions
- increased reaction time
- increased risk taking
- alcohol increases thinking distance
- doesn't affect braking distance
- alcohol increases stopping distance

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to explain fully why drinking and driving is such a bad idea (using **6 to 8** 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 explain why drinking and driving is such a bad idea (using **4 or 5** 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 explain why drinking and driving is such a bad idea (using **1 to 3** 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) 98 – 56 [1]
42 [2] [2]

(ii) Alcohol in food/sauces/mouthwash/medicine [1]

9

					AVAILABLE MARKS
5	(a)		They are large/they are heavy	[1]	
	(b)	(i)	Radiation all around us all the time	[1]	
		(ii)	Any **two** from: • hospitals • nuclear power stations • nuclear tests	[2]	
	(c)		20 g	[1]	
	(d)		(Too many) neutrons + protons [1] causing **nuclei** to split/disintegrate [1]	[2]	
	(e)	(i)	Beta and gamma	[1]	
		(ii)	15 cpm	[1]	9
6	(a)	(i)	Longer wire [1] cause higher resistance [1]	[2]	
		(ii)	Type of wire/width of wire/temperature	[1]	
		(iii)	Dimmer switch/volume control	[1]	
	(b)	(i)	Anticlockwise arrow	[1]	
		(ii)	Flow of electrons [1] electrons are negative [1]	[2]	
		(iii)	Current 2 + 3 = 1 [1] / current splits (shared) [1] 2 = 3 current [1]	[2]	9
7	(a)	(i)	(Hotter surface temp), brighter star	[1]	
		(ii)	Bigger diameter, bigger mass	[1]	
	(b)	(i)	The distance light travels in one year	[1]	
		(ii)	The distance between stars is enormous	[1]	
	(c)	(i)	Universe began 14 billion years ago [1] when a singularity [1] exploded/inflated/expanded [1]	[3]	
		(ii)	Any **two** from: • red shift/description • galaxies continue to move away from each other/still expanded • further galaxies move faster • CMBR	[2]	
		(iii)	Steady state	[1]	10

			AVAILABLE MARKS
8	**(a)**	(As wavelength increases), frequency decreases [1] energy decreases [1] [2]	
	(b)	X-rays carry less energy/gamma has more energy [1] less energy leads to less tissue damage [1] [2]	
	(c)	Any **two** from: • travel at same speed/speed of light • can travel through a vacuum • carry energy • transverse waves [2]	
	(d) **(i)**	Microwaves used in mobile phone signals/routers [1]	
	(ii)	We use microwaves more often/for longer periods of time [1]	
	(e)	$(5 \times 10^{-7}) \times (6 \times 10^{14})$ [1] 3×10^{8} [2]	10

AVAILABLE MARKS

9 (a) Indicative content

- hybrid = 2 engines = battery (electric) **+** petrol/diesel
- petrol/diesel is made from fossil fuel/oil/less Fossil Fuel used
- petrol/diesel are non-renewable
- (burning) petrol/diesel creates carbon dioxide
- hybrid means **less** air pollution (for residents)
- less fuel costs for driver
- more profit for driver

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to explain fully why the hybrid is the most popular taxi power source for drivers and residents (using **at least 6** 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 explain why the hybrid is the most popular taxi power source for drivers and residents (using **4 or 5** 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 explain why the hybrid is the most popular taxi power source for drivers and residents (using **1 to 3** 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) As carbon dioxide emissions increase so does the amount of **tax** to be paid [1]

(ii) £0, £20 or £30 [1] 8

Total **75**