Rewarding Learning

General Certificate of Secondary Education
2019–2020

Double Award Science
Physics

Unit P1

Higher Tier

[GDW32]

WEDNESDAY 22 MAY 2019, 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 Indicative content

Top pan balance
Measuring cylinder
Mass of empty cylinder
Mass of cylinder + milk
Density = mass ÷ volume
No spillage/read at eye level/bottom of meniscus [not repeat]

	Response	Mark
A	Candidates describe in detail **at least 5** of the points using good spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5]–[6]
B	Candidates describe in detail **3 or 4** of the points using satisfactory spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made some use of specialist terms.	[3]–[4]
C	Candidates describe **1 or 2** of the points. The spelling, punctuation and grammar is limited. The form and style are of a limited standard and there is no use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

2 (a) (i) W = F × d [1]
= 4000 × 5.5 [1] and [1]
= 22 000 [1] (J) [4]

(ii) 22 [1] (kJ) e.c.f. from (i) [1]

(b) $p = \frac{W}{t}$ (or equivalent) [1]

$t = \frac{30\,000}{2000}$ [1]

= 15 [1] (s) [3] 8

					AVAILABLE MARKS
3	**(a)**	**(i)**	Proton [1], electron [1], neutron [1] correctly labelled	[3]	
		(ii)	Number of protons = number of electrons	[1]	
		(iii)	electron [1] gained/lost or transferred [1]	[2]	
	(b)		$^{14}_{6}X$	[2]	
	(c)		Same number of protons [1] Different number of neutrons [1]	[2]	10
4	**(a)**	**(i)**	46 days [1] undecayed nuclei [1]	[2]	
		(ii)	512 ⟶ 256 [1] ⟶ 128 ⟶ 64 ⟶ 32 [1] 184 days [1] **or** 32 ⟶ 64 [1] ⟶ 128 ⟶ 256 ⟶ 512 [1] 184 days [1]	[3]	
	(b)	**(i)**	Fusion	[1]	
		(ii)	Fission	[1]	
		(iii)	Fusion	[1]	8
5	**(a)**		long half-life [1], gamma [1] short half-life [1], gamma [1] long half-life [1], alpha [1]	[6]	

	✓	γ
✓		γ
	✓	**α**

(b) Cancer/disrupts DNA
Damage to cells [1]

Any **three** from:
Protective clothing (i.e. shielding)
Keep source far away/forceps (i.e. distance)
Keep exposure time low (i.e. reduced time)
Store in lead container (may be awarded independently)
for [1] mark each [4] 10

				AVAILABLE MARKS
6	**(a)**	P = weight ÷ area (or equivalent) = $8.48 \times 10^5 \div 6$ [1] and [1] = 1.4×10^5 [1] Pa or N/m^2 [1] or 141 333 Pa	[5]	
	(b)	Pressure increased [1] area decreased [1]	[2]	7
7	**(a)**	Ek = 1/2 mv^2 [1] = $1/2 \times 50 \times 7^2$ [1] = 1225 [1] (J)		
		Ep = mgh [1] $50 \times 10 \times h = 1725$ [1] and [1] h = 3.5 [1] (m)	[7]	
	(b)	Speed – scalar [1] Velocity – vector [1] Acceleration – vector [1]	[3]	
	(c)	Distance greater (ticked)	[1]	11
8	**(i)**	Disp = area [1] = (12 × 6) + 1//2 (12 × 18) [1] and [1] or = 180 (m) [1] **or** Disp = **average** speed × time [1] = 15 × 12 [1] and [1] = 180 (m) [1] Disp = area [1] = $\frac{1}{2}$ (6 + 24)12 [2] = 180 (m) [1]	[4]	
	(ii)	a = gradient [1] $\left(\text{or } a = \frac{\Delta v}{t}\right)$ (or equivalent) = (24 – 6) ÷ 12 [1] = 1.5 [1] F = ma [1] 2250 = m × 1.5 [1] m = 1500 [1] (kg)	[6]	10
			Total	**70**