

Unit Code: J259/03
Qual Name: GCSE Physics B (Twenty First Century Science)
Qual Title: Breadth in physics (Higher)
Tier: Higher

Question Set	Q. No	Total Marks	AO	Spec Ref.	Topic	Question Subject, If required	Additional Notes/Comments	Maths Skills	Practical Assessment Skills
1	1a	2	1	6.5.1	Matter, models and explanations	Features of our solar system	FT overlap		
1	1b	2	1	6.5.4	Matter, models and explanations	Formation of solar system	FT overlap		
1	1c	1	1	5.3.4	Radioactive materials	Process of fusion	FT overlap		
2	1a	1	1	2.1.1	Sustainable energy	Energy transfer from chemical stores	FT overlap		
2	1bi	3	1, 2	3.4.3	Electric circuits	$E = QV$	FT overlap	Y	
2	1bii	4	1, 2	3.2.2	Electric circuits	$Q = It$	FT overlap	Y	
3	1a	2	2	6.1.5 (a)	Matter, models and explanations	$E = mcDq$	FT overlap Requires diagram of radiator and table of data in the stem	Y	
3	1bi	3	1, 2	2.1.3, 6.1.8	Sustainable energy	$E = Pt$ / E-transfer with DT	FT overlap Requires answer from (a)	Y	
3	1bii	1	1	2.1.5	Sustainable energy	Energy dissipation	FT overlap		
4	1a	2	2	4.2.4	Explaining motion	Conversion between units		Y	
4	1bi	3	1, 2	4.2.7	Explaining motion	$v^2 - u^2 = 2 \times a \times s$		Y	
4	1bii	2	1	4.2.5	Explaining motion	vector - scalar distinction	Conversion between units		
5	1a	2	1	1.4.9	Radiation and waves	variation of v, f and λ in different media	Requires diagram in stem		
5	1b	3	1, 2	1.3.6	Radiation and waves	$v = f \lambda$		Y	
6	1a	2	1	1.4.7	Radiation and waves	limited f range of hearing	Requires Table of data in stem		
6	1bi	1	3	1.4.7	Radiation and waves	limited f range of hearing	Requires stem of 1 and (b)		Y
6	1bii	2	1	1.4.6, 1.4.4	Radiation and waves	sound waves in solids	Requires stem of 1 and (b)		
6	1c	3	3	1.4.7	Radiation and waves	limited f range of hearing	Requires stem of 1 and (b)		Y
7	1a	2	1	3.7.1	Electric circuits	Induction of p.d.	Requires Table 7.1 of data in stem		
7	1bi	2	1, 2	3.7.1	Electric circuits	Induction of p.d.	Requires Table 7.1	Y	
7	1bii	1	2	3.7.1	Electric circuits	Induction of p.d.	Requires graph from (b)(i)	Y	
7	1biii	1	3	3.7.1	Electric circuits	Induction of p.d.			Y

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7	1c	2	1	3.7.3, 4.1.1	Electric circuits / Explaining motion	Induction of opposing magnetic field / Newton's 3rd law			
8	1a	2	1	5.1.9	Radioactive materials	Nuclear decay equations	Requires Table 8.1 of data in stem		
8	1b	2	3	5.1.10	Radioactive materials	Random nature of decay	Requires partial nuclear decay equations from (a) and Table 8.1		
8	1ci	2	2	5.1.11	Radioactive materials	Half-life	Requires Table 8.1	Y	
8	1cii	2	3	5.2.5	Radioactive materials	Hazards of radioactive materials	Requires Table 8.1		
9	1a	1	1	6.4.10	Matter, models and explanations	Floating and sinking factors	Requires illustration in stem		
9	1b	2	1	4.3.1, 6.4.10	Explaining motion / Matter models and explanations	Forces acting / floating and sinking			
9	1ci	2	1	6.4.9	Matter, models and explanations	Pressure, depth and upthrust	Requires diagram from (b)		
9	1cii	1	1	6.4.9	Matter, models and explanations	Pressure, depth and upthrust	Requires diagram from (b)		
10	1a	1	1	3.2.7	Electric circuits	Circuit symbols	Requires circuit diagram in stem		
10	1bi	3	1, 3	3.3.5©	Electric circuits	D.c. circuits for measurement & testing	Requires graph		
10	1bii	2	3	3.3.5©	Electric circuits	D.c. circuits for measurement & testing	Requires graph		
10	1ci	1	1	3.3.5(c),	Electric circuits	D.c. circuits for measurement & testing			Y
10	1cii	2	2, 3	3.3.5(c), 3.4.1	Electric circuits	D.c. circuits for measurement & testing			
11	1a	3	1, 2	4.1.7, 4.3.9	Explaining motion	$W = mg$ / $\text{Moment} = F \times d$	Requires diagram of balanced beam in stem	Y	
11	1bi	1	3	4.3.9,	Explaining motion	$\text{Moment} = F \times d$	Requires Table of data		
11	1bii	1	3	4.3.9,	Explaining motion	$\text{Moment} = F \times d$			Y
12	1a	2	1, 2	4.3.4	Explaining motion	$p = mv$			
12	1bi	4	1, 2	4.3.4	Explaining motion	$p = mv$	Requires diagram of impacting trolleys	Y	
12	1bii	4	1, 2	4.3.5	Explaining motion	$Dp = Ft$	Requires information from (b)(i) and diagram of impacting trolleys	Y	
13	1a	1	1	3.6.2	Electric circuits	Fleming's left hand rule	Requires diagram of section through loudspeaker		
13	1b	4	1, 2	3.6.3	Electric circuits	$F = BIl$	Requires information from stem of 1	Y	
14	1a	3	1, 2	6.1.6	Matter - models and explanations	$Q = mL$ (latent heat)	Requires diagram and results table in stem FT overlap	Y	
14	1b	2	2	2.1.6	Sustainable energy	reducing energy transfer	FT overlap Requires diagram in stem of 1		

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14	1ci	2	3	2.1.6, 6.1.3,	Sustainable energy	energy transfer by heating	Requires speech bubbles in stem of (c) FT overlap		Y
14	1cii	1	3	6.1.3	Matter - models and explanations	energy transfer by heating	FT overlap Requires stem of 1 and of (c)		Y
15	1ai	1	2	4.1.3, 4.1.4	Explaining motion	examples of interactions / forces as vectors	Requires Fig. 2.1 FT overlap		
15	1aaii	1	2	4.1.2, 4.1.4	Explaining motion	force interaction pairs / forces as vectors	Requires Fig. 2.1 FT overlap		
15	1bi	2	1	4.1.1	Explaining motion	Newton's 3rd law	FT overlap		
15	1bii	1	2	4.1.1	Explaining motion	Newton's 3rd law	FT overlap Requires Fig 2.1		
16	1a	2	1	5.2.2	Radioactive materials	contamination vs irradiation	FT overlap Requires stem of 1		
16	1b	1	1	5.2.4	Radioactive materials	hazards of ionising radiation	FT overlap		
16	1c	2	3	5.2.5	Radioactive materials	hazard due to type of emission and half-life	FT overlap		
17	1ai	2	2, 3	6.3.4	Matter - models and explanations	linear and non-linear force-extension	Requires diagram of spring and line graph and talking head & speech bubble	Y	
17	1aaii	1	2	6.3.4	Matter - models and explanations	linear and non-linear force-extension			
17	1bi	1	1	6.3.2, 6.3.4	Matter - models and explanations	particle model for elastic/plastic deformation / how to measure extension of a spring	Requires line graph		
17	1bii	2	3	6.3.2, 6.3.3b,	Matter - models and explanations	particle model for elastic/plastic deformation / linear and non-linear force-extension	Requires diagram of spring, and line graph		Y
17	1c	2	1, 2	4.1.7	Explaining motion	$W = mg$		Y	
18	1a	2	1	5.1.6	Radioactive materials	isotope nuclide notation	Requires Fig.5.1	Y	
18	1b	2	1	5.1.8	Radioactive materials	changes in nucleus due to type of emission	Requires Fig.5.1		
18	1c	1	1	5.1.7, 5.1.8	Radioactive materials	different types of emission	Requires Fig.5.1	Y	
19	1a	4	1, 2	3.2.4a	Electric circuits	$V = IR$	Requires diagram of lamp and circuit diagram A in stem	Y	
19	1bi	2	1, 2	3.3.2a	Electric circuits	series vs parallel circuits	Requires circuit diagram A and circuit diagram B		
19	1bii	1	3	3.3.2a	Electric circuits	series vs parallel circuits	Requires circuit diagram A and circuit diagram B		
20	1ai	2	1	3.5.2	Electric circuits	magnetic field of a magnet			
20	1aaii	1	1	3.5.2	Electric circuits	magnetic field of a magnet	Requires (a)(i)		
20	1b	2	1	3.5.4	Electric circuits	permanent vs induced magnets			

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21	1a	2	1	1.1.1	Radiation and waves	parts of the electromagnetic spectrum			
21	1bi	3	1, 2	1.3.6	Radiation and waves	$v = f \lambda$		Y	
21	1bii	4	1, 2	1.1.3, 4.2.1	Radiation and waves	transmission of radiation in space at same finite speed $s = d/t$		Y	
22	1a	3	1, 3	3.4.4,	Electric circuits	$P = VI = I^2R$	Requires Fig 9.1 and Fig 9.2		Y
22	1b	3	1, 2, 3	2.2.1,	Sustainable energy	energy resources	Requires Fig 9.1	Y	
22	1c	2	1	2.2.7,	Sustainable energy	trends in energy use			
23	1a	3	1	4.4.7	Explaining motion	energy transfer between stores	Requires diagram of clowns in stem		
23	1bi	2	1, 2	4.4.4	Explaining motion	$GPE = mgh$		Y	
23	1bii	3	1, 2	4.4.3	Explaining motion	$KE = 1/2 mv^2$	Requires answer from (b)(i)	Y	
24	1a	1	1	1.2.1	Radiation and waves	radiation intensity and wavelength vs temperature			
24	1b	2	2	1.2.2	Radiation and waves	temperature vs absorption and emission			
24	1c	2	3	1.2.2,	Radiation and waves	temperature vs absorption and emission			
25	1ai	3	1, 2	4.4.9	Explaining motion	$E = P \times t$		Y	
25	1a ii	3	1, 2	4.4.8, 4.4.9, 2.1.8	Explaining motion / Sustainable energy	definition of power as rate of energy transfer		Y	
25	1bi	1	1	2.2.7,	Sustainable energy	trends in energy use			
25	1bii	1	3	2.2.7,	Sustainable energy	trends in energy use			
26	1a	2	1	6.4.7	Matter - models and explanations	pressure variation with depth and density			
26	1bi	1	2	6.4.7,	Matter - models and explanations	pressure variation with depth and density	Requires line graph	Y	
26	1bii	2	1, 2	6.4.7	Matter - models and explanations	pressure variation with depth and density	Requires line graph		
26	1ci	2	2	6.4.7,	Matter - models and explanations	pressure variation with depth and density	Requires line graph	Y	
26	1cii	2	2	6.4.8,	Matter - models and explanations	$P = h r g$	Requires answer to (c)(i)	Y	
27	1 a	2	3	2.1.7, 1.1.5	Sustainable energy / Radiation and waves	thermal cooling vs thickness and thermal conductivity / absorption of radiation	Requires Data Table in stem of question FT overlap		
27	1 b i	2	1	2.1.7.	Sustainable energy	thermal cooling vs thickness and thermal conductivity	FT overlap		Y

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27	1 b ii	1	2	2.1.7,	Sustainable energy	thermal cooling vs thickness and thermal conductivity	FT overlap Requires stem of question		Y
28	1 ai	1	3	2.2.7,	Sustainable energy	trends in use of energy resources	FT overlap Requires Fig 2.1		
28	1a ii	1	3	2.2.7	Sustainable energy	trends in use of energy resources	FT overlap Requires Fig 2.1		
28	1 b i	2	3	2.2.7,	Sustainable energy	trends in use of energy resources	FT overlap Requires Fig 2.1		
28	1 b ii	1	3	2.2.7,	Sustainable energy	trends in use of energy resources	FT overlap Requires Fig 2.1		
28	1 b iii	1	2	2.2.7,	Sustainable energy	trends in use of energy resources	FT overlap Requires Fig 2.1	Y	
29	1 a	2	1	1.1.7	Radiation and waves	changes in nuclei vs generation and absorption of radiation	Requires Fig. 3.1 FT overlap		
29	1 b i	2	1	1.1.8	Radiation and waves	hazards of UV, X-ray and gamma	FT overlap		
29	1 b ii	1	3	1.1.8	Radiation and waves	hazards of UV, X-ray and gamma	FT overlap Requires Fig 3.1		
29	1 c	2	1	5.2.1	Radioactive materials	penetrating power of alpha, beta and gamma	FT overlap Requires Fig 3.1		
30	1 a	3	1, 2	4.3.4	Explaining motion	$p = mv$	Requires Table 4.1	Y	
30	1 b i	2	1	6.5.2	Matter - models and explanations	effect of gravity on speed and velocity when orbiting			
30	1 b ii	2	1	6.5.3	Matter - models and explanations	stability of orbit vs radius and speed	Requires Table 4.1		
31	1a ii	2	1	1.1.2	Radiation and waves	eyes detect limited frequency range of ems	Requires diagram of hand-held radios in stem		
31	1a ii	4	1, 2	1.3.6	Radiation and waves	$v = f \lambda$	Requires stem of (a)		
31	b	1	1	1.1.10	Radiation and waves	radio waves and oscillations in electrical circuits		Y	
32	1 a	4	1, 2	4.3.18, 4.2.6 (a)	Explaining motion	calculate deceleration $a = \Delta s / \Delta t$		Y	
32	1 b	4	1, 2	4.3.16, 4.3.4, 4.3.5	Explaining motion	estimate forces in large decelerations		Y	
33	1 a	3	1	6.1.1(b)	Matter - models and explanations	describe how to determine density	Requires Fig 7.1		Y
33	1 b	2	1, 2	6.1.1(b),	Matter - models and explanations	calculate volume to 3 s.f.		Y	
33	1 c	2	3	6.1.1(b),	Matter - models and explanations	describe a method to determine volume	Requires Fig 7.1		Y

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34	1 ai	3	1	1.3.7 (a)	Radiation and waves	how to measure speed of water ripples	Requires diagram of making a water ripple in stem		Y
34	1 aii	1	3	1.3.7 (a)	Radiation and waves	how to measure speed of water ripples	Requires diagram of making a water ripple in stem		Y
34	1 b i	1	2	1.3.7 (a),	Radiation and waves	how to measure speed of water ripples	Requires Data Table and graph	Y	
34	1 b ii	2	3	1.3.7 (a)	Radiation and waves	how to measure speed of water ripples	Requires Data Table and graph		
34	1 b iii	2	2	1.3.7 (a),	Radiation and waves	how to measure speed of water ripples	Requires graph	Y	
35	1 a	2	1	5.3.2	Radioactive materials	transfer of energy in fission to KE of particles	Requires Fig 9.1		
35	1 b i	2	1	5.3.3	Radioactive materials	chain reaction	Requires Fig 9.1 and Fig 9.2		
35	1 b ii	2	3	6.1.3, 6.1.2,	Matter - models and explanations	compare coolants using SHC data			
36	1 a	2	1	1.3.3	Radiation and waves	transverse vs longitudinal	Requires Data Table in stem		
36	1 b i	2	2	1.4.8	Radiation and waves	earthquake waves in solids and liquids	Requires diagram of Earth cross-section and talking head with speech bubble		
36	1 b ii	2	2	1.4.8	Radiation and waves	earthquake waves in solids and liquids	Requires diagram of Earth cross-section		
37	1 a	1	1	4.3.2	Explaining motion	equilibrium and free body diagram	Requires Fig 11.1		
37	1 bi	2	2	4.3.2	Explaining motion	equilibrium and free body diagram			
37	1 bii	1	2	4.3.2	Explaining motion	equilibrium and free body diagram	Requires Fig 11.1 and Fig 11.2		
38	1 a	2	1	1.2.1	Radiation and waves	intensity and wavelength of radiation vs temperature	Requires Data Table in stem		
38	1 b i	3	1, 2	4.2.1,	Explaining motion	speed = distance / time		Y	
38	1 b ii	1	2	1.1.3	Radiation and waves	transmission of em radiation through space at same finite speed			
39	1 a	4	1, 2	6.3.7,	Matter - models and explanations	calculate spring constant $k = F/x$	Requires diagram of pin-ball machine and Fig. 13.1	Y	
39	1 b	3	1, 2	4.4.5	Explaining motion	calculate speed using $1/2mv^2$		Y	
39	1 c i	1	1	4.4.2	Explaining motion	work = force x distance			
39	1 c ii	4	2	4.4.5	Explaining motion	determine friction using energy calculations	Requires answer to (c)(i)	Y	