

New  
Specification



*Rewarding Learning*

**General Certificate of Secondary Education  
2012–2013**

---

**Science: Single Award**

Unit 3 (Physics)

Higher Tier

[GSS32]

**WEDNESDAY 29 FEBRUARY, 2012**

**9.30 am–10.45 am**

---

**MARK  
SCHEME**

- 1 (a) (i) 2.5 m [1]  
(ii) 8 m [1]  
(b) 2 Hz [1]  
(c) (i) vibrations move up and down at right angles [1]  
to wave travel [1] [2]  
(ii) any electromagnetic wave [1]
- 2 (a) braking [1]  
(b) (i) 3 points correct [1] correct line [1] [2]  
(ii) as speed increases, thinking distance increases [1]  
(iii) no change [1]  
(c) (i) the shorter distance the stick falls [1]  
the quicker her reactions are [1] [2]  
(ii) repeat/average [1]  
0 cm on ruler to be held just above hand [1]/implied  
drop from same place/height each time [2]
- 3 (a) indicative content  
  - Amount of beta going through will change with thickness of aluminium
  - Thicker aluminium the less beta radiation detected (or vice versa)
  - Alpha would be stopped by aluminium/paper/air
  - Gamma would go straight through aluminium/lead
  - Beta stopped by aluminium

Band	Response	Mark
A	Candidates must use 4/5 of the above points in a logical sequence to explain fully why beta is best. They use good spelling, punctuation and grammar and the form and style are of a high standard.	5–6
B	Candidates use 3 of the above points in a logical sequence to partially explain why beta is best. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	3–4
C	Candidates explain why beta is best using 1/2 of the above points. However these are not presented in a logical sequence. They use limited spelling, punctuation and grammar.	2–1
D	Response not worthy of credit	0

[6]

- (b) cobalt 60 [1]  
Gamma has most penetrating power [1]/gamma kills bacteria  
half-life is longest/doesn't need to be replaced often [1] [2]

AVAILABLE  
MARKS

6

9

9

			AVAILABLE MARKS	
4	(a)	the longer the wavelength, the lower the frequency	[1]	8
	(b)	(i) 40	[1]	
		(ii) $40\,000 \times 7500$ /either transformation [1] 300 000 000 [2]	[2]	
	(c)	can travel through a vacuum/travel at the speed of light carry energy/travel at same speed transverse waves (any 2 = 1 mark each)	[2]	
	(d)	infra red [1] microwave [1]	[2]	
5	(a)	(i) chemical [1] kinetic/movement [1]	[2]	9
		(ii) easily changed into other types/forms	[1]	
	(b)	(i) current = decreased	[1]	
		voltage = increased	[1]	
		(ii) reduce amount of energy/electricity lost/less energy – electricity wasted/thinner wire/aluminium	[1]	
	(c)	(i) arrow pointing from +ve to –ve (anticlockwise)	[1]	
		(ii) current increases with voltage	[1]	
		(iii) dimmer/volume switch/thermostat/toaster/oven not hairdryer	[1]	
6	(a)	(i) 200 arbitrary units	[1]	8
		(ii) more light requires more power [1] for the same amount of power CFL produces more light CFL most efficient than halogen and halogen produces more light than filament	[2]	
	(b)	CFL most efficient; less power/energy used; less fossil fuels used; less global warming (any 3)	[3]	
	(c)	energy cannot be created or destroyed [1] it can only be changed from one type to another [1]	[2]	
7	(a)	(i) car + person good distance apart/measure distance Beep horn + flash lights at same time Start watch when lights seen Stop watch when horn heard Use speed = distance/time (any 3 = 1 mark each)	[3]	7
		(ii) wind or timing problems/human error	[1]	
	(b)	(i) reflected sound/bounce back	[1]	
		(ii) soft/named soft material [1] absorb sound [1]	[2]	

- 8 (a) (i) forces are equal/same/balanced [1] steady speed [1] [2]  
(ii) resultant force = 500N [1] causing acceleration [1] [2]  
(b) air bags/crumple zones/impact bars/crash barriers  
(any 2 = 1 mark each) [2]  
(c) (i) instantaneous = at one precise moment [1]  
average = over whole journey [1] [2]  
(ii) drivers slow down for longer distance [1]

- 9 (a) (i) Indicative content  
  - Matter originated from a single point (singularity)
  - Huge explosion/expansion in which energy and particles formed
  - After millions of years gravity pulled this matter together to eventually form stars and galaxies
  - More distant galaxies are moving faster proves expansion
  - Conclusion proves universe still expanding

Band	Response	Mark
A	Candidates must use 4/5 of the above points in a logical sequence to explain the Big Bang theory including the conclusion from the information given. They use good spelling, punctuation and grammar and the form and style are of a high standard.	5–6
B	Candidates use 2/3 of the above points in a logical sequence to partially explain the Big Bang theory including the conclusion from the information given. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	3–4
C	Candidates explain the Big Bang theory including the conclusion from the information given using some of the above points. However these are not presented in a logical sequence. They use limited spelling, punctuation and grammar.	2–1
D	Response not worthy of credit	0

[6]

(ii) 14 Billion years [1]

(iii) distance light travels in 1 year [1]

(b) red shift [1]  
light from further galaxies is shifted towards the red end of the light spectrum/galaxies moving away from each other [1] [2]

**Total**

**AVAILABLE MARKS**

9

10

**75**