



Rewarding Learning

**General Certificate of Secondary Education
2010–2011**

Science: Single Award (Modular)

Road Safety, Radioactivity
and Earth in Space

Module 6

Higher Tier

[GSC62]

FRIDAY 12 NOVEMBER 2010, AFTERNOON

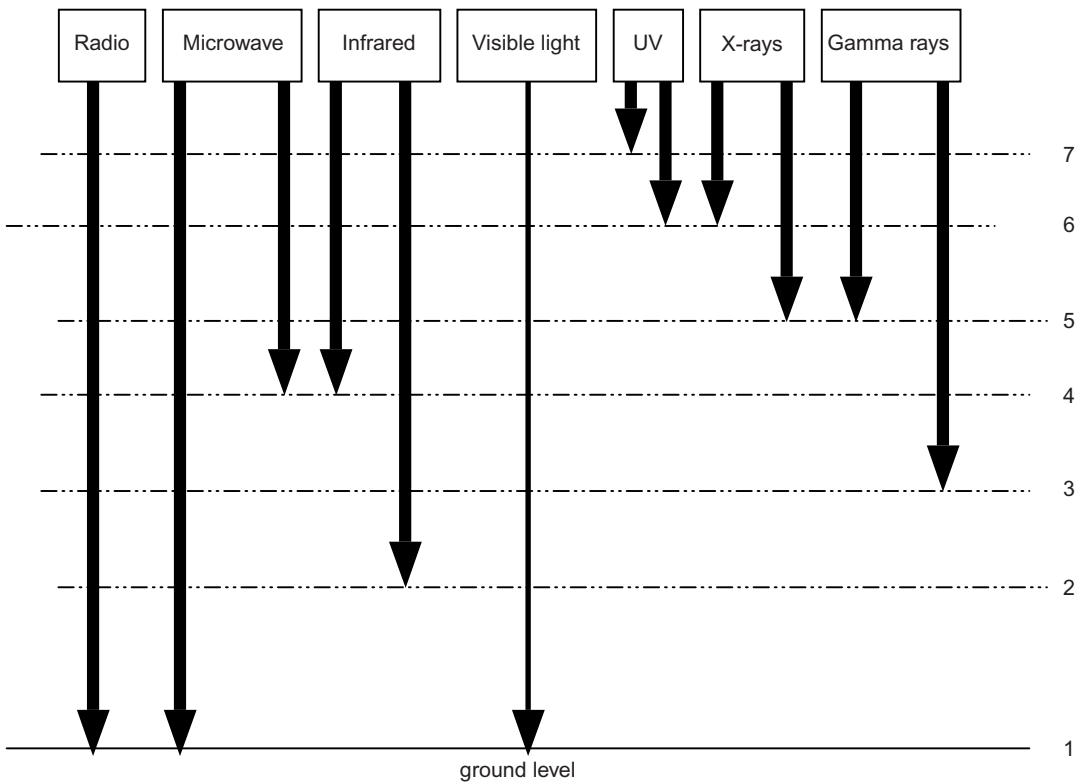
**MARK
SCHEME**

| | | | | AVAILABLE MARKS | |
|---|-------|---|--|-----------------|-----|
| 1 | (a) | Wrong word | Correct word | | |
| | | nitrogen | hydrogen | [1] | |
| | | pushed | pulled | [1] | |
| | | fission | fusion | [1] | [3] |
| | (b) | 8.4 years | | [1] | 4 |
| 2 | (a) | (i) | all points correct [2] 5 points [1] smooth curve [1] | maximum [3] | |
| | | (ii) | 70 counts per minute | [1] | |
| | (iii) | gamma rays from ground; cosmic rays from space; hospitals; nuclear power stations; nuclear weapons testing Any two | [2] | | |
| | (b) | (i) | Alpha does not pass through aluminium [1] Gamma all passes through [1] Beta amount depends on thickness [1] | [3] | |
| | | (ii) | Activity decreases too quickly/has to be replaced more often | [1] | 10 |
| 3 | (a) | (i) | Electric; petrol/diesel | [2] | |
| | | (ii) | Uses less fossil fuels [1] or less global warming/less greenhouse gases [1] | [2] | |
| | (b) | (i) | At speeds up to 20 mph the braking distance is less than the thinking distance; above 20 mph the braking distance is greater than the thinking distance | [2] | |
| | | (ii) | The ice would decrease the friction [1] braking distance would increase [1] | [2] | |
| | | (iii) | It increases the thinking distance/the total stopping distance [1] slows reaction time/increases thinking distance [1] | [2] | 10 |
| 4 | (a) | The forces are balanced (equal); the boat is moving at a steady speed | [2] | | |
| | (b) | the boat accelerates/speeds up/gets faster | [1] | 3 | |

- 5 (a) Change in velocity $6 - 4.2 = 1.8$
 momentum = 1.8×500
 900 (kgm/s) maximum [3]
- (b) They are weak enough to deform on impact to absorb some of the kinetic energy; they are strong enough to prevent a car crossing the carriageway and causing another accident [2]
- (c) Instantaneous speed is the speed of a car at any one point in time; the average speed of a car is the speed over a given distance [2]
- (d) distance from B to D = $0.75 - 0.25 = 0.5$ m; [1]
 time from B to D = $1.6 - 1.00 = 0.6$ s; [1]
 Average speed = $0.5/0.6 = 0.83$ m/s maximum [3]
- (e) They slow the cars down over a greater distance.
 Less serious accidents [2]

- 6 (a) The greater the distance the faster the galaxies are moving away from Earth [1]
- (b) Universe started as a single point (singularity) [1]
 Universe was created from a large explosion [1]
 After millions of years gravity pulled this matter together to eventually form stars and galaxies [1] maximum [3]

(c)



- (i) Arrow from visible light → ground level (see diagram above) [1]
- (ii) 6 [1]

Total

AVAILABLE MARKS

12

6

45