



Rewarding Learning

General Certificate of Secondary Education
2015

Double Award Science: Physics

Unit P2

Foundation Tier

[GSD61]

FRIDAY 12 JUNE, AFTERNOON

**MARK
SCHEME**

Subject-specific Instructions

In numerical problems, the marks for the intermediate steps shown in the mark scheme are for the benefit of candidates who do not obtain the final correct answer. A correct answer and unit, if obtained from a valid starting-point, gets full credit, even if all the intermediate steps are not shown. It is not necessary to quote correct units for intermediate numerical quantities.

Note that this “correct answer” rule does not apply for formal proofs and derivations, which must be valid in all stages to obtain full credit.

Do not reward wrong physics. No credit is given for consistent substitution of numerical data, or subsequent arithmetic, **in a physically incorrect equation.** However, answers to subsequent stages of questions that are consistent with an earlier incorrect numerical answer, and are based on physically correct equation, must gain full credit. Designate this by writing **ECF** (Error Carried Forward) by your text marks.

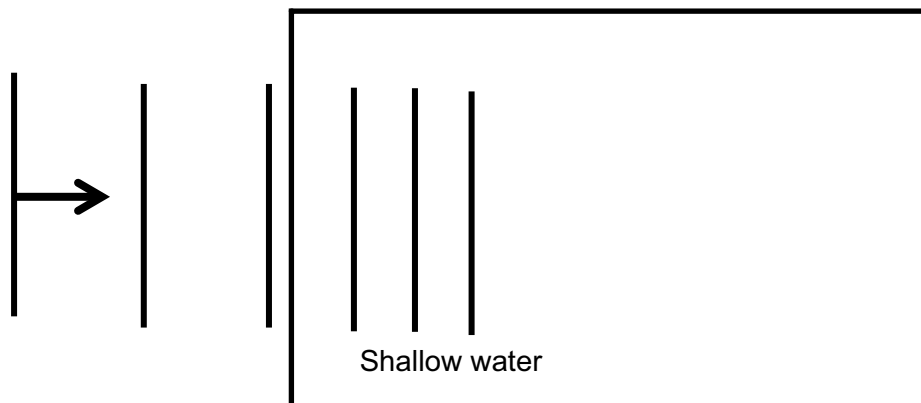
The normal penalty for an arithmetical and/or unit error is to lose the mark(s) for the answer/unit line. Substitution errors lose both the substitution and answer marks, but 10^n errors (e.g. writing 550 nm as 550×10^{-6} m) count only as arithmetical slips and lose the answer mark.

- 3 (i) Transverse [1]
(ii) Energy [1]
(iii) $\lambda = 5$ (m) [1]
(iv) $v = f \lambda$ [1]
 $v = 2 \times 5$ allow ecf from (iii) [1]
 $v = 10$ (m/s) [1] [3]
(v) 3 (cm) [1]

AVAILABLE
MARKS

7

4

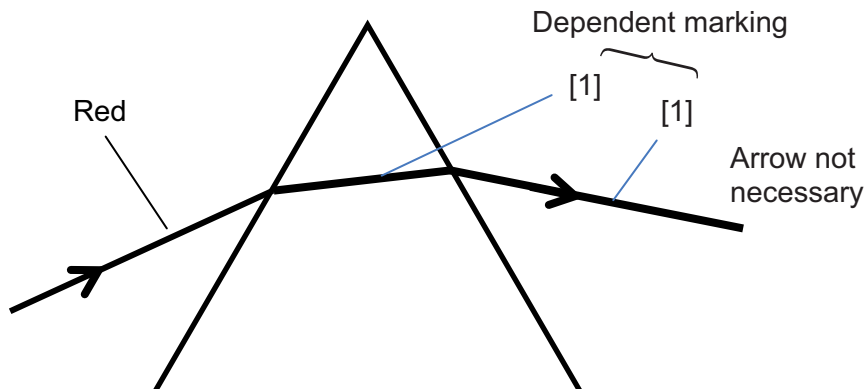


- (a) (i) Consider only the first 3 wavefronts
Waves are vertical i.e. parallel to **incident waves** [1]
Waves have shorter wavelength than incident waves [1]
Equal spacing within shallow water, by eye [1] } mark independently [3]
- (ii) Less [1]
- (b) Used to scan/see (unborn) babies/break up kidney stones/remove tartar from teeth/treat tissue damage or other suitable response
Used to detect/treat cancer (tumours) [1]
- (c) Distance = Speed \times Time (or equivalent) [1]
 $= 1500 \times 0.9$ [1]
 $= 1350$ (m) [1]
Depth = 675(m) [1] [4]
- or
- Depth = 1500 \times 0.45 [3]
 $= 675$ (m) [1] [4]

9

- 5 (a) (i) Position of vertical line [1] laterally inverted [1] same size [1] mark independently [3]
- (ii) New distance of F to mirror = $0.4 + 0.1 = 0.5\text{ m}$ [1]
 Distance of F to image = $0.5 + 0.5$
 = 1.0 (m) [1] [2]

- (b) (i) both answers must show correct refraction



- (ii) Violet [1]
- (iii) Travel at **different speeds** [1]

- 6 (a) (i) ac, ac, ac, dc [1] each } Accept "upper case" [4]
 (ii) dc, dc, ac [1] each } [3]
- (b) (i) magnet or magnetic pole [1]
 (ii) electromagnetic induction [1]

- 7 (a) (i) Mars and Jupiter [1] each [2]
- (ii) **Two** from Mercury, Venus, Earth, Mars [1] each [2]
Two from Jupiter, Saturn, Neptune, Uranus [1] each [2] [4]
- (iii) comets, asteroids [1] each [2]
 Pluto/dwarf planet – does not get [2]
- (iv) Gravity/gravitational [1]
- (b) (i) geocentric [1]
 (ii) Earth [1]
 (iii) heliocentric [1]

AVAILABLE MARKS

9

9

12

- 8 (i) Scale at least half [1], correct label with unit [1]
scale does not have to start (0,0) [2]
- (ii) plot points, 6 or 7 correct [2], 4 or 5 correct [1] [± 1 square] [2]
- (iii) points joined in a curve [1]
“dot to dot” [0]/[1]
- (iv) (reached) room temperature [1]
- (v) decreases [1] to a constant value [1] Dependent marking [2]
- (vi) 36(°C)–40(°C) [1]

- 9 **Five points from:**
Big Bang [1]
Exploded/Explosion [1] – or “Singularity” Mark independently
12–15 billion years ago [1]
Light from other **galaxies** [1]
Shifted to the red end of the spectrum [1] **or** “red shift” on its own
Space expanding [1] **or** Universe expanding **or** distance **between** galaxies increasing
Reject: Galaxies moving away
Reject: distance between **stars** increasing

Response	Marks
Candidates explain 5 or 6 of the above points. They use good spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5]–[6]
Candidates explain 3 or 4 of the above points. They use satisfactory spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made use of some specialist terms.	[3]–[4]
Candidates explain 1 or 2 of the of the above points. They use limited spelling, punctuation and grammar. The form and style are of a limited standard and they have made no use of specialist terms.	[1]–[2]
Response not worthy of credit.	[0]

[6]

Total

**AVAILABLE
MARKS**

9

6

90