Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Mark Schemes

Q1.

planning
(to determine the illumination at points along axis of the lamp)
measure distance from LDR to lamp using metre rule / tape **1**

find resistance of LDR using ohmmeter [or VI method explained,
or potential divider method explained: must be from diagram] **1**

read illumination from (calibration) graph **1**

(light meter method, scores 2 / 3; single circuit method or
interchanged meters, scores 1 / 3)

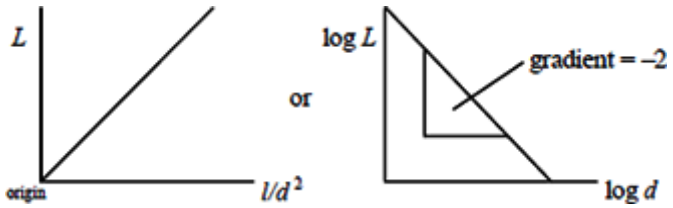
diagram:
sensible diagram to include lamp, LDR (light meter) and suitable
means of resistance measurement: symbols must be correct **1**

distance, d, shown or means to measure it **1**

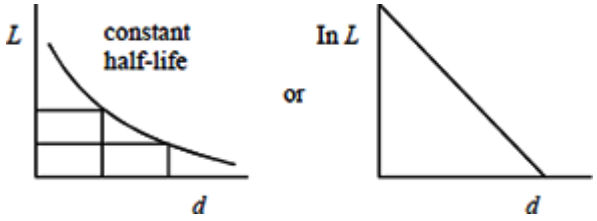
check for correct prediction by repeating at different distances **1**

plot a suitable graph to test prediction of **either** student,
with method of testing relationship explained **(1)**
(repeated calculations of L / d^2 and check for consistency is acceptable)

possible approaches for student A to test inverse-square variation:



possible approaches for student B to test exponential variation:



control:
eliminate stray illumination by using blackout [or by collimating beam]

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(subtracting background illumination not acceptable)
[or maintain intensity of spotlight by use of appropriate circuit]

1

difficulties:
any two of the following: (look for *difficulty* + *how to overcome* = 2)

reduce uncertainty in the graph **(1)**
by taking extra readings where the illumination changes

most rapidly with distance **(1)**

reduce uncertainty in R (V and I) **(1)**
by taking extra readings and averaging **(1)**

overcome uncertainty in d **(1)**
by measuring from specified point on lamp **(1)**
[ensure that the LDR only moves along axis of the lamp]
[allow any other good relevant physics]

4

(12 possible marks for) max 8

[8]

Q2.

(a) region of white dwarfs drawn around X and
region of red giants drawn around Z **(1)**
main sequence (band from W, dipping, flatter at Y, down to right) **(1)**

2

(b) (i) (apparent magnitude) brightness (of star) as seen from Earth **(1)**

(ii) $d = \frac{1350}{3.26}$ = 414 (pc) **(1)**

(iii) (use of $m - M = 5 \log \frac{d}{10}$ gives) $M = 1.7 - 5 \log \left(\frac{414}{10}\right)$ **(1)**

(allow C.E. for value of d from (ii))
M = –6.39 **(1)**

(iv) (Alnilam is) W **(1)**
correct absolute magnitude **(1)**
B or A class due to strong Balmer lines **(1)**

7

(c) (evolution of the Sun is) Y → Z → X

1

[10]

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