Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

(a) ϕ is minimum energy needed to remove electron **(1)**
E_k is maximum energy of emitted electron **(1)**

(2)

(b) (i) $E_k = hf - \phi$

$f = \frac{c}{\lambda}$ $\therefore E_k = hc\left(\frac{1}{\lambda}\right) - \phi$ **(1)**

cf $y = mx + c$ **(1)**

(ii)

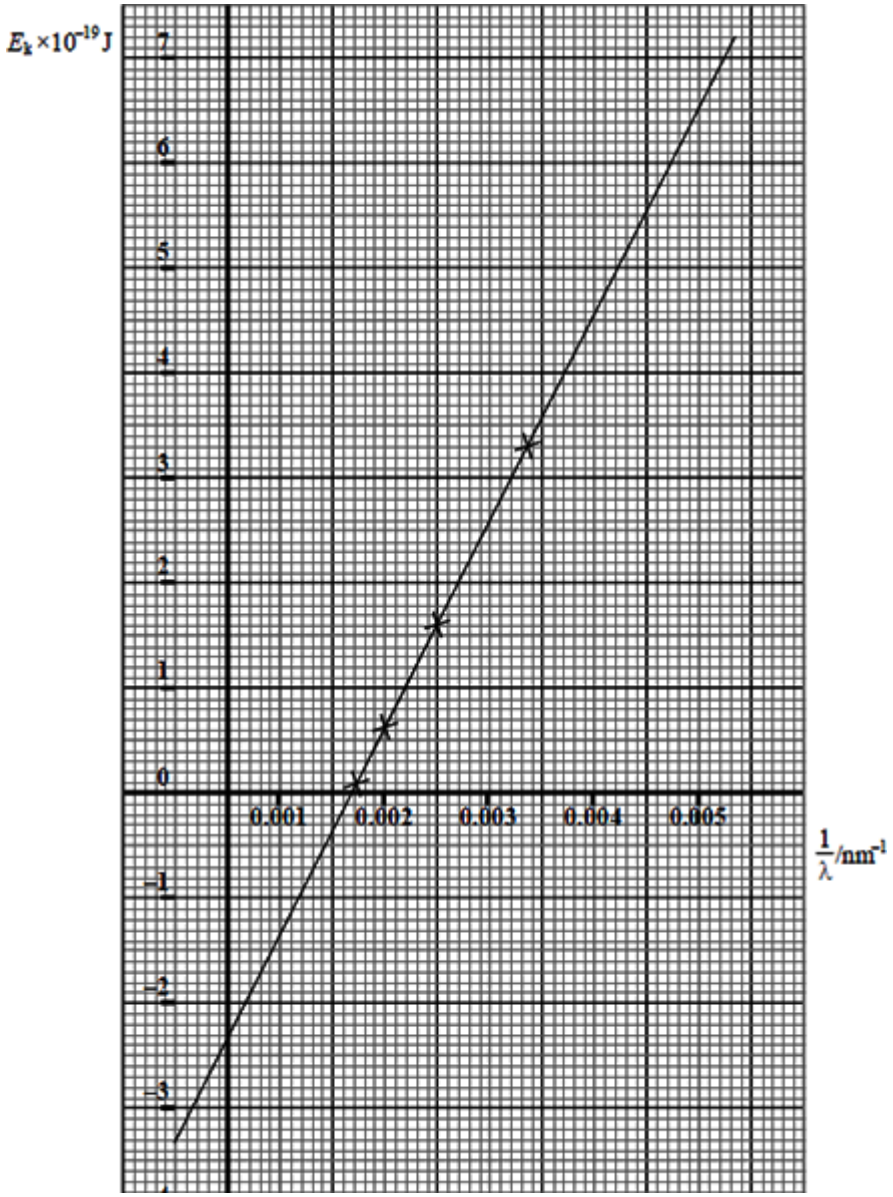
λ / nm	200	300	400	500	600
$E_k \times 10^{-19}$ J	6.72	3.30	1.68	0.66	0.05
$\frac{1}{\lambda}$ / nm^{-1}	0.0050	0.0033	0.0025	0.0020	0.0017

$\frac{1}{\lambda}$ values correct **(1)**

both axes correctly labelled **(1)**
five points correctly plotted **(1)**
sensible scale and straight line **(1)**

graph for this question

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from intercept, $\phi = 3.3 \times 10^{-19}$ J **(1)** = 2.1 eV **(1)**

use of large triangle gives gradient $\left(= \frac{6.7 \times 10^{-19}}{(5.00 - 1.65) \times 10^{6}}\right) = 2.01 \times 10^{-25}$

$h = \frac{\text{gradient}}{c} = 6.7 \times 10^{-34}$ J s **(1)**

(max 9)

(c) straight line to right of present curve **(1)**
parallel to it **(1)**

(2)

(d) ultraviolet high frequency **(1)**
above f_0 for emission **(1)**
[or red light low frequency **(1)**
below f_0 for emission **(1)**]

[*alternative (d)*
ultraviolet [red light] photon energy is high [low] **(1)**
above [below] work function **(1)**]

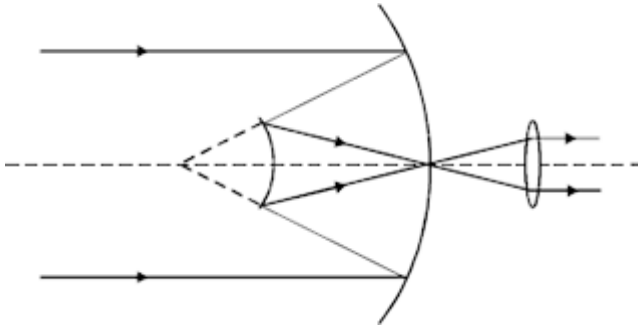
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(2)

[15]

Q2.

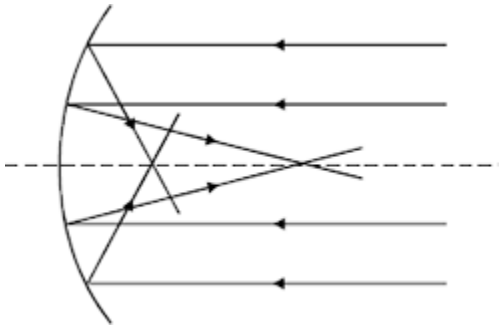
(a)



rays reflected at concave mirror **(1)**
rays reflected at convex mirror **(1)**
rays cross and emerge parallel from eye lens **(1)**

(3)

(b) (i)



rays close to axis and far from axis to different focal points **(1)**
correct focal points **(1)**
use of parabolic mirror **(1)**

(ii) light of different wavelength **(1)**
refracted to different foci **(1)**
no refraction with mirrors, no chromatic aberration with reflection **(1)**

(6)

[9]

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