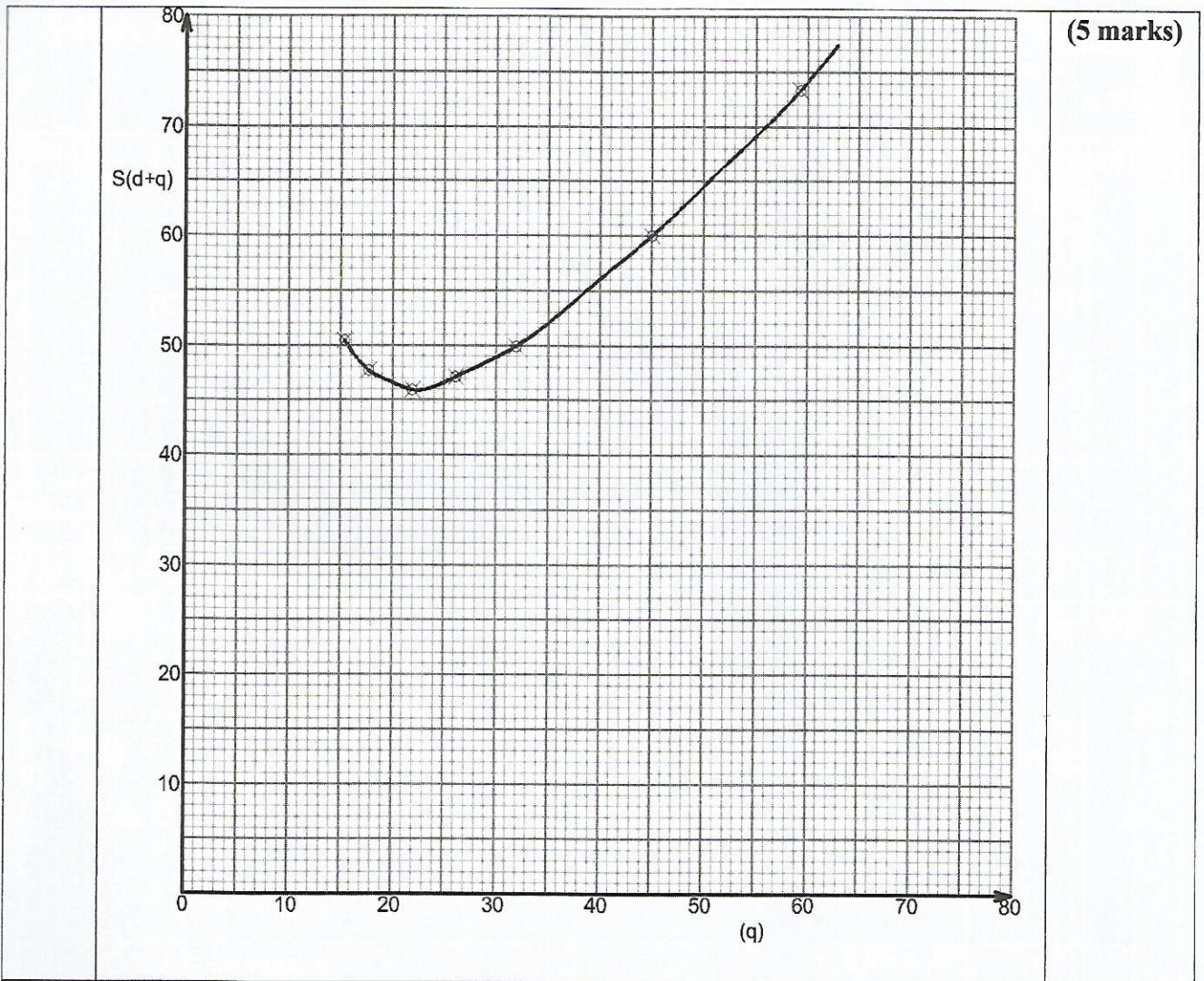


KCSE 2022 PAPER 3

5.4.3 Physics Paper 3 (232/2)

Question 1

b)	<p>(i) $q = 37.6 \text{ cm } \checkmark$</p> <p>(ii) $h = \frac{16q}{q + 16}$</p> <p>$= \frac{16 \times 37.6}{37.6 + 16} \checkmark$</p> <p>$= 11.22 \checkmark$</p>	<p>(1)</p> <p>(2)</p>																								
c)	<p>(i) $x = 5 \text{ cm } \checkmark$</p> <p>(ii) $r = \frac{xh}{x-h}$</p> <p>$= \frac{5(11.22)}{5-11.22} \checkmark$</p> <p>$= -9.019$</p> <p>$= -9.02 \checkmark$</p> <p>(iii) $\frac{r}{h} = 2(1-m)$</p> <p>$\frac{-9.02}{11.22} = (2-2m)$</p> <p>$m = 1.402$</p> <p>$m = 1.4 \checkmark$</p>	<p>(1)</p> <p>(2)</p> <p>(1)</p>																								
d)	<p>(ii) Table 1</p> <table border="1" data-bbox="349 1627 1193 1801"> <tbody> <tr> <td>d (cm)</td> <td>14</td> <td>15</td> <td>18</td> <td>21</td> <td>24</td> <td>30</td> <td>35</td> </tr> <tr> <td>q (cm)</td> <td>59.3</td> <td>45</td> <td>31.9</td> <td>26.1</td> <td>21.9</td> <td>17.7</td> <td>15.4</td> </tr> <tr> <td>S = d + q (cm)</td> <td>73.3</td> <td>60</td> <td>49.9</td> <td>47.1</td> <td>45.9</td> <td>47.7</td> <td>50.4</td> </tr> </tbody> </table>	d (cm)	14	15	18	21	24	30	35	q (cm)	59.3	45	31.9	26.1	21.9	17.7	15.4	S = d + q (cm)	73.3	60	49.9	47.1	45.9	47.7	50.4	<p>(5 marks)</p>
d (cm)	14	15	18	21	24	30	35																			
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S = d + q (cm)	73.3	60	49.9	47.1	45.9	47.7	50.4																			



- f) (i) $S_o = \text{minimum part of the graph}$
 $= 45.5 \text{ cm } \checkmark$ (1)
- (ii) $f = \frac{S_o}{4}$ (1)
 $= \frac{45.5}{4}$
 $= 11.375$
 $= 11.4 \text{ cm } \checkmark$
- (iii) V is the value of q when S is minimum (1)
 $V = 21.5 \text{ cm } \checkmark$

Question 2

PART A

(b)	<p>(i) $x = 26 \text{ cm}$ ✓</p> <p>(ii) $f_1 d_1 = f_2 d_2$</p> $20 \times m_0 = 50 \times 26 \checkmark \checkmark$ $M_0 = \frac{50 \times 26}{20}$ $= 65 \text{ g} \checkmark$	(1)
(d)	<p>(i) $X_1 = 16 \text{ cm}$ ✓</p> <p>(ii) $50 \times 16 = M_1 \times 20 \checkmark$</p> $M_1 = \frac{50 \times 16}{20} = \checkmark$ $M_1 = 40 \text{ g} \checkmark$ <p>(iii) $M_1 = M_0 - M_w$ $M_w = M_0 - M_1$</p> $= 65 - 40$ $= 25 \text{ g} \checkmark$ <p>(iv) $\mu =$ apparent loss in mass of prism ✓ (Do not accept upthrust)</p>	(1)

(e)	(i) $X_2 = 12.5 \text{ cm} \quad \checkmark$	(1)
	(ii) $X = \frac{RX_1 - SX_2}{R - S} = 26 = \frac{R \times 16 - 1000 \times 12.5}{R - 1000} \checkmark$	(3)
	$26R - 26000 = 16R - 12500 \quad \checkmark$	
	$10R = 13500$	
	$R = 1350 \text{ kg/m}^3 \quad \checkmark$	

PART B

h)	(i) $I = 0.42 \text{ A} \quad \checkmark$	(1)
	(ii) $V = 2.0 \text{ V} \quad \checkmark$	(1)
i)	$R_p = \frac{V}{I}$ $= \frac{2.0}{0.42}$ $= 4.76 \Omega \quad \checkmark$	(1)
l)	$AC = L = 38.9 \text{ cm} \quad \checkmark$	(1)
(m)	$CB = 100 - l = 100 - 38.9 = 61.1 \text{ cm} \quad 4.76 \checkmark$ $R = 4.76 \Omega$ Q length 38.9 cm $\frac{Q}{38.9} = \frac{P}{61.6} \Rightarrow Q = \frac{4.76}{61.1} \times 38.9$ $= 3.03 \Omega \quad \checkmark$	(2)