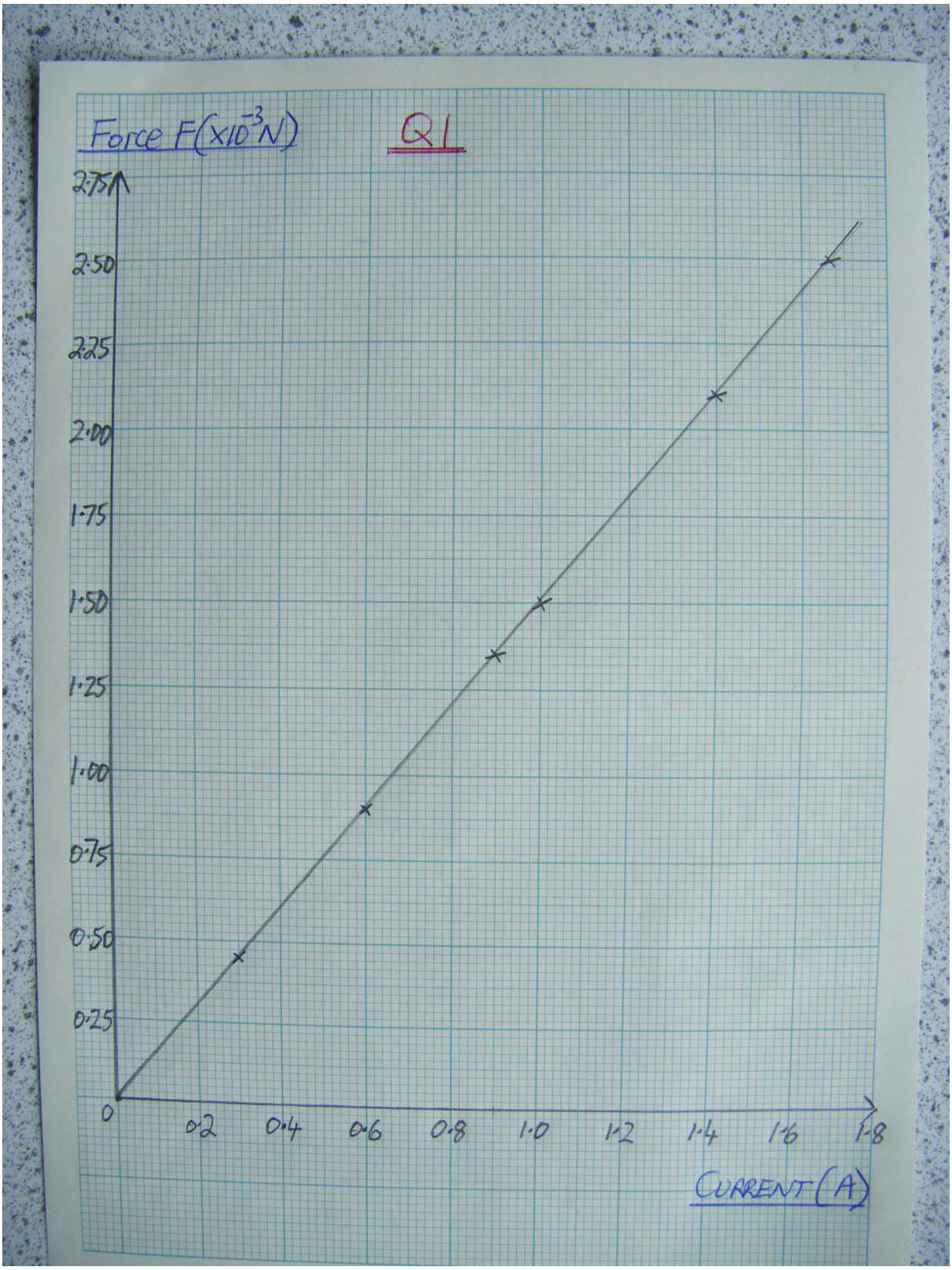
Higher Data Handling Answers

1. a) Graph of **Force (F) against Current (I).**



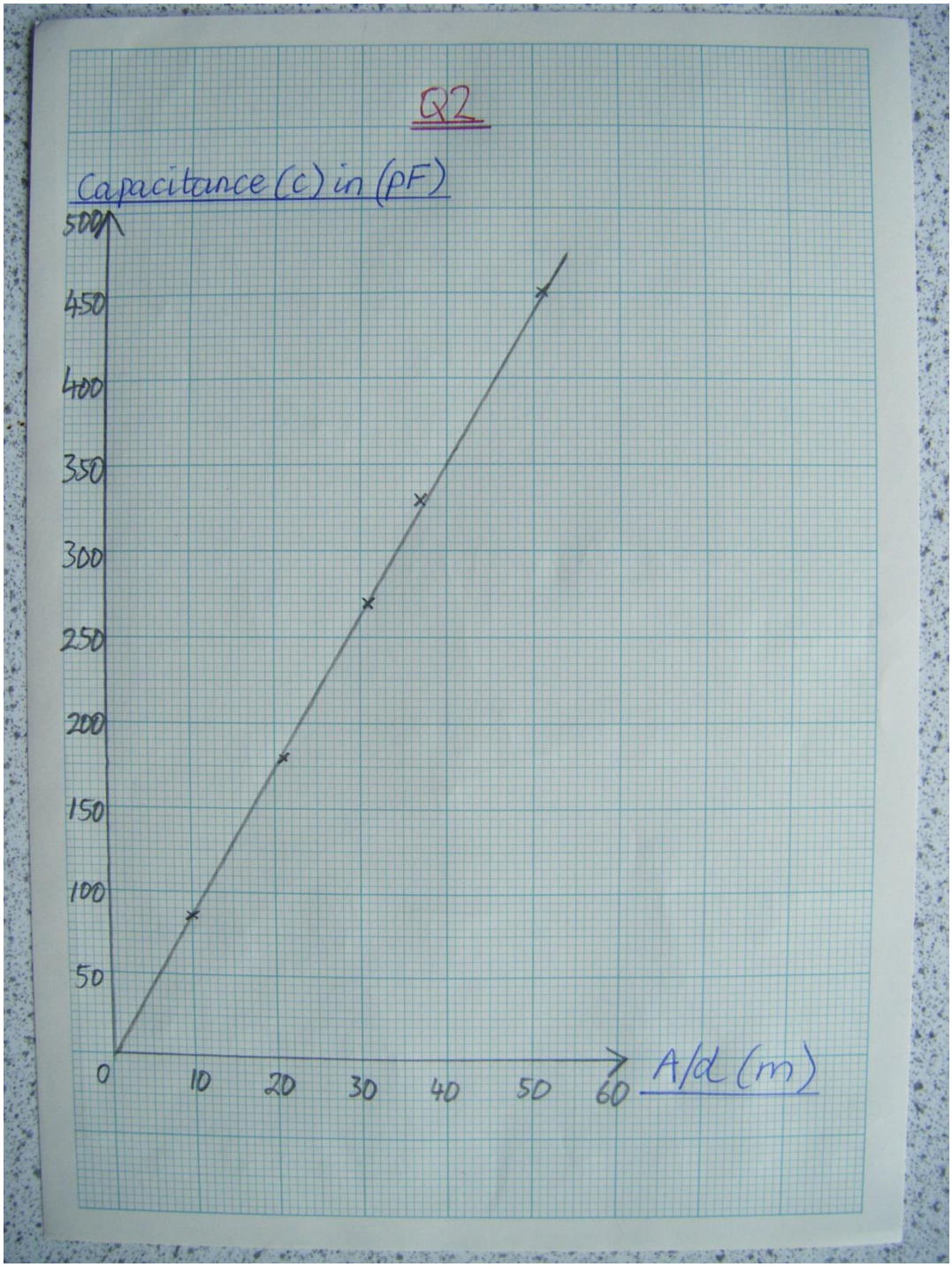
b) **Gradient** of F against I = **1.58×10^{-3}**.

c) B = **0.02T**.

2. a)

Capacitance C (pF)	Area A ($x10^{-2}m^2$)	Distance d ($x10^{-4}m$)	A/d (m)
88	0.94	9.40	10
180	1.07	5.10	21
270	2.95	9.50	31
330	1.78	4.80	37
450	2.09	4.10	51

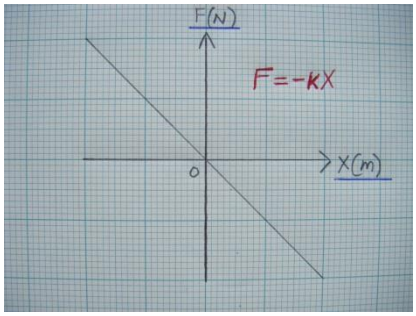
b) Graph of **Capacitance (C) against Area/distance (A/d)**.



c) Gradient => $\boldsymbol{\varepsilon_o = 8.83\ x10^{-12}}$. Accepted value = $\boldsymbol{\varepsilon_o}$ = 8.85 $x10^{-12}Fm^{-1}$.

d) The **gradient** will be **greater** as the total permittivity($\boldsymbol{\varepsilon_T}$) will be greater than the permittivity of free space($\boldsymbol{\varepsilon_o}$).

3. a) i)



ii) **a = - kx/m**.

b) i) $\mathbf{T^2 = 4\pi^2 m/k}$.

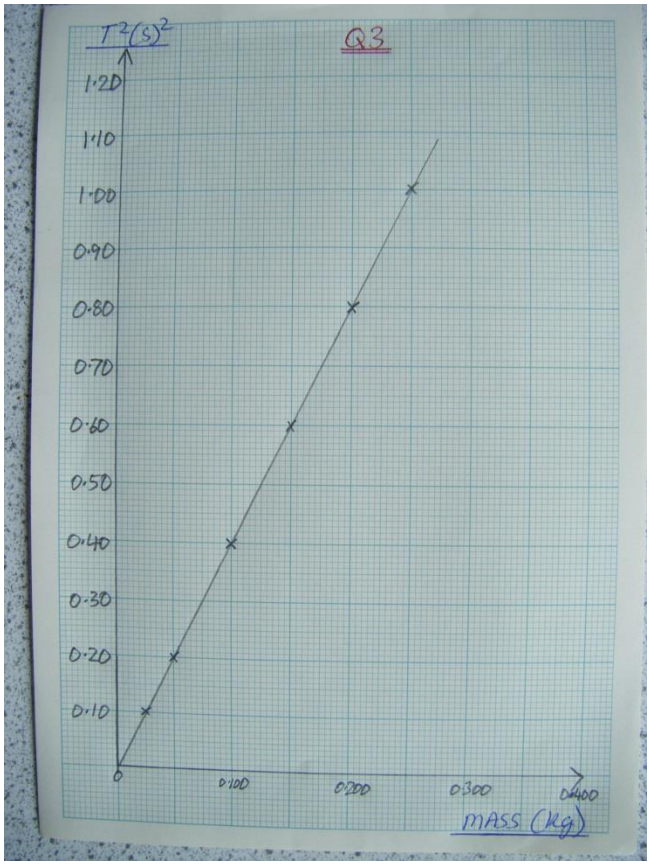
ii) To take the square root out of the equation.

This makes it easier to build up relationships between the quantities.

c) i)

Mass m (g)	Observed Period T (s)	T^2 $(s)^2$
0.025	0.32	0.10
0.050	0.45	0.20
0.100	0.63	0.40
0.150	0.77	0.60
0.200	0.89	0.80
0.250	1.00	1.00

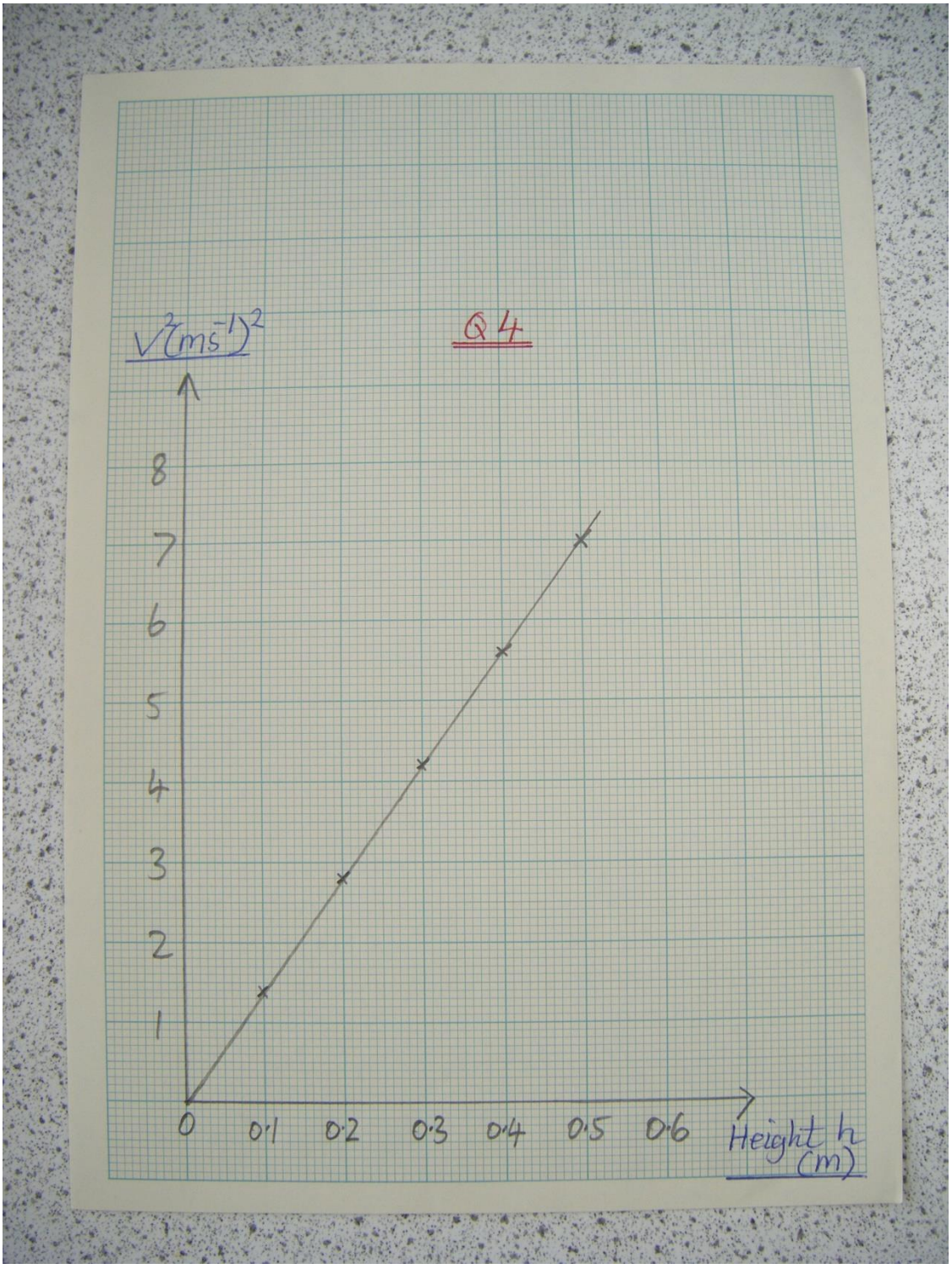
ii) **Graph of T^2 against m**.



iii) Gradient of graph = **4** => Spring constant $\mathbf{k = 9.87\ Nm^{-1}}$.

4. a) **$g = 7v^2/10h$**.

b) **Graph of v^2 against h**.



c) **Gradient** of v^2 against h = **14**.

d) **g** = **$9.8ms^{-2}$**.

e) Take more than 5 height readings

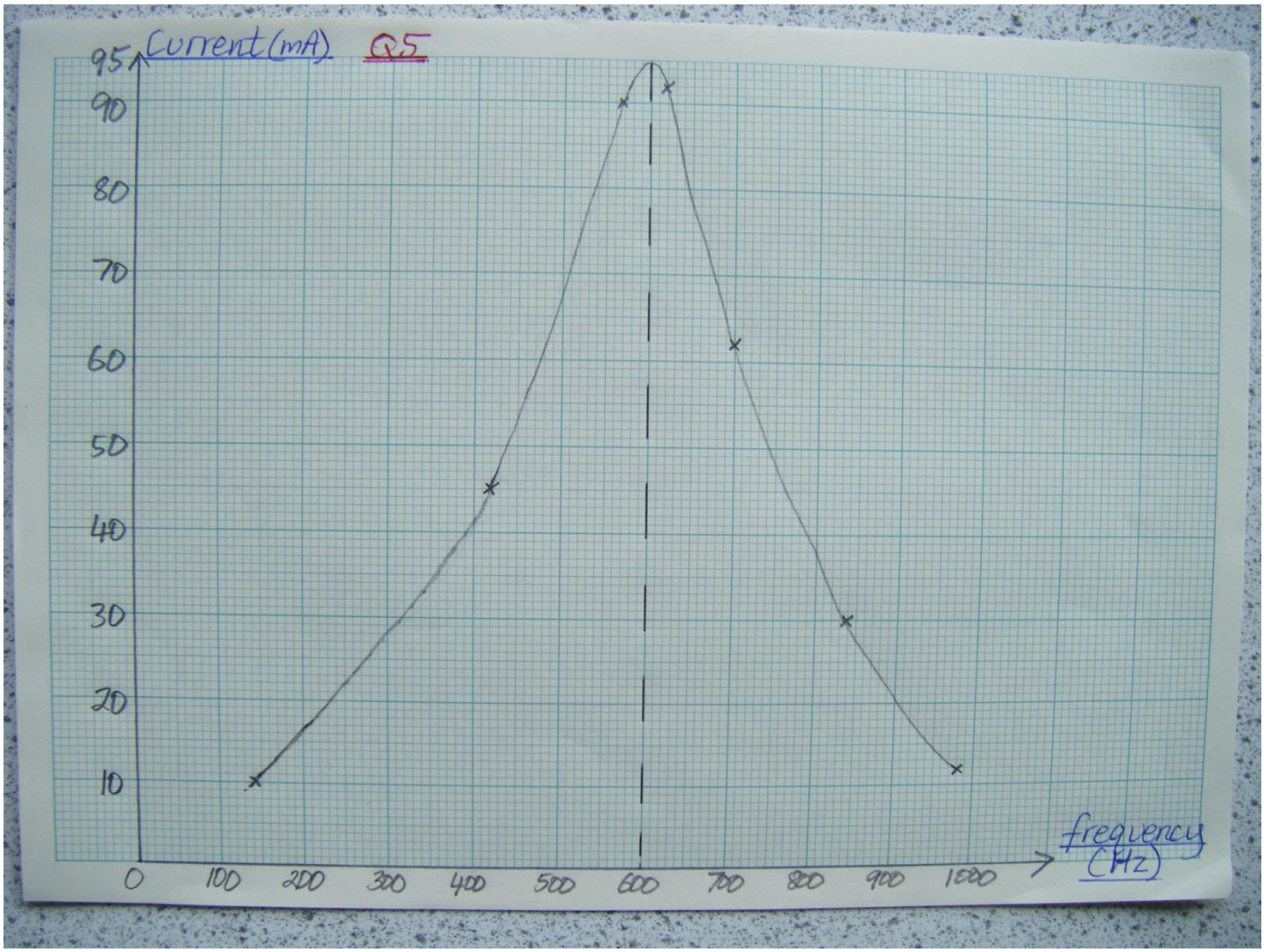
Take repeat readings for each height.

Both of the above points will reduce the random uncertainty in the mean.

5. a) i) $\mathbf{f_o = 1/(2\pi\sqrt{CL})}$.

ii) f_o = 602Hz.

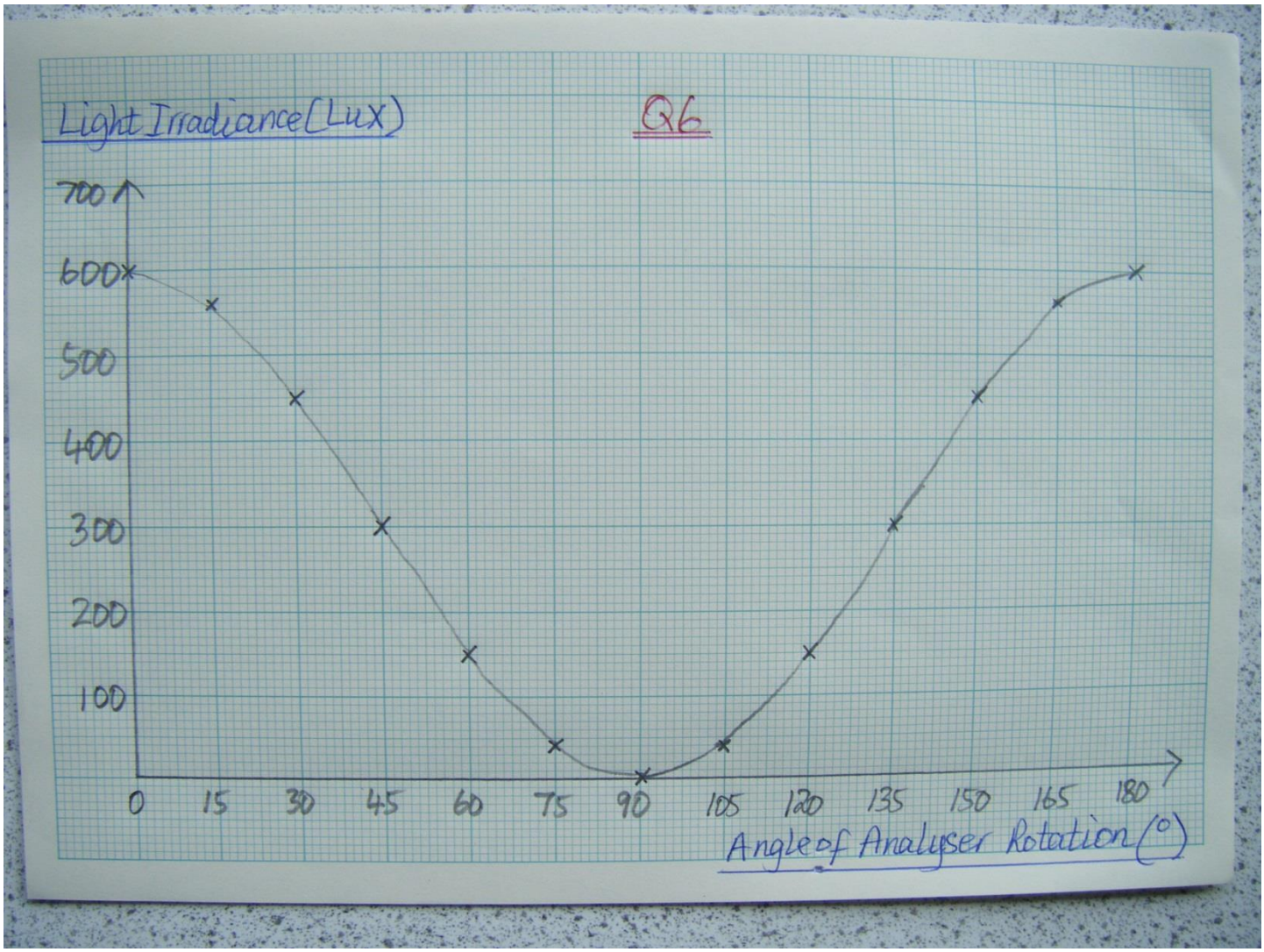
b) i) Graph of **Current (I) against Frequency (f)**.



ii) **f_o is approximately 600Hz**.

iii) The **current** recorded on the ac ammeter is at a **maximum** at the resonant frequency **f_o**.

6. a) Graph of **Light Irradiance (Lux)** against **Angle of Analyser Rotation (°)**.



b) **Cosine**.

c) Light Irradiance is at a **maximum** if analyser is **parallel or anti-parallel** to the polariser.

Light Irradiance is **zero** if the analyser is **perpendicular** to the polariser.

Light Irradiance is greater than zero and less than the maximum if the analyser is at an angle to the polariser but not at 0°,90° or 180°.