UACE PHYSICS P510/3 - 2020
SAMPLE RESULTS AND MARKING GUIDE

QUESTION 1. (40marks)

PART I

a) $l = 100.0\ cm$

$b = \dfrac{2.55 + 2.46 + 2.53}{3} = 2.51\ cm$

b) $C = 50.4\ cm$

e) $x_1 = 19.5\ cm$

$x_2 = 20.9\ cm$

f) $\theta = \dfrac{0.100 \times 19.5}{20.9} = 0.0933\ kg$

$K = 8.3 \times 10^{-2} \times 0.0933(1.000^2 + 0.0251^2)$

$= 7.7 \times 10^{-3}\ kgm^2$

$8\frac{1}{2}$ marks

PART II

e) $t = 85.0\ s$

f) $T = \dfrac{85.0}{20} = 4.25\ s$

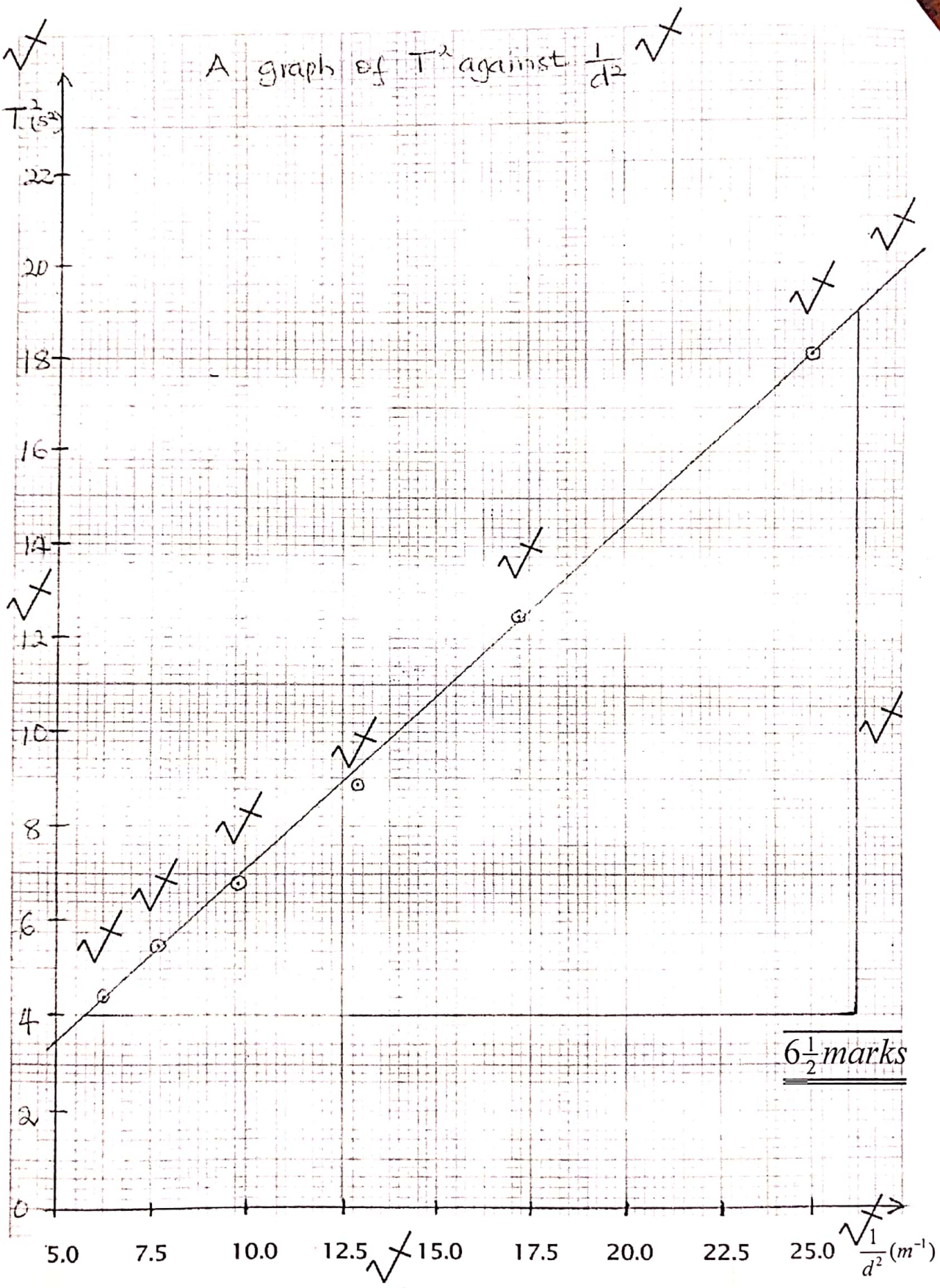
h) Table of results:

$d\ (m)$	$t\ (s)$	$T\ (s)$	$T^2\ (s^2)$	$d^2\ (m^2)$	$\frac{1}{d^2}\ (m^{-2})$
0.200	85.0	4.25	18.1	0.040	25.00
0.240	70.5	3.53	12.5	0.058	17.24
0.280	59.5	2.98	8.9	0.078	12.82
0.320	52.0	2.60	6.8	0.102	9.80
0.360	47.0	2.35	5.5	0.130	7.69
0.400	42.0	2.10	4.4	0.160	6.25
	1dp	2dp	1dp	3dp	2dp

j) $S = \dfrac{19.0 - 4.0}{26.25 - 5.75} = \dfrac{15.0}{20.50} = 0.732\ s^2m^2$

k) $g = \dfrac{1.6 \times 10^2 \times 0.500 \times 7.7 \times 10^{-3}}{0.732 \times 0.0933} = 9.0\ ms^{-2}$

25 marks



$6\frac{1}{2}$ *marks*

QUESTION 2. (*40marks*)

c) $x = 15.0\ cm$

f) $a = 19.0\ cm$

h) $b = 71.3\ cm$

j) Table of results:

D (cm)	a (cm)	b (cm)	d (cm)	d^2 (cm^2)	$\frac{d^2}{D}$ (cm)
90.0	19.0	71.3	52.3	2735	30.4
85.0	19.4	65.8	46.4	2153	25.3
80.0	20.0	60.2	40.2	1616	20.2
75.0	20.7	54.1	33.4	1116	14.9
70.0	21.8	48.4	26.6	708	10.1
65.0	23.5	41.8	18.3	335	5.2
	1dp	1dp	1dp	0dp	1dp

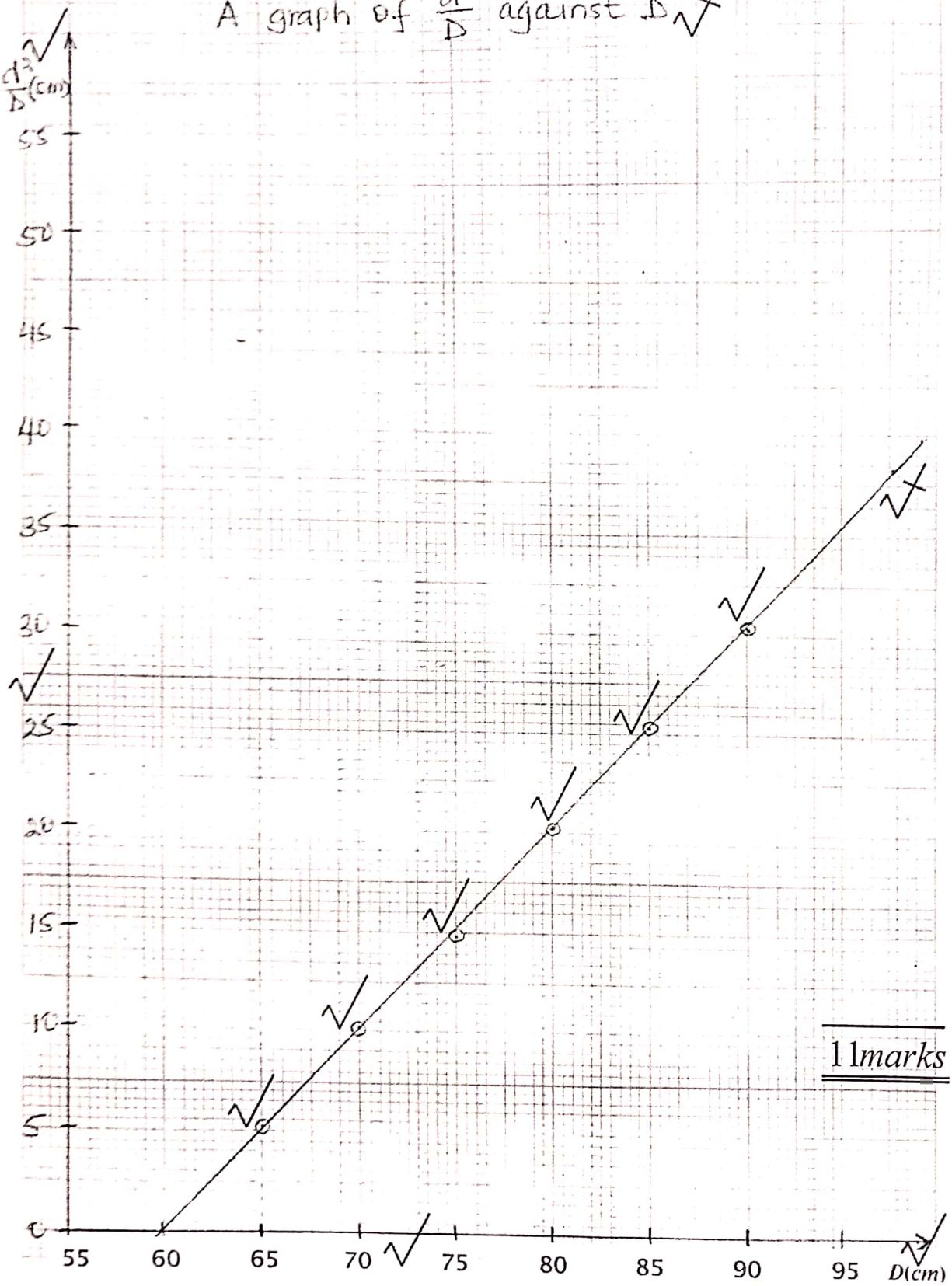
l) $C = 60.0\ cm$

m) $\theta = 15.0 + \frac{60.0}{4}$

$= 30.0\ cm$

29 marks

A graph of $\frac{d^2}{D}$ against D



11marks

QUESTION 3. (40marks)

PART I

c) $V_1 = 1.50$ V

e) $V_2 = 0.75$ V

g) $r_1 = \dfrac{1.50}{0.40 \times 50.0 \times 10^{-2}} = 7.5\,\Omega m^{-1}$

$r_2 = \dfrac{0.75}{0.20 \times 50.0 \times 10^{-2}} = 7.5\,\Omega m^{-1}$

PART II

c) $l_1 = 0.682$ m

f) $l_2 = 0.595$ m

i) Table of results:

y (m)	l_2 (m)	$\frac{1}{y}(m^{-1})$	$\frac{l_1}{l_2}$
0.300	0.595	3.33	1.15
0.400	0.620	2.50	1.10
0.500	0.638	2.00	1.07
0.600	0.655	1.67	1.04
0.700	0.662	1.43	1.03
0.800	0.670	1.25	1.02
	3dp	2dp	2dp

k) $S = \dfrac{1.166 - 1.004}{3.55 - 1.05}$

$= 0.0648\,m$

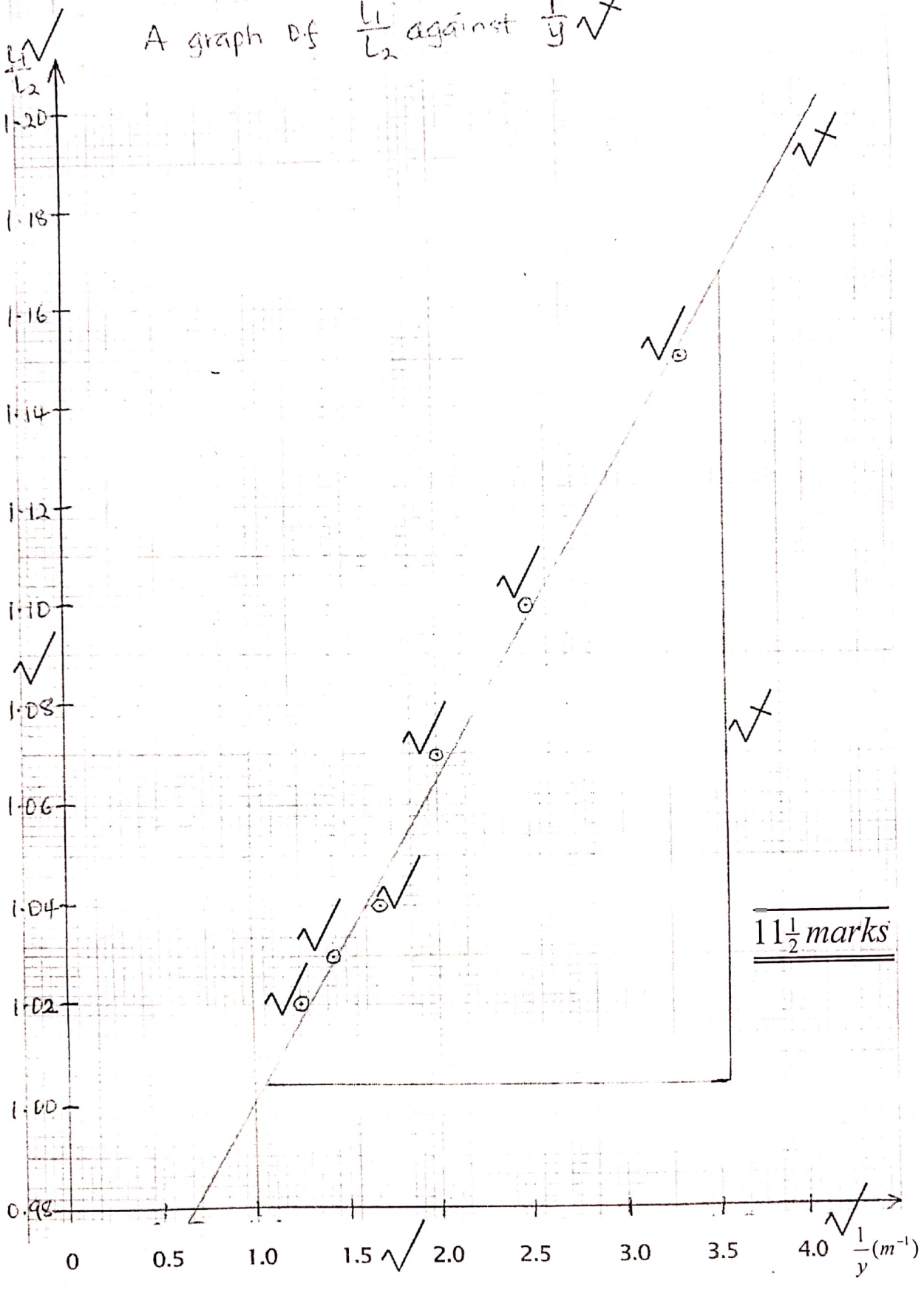
l) $r = \dfrac{0.0648(7.5 + 7.5)}{2}$

$= 0.486\Omega$

$28\frac{1}{2}$ marks

5

A graph of $\frac{L_1}{L_2}$ against $\frac{1}{y}$



$11\frac{1}{2}$ *marks*

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