Name **MYRON WYN EVANS**

Form **IV.1.** Date **1965**

Subject **ALGEBRA GRAPHS**

NEATNESS IS ESSENTIAL
ALL GRAPHS TO BE DRAWN IN PENCIL
ALL WRITING IS TO BE DONE IN INK

Draw the graph of $2y = x + \frac{4}{x}$ for values of x from 0.5 to 5. Take 1" as the unit on both axes. Use your graph to find the solutions of the equation $x + \frac{4}{x} = 4.8$. Draw the tangent at the point of curve which has $x=4$, and find its gradient.

x	0.5	1	2	3	4	5	0.25	2.5	1.5
x	0.5	1	2	3	4	5	0.25	2.5	1.5
$\frac{4}{x}$	8	4	2	$1\frac{1}{3}$	1	$\frac{4}{5}$	16	1.6	2.6
$2y$	8.5	5	4	$4\frac{1}{3}$	5	$5\frac{4}{5}$	16.25	4.1	4.1
y	4.25	2.5	2	2.17	2.5	2.9	8.125	2.05	2.05

1. $x + \frac{4}{x} = 4.8$

$\therefore 2y = 4.8$

$y = 2.4$

The solutions of the equation $x + \frac{4}{x} = 4.8$

are $x = 1.09$, and $x = 3.79$

2. Let the gradient of the tangent at the point of curve which $x = 4$ = m

Let the line be $y = mx + c$

The line cuts the y axis when $x = 1$.

$\therefore c = 1$

$\therefore y = mx + 1$

The point $(2.5, 4)$ lies on the line.

$\therefore 2.5 = 4m + 1$

$\therefore 4m = 1.5$

$m = \frac{1.5}{4}$

$= 0.375.$ $\therefore$ the gradient of the line is 0.375.

the line is $y = 0.375x + 1$

Graph of $2y = x + \frac{4}{x}$
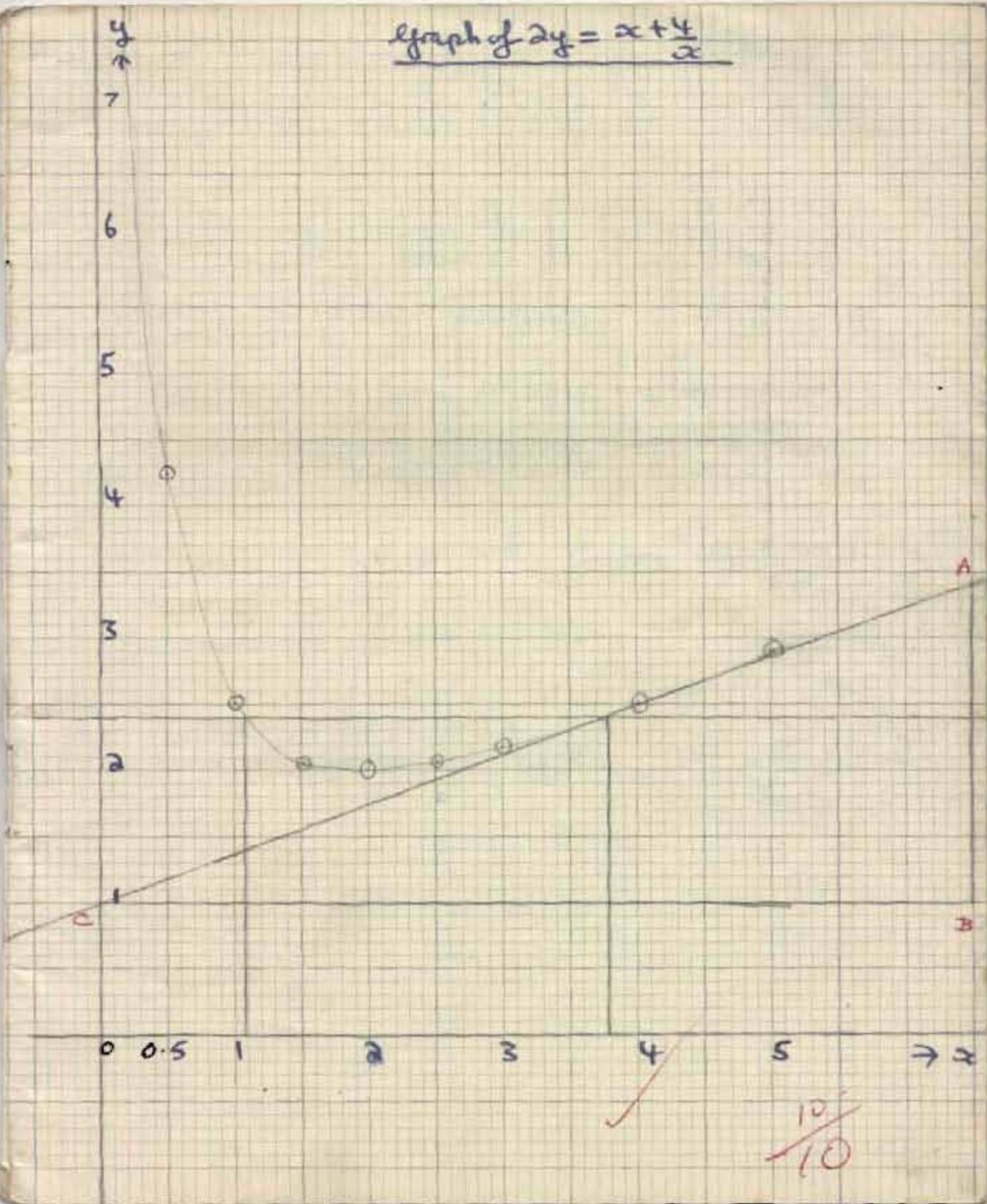
Draw the graph of $y = x^3 - 8x + 2$ from $x = -3$ to 3 (take 1" as the unit for values of x, 0.2" as the unit for values of y; it is advisable to plot at least 10 values). From the graph estimate the positive values of x for which y has a minimum value; also use the graph to find the solutions of the equation $x^3 - 8x = 3$.

x	-3	-2	-1	0	1	2	3	-2.5	-1.5	-1¼	1.5	-0.5	1.75	1.65
x^3	-27	-8	-1	0	1	8	27	-15.62 -3.375	-1.153		3.375	-0.125	5.359	4.492
$-8x$	24	16	8	0	-8	-16	-24	20.0 2	12.0 2	10 2	-12.0 2	4.0 2.0	-14 2	-13.2 2
	2	2	2	2	2	2	2	2						2
y	-1	10	9	2	-5	-6	5	6.38	10.625	10.047	-6.625	5.875	6.64	6708

(i) The positive value of x for which y has a minimum value is $x = 1.65$.

(ii) $x^3 - 8x = 3$

$x^3 - 8x - 3 = 0$

$\therefore x^3 - 8x + 2 = 5$

$\therefore y = 5$

$\therefore$ From graph $y = 5$. $\therefore$ solutions of equation $x^3 - 8x = 3$ are $x = 3$, $x = -0.39$; -2.6
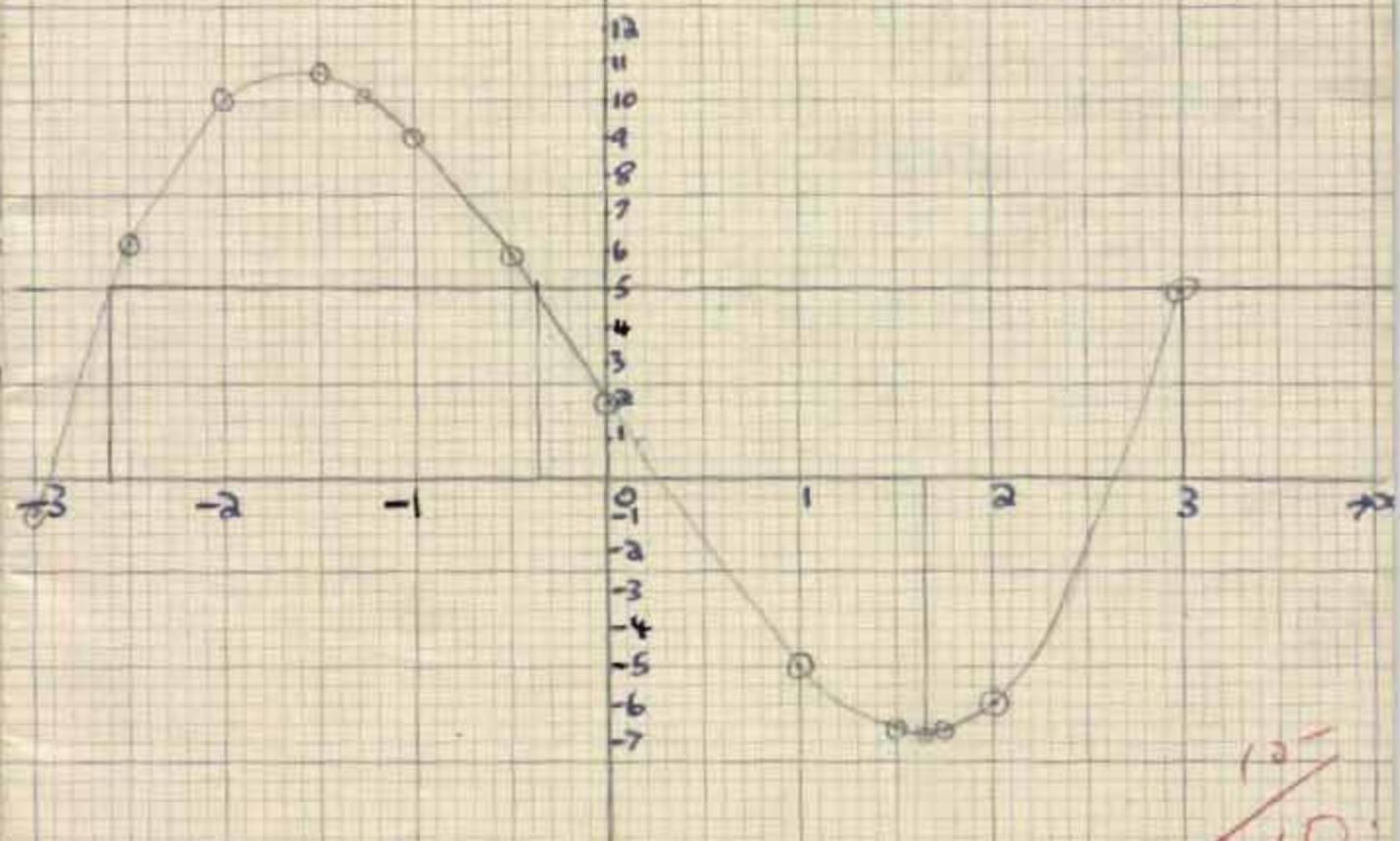
Graph of $y = x^3 - 8x + 2$

Draw the graph of $y = x^2 + 4x$ for values of x between -5 and 1 taking 1... one unit on both axes. Use your graph 1) To write down the range of values... values of x for which the value of the expression $x^2 + 4x$ is less than -2. 3... undrawing a suitable straight line graph. To solve the equation $x^2 + 3x$... $= 3$

x	-5	-4	-3	-2	-1	0	1	2	-4.5	0.5	-0.5
x^2	25	16	9	4	1	0	1	4	20.25	0.25	0.25
$4x$	-20	-16	-12	-8	-4	0	4	8	-18.0	2.0	-2.014
y	5	0	-3	-4	-3	0	5	12	2.25	2.25	-1.75

1. The range of values of x for which the value of the expression $x^2 + 4x$ is less than -2 : $x = 3.4$... to $x = -0.55$

2. $x^2 + 3x = 3$

$x^2 + 3x - 3 = 0$

$x^2 + 4x = x + 3$

$\therefore y = x + 3$

x	0	-1	-2
$\frac{x}{3}$	$\frac{0}{3}$	$\frac{-1}{3}$	$\frac{-2}{3}$
y	3	2	1

From the graph $y = x + 3$ $\therefore$ solutions of equation $x^2 + 3x = 3$ are $x =$
$-3.8, x = 0.8$

The graph of $y = x^2 + 4x$

$y = x + 3$

Draw
...
...
...
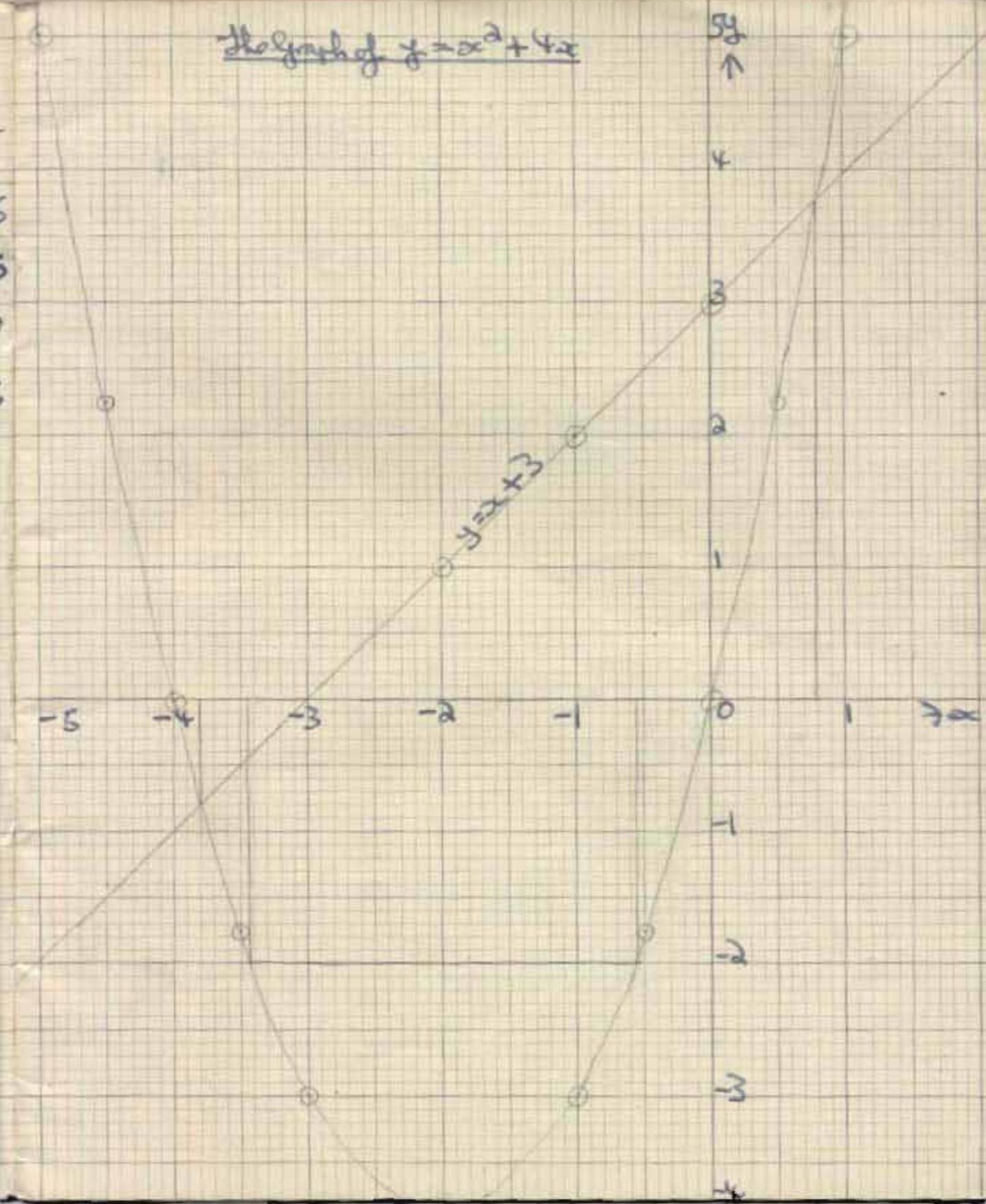
x	-2	-1	0	1	2	3	1.5	0.5	-2.5	3.5	-3	0.7
$3x^2$	12	3	0	3	12	27	6.75	0.75	18.75	36.25	27	1.47
$-4x$	8	4	0	-4	-8	-12	-6	-2	10	-14	12	-2.8
$+2$	2	2	2	2	2	2	2	2	2	2	2	2
y	22	9	2	1	6	17	2.75	0.75	30.75	24.25	41	2.27

The least value of $y = 0.75$ Ans = 0.67

x	-1	0	1
$2x$	-2	0	2
4	4	4	4
y	2	4	6

$3x^2 - 4x + 2$ is less than $2x + 4$
other from $x = -0.25$ to $x = 2.35$.

Note that the
point where the
...

Graph of $y = 3x^2 - 4x + 2$ ↑

35

30

25

20

15

10

5

$y = 2x + 4$

-3   -2   -1   0   1   2   3   →x

0.6 ?

Not 0.75

-5

Graph connecting wavelength to frequency. (from 200m - 600m.)

180.

160 -

140 -

120 -

100 -

Pork

Mutton.

Saving tins

beef

80 -

Dung

60 -

40 -

20 -

0   1 lb.   2 lb.   3 lb.   4 lb.   5 lb.   6 lb.
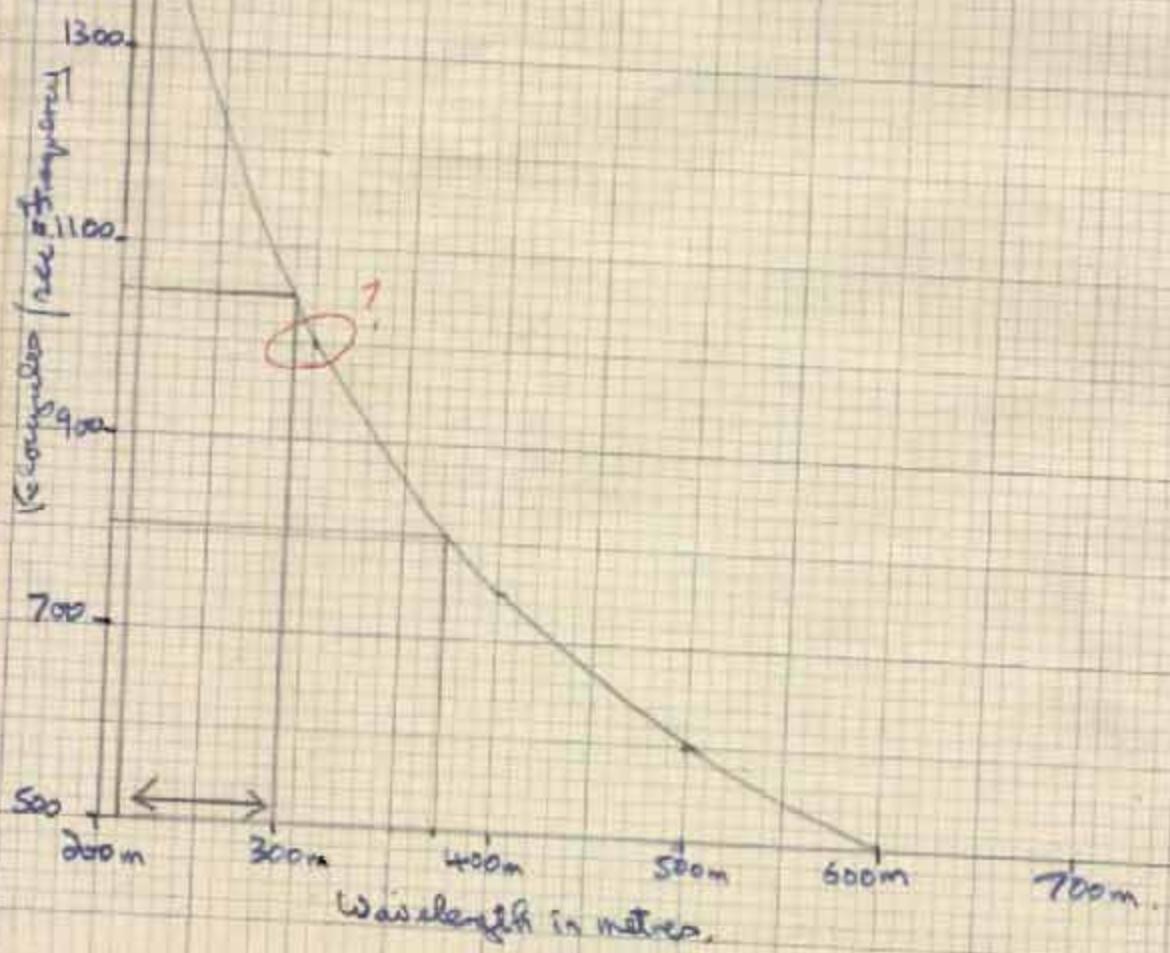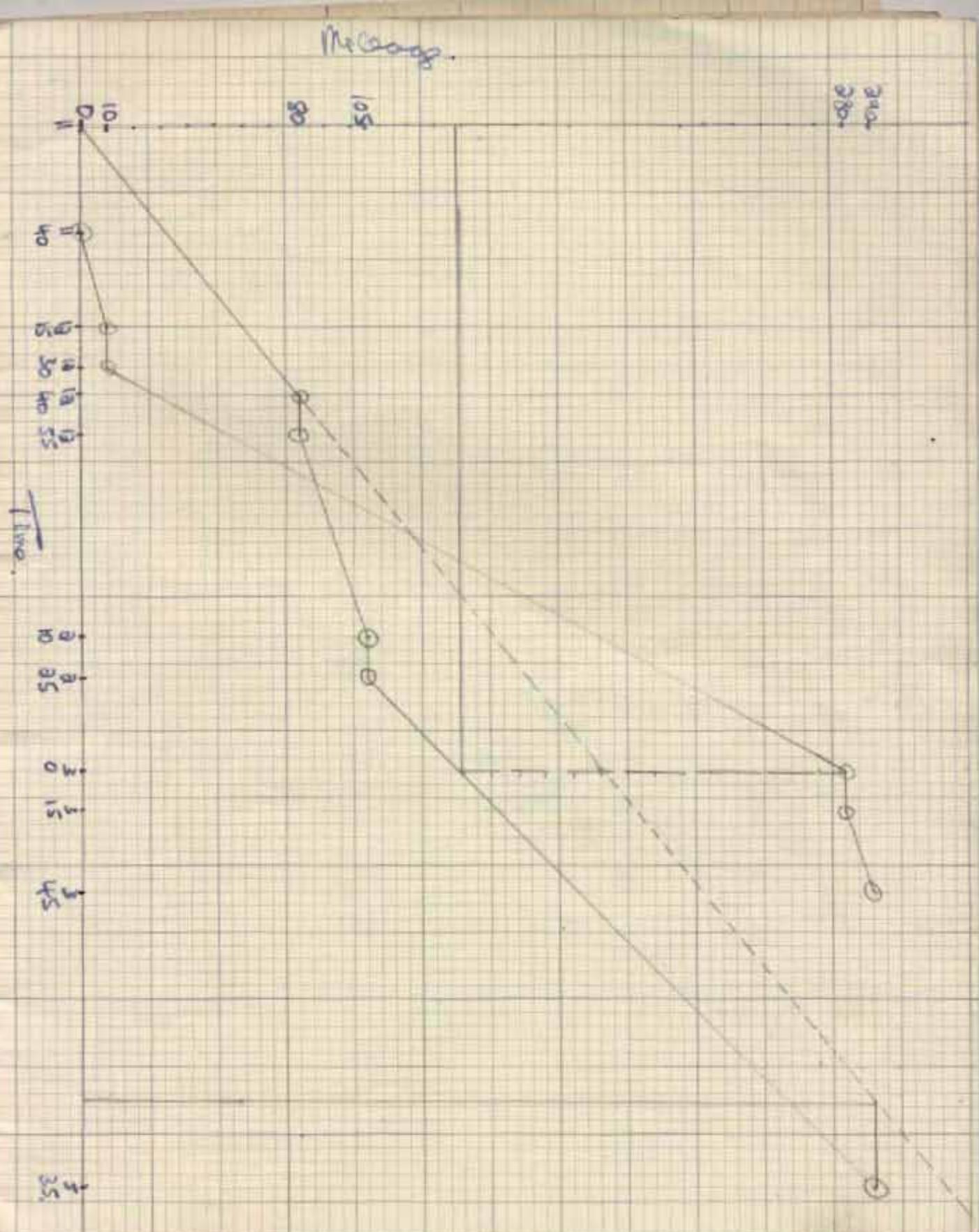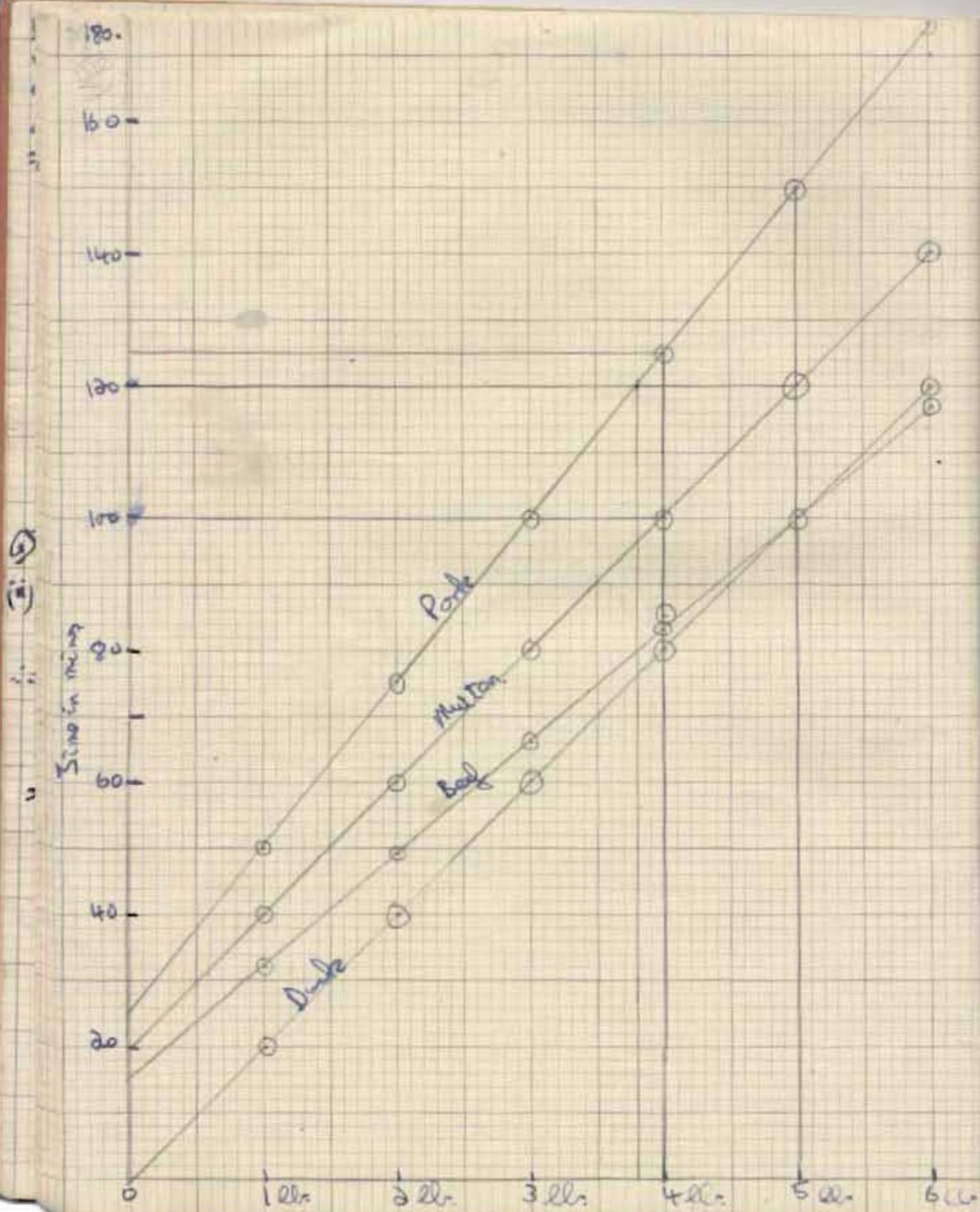
x	1	2	3
$5(1-\frac{1}{2x})$	$2\frac{1}{2}$	0	$-2\frac{1}{2}$
5	$2\frac{1}{2}$	0	$-2\frac{1}{2}$

i) The minimum value of $x^3 - 10x + 6$ is $y = 18\frac{1}{4}$

ii) $x = -2.79$ to $x = 0.15$ and $x > 2.69$

$y = 5\left(1 - \frac{1}{2x}\right)$
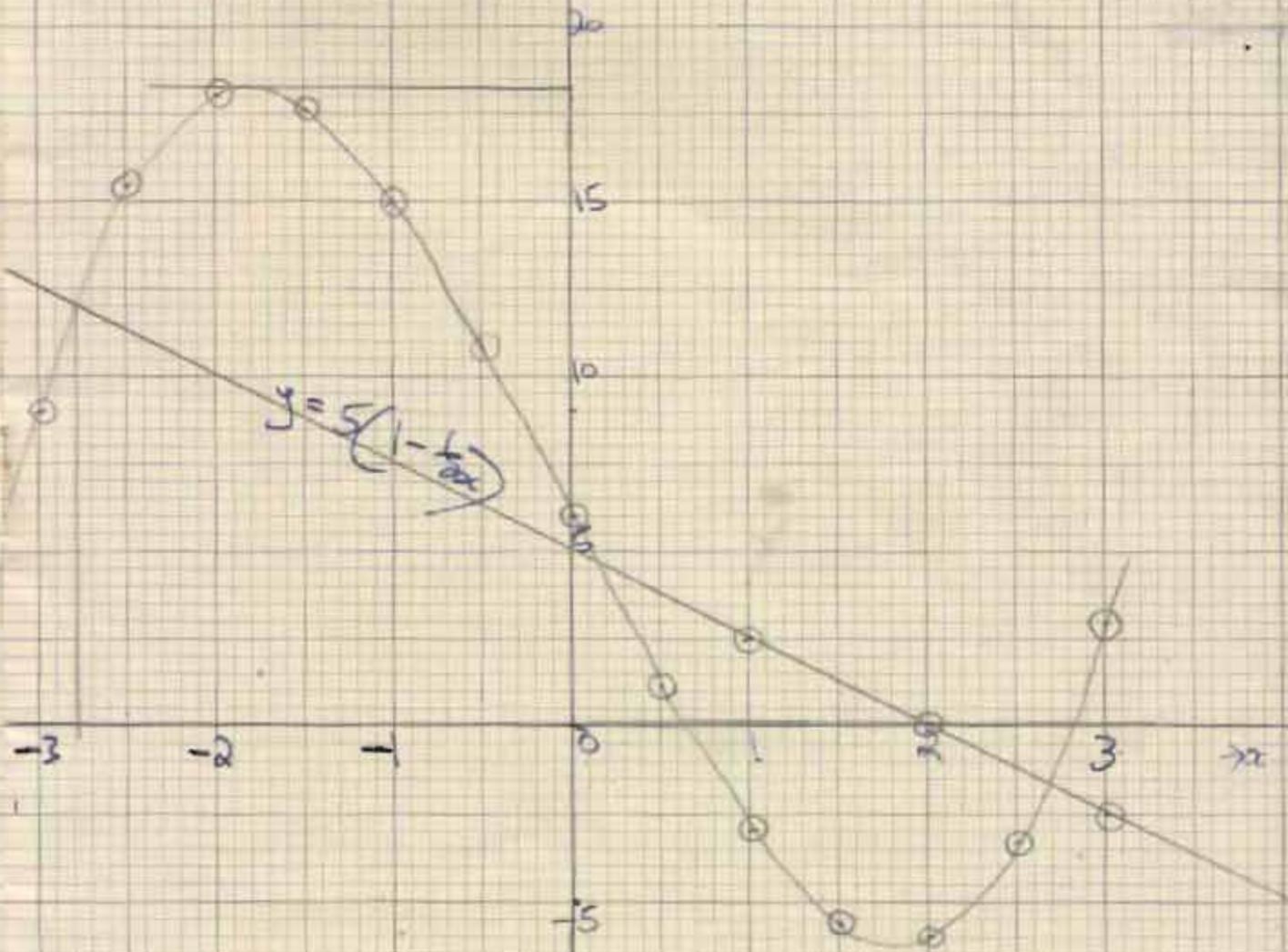
Draw the graph of $2y = 6 + 2x - x^2$,
$$4y = x + 4$$
Show that without solving that whether they intersect.
$$2x^2 - 3x = 8$$

when the graphs meet $\dfrac{6 + 2x - x^2}{2} = \dfrac{x+4}{4}$

$$\therefore \quad 4(6 + 2x - x^2) = x + 4$$
$$12 + 4x - 2x^2 = x + 4$$
$$12 + 4x - 2x^2 - x - 4 = 0$$
$$-2x^2 + 3x + 8 = 0$$
$$\therefore \quad 2x^2 - 3x = 8$$

$$2y = 6 + 2x - x^2$$
$$y = x^2 - 2x - 2$$

$$2y = 6 - 2$$
$$2y = 4.$$
$$y = 2.$$

What equation is satisfied when $y = 2x + 3$, and $y = x^3 + 5x - 4$ meet
when these two meet
$$2x + 3 = x^3 + 5x - 4$$
$$\therefore \quad x^3 + 5x - 4 - 2x - 3 = 0$$
as. $\quad x^3 + 3x - 7 = 0$

$2y + 3x = 4$

$y = 2x^2 + x + 1$

when they meet

$$\frac{2y - 3x + 4}{2} = 2x^2 + x + 1$$

$\therefore -3x + 4 = 2(2x^2 + x + 1)$

$\therefore -3x + 4 = 4x^2 + 2x + 2$

$\therefore 4x^2 + 2x + 2 + 3x - 4 = 0$

$\therefore 4x^2 + 5x - 2 = 0.$ ✓

$y = x^2 + 3x + 2.$

$x^2 + 2x - 1 = 0$

$x^2 + 3x + 2 = x + 3$

$\therefore y = x + 3$ is the straight line graph. ✓

$2y = x^2 + 3x + 4$

$x^2 - x - 2$

$\frac{1}{2}x^2 + 1\frac{1}{2}x + 2 = 2\frac{1}{2}x + 4$

$\therefore y = 2\frac{1}{2}x + 4$

$2y + x = 5$

$x^2 + x = y.$

when they meet
$$\frac{5 - x}{2} = x^2 + x$$

$\therefore 5 - x = 2(x^2 + x)$

$5 - x = 2x^2 + 2x$

$2x^2 + 2x - 5 + x = 0$

$2x^2 + 3x - 5 = 0$