CHAPTER FIFTEEN

Graphs

QUESTIONS WITH SUPPLEMENTARY NOTES

(Q1)(a) Copy and complete the table given below for the relation x + y = 180.

X	0	30	60	90	120	150	180
Y	180			90			0

(b)(i) Using a scale of 2cm to 20 units on both axes, draw two perpendicular axes Ox and Oy.

(ii) Mark both axes from 0 to 180.

Plot all the seven points and join them all together using a ruler.

(c) Using your graph, find

(i) y when x = 100.

(ii) x when y = 70.

Soln:

(a) From x + y = 180 => y = 180 – x

If x = 30 => y = 180 – x => y = 180 – 30 = 150.

If x = 60 = > y = 180 – x => y = 180 – 60 = 120.

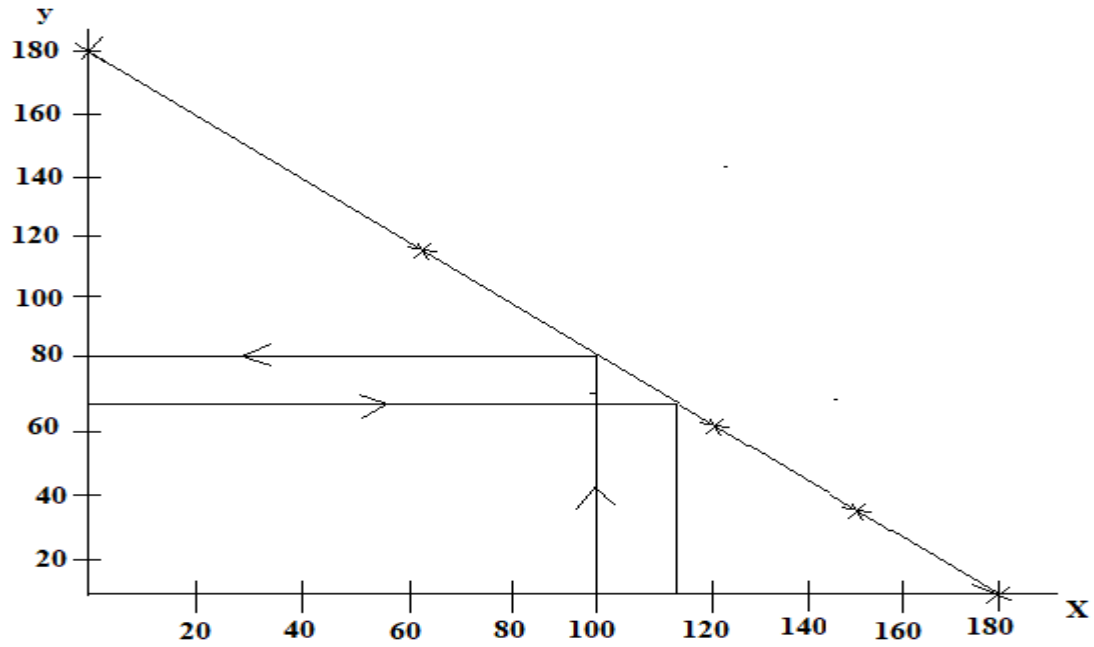
If x = 120 => y = 180 – x => y = 180 – 120 = 60.

If x = 150 => y = 180 – x => y = 180 – 150 = 30.

The final table becomes as shown next:

X	0	30	60	90	120	150	180
Y	180	150	120	90	60	30	0

(b)



(c) (i) From the point 100 on the x-axis, draw a straight line to meet the graph. Then from this meeting point, draw another straight line to meet the y-axis. This value on the y-axis is the required answer.

(ii) First locate the point 70 on the y-axis, and draw a straight line from this point to meet the graph. From this meeting point, draw another straight line to meet the x-axis. This meeting point is your answer.

(Q2) The mapping below has the rule, y = 2x + 3.

x	0	1	2	3	4
↓	↓	↓	↓	↓	↓
y	–	5	7	–	–

(a)(i) Copy the mapping and fill in the missing numbers.

(ii) Using a scale of 2cm to 1 unit on the x-axis and 2cm to 2 units on the y-axis with 0 being the origin, draw the perpendicular axes Ox and Oy on a graph sheet.

(iii) On the same graph sheet, mark the x- axis from 0 to 5 and the y-axis from 0 to 12.

(iv) Plot on the graph sheet the ordered pairs (x, y) from the mapping and join all the points using a straight edge.

(b) From your graph, find

(i) y when x = 3.5.

(ii) x when y = 8.

(iii) the gradient of the line y = 2x + 3.

Soln:

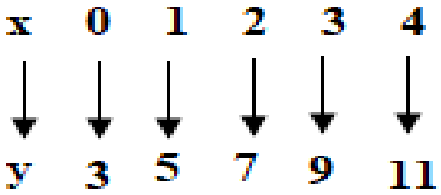
y = 2x + 3.

If x = 0, then y = 2x + 3 => y = 2(0) + 3, => y = 0 + 3 = 3.

If x = 3, then y = 2x + 3 => y = 2(3) + 3 => y = 6 + 3 = 9.

If x = 4, then y = 2x + 3 => y = 2(4) + 3, => y = 8 + 3 = 11.

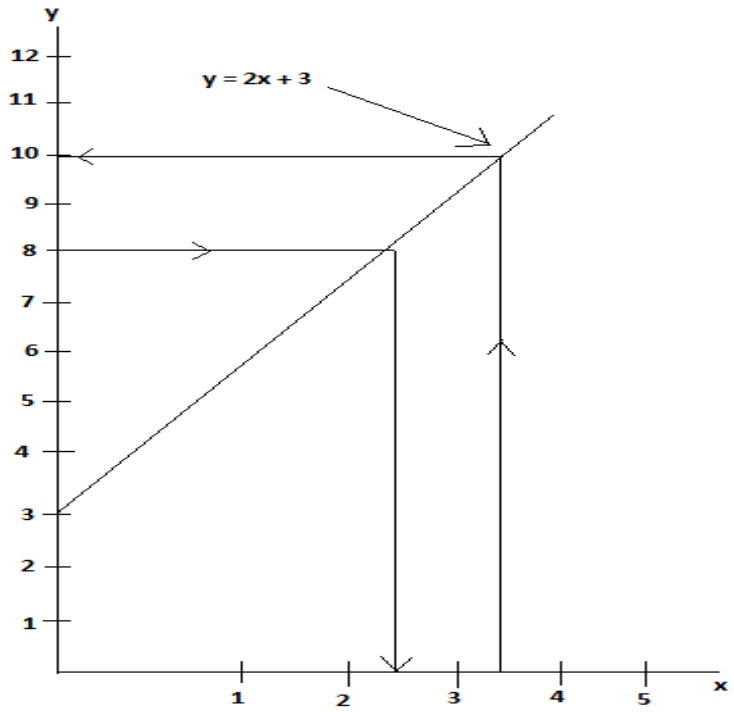
The mapping given becomes as shown next:



N/B: This mapping in a table form will appear as shown next:

X	0	1	2	3	4
Y	3	5	7	9	11

(iii)



(b)(i) From the graph, when x = 3.5, then y = 10.

NB. From the point 3.5 on the x-axis, draw a straight line to meet the graph, and draw another one from this meeting point to meet the y-axis.

(ii) From the final table, the graph passes through the points (2, 7) and (3, 9).

Let $(x_1, y_1) = (2, 7)$ and $(x_2, y_2) = (3, 9)$.

Then $x_1 = 2$, $y_1 = 7$, $x_2 = 3$ and $y_2 = 9$.

The gradient = $\frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 7}{3 - 2} = \frac{2}{1} = 2$.

(Q3)(i)(a) Copy and complete the table for values of x for the relations $y_1 = 2x + 5$ and $y_2 = 3 - 2x$ for x from - 4 to 3.

x	- 4	- 3	- 2	- 1	0	1	2	3
$y_1 = 2x + 5$	- 3							11
$y_2 = 3 – 2x$	11	9		5				-3

(b)(i) Using a scale of 2cm to 1 unit on the x-axis and 2cm to 2units on the y-axis, draw two perpendicular axes Ox and Oy on a graph sheet.

(ii) On the same graph sheet, draw the graphs of the relations $y_1 = 2x + 5$ and $y_2 = 3 – 2x$.

(c) Find the coordinates of the point where y_1 and y_2 meet.

Soln:

Consider first the relation $y_1 = 2x + 5$.

If x = - 3, then y = 2(-3) + 5 => y = - 6 + 5 = - 1.

If x = - 2, then y = 2(- 2) + 5 => y = - 4 + 5 = 1.

If x = 0, then y = 2(0) + 5 => y = 0 + 5 = 5.

If x = 2, then y = 2(2) + 5 => y = 4 + 5 = 9.

Next, consider the relation $y_2 = 3 – 2x$.

If x = - 2, then $y_2 = 3 – 2(-2)$ => $y_2 = 3 + 4 = 7$.

If x = 0, then $y_2 = 3 – 2(0)$ => $y_2 = 3 – 0 = 3$.

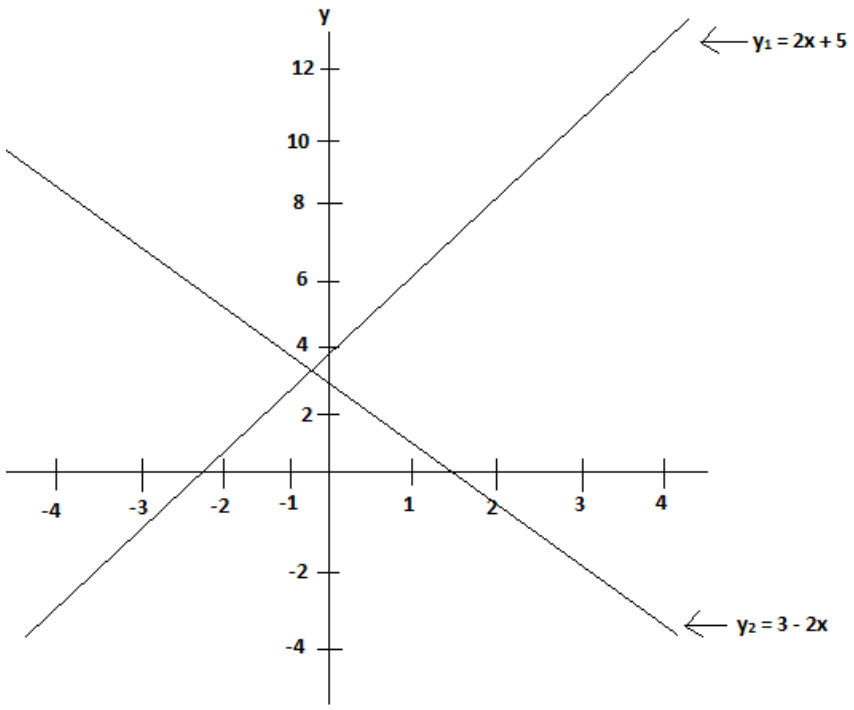
If x = 1, then $y_2 = 3 – 2(1)$ => $y_2 = 3 – 2 = 1$.

If x = 2, then $y_2 = 3 – 2 (2)$ => $y_2 = 3 – 4 = -1$.

Our table finally becomes as shown next:

x	- 4	- 3	- 2	- 1	0	1	2	3
$y_1 = 2x + 5$	- 3	- 1	1	3	5	7	9	11
$y_2 = 3 – 2x$	11	9	7	5	3	1	-1	-3

(b)



(c) Consider first the point of intersection of the two graphs, and determine the x and y coordinates concerned. From the graph drawn, then the coordinates of the point of intersection are (- 0.5, 4).