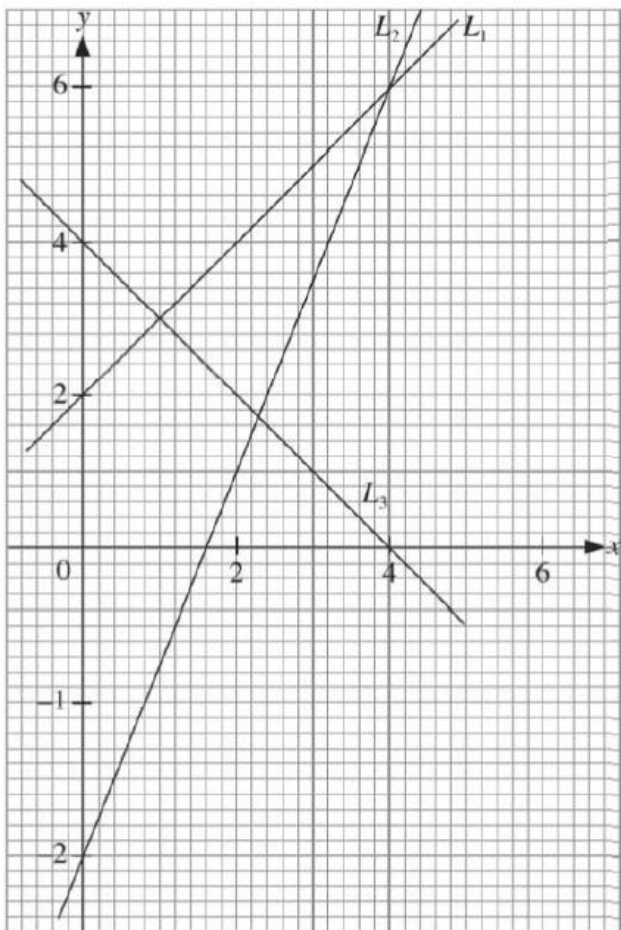
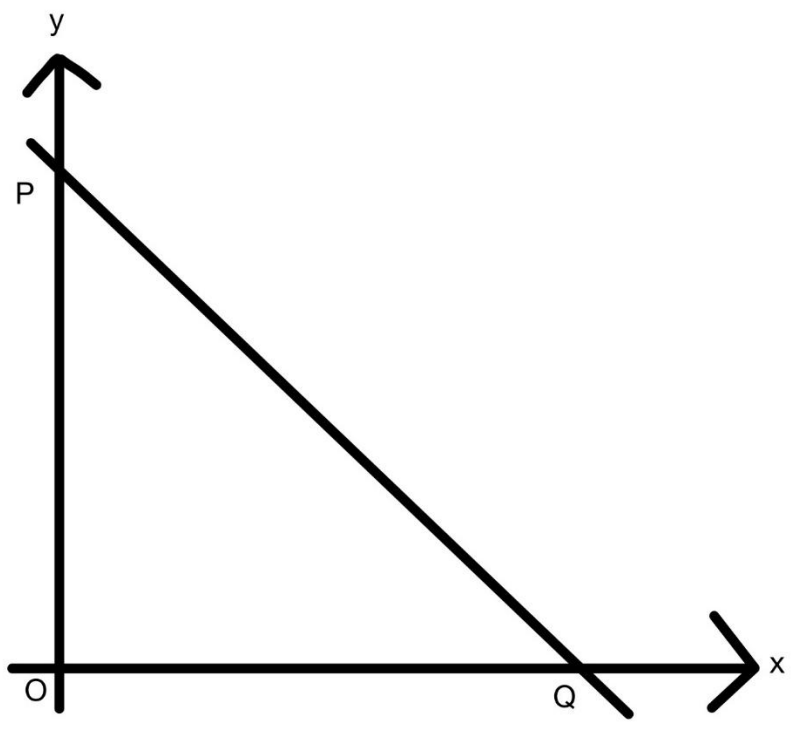
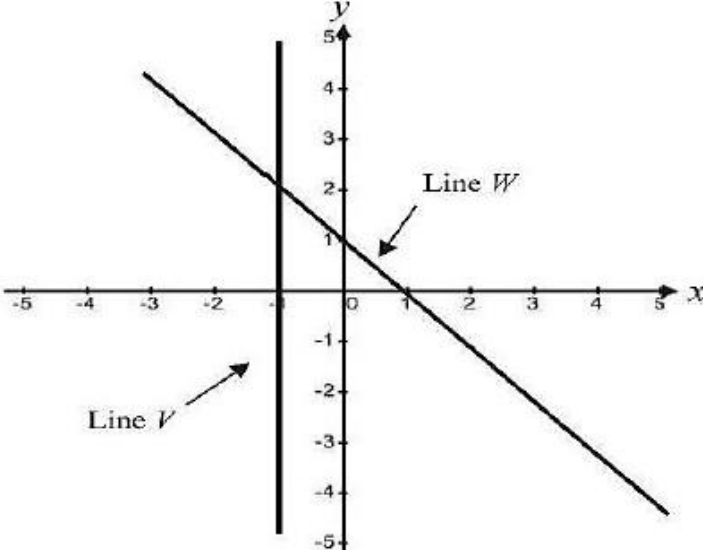
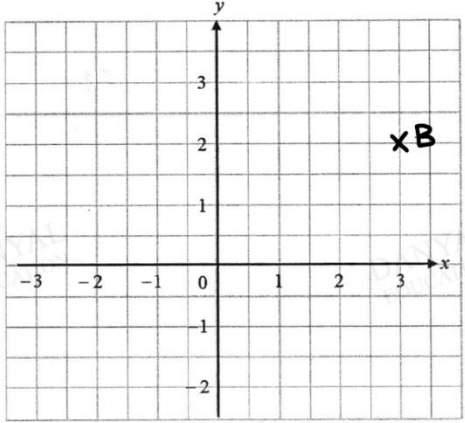


8 ESSENTIAL QUESTIONS TO MASTER

FUNCTIONS & LINEAR GRAPHS

1	The temperature of a cake was 10°C when it was taken from the refrigerator. The cake was placed in an oven. The temperature rose at a constant rate for 20 minutes. At the end of 20 minutes, the temperature was 90°C. Find: (a) The temperature after 12 minutes. (b) The number of minutes it took to reach 50°C.	[2] [1]
2	The equation of a function is $y = -\frac{1}{2}x + 3$. Find (a) the value of y when $x = \frac{2}{5}$, (b) the value of x when $y = -2$. Hence, explain why $(5, -1)$ does not lie on the line.	[1] [2]
3	Given that the equation of each of the following lines is in the form of $y = mx + c$, find the gradient m and state the y-intercept c of each line. 	

4	The equation of the line $2x - y + 6 = 0$ intersects the y-axis at point P and the x-axis at point Q.  (a) Determine the y-coordinate of point P. [1] (b) Calculate the slope (gradient) of the line PQ. [1] (c) If point Q is represented as $(q, 0)$, find the value of q. [1]									
5	(a) Copy and complete the table below. [1] <table border="1" data-bbox="256 1331 824 1415"><tr><td>x</td><td>-3</td><td>0</td><td>1</td></tr><tr><td>$y=2x+5$</td><td></td><td></td><td></td></tr></table> (b) Draw the graph of the equation $y=2x+5$ from $x=-3$ to $x=1$. [3] From the graph find the value of x when $y=-\frac{13}{2}$	x	-3	0	1	$y=2x+5$				
x	-3	0	1							
$y=2x+5$										
6	The total cost, C, for admission to the City Zoo for a adults and c children is given by the equation $C = 45a + 15c$. (a) Calculate the total cost for three adults and five children to enter the zoo. [1] (b) What do the coefficients of a and c represent in the equation? [1] (c) If the total cost for a adults and two children is \$210, find the number of adults. [1]									
7	Write down the equation of the following graphs. (a) Line V [1] (b) Line W [1]									

		
8	B is a point on the coordinate plane.  a) Write down the coordinate of B. b) Plot and label clearly the coordinate of A (-1,-2) in the coordinate plane. c) Find the gradient of AB.	[1] [1] [2]

Answer Key:

1	(a) Temperature increased from 10°C to 90°C in 20 minutes. Total temperature increase is $90^{\circ}\text{C} - 10^{\circ}\text{C} = 80^{\circ}\text{C}$. Rate of temperature increase is $\frac{80^{\circ}\text{C}}{20 \text{ minutes}} = 4^{\circ}\text{C}$ per minute. Initial temperature was 10°C.	
---	--	--

	After 12 minutes, the temperature increased by $12 \text{ minutes} \times 4^{\circ}\text{C} = 48^{\circ}\text{C}$ The temperature after 12 minutes is $10^{\circ}\text{C} + 48^{\circ}\text{C} = 58^{\circ}\text{C}$. (b) Temperature needs to increase from 10°C to 50°C, which is a change of $50^{\circ}\text{C} - 10^{\circ}\text{C} = 40^{\circ}\text{C}$. Since the temperature increases at a rate of 4°C per minute, the time it takes to reach 50°C is $\frac{40^{\circ}\text{C}}{4^{\circ}\text{C/minute}} = 10 \text{ minute}$	
2	(a) Substitute $x = \frac{3}{4}$ into the equation: $y = -\frac{1}{3}\left(\frac{3}{4}\right) + 2$ $y = -\frac{1}{4} + 2$ $y = -\frac{1}{4} + \frac{8}{4}$ $y = \frac{7}{4}$ So, when $x = \frac{3}{4}, y = \frac{7}{4}$. (b) Substitute $y = -1$ into the equation: $-1 = -\frac{1}{3}x + 2$ Subtract 2 from both sides: $-1 - 2 = -\frac{1}{3}x$ $-3 = -\frac{1}{3}x$ Multiply both sides by -3: $(-3)(-3) = x$ $9 = x$ So, when $y = -1, x = 9$. (c) To determine if the point (7, -1) lies on the line, substitute $x = 7$ and $y = -1$ into the equation and see if it holds true: $-1 = -\frac{1}{3}(7) + 2$ $-1 = -\frac{7}{3} + 2$ $-1 = -\frac{7}{3} + \frac{6}{3}$ $-1 = -\frac{1}{3}$ Since $-1 \neq -\frac{1}{3}$, the point (7, -1) does not lie on the line.	

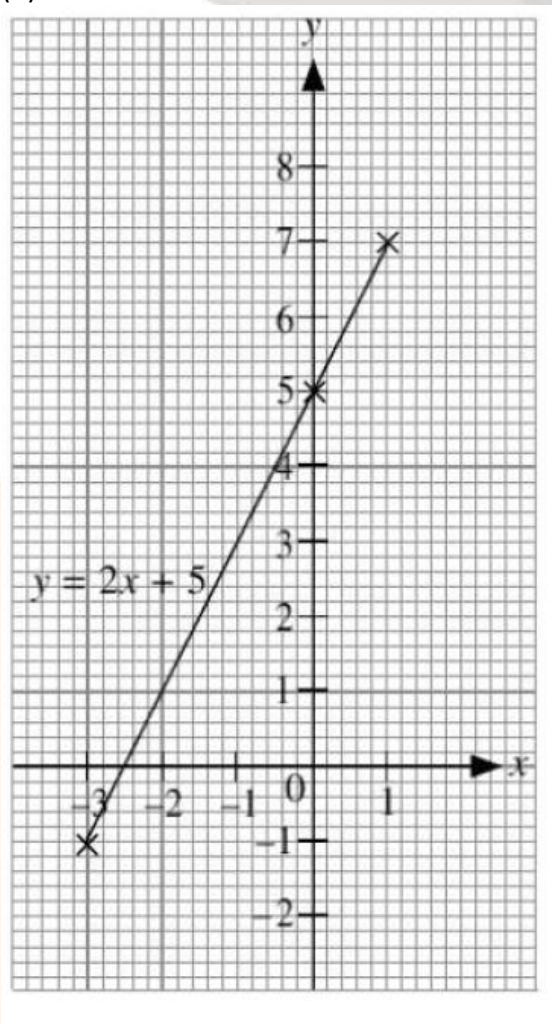
	The point (7, -1) does not lie on the line because substituting $x = 7$ into the equation does not yield $y = -1$.	
3	For L_1: Vertical change (or rise) = $6 - 2 = 4$ Horizontal change (or run) = $4 - 0 = 4$ Since the line slopes upwards from the left to the right, its gradient is positive. $m = \text{gradient of line} = \frac{4}{4} = 1$ $c = \text{y-intercept}$ $y = 2$ For L_2: Vertical change (or rise) = $6 - (-2) = 8$ Horizontal change (or run) = $4 - 0 = 4$ Since the line slopes upwards from the left to the right, its gradient is positive. $m = \text{gradient of line} = \frac{8}{4} = 2$ $c = \text{y-intercept}$ $y = -2$ For L_3: Vertical change (or rise) = $4 - 0 = 4$ Horizontal change (or run) = $4 - 0 = 4$ Since the line slopes downwards from the left to the right, its gradient is negative. $m = \text{gradient of line} = -\frac{4}{4} = -1$ $c = \text{y-intercept}$ $y = 4$	
4	(a) To find the y-intercept, we set $x = 0$ in the equation of the line: $2(0) - y + 6 = 0$ $-y + 6 = 0$ $y = 6$ So, the y-coordinate of point P is 6. (b) First, we rewrite the equation in the slope-intercept form, which is $y = mx + c$, where m is the slope. $2x - y + 6 = 0$ $y = 2x + 6$ From this, we can see that the slope m is 2. (c) $2x - 0 + 6 = 0$ $2x = -6$ $x = -3$ Since $Q(-3, 0)$, $q = -3$	

5

(a)

x	-3	0	1
$y=2x+5$	$2 \times (-3) + 5 = -1$	$2 \times (0) + 5 = 5$	$2 \times (1) + 5 = 7$

(b)



(c) From the graph, the value of x is about -5

(Note: It is necessary to extrapolate the graph so that we can find the value of x when y is less than -6.)

6

(a) $C = 45(3) + 15(5) = 135 + 75 = 210$

(b) The coefficient of a which is 45, represents the cost per adult.
The coefficient of c, which is 15, represents the cost per child.

(c)

$$210 = 45a + 15(2)$$

$$210 = 45a + 30$$

$$210 - 30 = 45a$$

	$180 = 45a$ $a = \frac{180}{45}$ $a = 4$	
7	(a) $x = -1$ (b) $y = -x + 1$	
8	(a) (3,2) (b) * Locate the point where $x = -1$ on the x-axis. * Locate the point where $y = -2$ on the y-axis. * Plot the point where these two lines intersect. * Label the point $A(-1, -2)$. (c) Use the gradient formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{2 - (-2)}{3 - (-1)} = \frac{2 + 2}{3 + 1} = \frac{4}{4} = 1$	