

Name: \_\_\_\_\_

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# Graphs

## Foundation Questions

Date: \_\_\_\_\_

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**Time:** 48 minutes

**Total marks available:** 48

**Total marks achieved:** \_\_\_\_\_

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## Questions

### Q1.

(a) Simplify  $7x + 2y - 3x + 4y$

.....  
(2)

(b) Factorise  $10x - 15$

.....  
(1)

(c) Solve  $5p = 3p + 8$

$p =$  .....  
(2)

**(Total for question = 5 marks)**

### Q2.

(a) Solve  $f + 2f + f = 20$

$f =$  .....  
(1)

(b) Solve  $18 - m = 6$

$m =$  .....  
(1)

(c) Simplify  $d^2 \times d^3$

.....  
(1)

**(Total for question is 3 marks)**

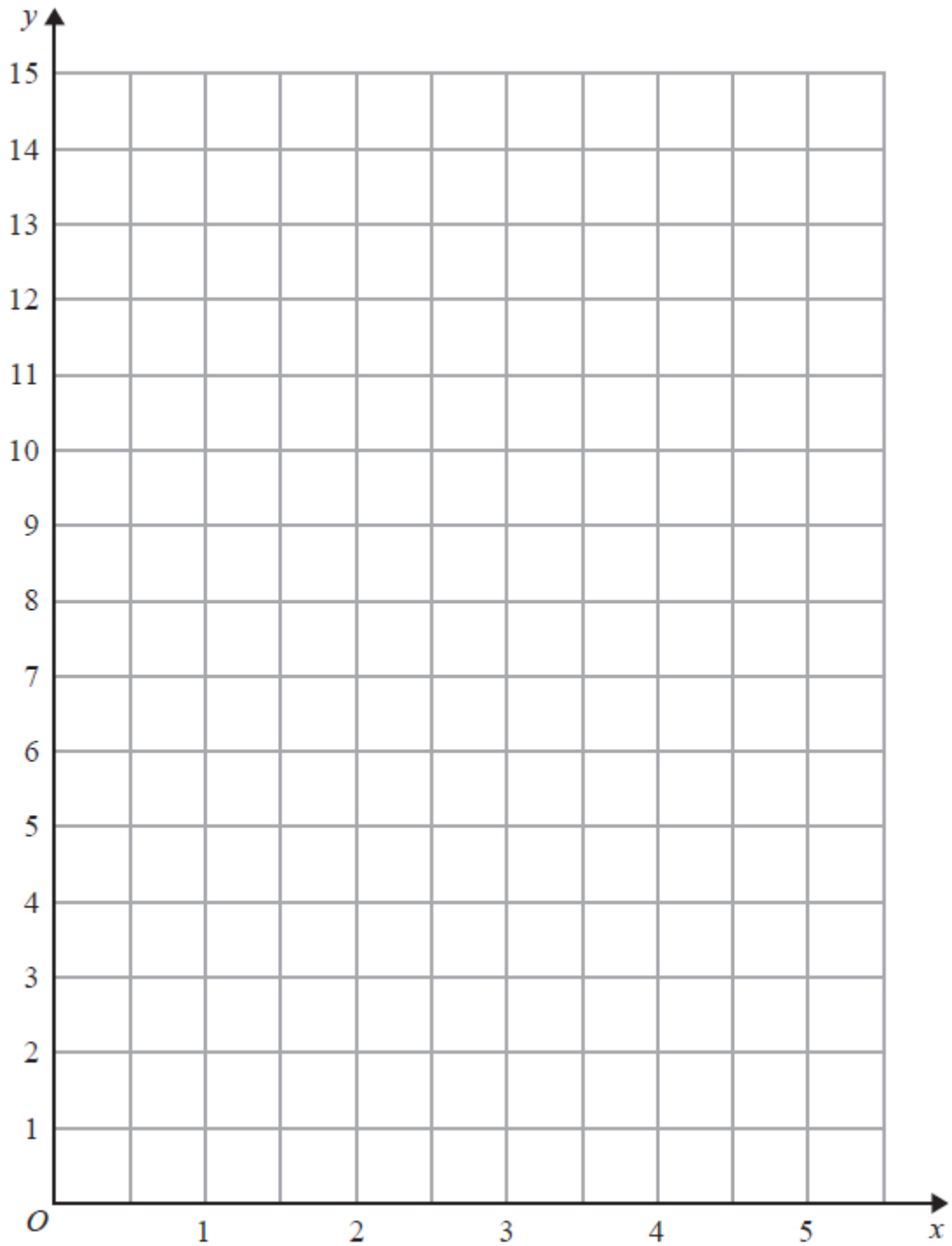
### Q3.

(a) Complete the table of values for  $y = 2x + 3$  for values of  $x$  from 0 to 5

$x$	0	1	2	3	4	5
$y$		5		9		

(2)

(b) On the grid, draw the graph of  $y = 2x + 3$  for values of  $x$  from 0 to 5



(2)  
 (Total for question = 4 marks)

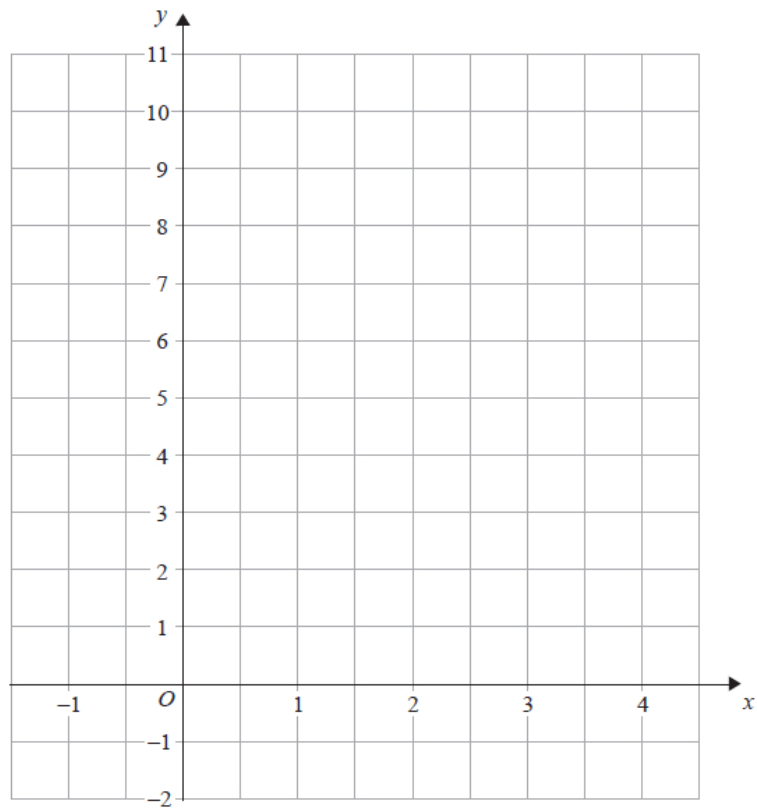
**Q4.**

(a) Complete the table of values for  $y = 8 - 2x$

$x$	-1	0	1	2	3	4
$y$			6			0

(2)

(b) On the grid, draw the graph of  $y = 8 - 2x$  for values of  $x$  from  $-1$  to  $4$



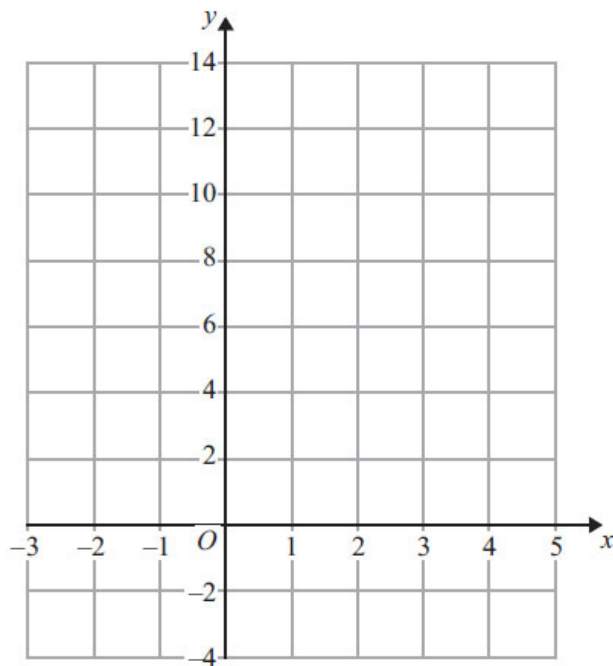
(2)  
(Total for question = 4 marks)

**Q5.**

(a) Complete the table of values for  $y = 2x + 2$

$x$	-2	-1	0	1	2	3	4
$y$	-2				6		

(b) On the grid, draw the graph of  $y = 2x + 2$



(2)  
(Total for Question is 4 marks)

**Q6.**

The equation of a straight line **L** is  $y = 3 - 4x$

(i) Write down the gradient of **L**.

.....  
(1)

(ii) Write down the coordinates of the point where **L** crosses the  $y$ -axis.

( ..... , ..... )  
(1)

**(Total for question = 2 marks)**

**Q7.**

The straight line **L**<sub>1</sub> passes through the points with coordinates (4, 6) and (12, 2)

The straight line **L**<sub>2</sub> passes through the origin and has gradient -3

The lines **L**<sub>1</sub> and **L**<sub>2</sub> intersect at point *P*.

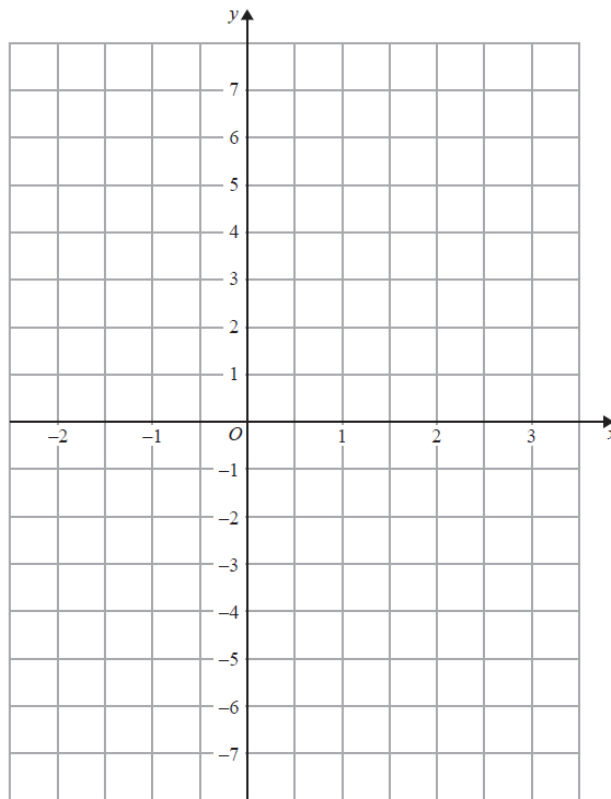
Find the coordinates of *P*.

( ..... , ..... )

**(Total for question = 4 marks)**

**Q8.**

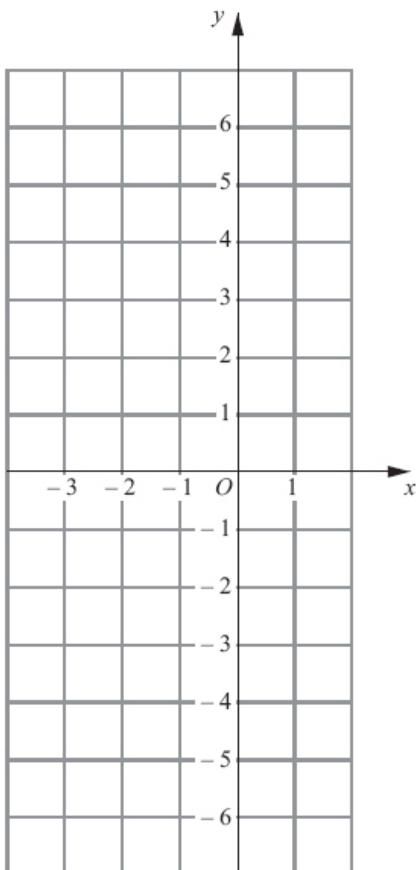
On the grid, draw the graph of  $y = 2x - 3$  for values of  $x$  from  $-2$  to  $3$



**(Total for question = 3 marks)**

**Q9.**

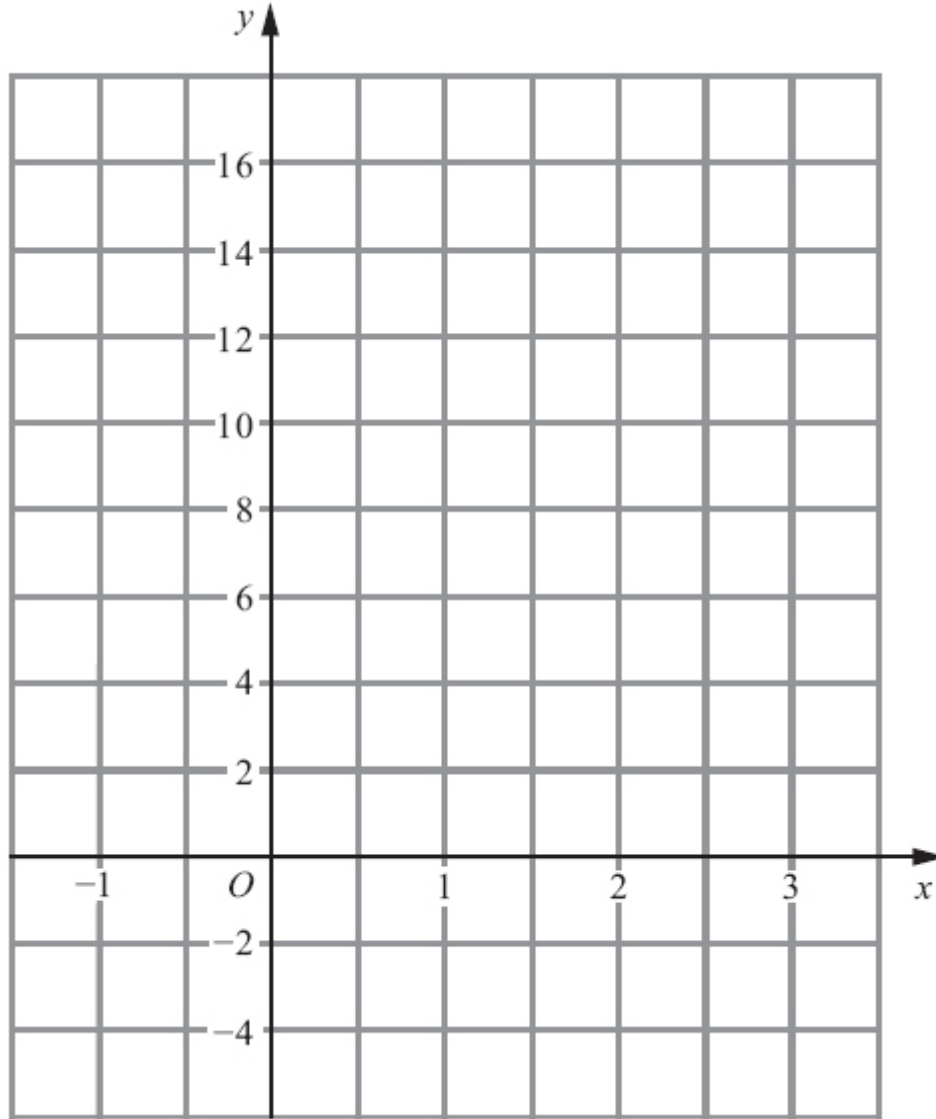
On the grid, draw the graph of  $y = 2x + 3$  for values of  $x$  from  $x = -3$  to  $x = 1$



**(Total for Question is 3 marks)**

**Q10.**

(a) On the grid, draw the graph of  $y = 4x + 2$  from  $x = -1$  to  $x = 3$



(3)

(b) (i) Write down the equation of a straight line that is parallel to  $y = 4x + 2$

.....

(ii) Write down the gradient of a straight line that is perpendicular to  $y = 4x + 2$

.....

(2)

**(Total for Question is 5 marks)**

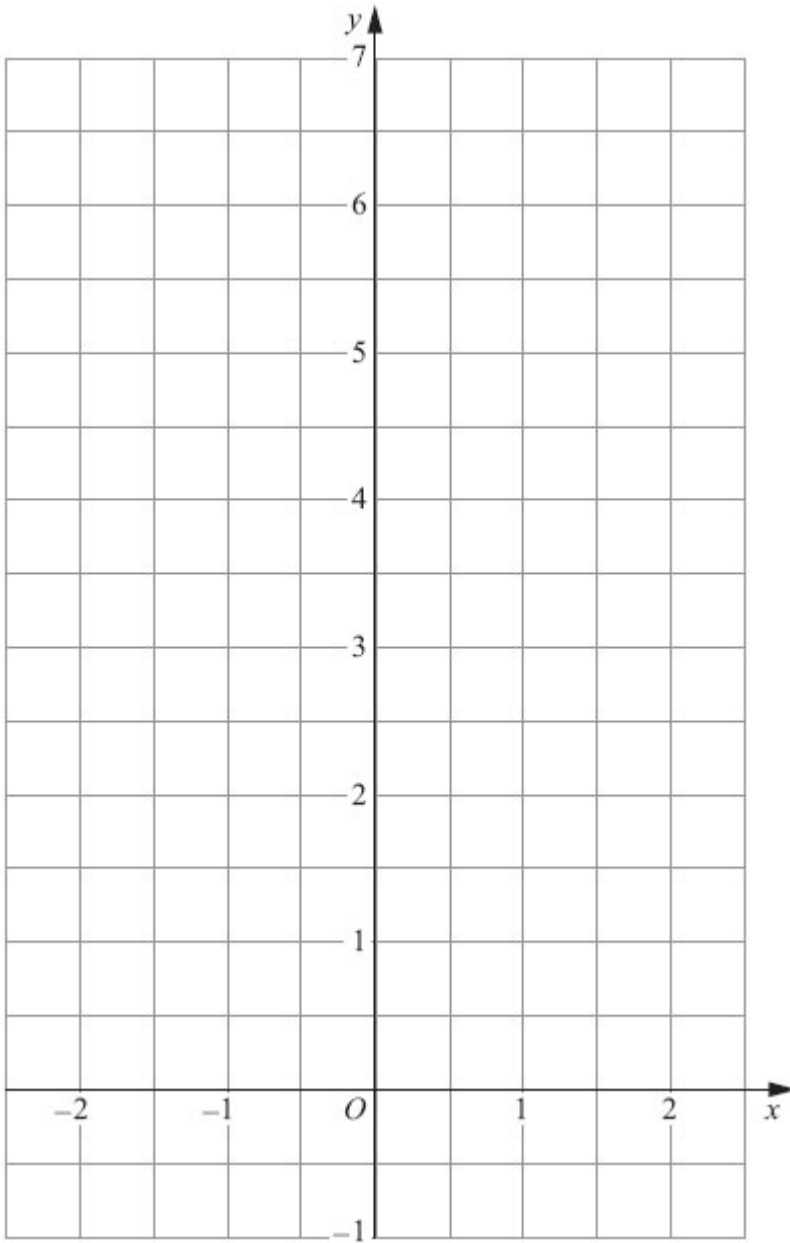
**Q11.**

(a) Complete the table of values for  $y = \frac{1}{2}x + 4$

x	-2	-1	0	1	2
y	3		4		

(2)

(b) On the grid, draw the graph of  $y = \frac{1}{2}x + 4$



(2)

(c) (i) On the grid, draw the line that is perpendicular to  $y = \frac{1}{2}x + 4$  and passes through the point with coordinates (0, 4).

(ii) Find the equation of this line.

.....

(3)



**(Total for Question is 7 marks)**

**Q12.**

(a) Write down the equation of a straight line that is parallel to  $y = 5x + 6$

.....

**(1)**

(b) Find an equation of the line that is perpendicular to the line  $y = 5x + 6$  and passes through the point  $(-2, 5)$ .

.....

**(3)**

**(Total for Question is 4 marks)**

**Q1.**

No Examiner's Report available for this question

**Q2.**

No Examiner's Report available for this question

**Q3.**

Students appeared well prepared for this question. The provision of a partly completed table of values and axes helped ensure that well over half of students gained full marks. Occasionally, students plotted the points correctly but failed to join them with a straight line. This question was another one where good checking strategies could be used to identify errors. When points plotted did not form a line, not only could the appropriate points themselves be reviewed but also the matching table entries in part (a).

**Q4.**

Many scored full marks for their table, with the value for  $x = -1$  proving the most challenging. The biggest loss of marks in part (b) was for those students who correctly plotted the points, but then failed to join them to give the line. Some who drew a correct line by ignoring some incorrect points then failed to go back to the table to correct them.

**Q5.**

This question was done quite well. Many candidates were able to complete the table and draw the line. A common incorrect answer in part (a) was  $y = -1$  (at  $x = -1$ ). In part (b), a significant number of candidates were able to plot the points correctly but did not connect with a straight line. Some candidates, having made an error in the table, then went on to plot the correct line in part (b), thus ignoring the error in the table. Many candidates did not use a ruler to draw the straight line.

**Results Plus: Examiner Tip**

Candidates should be advised to draw lines over the entire interval defined by the values of  $x$  in the table.

**Q6.**

In this cohort, very few students showed any understanding of  $y = mx + c$

Closest attempts were 3 or 4 in part (a) and (3, 4) or (3, -4) in part (b).

**Q7.**

Students sometimes gained the first mark for either showing a method to find the gradient of  $L_1$ , or for stating  $L_2$  as  $y = -3x$ . A few tried working with the general equation  $y = mx + c$  but most did not know what to do with it.

**Q8.**

There were many fully correct answers to this straight line question. A smaller number than usual forgot to draw in the line, which was good. However, as usual, many made errors in calculating with the negative values of  $x$

**Q9.**

There were many candidates who failed to attempt this question, and few gained full marks. The most successful attempts were from those who drew a table of values. Some drew a line which sometimes went through (0,3), but rarely had the correct gradient.

**Q10.**

Over 50% of candidates drew clear, accurate graphs and scored full marks in the first part of this question. Most candidates plotted two or more points which they then joined to form a straight line. Relatively few candidates constructed a table of values before plotting points. A significant minority of candidates tried to use the gradient-intercept method to draw the line. This approach proved less successful. Most candidates using this method drew lines passing through (0, 2) but with an incorrect gradient. There was little evidence to suggest that the different scales on the  $x$  and  $y$  axes had confused candidates.

In part (b)(i) nearly 60% of candidates gave a correct equation. Of those who were not successful, a few gave an expression rather than an equation. In part (b)(ii) correct answers were rare. A large number of candidates who demonstrated an understanding of the situation gave the equation of a perpendicular line rather than the gradient. This highlights the need for candidates to ensure they read the particular demands of a question carefully.

**Q11.**

Part (a) was well answered with the vast majority of candidates gaining full marks. and only 4% failing to gain a mark.

Part (b) was answered well with the majority of candidates scoring 2 marks for drawing the correct line. Those who had errors in (a) generally scored 1 mark for plotting their points correctly.

Part (c), many candidates did not attempt to draw a perpendicular line. Of those who did, the most common incorrect response was to draw a reflection in the y axis of their line. Candidates had varying success in finding the equation of the perpendicular line. Some were able to use the fact that the gradients of the two lines had to multiply together to give -1 in order to work out the gradient of the perpendicular and so were able to use this to find the correct equation even if their perpendicular line was non-existent or incorrect. Others found the gradient of their 'perpendicular' line from their diagram and then used this together with the y-intercept to give the equation for their line thus gaining the follow through marks.

**Q12.**

In part (a) half the candidates could provide an equation of a straight line parallel to the given line with some enjoying providing unusual, but correct answers such as  $y = 5x + 123456789$

The most common incorrect responses were simply to swap the 5 and 6 over, doubling and writing  $y = 10x + 12$ , omitting  $y =$  or writing  $y = -5x + 6$

In part (b) there were hardly any fully correct answers (< 4%). Many had no idea what to do, with 86% not scoring at all. Around 9% scored 1 mark for a correct gradient seen. However many wrote  $-1/(5x)$  rather than  $(-1/5)x$ . Substitution of  $x = -2$  and  $y = 5$  into any equation was seldom seen. A significant number of candidates did not attempt this question at all whilst others attempted to draw a sketch and got no further.

**Mark Scheme****Q1.**

Question	Working	Answer	Notes
(a)		$4x + 6y$	M1 for $4x$ or $6y$ A1 for $4x + 6y$ or $2(2x + 3y)$
(b)		$5(2x - 3)$	B1 cao
(c)		4	M1 for method to isolate terms in $p$ on one side and constants on the other side A1 cao

**Q2.**

Paper 1MA1: 3F			
Question	Working	Answer	Notes
(a)		5	B1 cao
(b)		12	B1 cao
(c)		$d^5$	B1

**Q3.**

Question	Working	Answer	Mark	Notes
(a)		3 (5) 7 (9) 11, 13	2	B2 for 3, 7, 11, 13 (B1 for 2 or 3 correct values)
(b)		Graph drawn	2	M1 (may fit from (a) if B1 awarded) for at least 5 points correctly plotted A1 for correct graph from $x = 0$ to $x = 5$

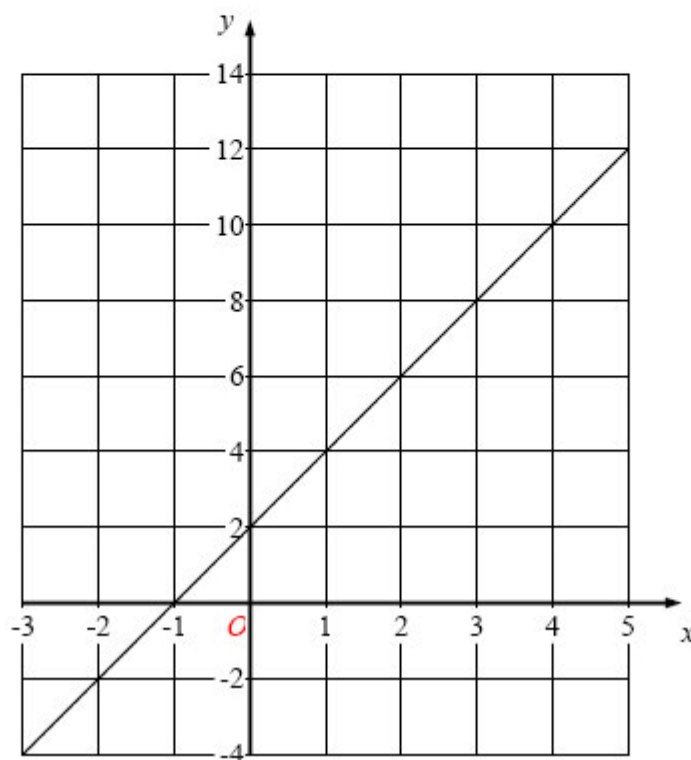
**Q4.**

PAPER: IMA0/2F				
Question	Working	Answer	Mark	Notes
(a)		10, 8, (6), 4, 2, (0)	2	B2 for fully correct table (B1 for 2 or 3 entries correct)
(b)		line drawn	2	B2 for correct straight line between $x = -1$ and $x = 4$ (B1 for a single straight line which passes through (0, 8) or for a single straight line with negative gradient $-2$ or for at least 5 points from their table plotted correctly)

**Q5.**

	Working	Answer	Mark	Notes																
(a)		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>y</td> <td>-2</td> <td>0</td> <td>2</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> </tr> </table>	x	-2	-1	0	1	2	3	4	y	-2	0	2	4	6	8	10	2	B2 cao (B1 for any 2 correct values)
x	-2	-1	0	1	2	3	4													
y	-2	0	2	4	6	8	10													
(b)		Correct graph	2	B2 for a correct line through at least two correct points (B1 for correct points plotted ft their table if at least B1 earned in part a)																

**b**



**6.**

Question	Answer	Mark	Mark scheme	Additional guidance
(i)	-4	B1	cao	
(ii)	(0, 3)	B1	cao	

Q7.

Question	Answer	Mark	Mark scheme	Additional guidance
	$\left(\frac{-16}{5}, \frac{48}{5}\right)$	P1	for a method to find gradient of $L_1$ eg $\frac{6-2}{4-12} (= -\frac{1}{2})$ or states $L_2$ as $y = -3x$	Ignore sketches.
		P1	(dep on P1) for a method to find equation of $L_1$ eg subs into $y = "-\frac{1}{2}"x + c$ OR states $L_1$ as $y = "-\frac{1}{2}"x + 8$	
		P1	(dep on P2) complete method to equate both lines eg $"-\frac{1}{2}"x + 8 = -3x$	
		A1	oe	Accept equivalents eg (-3.2, 9.6)

Q8.

PAPER: 5MB2H_01				
Question	Working	Answer	Mark	Notes
	$x \ -2 \ -1 \ 0 \ 1 \ 2 \ 3$ $y \ -7 \ -5 \ -3 \ -1 \ 1 \ 3$	correct line	3	<p><b>(Table of values)</b> M1 for at least 2 correct attempts to find points by substituting values of <math>x</math>. M1 ft for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between -2 and 3</p> <p><b>(No table of values)</b> M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of <math>2x-3</math> drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line between -2 and 3</p> <p><b>(Use of <math>y=mx+c</math>)</b> M2 line segment of <math>2x-3</math> drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of 2 OR line drawn with a <math>y</math> intercept of -3 and a positive gradient) A1 for correct line between -2 and 3</p>

**Q9.**

Question	Working						Answer	Mark	Notes							
	<table border="1" data-bbox="263 246 630 313"> <tr> <td><math>x</math></td> <td>-3</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> </tr> <tr> <td><math>y</math></td> <td>-3</td> <td>-1</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	$x$	-3	-2	-1	0	1	$y$	-3	-1	1	3	5	Line	3	<p><b>(Table of values)</b>  M1 for at least 2 correct attempts to find points by substituting values of <math>x</math>.  M1 ft for plotting at least 2 of their points (any points plotted from their table must be correct)  A1 for correct line between -3 and 1</p> <p><b>(No table of values)</b>  M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of <math>2x+3</math> drawn (ignore any additional incorrect segments)  (M1 for at least 3 correct points with no more than 2 incorrect points)  A1 for correct line between -3 and 1</p> <p><b>(Use of <math>y=mx+c</math>)</b>  M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of <math>2x+3</math> drawn (ignore any additional incorrect segments)  (M1 for line drawn with gradient of 2 OR line drawn with a <math>y</math> intercept of 3 and a positive gradient)  A1 for correct line between -3 and 1</p>
$x$	-3	-2	-1	0	1											
$y$	-3	-1	1	3	5											

Q10.

Question	Working	Answer	Mark	Notes
(a)	Table of values $x = -1 \ 0 \ 1 \ 2 \ 3$ $y = 2 \ 2 \ 6 \ 10 \ 14$ OR Using $y = mx + c$ , gradient = 4, y intercept = 2	Line from $(-1, 2)$ to $(3, 14)$	3	<p><b>(Table of values)</b>                      M1 for at least 2 correct attempts to find points by substituting values of <math>x</math>.                      M1 ft for plotting at least 2 of their points (any points plotted from their table must be correct)                      A1 for correct line between 1 and 3</p> <p><b>(No table of values)</b>                      M2 for at least 2 correct points (and no incorrect points) plotted                      OR line segment of <math>y = 4x + 2</math> drawn (ignore any additional incorrect segments)                      (M1 for at least 3 correct points with no more than 2 incorrect points)                      A1 for correct line between -1 and 3</p> <p><b>(Use of <math>y = mx + c</math>)</b>                      M2 for at least 2 correct points (and no incorrect points) plotted                      OR line segment of <math>y = 4x + 2</math> drawn (ignore any additional incorrect segments)                      (M1 for line drawn with gradient 4                      OR line drawn with a y intercept of 2)                      A1 for correct line between 1 and 3</p> <p>B1 Correct equation given.                      B1 Correct gradient given.</p> <p>Note – 0.25 could be written as <math>-\frac{1}{4}</math> oe</p>
(b)(i)		$y = 4x + c, c \neq 2$	1	
(ii)		- 0.25	1	

**Q11.**

Question	Working	Answer	Mark	Notes
(a)		3.5, 4.5, 5	2	B2 for 3.5, 4.5, 5 oe (B1 for 1 correct)
(b)		Single line from (-2, 3) to (2, 5)	2	B2 cao for correct single line between $x = -2$ and $x = 2$ (B1 ft for plotting at least 4 points correctly or for a line with gradient $\frac{1}{2}$ or for a single straight line passing through (0, 4))
(c)(i)	(1, 2) to (0, 4)	Correct line	3	B1 ft for a perpendicular line through (0, 4) for at least $x = -1$ to $x = 1$
(ii)		$y = -2x + 4$		B2 correct answer or f.t. correct equation for their line (B1 $y = -2x + k$ or $-2x + 4$ or ft correct expression for their line with no $y =$ )

**Q12.**

Question	Working	Answer	Mark	Notes
(a)		$y = 5x + c$	1	B1 for $y = 5x + c$ oe $c \neq 6$
(b)	gradient = $-\frac{1}{m} = -\frac{1}{5}$ $y = -\frac{1}{5}x + c$ $x = -2, y = 5$ $5 = \frac{2}{5} + c$ $c = 5 - \frac{2}{5} = 4\frac{3}{5}$ $y = -\frac{1}{5}x + 4\frac{3}{5}$	$y = -\frac{1}{5}x + 4\frac{3}{5}$	3	M1 recognition that gradient = $-\frac{1}{m} = -\frac{1}{5}$ oe  M1 substitution of $x = -2, y = 5$ in $y = mx + c$ where $m = -\frac{1}{5}, \frac{1}{5}$ or $-5$  A1 $y = -\frac{1}{5}x + 4\frac{3}{5}$ oe