High School Mathematics Test 2015

Year 10

Linear Relations

Non Calculator

Skills and Knowledge Assessed:

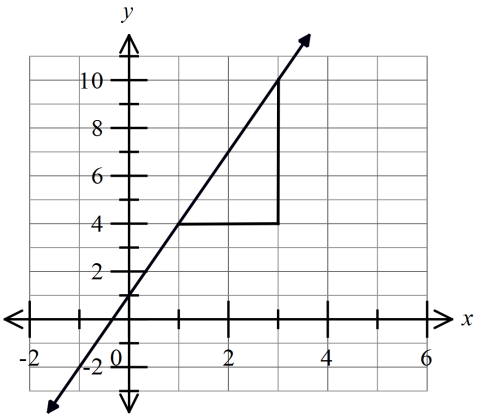
- Sketch linear graphs using the coordinates of two points and solve linear equations (ACMNA215)
- Solve problems involving parallel and perpendicular lines (ACMNA238)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. What is the gradient of the line shown below?



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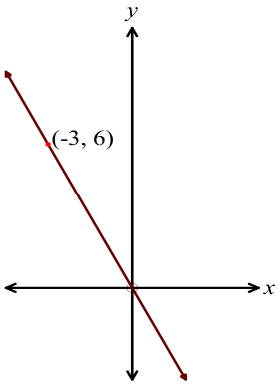
2. Complete the table for the equation $y = 15 - 3x$.

x	1	2	3	4
y		9		6

3. What is the equation of the line shown?



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4. Does the point (2, 6) lie on the line $y = 2x + 4$? Explain your answer.

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5. A line on the number plane has a gradient of 6 and crosses the y axis at $y = 7$.

What is the equation of the line?

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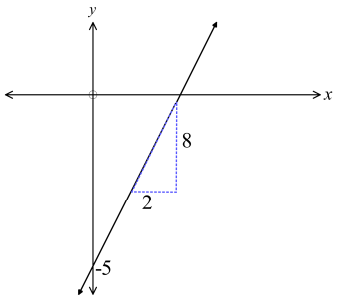
6. What is the equation of the line shown?



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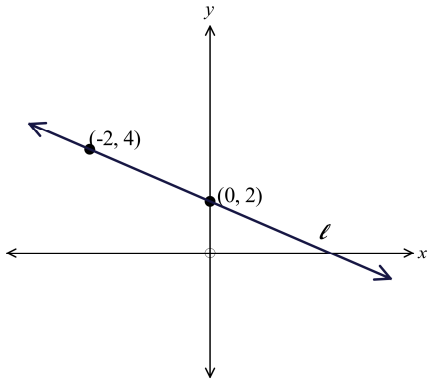
7. The points (0, 2) and (-2, 4) lie on a line l.
What is the equation of the line l ?



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8. On a number plane, a straight line has a gradient of -5 and passes through the point (-3, -6).
What is the equation of the line?

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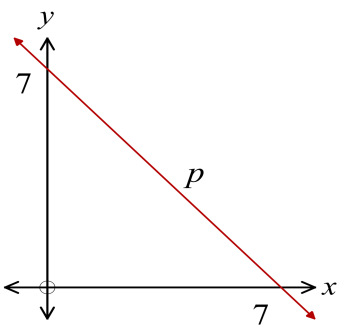
9. The line p is shown on the number plane to the right.
The equation of the line p, is:



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10. A line on the number plane crosses the x axis at $x = -2$ and crosses the y axis at $y = 12$.
What is the equation of the line?

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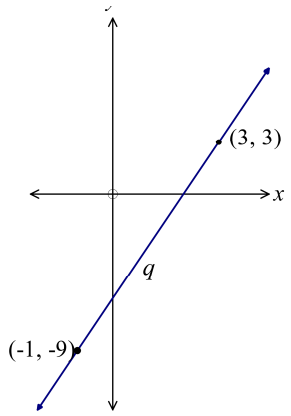
11. The points $(-1, -9)$ and $(3, 3)$ lie on a line q.
What is the equation of the line q?



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12. A straight line on a number plane has an equation of $10x - 5y - 13 = 0$.
What is the gradient of the line?

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13. A line on the Cartesian plane is parallel to the line $y = -3x + 12$ and passes through the point $(0, 7)$.
What is the equation of the line?

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14. A straight line on a number plane is parallel to the line $x - 3y + 16 = 0$ and passes through $(2, 12)$.
What is the equation of the line?

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15. The line $y = -2x - 8$ and the line j are perpendicular and intersect at the point $(-2, -4)$.
Find the equation of the line j.

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High School Mathematics Test 2015

Year 10

Linear Relations

Calculator Allowed

Name_____

Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. A line on the number plane has an equation: $y = 4x - 3$.

   What is its gradient?

   A. -4 B. -3 C. 3 D. 4

2. Which value is incorrect in the table for $y = 4x + 3$?

x	0	1	2	3
y	3	7	10	15

   A. 3 B. 7 C. 10 D. 15

3. A line has a gradient of -5 and passes through the point $(0, 7)$ on the y axis.

   What is its equation?

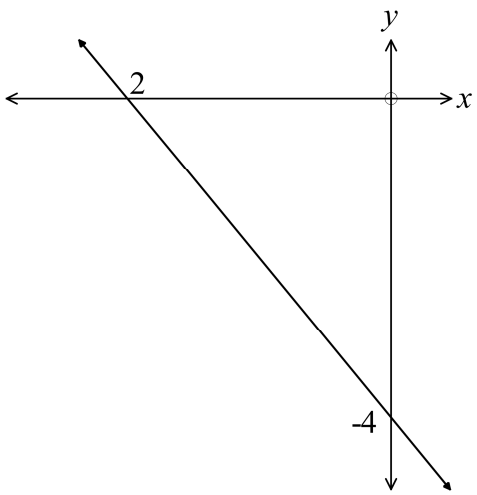
   A. $y = -7x - 5$

   B. $y = -5x + 7$

   C. $y = 5x + 7$

   D. $y = 7x - 5$

4. The equation of the line shown is:



A. $y = -4x - 2$

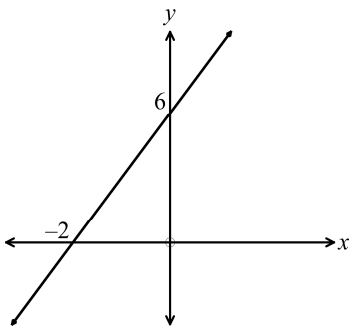
B. $y = -2x - 4$

C. $y = 2x - 4$

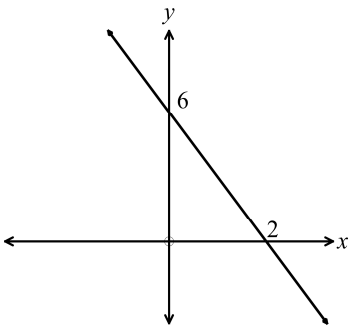
D. $y = 4x - 2$

5. Which is the graph of the line $y = -3x - 6$

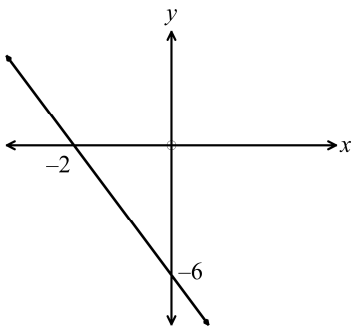
A.



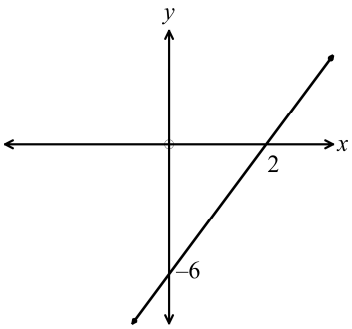
B.



C.

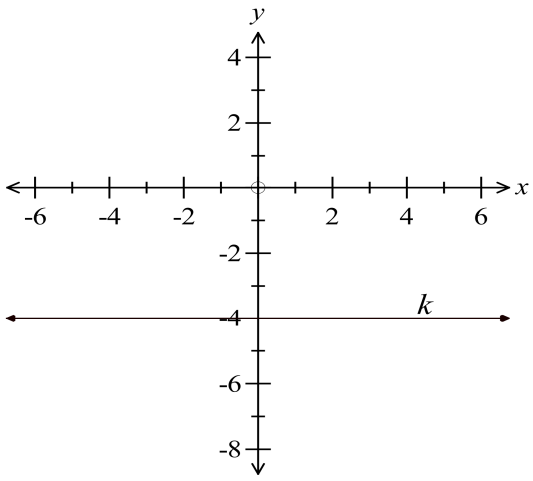


D.



6. The line k is shown on the number plane to the right.

The equation of the line k, is:



A. $y = -4$

B. $y = -4x$

C. $y = 4$

D. $y = 4x$

7. A line has a gradient of 4 and passes through the point $(-2, 10)$. What is its equation?

A. $y = 18 - 4x$

B. $y = 10 - 4x$

C. $y = 4x + 10$

D. $y = 4x + 18$

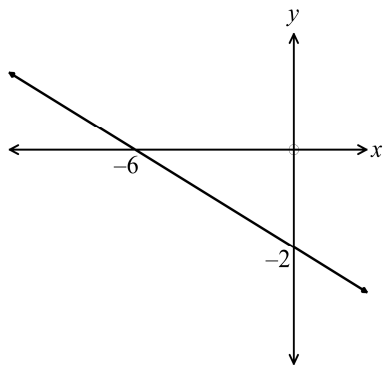
8. A line has an equation $y = 5x - 4$.

Which point lies on the line?

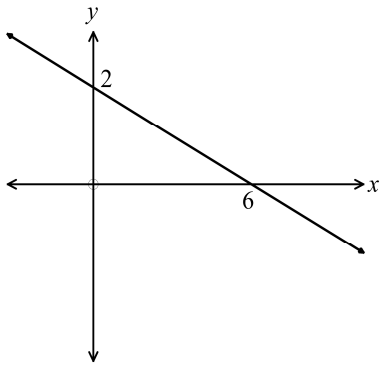
A. (-2, -7) B. (-2, -14) C. (-1, -8) D. (-1, -10)

9. Which is the graph of the line $y = \frac{1}{3}x - 2$?

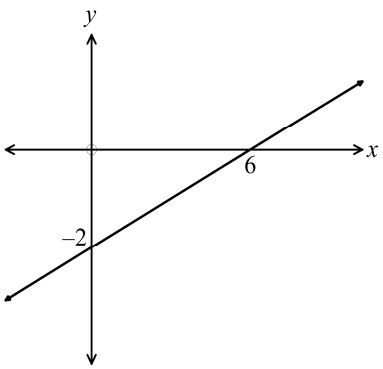
A.



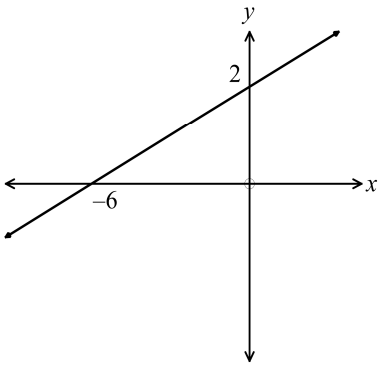
B.



C.



D.



10. A line has a gradient of -4 and passes through the point $(-2, 5)$.
What is its equation?

A. $y = -4x - 3$ B. $y = -4x - 1$ C. $y = -2x + 1$ D. $y = 2x + 4$

11. A line has equation $3x + 4y - 12 = 0$. Which statement is true?

A. Its gradient is $-\frac{4}{3}$ and its y intercept is -3.

B. Its gradient is $-\frac{3}{4}$ and its y intercept is -3.

C. Its gradient is $-\frac{3}{4}$ and its y intercept is 3.

D. Its gradient is $\frac{3}{4}$ and its y intercept is 3

12. The points $P\ (1, -1)$ and $Q\ (3, 7)$ lie on a line l.

The equation of the line l , is:

A. $y = -4x - 7$ B. $y = 4x - 5$ C. $y = 4x + 5$ D. $y = 4x + 7$

13. Line n has a gradient of $-\frac{2}{3}$.

Line p has a gradient of $\frac{2}{3}$.

Line q has a gradient of $1\frac{1}{2}$.

Which statement is true?

A. Line n is perpendicular to line q.

B. Line p is perpendicular to line q.

C. Line p is perpendicular to line n.

D. Line p is parallel to line n.

14. Which line is perpendicular to $3x - y + 8 = 0$

A. $y = -3x - 9$ B. $y = 3x - 9$ C. $y = \frac{1}{3}x - 9$ D. $y = -\frac{1}{3}x - 9$

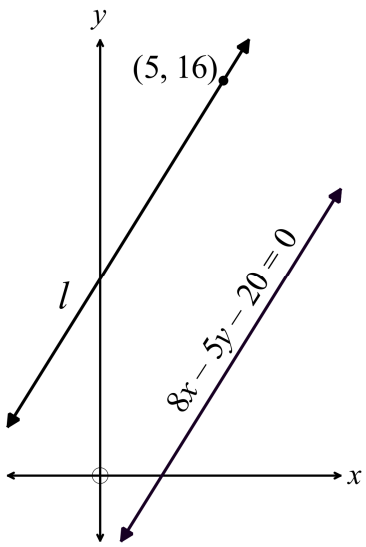
15. The line l passes through the point (5, 16) and is parallel to the line $8x - 5y - 20 = 0$.
What is the equation of the line l ?

A. $5x - 8y + 40 = 0$

B. $5x + 8y + 40 = 0$

C. $8x + 5y + 40 = 0$

D. $8x - 5y + 40 = 0$



High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Linear Relations

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭
11.	A ⬭	B ⬭	C ⬭	D ⬭
12.	A ⬭	B ⬭	C ⬭	D ⬭
13.	A ⬭	B ⬭	C ⬭	D ⬭
14.	A ⬭	B ⬭	C ⬭	D ⬭
15.	A ⬭	B ⬭	C ⬭	D ⬭

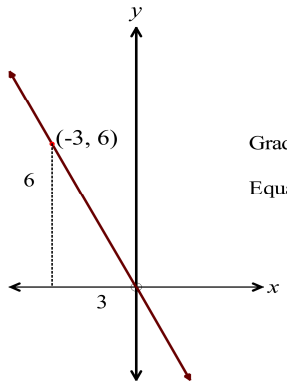
High School Mathematics Test 2015

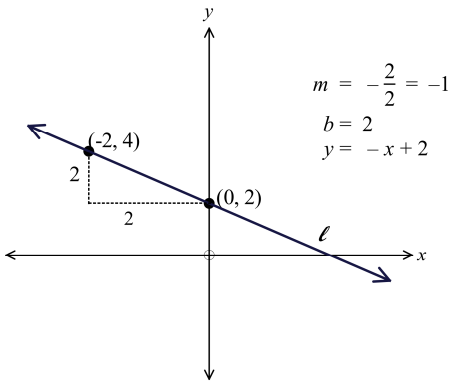
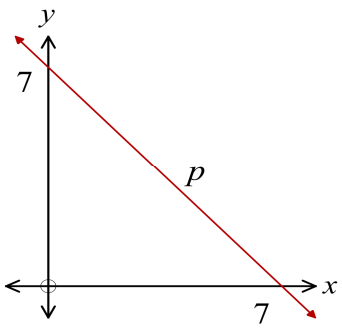
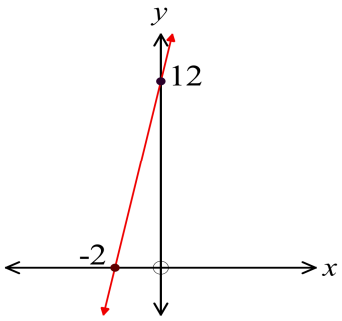
Year 10 Linear Relations

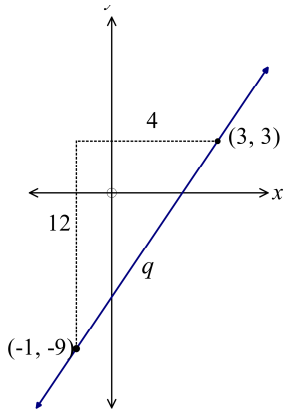
Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	Gradient $= \frac{rise}{run} = \frac{6}{2} = 3$	3
2.	<table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>$y = 15 - 3x$</td><td>**12**</td><td>9</td><td>**6**</td><td>6</td></tr></table>	See table
3.	 Gradient $= -\frac{6}{3} = -2$ Equation $y = -2x$	$y = -2x$
4.	Does the point (2, 6) lie on the line $y = 2x + 4$? Sub (2, 6) into $y = 2x + 4$ $RHS = 2(2) + 4 = 4 + 4 = 8 \neq 6$ $RHS \neq LHS$ so not on line.	Explanation why point is not on the line is needed for a mark.
5.	Gradient $m = 6$ and y intercept $b = 7$. $y = mx + b$ $y = 6x + 7$	$y = 6x + 7$
6.	Gradient $m = \frac{8}{2} = 4$ y intercept $b = -5$ $y = mx + b$ $y = 4x - 5$	$y = 4x - 5$

7.	 $m = -\frac{2}{2} = -1$ $b = 2$ $y = -x + 2$	$y = -x + 2$
8.	$m = -5$ through $(-3,-6)$ $y = -5x + b$ $-6 = -5(-3) + b$ $-6 = 15 + b$ $b = -21$ $y = -5x - 21$	$y = -5x - 21$
9.	 $m = -\frac{7}{7} = -1$ $b = 7$ $y = -1x + 7$ $y = -x + 7$	$y = -x + 7$
10.	Crosses the x axis at $x = -2$ and crosses the y axis at $y = 12$.  $m = \frac{12}{2} = 6$ $b = 12$ $y = 6x + 12$	$y = 6x + 12$

11.	 $m = \frac{12}{4} = 3$ $y = 3x + b$ $3 = 3 \times 3 + b$ $3 = 9 + b$ $b = -6$ $y = 3x \quad 6$	$y = 3x - 6$
12.	$10x - 5y - 13 = 0$ $5y = 10x - 13$ $y = \frac{10}{5}x - \frac{13}{5}$ $y = 2x - 2\frac{3}{5}$ Gradient is 2.	2
13.	parallel to the line $y = -3x + 12$ through the point $(0, 7)$. Since parallel, $m = -3$ through (0,7) so $b = 7$ $y = -3x + 7$	$y = -3x + 7$
14.	Parallel to the line $x - 3y + 16 = 0$ through (2, 12). $x - 3y + 16 = 0$ $3y = x + 16$ $y = \frac{1}{3}x + \frac{16}{3}$ $m = \frac{1}{3}$ Through (2,12) $y - 12 = \frac{1}{3}(x - 2)$ $y - 12 = \frac{1}{3}x - \frac{2}{3}$ $3y - 36 = x - 2$ $x - 3y + 34 = 0$ *OR* $3y = x + 34$ $y = \frac{1}{3}x + 11\frac{1}{3}$	$y = \frac{1}{3}x + 11\frac{1}{3}$ *OR* $x - 3y + 34 = 0$

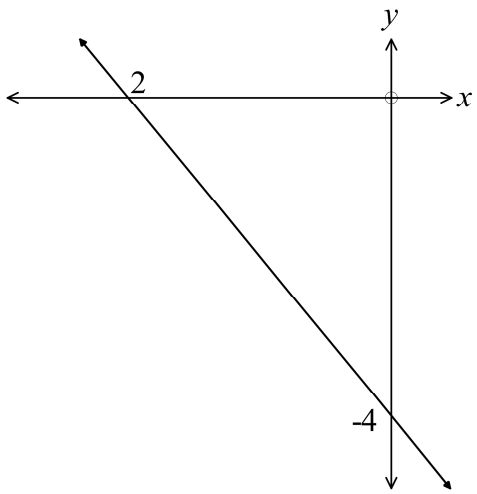
15.	The line $y = -2x - 8$ has $m = -2$ so perpendicular line has $m = \frac{1}{2}$ $y = \frac{1}{2}x + b$ Through $(-2, -4)$ so $-4 = \frac{1}{2} \times (-2) + b$ $-4 = -1 + b$ $b = -3$ $y = \frac{1}{2}x - 3$	$y = \frac{1}{2}x - 3$

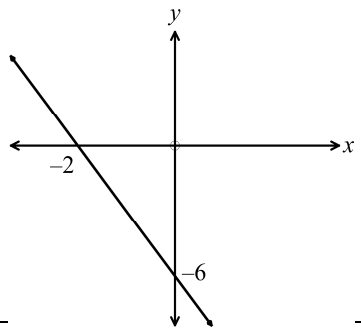
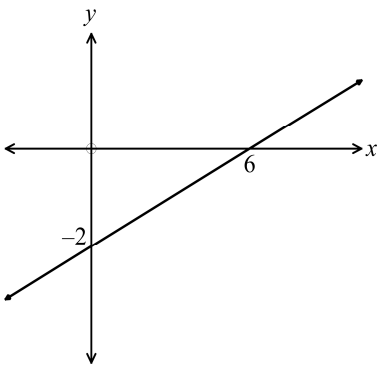
High School Mathematics Test 2015

Year 10 **Linear Relations** Calculator Allowed

Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	$y = 4x - 3$ $y = mx + b$ so $m = 4$ Gradient = 4	**D**
2.	Correct values in the table for $y = 4x + 3$ are: x: 0, 1, 2, 3 y: 3, 7, **11**, 15 So 10 is incorrect, should be 11.	**C**
3.	Gradient of -5 through 7 on the y axis. $m = -5$ and $b = 7$ $y = -5x + 7$	**B**
4.	 $m = -\frac{4}{2} = -2$ $b = -4$ $y = -2x - 4$	**B**

5.	The graph of the line $y = -3x - 6$ will have $m = -3$ and $b = -6$  	**C**
6.	Horizontal line so $y = -4$	**A**
7.	Gradient of 4 and passes through the point $(-2, 10)$ $y - 10 = 4(x - -2)$ $y - 10 = 4x + 8$ $y = 4x + 18$	**D**
8.	$y = 5x - 4$ (-2, -7) $RHS = 5 \times (-2) - 4 = -10 - 4 = -14 \neq -7$ Not on line. (-2, -14) $RHS = 5 \times (-2) - 4 = -10 - 4 = -14$ So is on line. (-1, -8) $RHS = 5 \times (-1) - 4 = -5 - 4 = -9 \neq -8$ Not on line. (-1, -10) $RHS = 5 \times (-1) - 4 = -5 - 4 = -9 \neq -10$ Not on line.	**B**
9.	$y = \frac{1}{3}x - 2$ Gradient $m = \frac{1}{3}$ intercept $b = -2$  	**C**

10.	$m = -4$ and passes through $(-2, 5)$ $y = mx + b$ $y = -4x + b$ $5 = -4(-2) + b$ $5 = 8 + b$ $b = -3$ $y = -4x - 3$ OR $m = -4$ and passes through $(-2, 5)$ $y - y_1 = m(x - x_1)$ $y - 5 = -4(x - -2)$ $y - 5 = -4x - 8$ $y = -4x - 3$	**A**
11.	$3x + 4y - 12 = 0$ $4y = -3x + 12$ $y = -\frac{3}{4}x + 3$ Gradient $= -\frac{3}{4}$ and intercept $= 3$	**C**
12.	For the points $P\ (1, -1)$ and $Q\ (3, 7)$ $m = \frac{7 - -1}{3 - 1}$ $= \frac{8}{2} = 4$ Equation $y - 7 = 4(x - 3)$ $y - 7 = 4x - 12$ $y = 4x - 5$	**B**
13.	No gradients are equal, so none parallel. $-\frac{2}{3} \times 1\frac{1}{2} = -\frac{2}{3} \times \frac{3}{2} = -1$ So line n is perpendicular to line q.	**A**
14.	$3x - y + 8 = 0$ $y = 3x + 8$ $m = 3$ So perpendicular line has $m = -\frac{1}{3}$	**D**

15.	Parallel to $8x - 5y - 20 = 0$ $5y = 8x - 20$ $y = \frac{8}{5}x - \frac{20}{5}$ $m = \frac{8}{5}$ Through (5,16) so $y - 16 = \frac{8}{5}(x - 5)$ $5y - 80 = 8x - 40$ $8x - 5y + 40 = 0$	**D**

High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Linear Relations

Name _____ANSWERS_____

Completely fill the response oval representing the most correct answer.

1.	A ○	B ○	C ○	D ●
2.	A ○	B ○	C ●	D ○
3.	A ○	B ●	C ○	D ○
4.	A ○	B ●	C ○	D ○
5.	A ○	B ○	C ●	D ○
6.	A ●	B ○	C ○	D ○
7.	A ○	B ○	C ○	D ●
8.	A ○	B ●	C ○	D ○
9.	A ○	B ○	C ●	D ○
10.	A ●	B ○	C ○	D ○
11.	A ○	B ○	C ●	D ○
12.	A ○	B ●	C ○	D ○
13.	A ●	B ○	C ○	D ○
14.	A ○	B ○	C ○	D ●
15.	A ○	B ○	C ○	D ●