School Name
Mathematics Test 2017

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_____

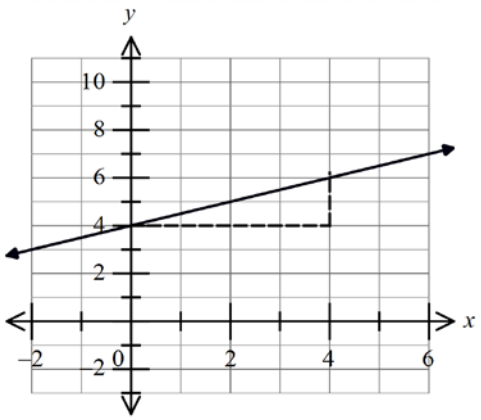
Section 1 Short Answer Section

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

1. Complete the table for the relation $y = 3x - 12$.

x	1	2	4	5
y		–6		3

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



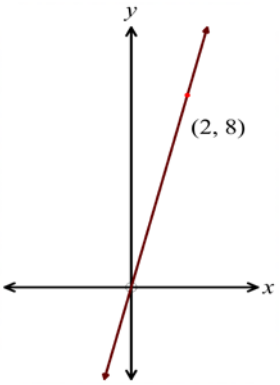
……

……

……

……

3. What is the equation of the line shown?



……

……

……

4. Does the point (–2, 21) lie on the line $y = 15 - 3x$? Explain your answer.

……

……

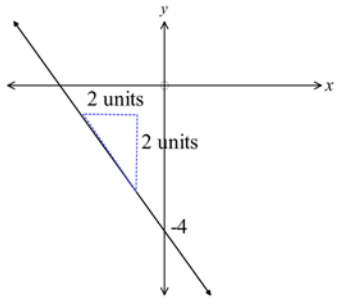
5. A line on the number plane has a gradient of –4 and crosses the y axis at $y = –9$.

What is the equation of the line?

……

……

6. What is the equation of the line shown?

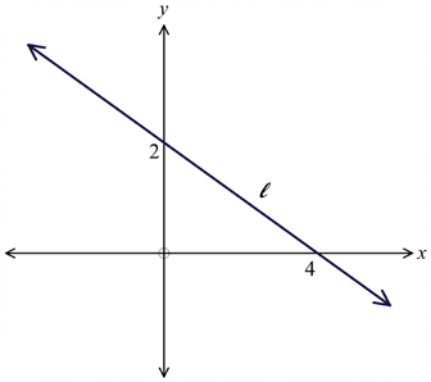


.....

.....

.....

7. The line l crosses the y axis at 2 and the x axis at 4.
What is the equation of the line l ?



.....

.....

.....

.....

8. A straight line that passes through the point (–3, 7) has a gradient of –8.
What is the equation of the line?

……

……

9. The line q is perpendicular to the line $y = \frac{1}{2}x - 9$.

What is the gradient of the line q?

……

……

……

……

10. A horizontal line on the number plane passes through the point $(-7, 9)$.

What is the equation of the line?

……

……

11. A straight line passes through the points $(-1, 3)$ and $(4, 13)$.

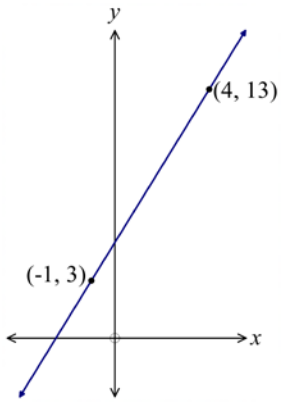
What is the equation of the line?

.....

.....

.....

.....



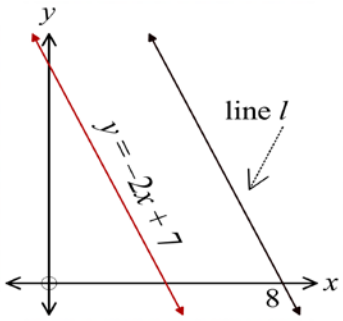
12. A straight line on a number plane has an equation of $6x + 12y - 30 = 0$.

What is the gradient of the line?

……

……

13. The line l is parallel to the line $y = -2x + 7$ and has an x intercept at $x = 8$.
The equation of the line l, is:



……

……

……

14. Find the equation of the line which is parallel to the line $2x - y + 9 = 0$ and passes through (–4, 6).

……

……

……

……

15. Find the equation of the line which is perpendicular to $2x - 6y + 7 = 0$ and passes through the point (–5, 3).

……

……

……

……

School Name
Mathematics Test 2017

Calculator Allowed

Year 10

Linear Relations

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 $y = 3x - 5$.

What is its gradient?

A. –5 B. –3 C. 3 D. 5

2. What is the missing value in the table for $y = 5x - 6$?

x	0	2	4	6
y	–6	?	14	24

A. –4 B. 4 C. 6 D. 10

3. A line has a gradient of –2 and passes through the point (0, –5).

What is its equation?

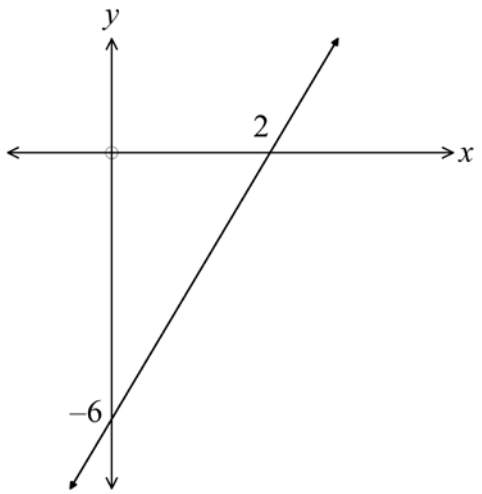
A. $y = -5x - 2$

B. $y = -5x + 2$

C. $y = -2x - 5$

D. $y = -2x + 5$

4. The equation of the line shown is:



A. $y = 3x - 6$

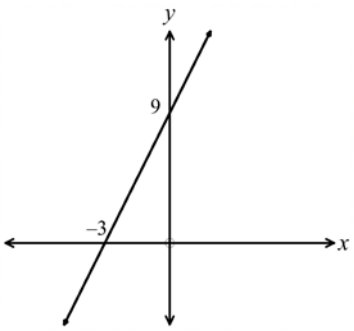
B. $y = 3x - 2$

C. $y = 6x - 2$

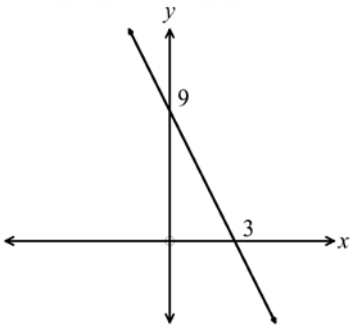
D. $y = 6x + 2$

5. Which is the graph of the line $y = 3x - 9$?

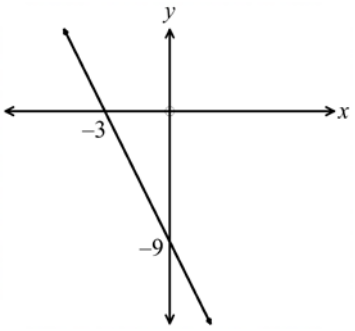
A.



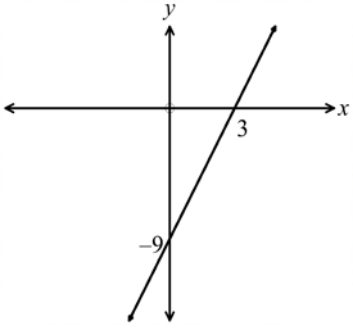
B.



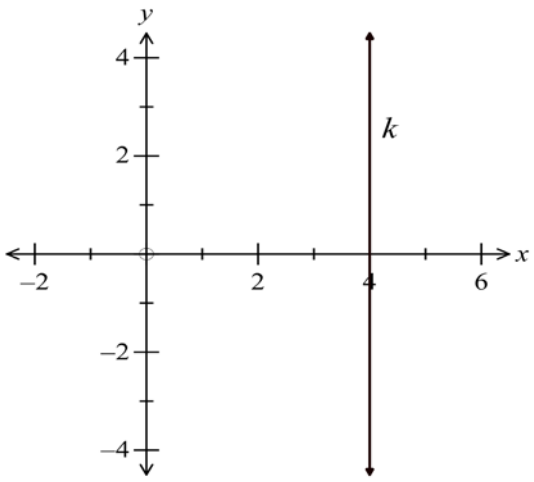
C.



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. $x = -4$

C. $y = 4$

D. $x = 4$

7. A line has a gradient of –6 and passes through the point (–5, 3).
What is its equation?

A. $y = -6x - 33$

B. $y = -6x - 27$

C. $y = -5x + 3$

D. $y = 6x + 27$

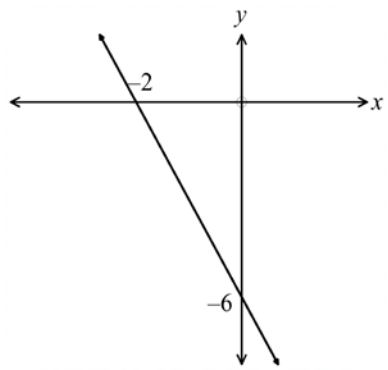
8. Which line does not contain the point (–2, –6) ?

A. $y = -4x - 14$ B. $y = -2x - 10$

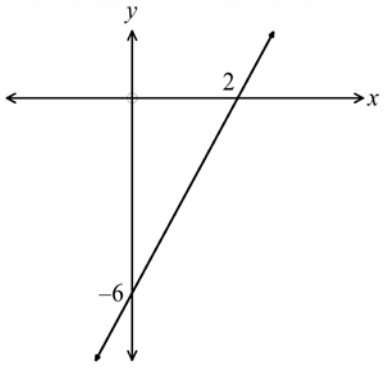
C. $y = 2x - 6$ D. $y = 4x + 2$

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

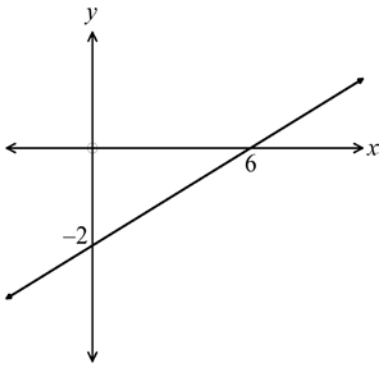
A.



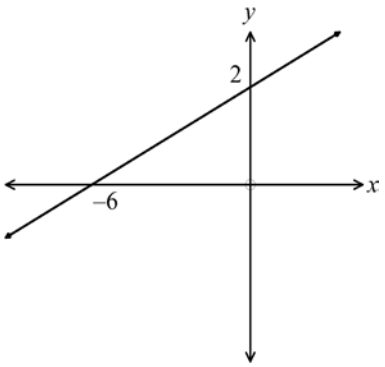
B.



C.



D.



10. Which of these lines is perpendicular to the line $y = 4x - 7$? ?

A. $y = -4x - 3$ B. $y = -\frac{x}{4} - 8$ C. $y = \frac{x}{4} + 1$ D. $y = 4x + 4$

11. A line has equation $8x - 2y - 7 = 0$. Which statement is true?

A. Its gradient is –4 and its y intercept is $y = 3\frac{1}{2}$

B. Its gradient is –4 and its y intercept is $y = -3\frac{1}{2}$

C. Its gradient is 4 and its y intercept is $y = 3\frac{1}{2}$

D. Its gradient is 4 and its y intercept is $y = -3\frac{1}{2}$

12. What is the equation of the line which passes through the points (3, –7) and (–1, 1)?

A. $y = -2x - 1$ B. $y = -2x + 13$

C. $y = 2x - 13$ D. $y = 2x + 1$

13. Line j has its equation : $y = -2x + 5$

Line k has its equation : $2x + y - 4 = 0$

Line l has its equation : $x + 2y + 8 = 0$

Which statement is true?

A. Line j is perpendicular to line k.

B. Line j is parallel to line k.

C. Line k is perpendicular to line l.

D. Line k is parallel to line l.

14. Which line is perpendicular to $2x + 5y - 7 = 0$?

A. $2x - 5y + 9 = 0$ B. $2x + 5y + 9 = 0$

C. $5x - 2y + 9 = 0$ D. $5x + 2y + 9 = 0$

15. The line l passes through the point (–2, 10) and is perpendicular to the line $3x - 4y - 12 = 0$.
What is the equation of the line l ?

A. $4x - 3y - 32 = 0$

B. $3x - 4y - 32 = 0$

C. $4x + 3y - 32 = 0$

D. $3x + 4y - 32 = 0$

School Name

Mathematics 2017

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 ⬭

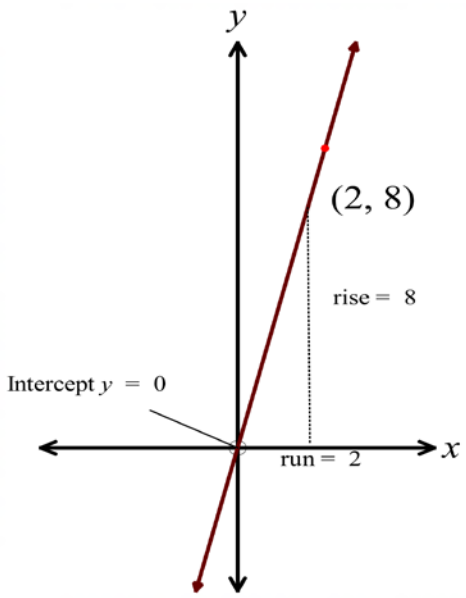
School Name
Mathematics Test 2017

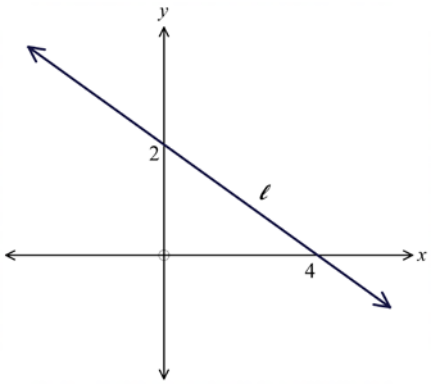
Year 10

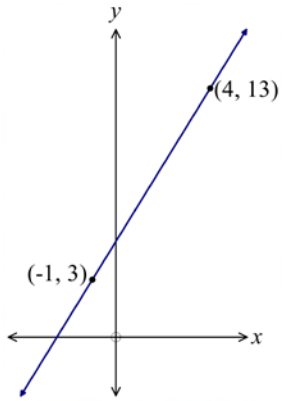
Linear Relations

Non Calculator Section

ANSWERS

Question	Working and Answer
1.	<table><tr><td>x</td><td>1</td><td>2</td><td>4</td><td>5</td></tr><tr><td>$y = 3x - 12$</td><td>–9</td><td>–6</td><td>0</td><td>3</td></tr></table>
2.	Gradient $= \frac{rise}{run} = \frac{2}{4} = \frac{1}{2}$
3.	 Gradient $m = \frac{rise}{run}$ $= \frac{8}{2}$ $= 4$ Equation $y = mx + b$ $y = 4x + 0$ $y = 4x$
4.	Does the point (–2, 21) lie on the line $y = 15 - 3x$? Sub (–2, 21) into $y = 15 - 3x$ LHS = 21 $RHS = 15 - 3(-2) = 15 - (-6) = 15 + 6 = 21 =$ LHS RHS = LHS so it is on the line.

Question	Working and Answer
5.	Gradient $m = -4$ and y intercept $b = -9$. $y = mx + b$ $y = -4x - 9$
6.	Gradient $m = -\frac{2}{2} = -1$ y intercept $b = -4$ $y = mx + b$ $y = (-1)x + (-4)$ $y = -x - 4$
7.	 gradient $= -\frac{2}{4} = -\frac{1}{2}$ y intercept $= 2$ Equation $y = mx + b$ $y = -\frac{1}{2}x + 2$
8.	$m = -8$ through $(-3,7)$ $y = -8x + b$ $7 = -8(-3) + b$ $7 = 24 + b$ $b = -7 - 24 = -17$ $y = -8x - 17$
9.	Gradient of given line is $m_1 = \frac{1}{2}$. Perpendicular lines have gradients $m_1 \times m_2 = -1$ $\frac{1}{2} \times m_2 = -1$ $m_2 = -1 \div \frac{1}{2}$ $= -1 \times 2$ $= -2$
10.	A horizontal line has the same y value for every point on the line. As the line passes through the point $(-7, 9)$, its equation is $y = 9$.

Question	Working and Answer
11.	 $m = \frac{13-3}{4--1}$ $= \frac{10}{5}$ $= 2$ Equation $y = mx + b$ sub (4, 13) $13 = 2(4) + b$ $13 = 8 + b$ $b = 13 - 8 = 5$ $y = 2x + 5$
12.	$6x + 12y - 30 = 0$ $12y = -6x + 30$ $y = \frac{-6}{12}x + \frac{30}{12}$ $y = -\frac{1}{2}x + 2\frac{1}{2}$ Gradient is $-\frac{1}{2}$.
13.	Gradient of l is the same as $y = -2x + 7$, so $m = -2$. Line l passes through (8, 0). $y = -2x + b$ $0 = -2(8) + b$ $b = 16$ $y = -2x + 16$
14.	Parallel to the line $2x - y + 9 = 0$ through (-4, 6). $2x - y + 9 = 0$ $y = 2x + 9$ $m = 2$ Through (–4,6) $y - 6 = 2(x - -4)$ $y - 6 = 2x + 8$ $y = 2x + 14$ *OR* $2x - y + 14 = 0$

Question	Working and Answer
15.	The line $2x - 6y - 7 = 0$ $6y = 2x - 7$ $y = \frac{2}{6}x - \frac{7}{6}$ $y = \frac{1}{3}x - \frac{7}{6}$ has $m = \frac{1}{3}$ so perpendicular line has $m = -3$ $y = -3x + b$ Through $(-5, 3)$ so $3 = -3 \times (-5) + b$ $3 = 15 + b$ $b = -12$ $y = -3x - 12$

School Name
Mathematics Test 2017

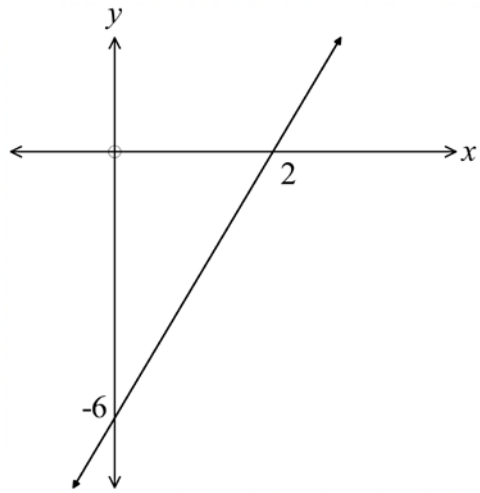
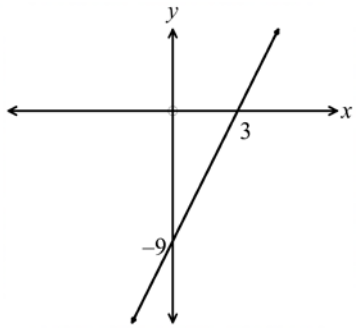
Year 10

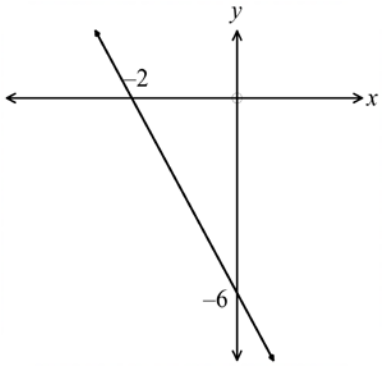
Linear Relations

Calculator Allowed
Multiple Choice
Section

ANSWERS

Question	Working	M C Answer
1.	$y = 3x - 5$ $y = mx + b$ so $m = 3$ Gradient = 3	**C**
2.	Want values in the table for $y = 5x - 6$ for $x = 2$ $y = 5(2) - 6$ $= 10 - 6$ $y = 4$	**B**
3.	Gradient of -2 through -5 on the y axis. $m = -2$ and $b = -5$ $y = -2x - 5$	**C**

4.	 $m = \frac{6}{2} = 3$ $b = -6$ $y = 3x - 6$	**A**
5.	The graph of the line $y = 3x - 9$ will have $m = 3$ and $b = -9$ 	**D**
6.	Vertical line through 4 so $x = 4$	**D**
7.	Gradient of –6 and passes through the point (–5, 3) $y - 3 = -6(x - -5)$ $y - 3 = -6x - 30$ $y = -6x - 27$	**B**

8.	Substitute $x = -2$ into each equation and see if the result is $y = -6$. A. $y = -4x - 14$ $= -4(-2) - 14$ $= 8 - 14$ $= -6$ $\therefore$ contains the point B. $y = -2x - 10$ $y = -2(-2) - 10$ $= 4 - 10$ $= -6$ $\therefore$ contains the point C. $y = 2x - 6$ $y = 2(-2) - 6$ $= -4 - 6$ $= -10$ $\therefore$ doesn't contain the point D. $y = 4x + 2$ $y = 4(-2) + 2$ $= -8 + 2$ $= -6$ $\therefore$ contains the point	**C**
9.	$y = -3x - 6$ Gradient $m = -3$ intercept $b = -6$ 	**A**
10.	$y = 4x - 7$ has a gradient of $m_1 = 4$ Perpendicular lines have $m_1 \times m_2 = -1$ $4 \times m_2 = -1$ $m_2 = -\frac{1}{4}$ The line which has a gradient of $-\frac{1}{4}$ is $y = -\frac{x}{4} - 8$	**B**
11.	$8x - 2y - 7 = 0$ $2y = 8x - 7$ $y = 4x - \frac{7}{2}$ Gradient = 4 and intercept = $-3\frac{1}{2}$	**D**

12.	For the points (3, –7) and (–1, 1): $m = \frac{1 - -7}{-1 - 3}$ $= \frac{8}{-4} = -2$ Equation $y - -7 = -2(x - 3)$ $y + 7 = -2x + 6$ $y = -2x - 1$	**A**
13.	Line j has its equation : $y = -2x + 5$ so $m = -2$ Line k has its equation : $2x + y - 4 = 0 \Rightarrow y = -2x + 4$ so $m = -2$ Line l has its equation : $x + 2y + 8 = 0$ $\Rightarrow 2y = -x - 8 \Rightarrow y = -\frac{1}{2}x - 4$ so $m = -\frac{1}{2}$ Lines j and k have the same gradient, so are parallel. No lines are perpendicular as no two gradients have a product of –1.	**B**
14.	$2x + 5y - 7 = 0$ $5y = -2x + 7$ $y = -\frac{2}{5}x + \frac{7}{5}$? $m_1 = -\frac{2}{5}$ for perpendicular $m_2 = \frac{5}{2}$ 2*nd* line is of the form $y = \frac{5}{2}x + b$ $2y = 5x + b_2$ $5x - 2y + b_3 = 0$ which matches $5x - 2y + 9 = 0$	**C**

15.	Parallel to $3x - 4y - 12 = 0$ $4y = 3x - 12$ $y = \frac{3}{4}x - 3$ $m_1 = \frac{3}{4}$ $m_2 = -\frac{4}{3}$ Through $(-2,10)$ so $y - 16 = -\frac{4}{3}(x + 2)$ $3y - 48 = -4x - 16$ $4x + 3y - 32 = 0$	**C**

School Name

Mathematics 2017

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 ○