High School Mathematics Test 2015

Year 10 **Simultaneous Equations** Non Calculator

Skills and Knowledge Assessed:

- Solve linear simultaneous equations, using algebraic and graphical techniques including using digital technology (ACMNA237)

Name_____

Section 1 Short Answer Section

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

1. Find the point of intersection of the lines $2x - 3y + 12 = 0$ and $y = -2$, without drawing a graph.

……....

……

2. Solve simultaneously : $9x - 5y + 15 = 0$ and $y = 3x$.

……....

……....

……

3. What is the x value of the point of intersection of $2x + y = 15$ and $3x - y = 20$?

.....

.....

.....

4. Solve the simultaneous equations: $3p - 5r = 17$ and $p - 5r = 19$.

.....

.....

.....

5. Find the values of s and t for which $4s - 3t = 11$ and $2s + t = 3$.

.....

.....

.....

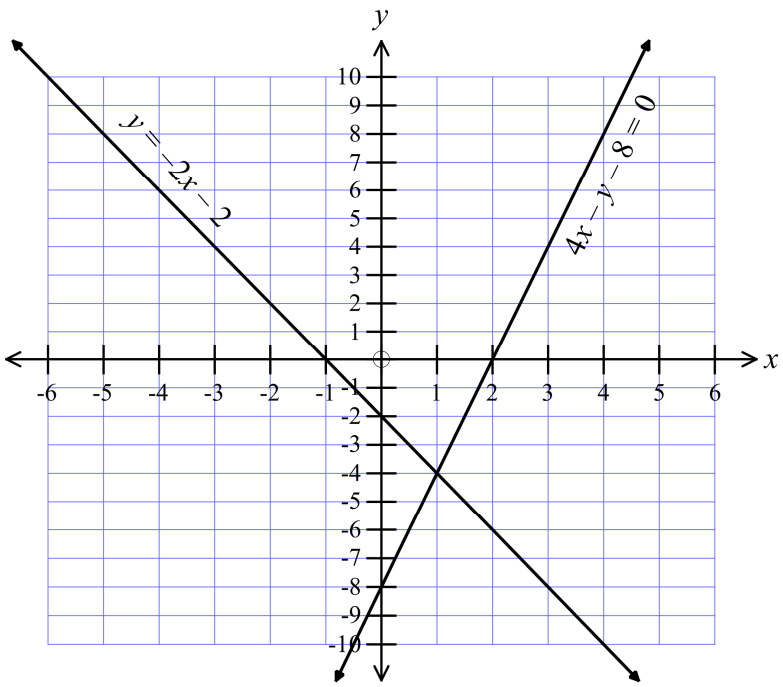
6. Find the point of intersection of $y = 5x - 16$ and $2x + y - 5 = 0$.

.....

.....

.....

Questions 7 – 11 refer to the graph below.



7. Sketch $y = x + 7$ on the graph above

8. Sketch $2x + y - 10 = 0$ on the graph above.

9. Solve simultaneously: $\begin{cases} y = -2x - 2 \\ 4x - y - 8 = 0 \end{cases}$

.....

10. Solve simultaneously: $\begin{cases} y = -2x - 2 \\ y = x + 7 \end{cases}$

.....

11. Solve simultaneously: $\begin{cases} 4x - y - 8 = 0 \\ 2x + y - 10 = 0 \end{cases}$

.....

12. Solve simultaneously: s $\begin{cases} y = x + 7 \\ 2x + y - 10 = 0 \end{cases}$

.....

High School Mathematics Test 2015

Year 10

Simultaneous Equations

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. Solve simultaneously $3x - y = 12$ and $y = x$.

   A. $(-6, -6)$ B. $(3, 3)$ C. $(6, 6)$ D. $(12, 12)$

2. Solve simultaneously $y = 5x + 6$ and $y = x + 2$.

   A. $(-2, 0)$ B. $(-1, 1)$ C. $(0, 2)$ D. $(1, 3)$

Questions 3 and 4 refer to the following:

A partially completed solution to a pair of simultaneous equations is shown:

$3x - 2y = 14$ ..... ①
$5x + 2y = 10$..... ②
$8x = 24$ ..... ③ Reason ③ ÷ 8 .
$x = 3$..... ④
$9 - 2y = 14$ Sub ④ into ①
$-2y =$
$y =$
Solution (,)

3. What reason should be given for equation ③ ?

   A. ① × 2 B. ① × ② C. ② – ① D. ① + ②

4. What is the final solution to the simultaneous equations?

   A. $(3, -2.5)$ B. $(3, -3.5)$ C. $(3, -7)$ D. $(-2.5, 3)$

5. What ordered pair is a solution to the simultaneous equations below?

$$\begin{cases} x - 6y - 8 = 0 \\ 7x + 6y - 8 = 0 \end{cases}$$

A. $\left(-2, -1\frac{2}{3}\right)$ B. $\left(-1, -1\frac{1}{2}\right)$ C. $\left(1, -1\frac{1}{6}\right)$ D. $(2, -1)$

6. Solve simultaneously $4x - 3y - 15 = 0$ and $y = 2x - 3$.

A. $(-6, -9)$ B. $(-3, -9)$ C. $(-3, 9)$ D. $(3, -9)$

7. What is the y value, when the equations below are solved simultaneously?

$$\begin{cases} 3x + 5y = 15 \\ 6x + 3y = 16 \end{cases}$$

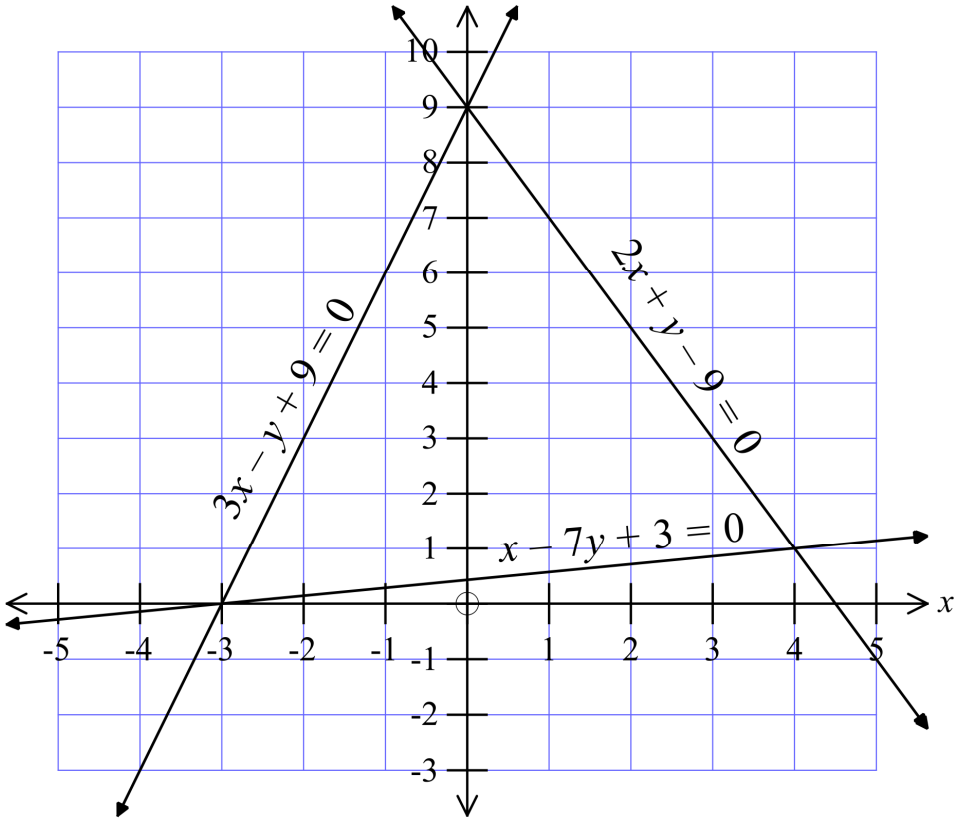
A. $y = 1$

B. $y = 1\frac{2}{3}$

C. $y = 2$

D. $y = 2\frac{2}{3}$

Question 8 – 9 refer to the graph below.



8. Solve $\begin{cases} 3x - y + 9 = 0 \\ x - 7y + 3 = 0 \end{cases}$

A. $(-3, 0)$ B. $\left(0, \frac{1}{2}\right)$ C. $(0, 9)$ D. $(4, 1)$

9. Solve $\begin{cases} 2x + y - 9 = 0 \\ x - 7y + 3 = 0 \end{cases}$

A. $(-3, 0)$ B. $\left(0, \frac{1}{2}\right)$ C. $(0, 9)$ D. $(4, 1)$

Questions 10 – 12 refer to the following.

The number plane shows the lines

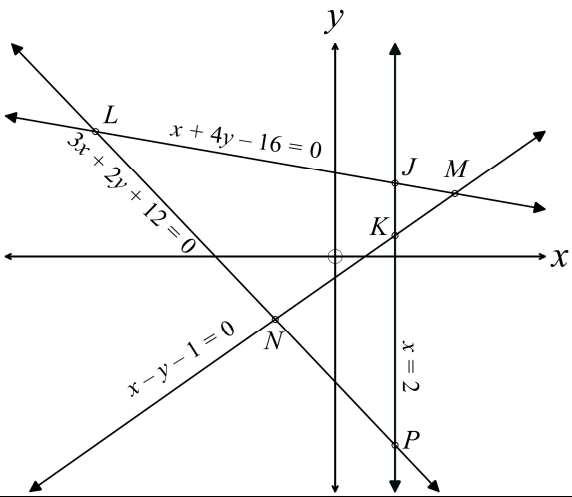
$x = 2$ ①

$x + 4y - 16 = 0$ ②

$x - y - 1 = 0$ ③

$3x + 2y + 12 = 0$ ④

The points of intersection of these lines are labelled on the graph.



10. The point N is the solution to which pair of simultaneous equations?

A. $x = 2$ and $x + 4y - 16 = 0$.

B. $x = 2$ and $x - y - 1 = 0$.

C. $x - y - 1 = 0$ and $3x + 2y + 12 = 0$.

D. $x + 4y - 16 = 0$ and $3x + 2y + 12 = 0$.

11. Which point is the solution to the pair of equations:

$x + 4y - 16 = 0$ and $x - y - 1 = 0$.

A. Point L B. Point M C. Point N D. Point P

12. What are the coordinates of the point J ?

A. (2, -9) B. (2, 1) C. (2, 2.5) D. (2, 3.5)

High School Mathematics Test 2015

Year 10 *Simultaneous Equations*

Calculator Allowed

Name_____

Section 3 Longer Answer Section

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

Marks

1. (a) Solve simultaneously: $\begin{cases} y = -2x - 2 \\ y = 3x + 7 \end{cases}$ **3**

……

……

……

……

……

(b) Solve simultaneously: $\begin{cases} 2x + 3y - 12 = 0 \\ 3x - 4y + 16 = 0 \end{cases}$ **3**

……

……

……

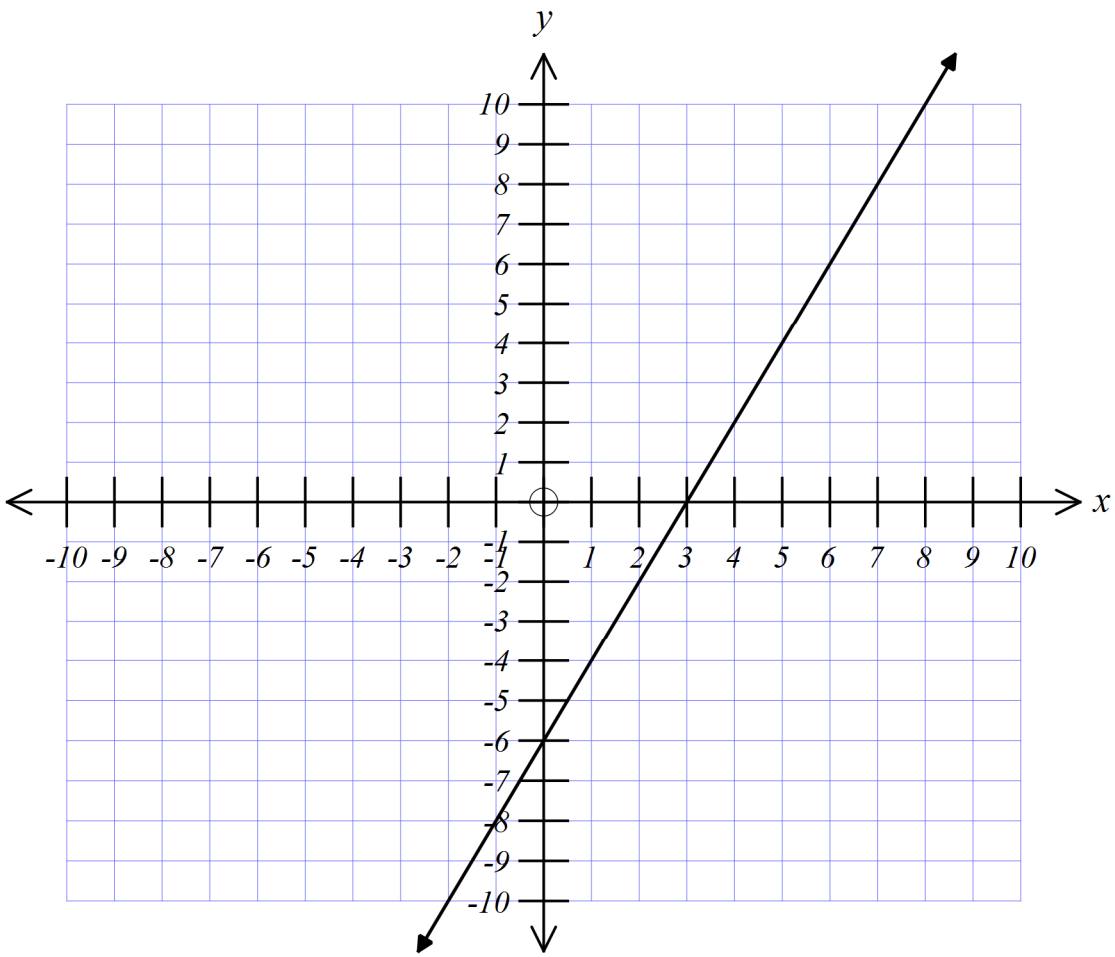
……

……

……

Marks

2. The line $y = 2x - 6$ is shown on the graph below.



(a) Draw the lines $y = 6 - x$ and $2x + 3y + 10 = 0$ on the same graph. **2**

(b) Solve $y = 2x - 6$ simultaneously with $y = 6 - x$. **1**

.....

(c) Solve $y = 2x - 6$ simultaneously with $2x + 3y + 10 = 0$ **1**

.....

High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Simultaneous Equations

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 ⬭

High School Mathematics Test 2015

Year 10

Simultaneous Equations

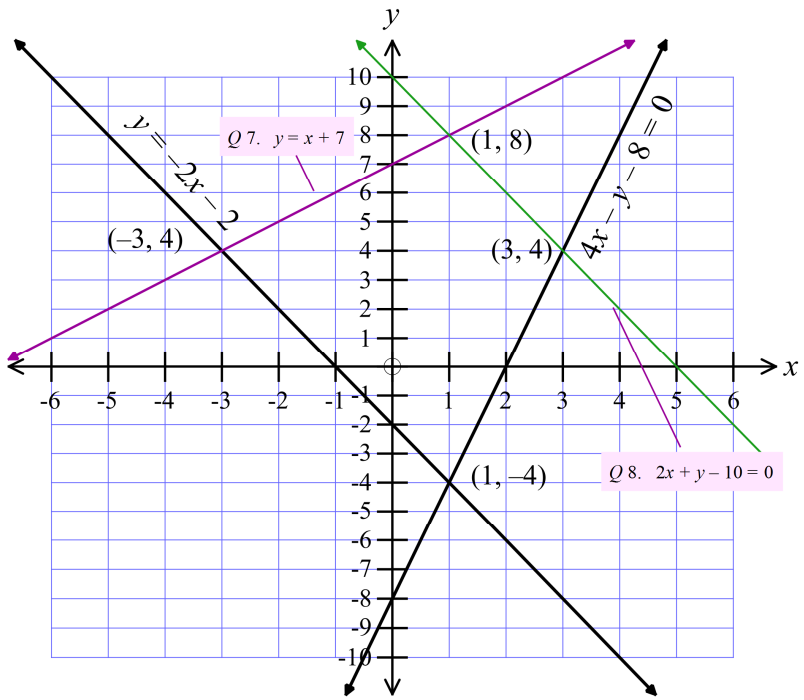
Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	$2x - 3y + 12 = 0$ ① $y = -2$ ② Sub $y = -2$ into ① $2x - 3(-2) + 12 = 0$ $2x + 6 + 12 = 0$ $2x = -18$ $x = -\frac{18}{2}$ $x = -9$ Point is $(-9, -2)$	$(-9, -2)$
2.	$9x - 5y + 15 = 0$ ① $y = 3x$ ② Sub ② into ① $9x - 5(3x) + 15 = 0$ $9x - 15x = -15$ $-6x = -15$ $x = \frac{-15}{-6} = 2\frac{1}{2}$ $y = 3\left(2\frac{1}{2}\right) = 7\frac{1}{2}$ Solution $\left(2\frac{1}{2}, 7\frac{1}{2}\right)$	$\left(2\frac{1}{2}, 7\frac{1}{2}\right)$
3.	$2x + y = 15$ ① $3x - y = 20.$ ② $5x = 35$ ① + ② $x = \frac{35}{5} = 7$	$x = 7$

4.	$3p - 5r = 17$ ① $p - 5r = 19$ ② $2p = -2$ ① − ② $p = \frac{-2}{2} = -1$ Sub into ② $-1 - 5r = 19$ $-5r = 20$ $r = \frac{20}{-5}$ $r = -4$ Solution $p = -1,\ r = -4$	$p = -1,\ r - -4$
5.	$4s - 3t = 11$ ① $2s + t = 3$ ② $6s + 3t = 9$ ③ ② × 3 $10s = 20$ ① + ③ $s = \frac{20}{10} = 2$ Sub in ② $2(2) + t = 3$ $4 + t = 3$ $t = -1$ Solution $s = 2$ and $t = -1$	$s = 2\ ,\ t = -1$
6.	$y = 5x - 16$ ① $2x + y - 5 = 0$ ② Sub ① into ② $2x + (5x - 16) - 5 = 0$ $7x - 21 = 0$ $7x = 21$ $x = \frac{21}{7} = 3$ Sub into ① $y = 5(3) - 16 = -1$ Point is $(3, -1)$	$(3, -1)$

		
7.	See graph above	Line on graph
8.	See graph above	Line on graph
9.	(1, –4) from graph.	(1, –4)
10.	(–3, 4) from graph.	(–3, 4)
11.	(3, 4) from graph.	(3, 4)
12.	(1, 8) from graph.	(1, 8)

High School
Mathematics Test 2015

Year 10

Simultaneous Equations

Calculator Allowed

Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	$3x - y = 12$ ① $y = x$ ② Sub ② into ① $3x - x = 12$ $2x = 12$ $x = 6$ $y = 6$ Solution (6, 6)	**C**
2.	$y = 5x + 6$ ① $y = x + 2$ ② Sub ② into ① $x + 2 = 5x + 6$ $-4x = 4$ $x = -1$ $y = -1 + 2 = 1$ Solution (–1, 1)	**B**
3.	$3x - 2y = 14$ ..... ① $5x + 2y = 10$..... ② $8x = 24$ ..... ③ ① + ② $x = 3$..... ④ ③ ÷ 8 $9 - 2y = 14$ Sub ④ into ① $-2y = 5$ $y = -2.5$ Solution (3, –2.5)	**D**
4.	See above	**A**

5.	$x - 6y - 8 = 0$ ① $7x + 6y - 8 = 0$ ② $8x - 16 = 0$ ③ ① + (2) $8x = 16$ $x = 2$ ④ Solve ③ $2 - 6y - 8 = 0$ ⑤ Sub ④ into ① $-6y = 6$ $y = -\frac{6}{6} = -1$ Solution $(2, -1)$	**D**
6.	$4x - 3y - 15 = 0$ ① $y = 2x - 3$ ② $4x - 3(2x - 3) - 15 = 0$ ④ Sub ② into ① $4x - 6x + 9 - 15 = 0$ $-2x = 6$ $x = -3$ ⑤ Solve ④ $y = 2(-3) - 3$ Sub ⑤ into ② $y = -9$ Solution $(-3, -9)$	**B**
7.	$3x + 5y = 15$ ① $6x + 3y = 16$ ② $6x + 10y = 30$ ③ ① × 2 $7y = 14$ ④ ③ − ② $y = 2$	**C**
8.	$(-3, 0)$	**A**
9.	$(4, 1)$	**D**
10.	$x - y - 1 = 0$ and $3x + 2y + 12 = 0$ from Graph.	**C**
11.	Point M from Graph.	**B**
12.	For point J $x = 2$ ① $x + 4y - 16 = 0$ ② Sub ① into ② $2 + 4y - 16 = 0$ $4y = 14$ $y = \frac{14}{4} = 3.5$ Solution $(2, 3.5)$	**D**

High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Simultaneous Equations

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 ●

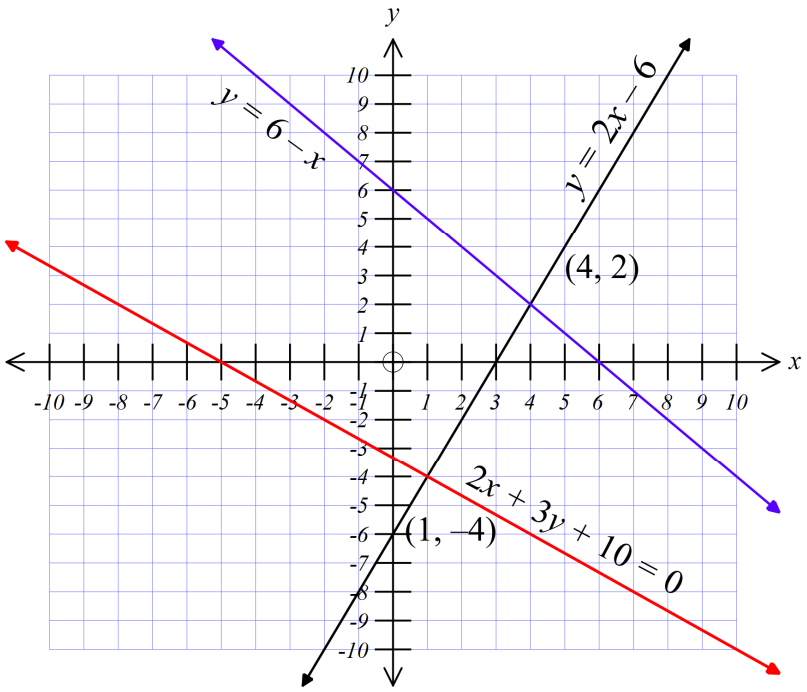
High School Mathematics Test 2015

Year 10	Simultaneous Equations	Calculator Allowed

Section 3 Longer Answer Section

ANSWERS

		Marks
1.	(a) $y = -2x + 2$ ① $y = 3x + 7$ ② Sub ① in ② $-2x + 2 = 3x + 7$ $-5x = 5$ $x = \frac{5}{-5} = -1$ $y = -2(-1) + 2$ $= 2 + 2$ $= 4$ Solution $(-1, 4)$	**3 marks for correct answer with working.** **2 marks for almost complete partial answer, or incorrect answer with only minor errors** **1 mark for some basic working on the right course**
	(b) $2x + 3y - 12 = 0$ ① $3x - 4y + 16 = 0$ ② $6x + 9y - 36 = 0$ ③ ① × 3 $6x - 8y + 32 = 0$ ④ ② × 2 $9y - -8y - 36 - 32 = 0$ ③ − ④ $17y = 68$ $y = \frac{68}{17} = 4$ Sub into ① $2x + 3(4) - 12 = 0$ $2x = 0$ $x = 0$ Solution $(0, 4)$	**3 marks for correct answer with working.** **2 marks for almost complete partial answer, or incorrect answer with only minor errors** **1 mark for some basic working on the right course**

2.	(a)  	**1 mark for each of the red and blue lines on this graph**
	(b) (4, 2)	**1 mark for correct point read from graph**
	(c) (1, -4)	**1 mark for correct point read from graph**