

# High School Mathematics Test 2014

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. Use an algebraic method to solve simultaneously  $3x + y + 4 = 0$  and  $x = 4$ .

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.....

2. Use an algebraic method to solve simultaneously  $y = 2x$  and  $x + y - 12 = 0$ .

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.....  
.....

3. What is the  $x$  value of the point of intersection of  $2x + 4y = 15$  and  $3x - 4y = 10$ .

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.....  
.....

4. Solve the simultaneous equations:  $2a - 5b = 10$  and  $4a - 5b = 18$ .

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.....  
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5. Find the values of  $k$  and  $m$  which simultaneously solve the equations  $2k - 3m = 5$  and  $5k - m = 6$ .

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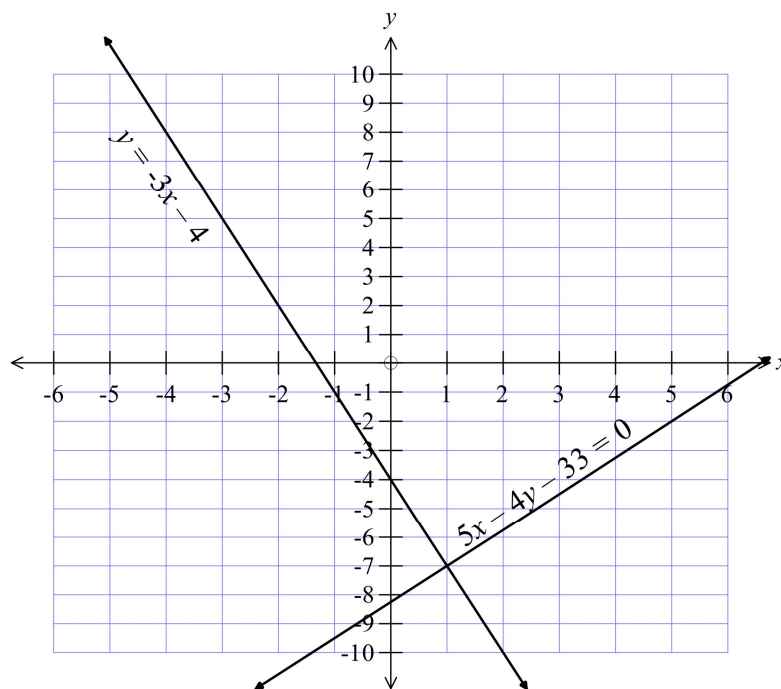
6. Find the point of intersection of  $y = 3x - 18$  and  $3x + y = 6$ .

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Questions 7 – 11 refer to the graph below.



7. Sketch  $y = 4x + 10$  on the graph above

8. Sketch  $4x + 3y - 14 = 0$  on the graph above.

9. Solve simultaneously: 
$$\begin{cases} y = -3x - 4 \\ 5x - 4y - 33 = 0 \end{cases}$$

.....

10. Solve simultaneously: 
$$\begin{cases} y = 4x + 10 \\ y = -3x - 4 \end{cases}$$

.....

11. Solve simultaneously: 
$$\begin{cases} y = 4x + 10 \\ 4x + 3y - 14 = 0 \end{cases}$$

.....

12. Solve simultaneously: 
$$\begin{cases} 5x - 4y - 33 = 0 \\ 4x + 3y - 14 = 0 \end{cases}$$

.....

# High School Mathematics Test 2014

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  $3x + 4y = 14$  and  $y = x$ .
- A.  $(-5, -5)$     B.  $(-2, -2)$     C.  $(2, 2)$     D.  $(5, 5)$

2. Solve simultaneously  $y = 7 - 5x$  and  $y = x + 1$ .
- A.  $(0, 1)$     B.  $(1, 2)$     C.  $(2, 3)$     D.  $(3, 4)$

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

$$\begin{cases} 3x - 2y = 5 \\ 5x + 2y = 51 \end{cases}$$

- A.  $(7, 8)$     B.  $(7, 10)$     C.  $(8, 7)$     D.  $(9, 5)$

4. The solution to a pair of simultaneous equations is shown:

$$\begin{array}{ll} 3x - 2y = 24 \dots\dots \textcircled{1} & \\ 5x - 2y = 20 \dots\dots \textcircled{2} & \\ 2x = -4 \dots\dots \textcircled{3} \quad \textcircled{2} - \textcircled{1} & \dots\dots \text{Line 1} \\ x = -2 \dots\dots \textcircled{4} \quad \textcircled{3} \div 2 & \dots\dots \text{Line 2} \\ -10 - 2y = 20 \text{ Sub } \textcircled{4} \text{ in } \textcircled{2} & \dots\dots \text{Line 3} \\ -2y = 10 & \dots\dots \text{Line 4} \\ y = -5 & \\ \text{Solution } (-2, -5) & \end{array}$$

In which line does a mistake occur?

- A. Line 1    B. Line 2    C. Line 3    D. Line 4

5. Solve simultaneously  $2x - y - 12 = 0$  and  $y = x - 3$ .

- A.  $(-6, -9)$     B.  $(6, 9)$     C.  $(9, 6)$     D.  $(12, 6)$

6. When the equations below are solved simultaneously;

$$\begin{cases} 5x + 2y = -4 \\ 8x + 4y = -5 \end{cases}$$

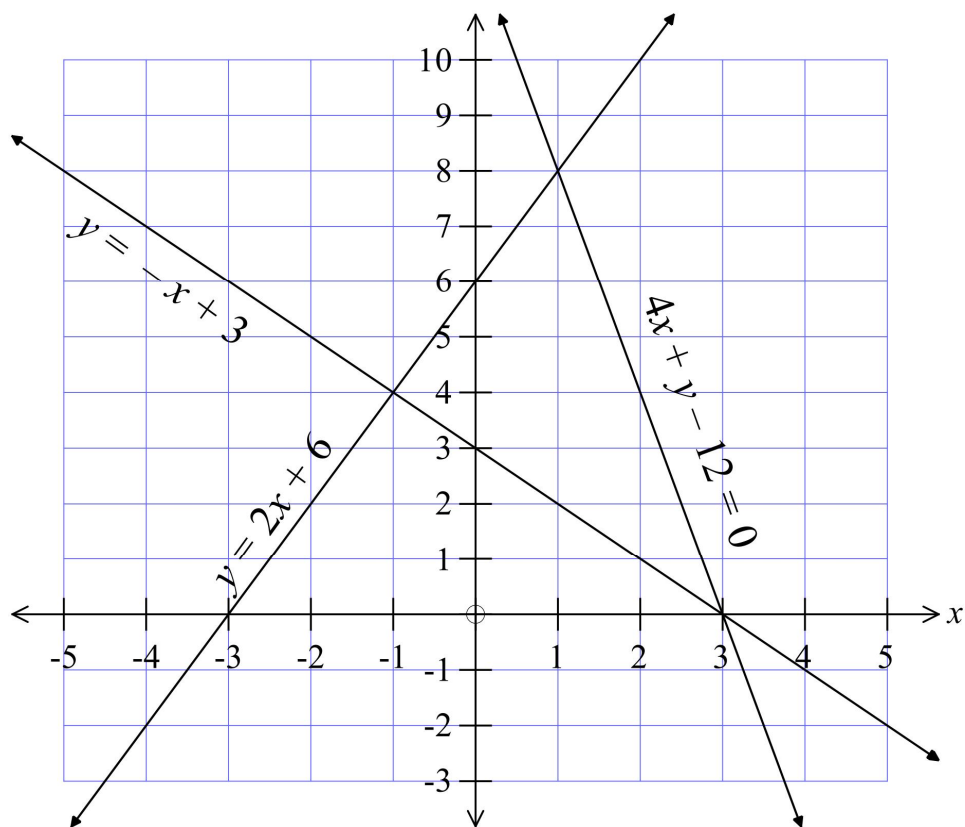
A.  $x = -\frac{3}{2}$

B.  $x = -\frac{1}{2}$

C.  $x = \frac{1}{2}$

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

Question 7 – 9 refer to the graph below.



7. Solve

$$\begin{cases} y = -x + 3 \\ y = 2x + 6 \end{cases}$$

- A.  $(-1, 4)$       B.  $(0, 3)$       C.  $(1, 8)$       D.  $(3, 0)$

8. Solve

$$\begin{cases} 4x + y - 12 = 0 \\ y = 2x + 6 \end{cases}$$

- A.  $(-1, 4)$       B.  $(0, 3)$       C.  $(1, 8)$       D.  $(3, 0)$

9.

Solve

$$\begin{cases} 4x + y - 12 = 0 \\ y = -x + 3 \end{cases}$$

- A.  $(-1, 4)$       B.  $(0, 3)$       C.  $(1, 8)$       D.  $(3, 0)$

10.

The number plane shows the lines

$p : y = 2x$

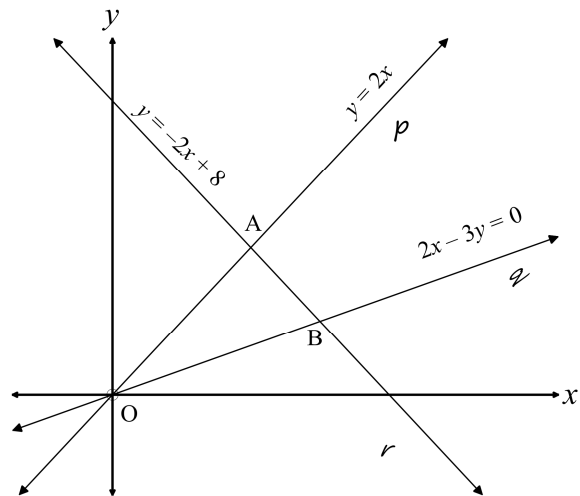
$q : 2x - 3y = 0 \text{ and}$

$r : y = -2x + 8.$

The points O, A and B are the points where pairs of lines intersect.

The point B is the solution to which pair of simultaneous equations?

- A.  $2x - 3y = 0$  and  $2x - y = 0$ .  
B.  $2x - 3y = 0$  and  $2x + y = 8$ .  
C.  $2x - y = 0$  and  $2x - y = 8$ .  
D.  $2x + y = 0$  and  $2x - y = 8$ .



# *High School Mathematics Test 2014*

## Simultaneous Equations

### Multiple Choice Answer Sheet

Name \_\_\_\_\_

Completely fill the response oval representing the most correct answer.

- |     |   |                       |   |                       |   |                       |   |                       |
|-----|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| 1.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 2.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 3.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 4.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 5.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 6.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 7.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 8.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 9.  | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 10. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |

# High School Mathematics Test 2014

## Simultaneous Equations

### ANSWERS

Section 1 ( 1 mark each)	
	Working and Answers
1.	$3x + y + 4 = 0$ (1) $x = 4$ (2) Sub (2) into (1) $3(4) + y + 4 = 0$ $y + 16 = 0$ $y = -16$ Solution $x = 4, y = -16$ .
2.	$y = 2x$ (1) $x + y - 12 = 0$ (2) Sub (1) into (2) $x + 2x - 12 = 0$ $3x = 12$ $x = 4$ $y = 2(4) = 8$
3.	$2x + 4y = 15$ (1) $3x - 4y = 10$ (2) $5x = 25$ (1) + (2) $x = \frac{25}{5}$ $x = 5$
4.	$2a - 5b = 10$ (1) $4a - 5b = 18$ (2) $2a = 8$ (2) - (1) $a = 4$ sub in (1) $2(4) - 5b = 10$ $-5b = 2$ $b = -\frac{2}{5}$ Solution $a = 4, b = -\frac{2}{5}$
5.	$2k - 3m = 5$ (1) $5k - m = 6$ (2) $15k - 3m = 18$ (3) (2) $\times 3$ $13k = 13$ (3) - (1) $k = 1$ Sub in (1) $2(1) - 3m = 5$ $-3m = 3$ $m = -1$ $k = 1, m = -1$



6.	$y = 3x - 18$ ① $3x + y = 6$ ② Sub ① into ② $3x + 3x - 18 = 6$ $6x = 24$ $x = 4$ Sub in ① $y = 3(4) - 18$ $y = -6$ Point is $(4, -6)$
7.	
8.	
9.	$(1, -7)$ from graph.
10.	$(-2, 2)$ from graph.
11.	$(-1, 6)$ from graph.
12.	$(5, -2)$ from graph.

Section 2 (1 mark each)		
	Working	Answers
1.	$3x + 4y = 14$ (1) $y = x$ (2) Sub (2) into (1) $3x + 4x = 14$ $7x = 14$ $x = 2$ $y = 2$ Solution (2,2)	C
2.	$y = 7 - 5x$ (1) $y = x + 1$ (2) Sub (1) into (2) $7 - 5x = x + 1$ $7 - 6x = 1$ $-6x = -6$ $x = 1$ $y = 7 - 5(1) = 2$ Solution (1, 2)	B
3.	$3x - 2y = 5$ (1) $5x + 2y = 51$ (2) $8x = 56$ (1) + (2) $x = 7$ Sub into (1) $3(7) - 2y = 5$ $21 - 2y = 5$ $-2y = -16$ $y = 8$ Solution (7,8)	A
4.	Line 4 should be $-2y = 30$	D
5.	$2x - y - 12 = 0$ (1) $y = x - 3$ (2) Sub (2) into (1) $2x - (x - 3) - 12 = 0$ $x + 3 - 12 = 0$ $x = 9$ $y = 9 - 3 = 6$ Solution (9, 6)	C
6.	$5x + 2y = -4$ (1) $8x + 4y = -5$ (2) $10x + 4y = -8$ (3) (1) $\times 2$ $2x = -3$ (3) $-$ (2) $x = -\frac{3}{2}$	A
7.	(-1, 4) from graph	A
8.	(1, 8) from graph	C
9.	(3, 0) from graph	D
10.	B is intersection of $y = -2x + 8$ and $2x - 3y = 0$ which becomes $2x + y = 8$ and $2x - 3y = 0$	B

# High School Mathematics Test 2014

## Simultaneous Equations

### Multiple Choice Answer Sheet

Name Marking Sheet

Completely fill the response oval representing the most correct answer.

- |     |   |                                  |   |                                  |   |                                  |   |                                  |
|-----|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|
| 1.  | A | <input type="radio"/>            | B | <input type="radio"/>            | C | <input checked="" type="radio"/> | D | <input type="radio"/>            |
| 2.  | A | <input type="radio"/>            | B | <input checked="" type="radio"/> | C | <input type="radio"/>            | D | <input type="radio"/>            |
| 3.  | A | <input checked="" type="radio"/> | B | <input type="radio"/>            | C | <input type="radio"/>            | D | <input type="radio"/>            |
| 4.  | A | <input type="radio"/>            | B | <input type="radio"/>            | C | <input type="radio"/>            | D | <input checked="" type="radio"/> |
| 5.  | A | <input type="radio"/>            | B | <input type="radio"/>            | C | <input checked="" type="radio"/> | D | <input type="radio"/>            |
| 6.  | A | <input checked="" type="radio"/> | B | <input type="radio"/>            | C | <input type="radio"/>            | D | <input type="radio"/>            |
| 7.  | A | <input checked="" type="radio"/> | B | <input type="radio"/>            | C | <input type="radio"/>            | D | <input type="radio"/>            |
| 8.  | A | <input type="radio"/>            | B | <input type="radio"/>            | C | <input checked="" type="radio"/> | D | <input type="radio"/>            |
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