# *High School Mathematics Test 2013*

Year

# *Linear Relations*

**Non Calculator Section**

**Skills and Knowledge Assessed:**

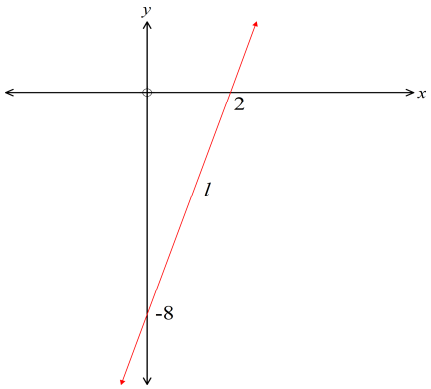
- Sketch linear graphs using the coordinates of two points and solve linear equations (ACMNA215)
- Solve problems involving parallel and perpendicular lines (ACMNA238)

Name_____

## Section 1 Non Calculator Section

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

1. The line l is shown on the number plane to the right.
The equation of the line *l*, is:

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2. A line on the Cartesian plane has a gradient of $-5$ and crosses the y axis 10 units below the origin.
What is the equation of the line?

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3. On a number plane, the straight line *p*, has a gradient of 4 and passes through the point (4, 9).
What is the equation of the line?

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4. A straight line on a number plane has an equation of $6x + 2y - 7 = 0$.
What is the gradient of the line?

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5. Without drawing the line, show that the line $2x + 3y - 3 = 0$ passes through the point $(-9, 7)$.

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6. On the number plane provided, draw a sketch of the line $y = \frac{2}{3}x - 4$.

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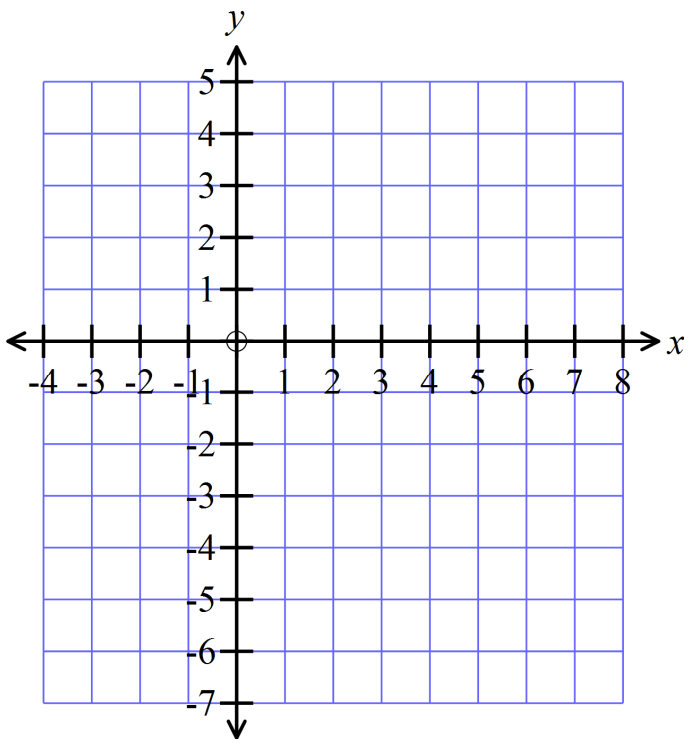


7. What are the coordinates of the point where the line $5x - 6y + 12 = 0$ crosses the $x$ axis?

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8. A line crosses the $x$ axis at (8, 0) and the y axis at (4, 0)
What is the equation of the line?

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9. A line on the Cartesian plane is parallel to the line $y = 3x - 4$ and passes through the point $(-6, 2)$.
What is the equation of the line?

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10. The line $y = 2x - 4$ and the line $k$ are perpendicular and intersect at the point ( 3, 2).
Find the equation of the line $k$.

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# *High School*
# *Mathematics Test 2013*
# *Linear Relations*

Calculator Allowed Section

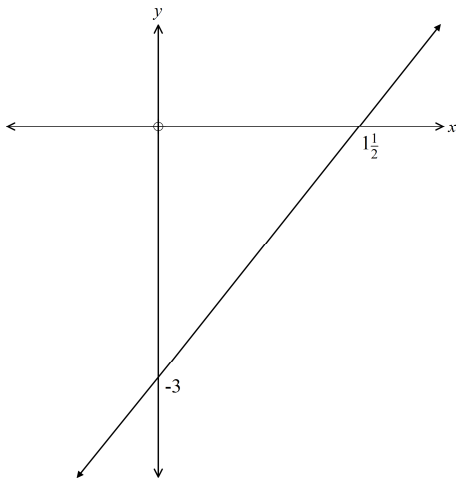
Year

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. The equation of the line shown is:




A. $y = 3x - 2$

B. $y = x + 2$

C. $y = 2x - 3$

D. $y = 4x - 4$

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2. A line has a gradient of $-4$ and passes through the point $(0, 7)$.
What is the equation of the line?

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

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3. A line has a gradient of $-4$ and passes through the point $(1, -1)$. What is its equation?

A. $y = 4 - 3x$

B. $y = 4x - 3$

C. $y = 3 - 4x$

D. $y = 3x - 4$

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4. A line has an equation $y = -2x - 7$.
What is its gradient?

A. $-7$ B. $-2$ C. $-\frac{1}{2}$ D. $7$

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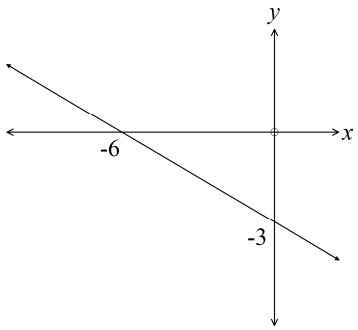
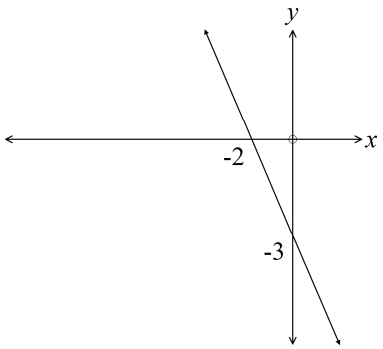
5. Which is the graph of the line $y = -\frac{3}{2}x - 3$ ?

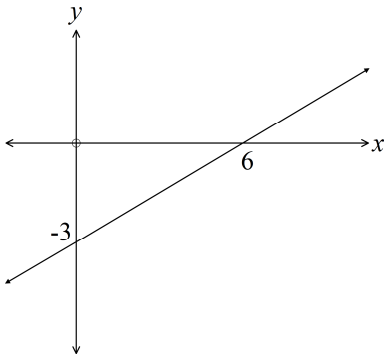
A.



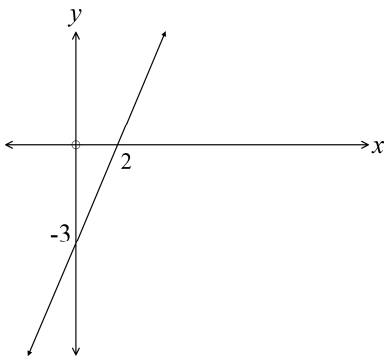

B.




C.




D.




6. A line has equation $2x - 3y + 9 = 0$. Which statement is true?

A. Its gradient is $-\frac{2}{3}$ and its $y$ intercept is $-3$.

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

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

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

7. The points $A$ (3, 5) and $B$ $(6, -4)$ lie on a line $l$.

The equation of the line $l$ , is:

A. $y = -3x - 6$ B. $y = -\frac{1}{3}x - 2$ C. $y = \frac{1}{3}x - 6$ D. $y = 3x - 22$

8. Line $p$ has equation $y = 2x + 4$ and line $q$ has equation $x + 2y - 8 = 0$.
Which statement is true?

A. Line $p$ is parallel to line $q$.

B. Line $p$ is perpendicular to line $q$.

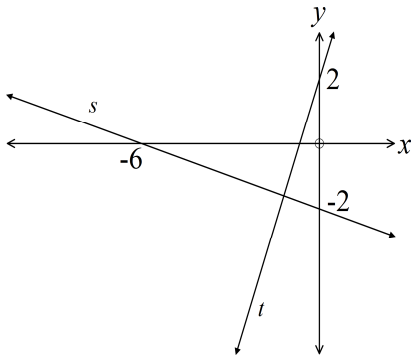
C. The lines are neither parallel nor perpendicular.

D. The lines are both parallel and perpendicular.

9. Which line is parallel to $2x - y + 5 = 0$

A. $y = 2x - 7$ B. $y = \frac{1}{2}x - 7$ C. $y = -2x - 7$ D. $y = -\frac{1}{2}x - 7$

10. The line $t$ is perpendicular to the line $s$, shown. What is the equation of the line $t$?




A. $y = -3x + 2$

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

C. $y = \frac{1}{3}x + 2$

D. $y = 3x + 2$

# *High School*
# *Mathematics Test 2013*
# *Linear Relations*

Year

**Calculator Allowed Section**

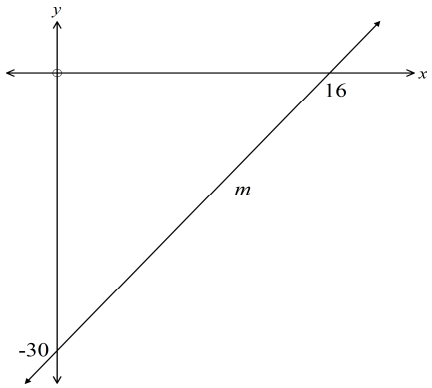
Name_____

## Section 3 Longer Answer Section

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

**Marks**

1. (a) The line $m$ is shown on the number plane. **2**
Give the equation of the line $m$ in general form.

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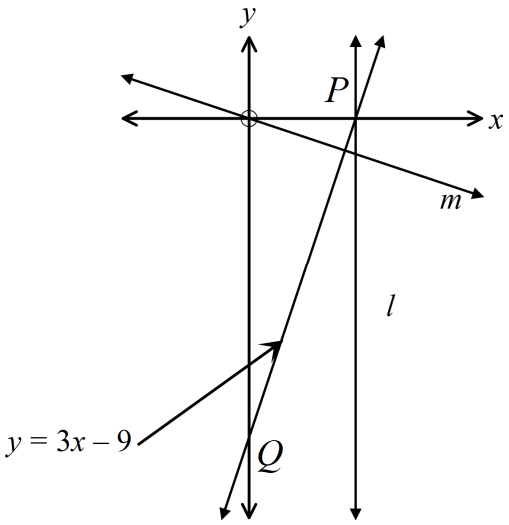
2. The diagram shows a number plane. The line $y = 3x - 9$ intersects the vertical line $l$ on the point $P$ on the x axis. The line $m$ is perpendicular to the line $y = 3x - 9$ and passes through the origin.



**Marks**

a) What are the coordinates of the points $P$ and $Q$? **2**

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b) What is the equation of the line $l$? **1**

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c) What is the equation of the line $m$? **2**

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# *High School*
# *Mathematics Test 2013*

## *Multiple Choice Answer Sheet*

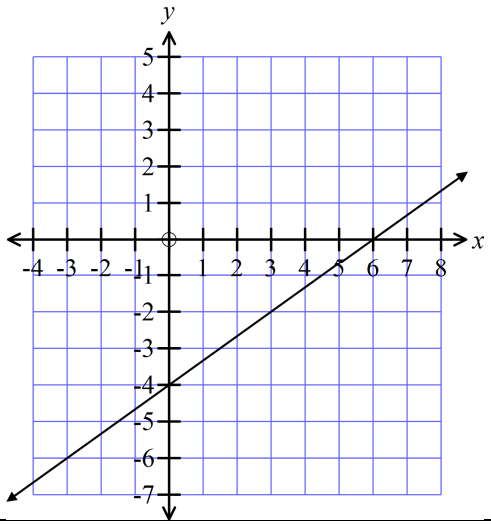
Name _____

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 ⬭ |

# *High School*
# *Mathematics Test 2013*
# *Linear Relations*

# ANSWERS

| Section 1 | |
|---|---|
| 1. | Gradient $= \frac{8}{2} = 4$<br>$y$ intercept $= -8$<br>Equation: $y = 4x - 8$ |
| 2. | $m = -5,\ b = -10$<br>Use $y = mx + b$<br>Equation : $y = -5x - 10$ |
| 3. | $m = 4, (x_1, y_1) = (4, 9)$<br>Use $y - y_1 = m(x - x_1)$<br>$y - 9 = 4(x - 4)$<br>$y - 9 = 4x - 16$<br>$y = 4x - 7$ |
| 4. | $6x + 2y - 7 = 0$.<br>Make $y$ the subject.<br>$2y = -6x + 7$<br>$y = -3x + \frac{7}{2}$<br>Gradient is coeffinient of $x$.<br>Gradient $= -3$ |
| 5. | Substitute $(-9, 7)$ into the LHS of the equation.<br>$2(-9) + 3(7) - 3 = -18 + 21 - 3$<br>$= 0$<br>$= RHS$<br>$\therefore$ $(-9, 7)$ lies on the line. |
| 6. |  <br><br>Can use gradient and intercept, or complete a table and plot points. |

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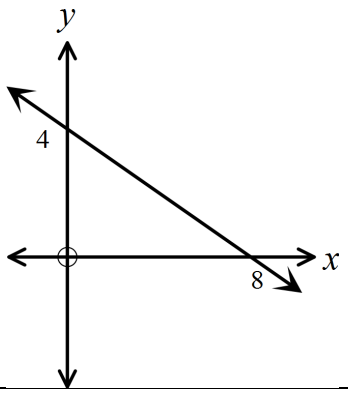
|---|---|
| 7. | Crosses the $x$ axis where $y = 0$.<br>Sub $y = 0$ into the equation.<br>$5x - 6(0) + 12 = 0$<br>$5x = -12$<br>$x = -\frac{12}{5} = -2\frac{2}{5}$<br>Crosses the $x$ axis at<br>$(-2\frac{2}{5}, 0)$ |
| 8. | From sketch,<br>Gradient $= \frac{Rise}{Run} = -\frac{4}{8} = -\frac{1}{2}$<br>$y$ intercept is 4<br>Equation is $y = -\frac{1}{2}x + 4$<br>or $x + 2y - 8 = 0$<br>  |
| 9. | Since parallel to $y = 3x - 4$ it has gradient of 3.<br>Use $y - y_1 = m(x - x_1)$<br>$y - 2 = 3(x - -6)$<br>$y - 2 = 3x + 18$<br>$y = 3x + 20$ |
| 10. | Since perpendicular to $y = 2x - 4$ it has gradient of $-\frac{1}{2}$.<br>Since $2 \times -\frac{1}{2} = -1$ for perpendicular lines.<br>Use $y - y_1 = m(x - x_1)$<br>$y - 2 = -\frac{1}{2}(x - 3)$<br>$y - 2 = -\frac{1}{2}x + \frac{3}{2}$<br>$y = -\frac{1}{2}x + \frac{7}{2}$<br>or $x + 2y - 7 = 0$ |

| Section 2 | |
|---|---|
| 1. | C |
| 2. | D |
| 3. | C |
| 4. | B |
| 5. | B |
| 6. | D |
| 7. | A |
| 8. | B |
| 9. | A |
| 10. | D |

| Section 3 | |
|---|---|
| 1. | From sketch, gradient $= \frac{30}{16} = \frac{15}{8}$<br>$y$ intercept is $-30$<br>Equation $y = \frac{15}{8}x - 30$<br>Change to general form.<br>$8y = 15x - 240$<br>$15x - 8y - 240 = 0$ |
| 2 a) | $Q$ is the $y$ intercept, so $Q$ is (0, -9)<br>$P$ is the $x$ intercept, so $y = 0$<br>$3x - 9 = 0$<br>$3x = 9$<br>$x = 3$<br>$P$ is (3, 0) |
| 2 b) | Line $l$ is a vertical line through (3, 0)<br>Equation $x = 3$. |
| 2 c) | Since perpendicular to $y = 3x - 9$ , gradient is $-\frac{1}{3}$. Passes through the origin .<br>Equation $y = -\frac{1}{3}x + 0$<br>$y = -\frac{1}{3}x$. |

# *High School*
# *Mathematics Test 2013*

## *Multiple Choice Answer Sheet*

Name Marking Sheet

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 ● |