High School
Mathematics Test 2015

Year 8

Linear Relations

Non Calculator Section

Name_____

Skills and Knowledge Assessed:

- Given coordinates, plot points on the Cartesian plane, and find coordinates for a given point (ACMNA178)
- Plot linear relationships on the Cartesian plane with and without the use of digital technologies (ACMNA193)
- Create algebraic expressions and evaluate them by substituting a given value for each variable (ACMNA176)

Answer all questions in the spaces provided on this test paper by:

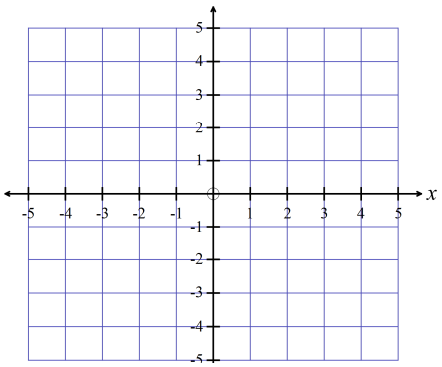
Writing the answer in the box provided.

or

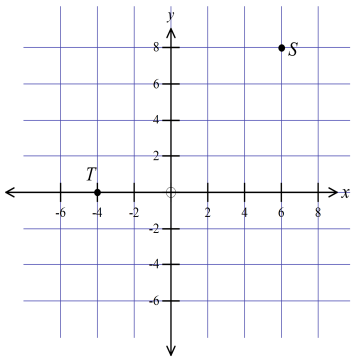
Shading in the bubble for the correct answer from the four choices provided.

Show any working out on the test paper. Calculators are **not** allowed.

1. Mark and label the points *D* (-2, -3) and *E* (3, -2) on the number plane.



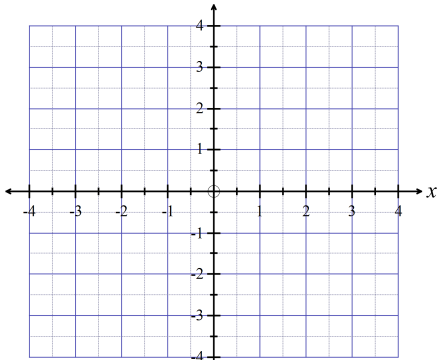
2. Write down the ordered pairs that describe the position of the points *S* and *T*.



S (,)

T (,)

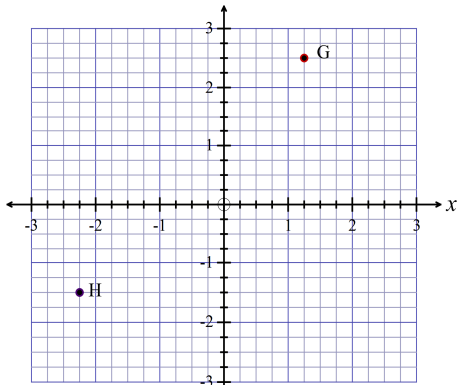
3. Mark and label the points $V\ (3\frac{1}{2},\ -2\frac{1}{2})$ and $W\ (-2\frac{1}{2},\ 1\frac{1}{2})$ on the number plane.



4. Write down the ordered pairs for the points G and H.

G (,)

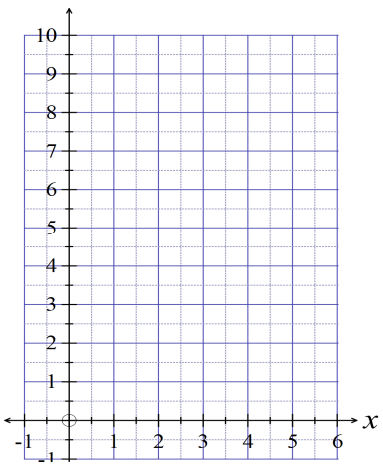
H (,)



5. Use the rule $y = 3x$ to complete the table of ordered pairs below.

x	0	1	2	3
$y = 3x$				

6. Plot the points from the table in the previous question on the number plane.



7. Which rule could be used to describe the ordered pairs in the table below?

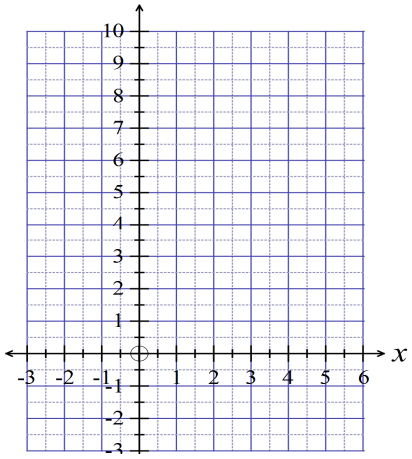
x	1	3	4	6
y	5	7	8	10

☐ $y = x + 2$ ☐ $y = x + 4$ ☐ $y = 2x$ ☐ $y = 5x$

8. Use the rule to complete the table of ordered pairs below.

x	-1	0	1	2
$y = 2x + 5$				

9. Plot the points from the table in question 8 on the number plane and draw the line which passes through them.



Questions 10 – 13 refer to the pattern of numbers below.

Position in pattern	Number
1	6
2	9
3	12
4	

10. What number would be at position 4 in the pattern?

11. What number would be at position 8 in the pattern?

12. Complete the statement below.

Number = ☐ × the position in the pattern + ☐

13. What position in the pattern would have a value of 24?

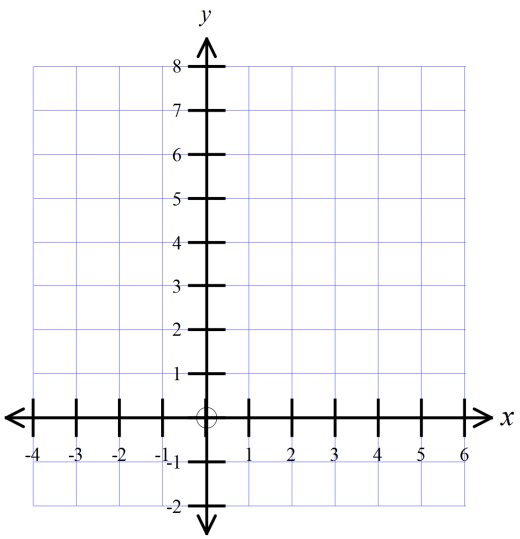
14. Complete the table for $y = 10 - 3x$.

x	–1	0	2
y			

15. Complete the table of ordered pairs for the equation $y = -2x + 5$.

x	-1	0	2
y	7		

16. Use the ordered pairs from question 15 to graph the line $y = -2x + 5$ on the number plane.

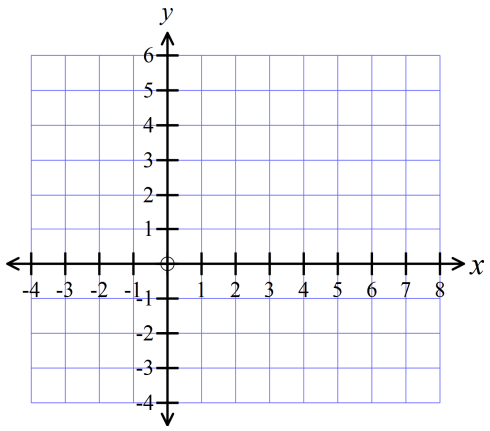


17. Which equation describes the ordered pairs in the table shown?

x	-1	0	1
y	16	15	14

☐ $y = 15x$ ☐ $y = 15 + x$ ☐ $y = 15 - x$ ☐ $y = 14x + 1$

18. Draw the line represented by $y = -2$ on the graph.



High School
Mathematics Test 2015

Year 8

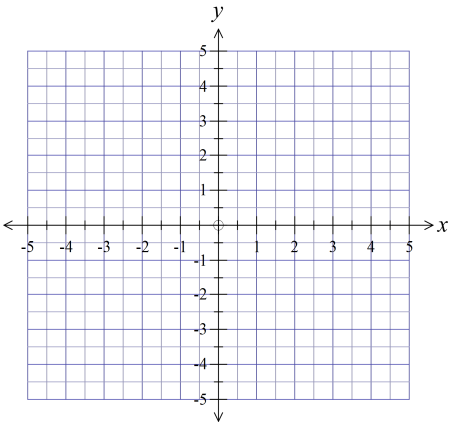
Linear Relations

Calculator Allowed
Short Answer Section

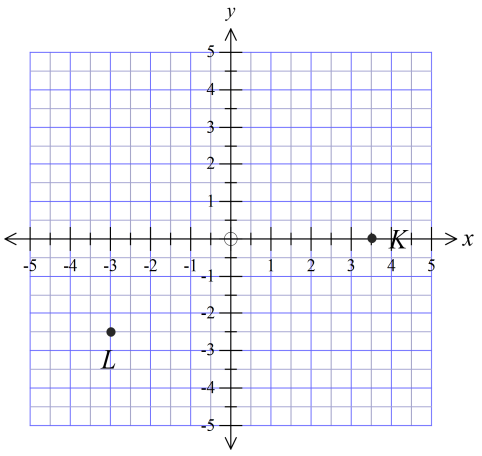
Name_____

Answer all questions in the spaces provided on this test paper by:
Writing the answer in the box provided.
or
Shading in the bubble for the correct answer from the four choices provided.
Show any working out on the test paper. Calculators are allowed.

1. Mark and label the points *M* (4.5, -2.5) and *N* (-4.5, 3.5) on the number plane.



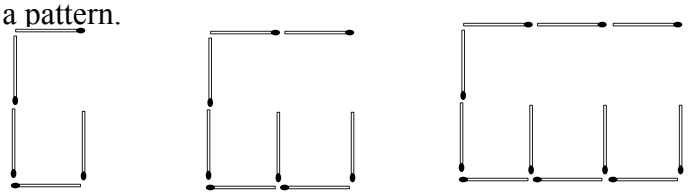
2. Give the ordered pairs that describe the points *K* and *L* below.



K (,)

L (,)

Questions 3 – 6 refer to the diagram below, where matchsticks are used to make the first 3 steps in a pattern.



Step 1 *Step 2* *Step 3*

5 matches 8 matches 11 matches

3. How many matches, in total, are needed to produce *Step 4* of the pattern?

☐ 12 ☐ 13 ☐ 14 ☐ 15

4. Draw what *Step 5* of the pattern would look like.

5. How many matches would be needed to make *Step 8* of the pattern?

☐ matches.

6. Describe in words the pattern that gives the number of matches for a given step.

_____

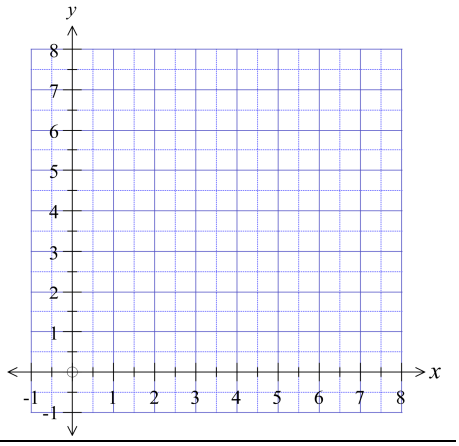
_____

7. Complete the table for the equation $y = 2x - 6$

x	0	0.5	1
y			

8. Plot the ordered pairs from the table on the graph provided.

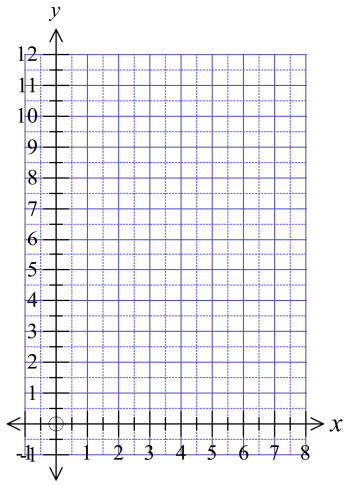
x	2	2.5	3
y	7	4	1



9. Draw the line which represents the equation $y = 3x + 8$

Three ordered pairs have been calculated in the table.

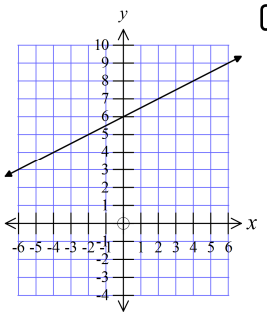
x	-1	0	1
y	5	8	11

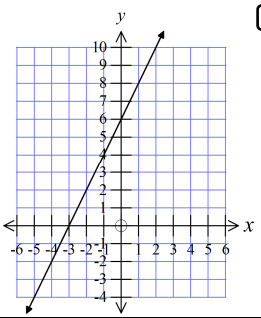


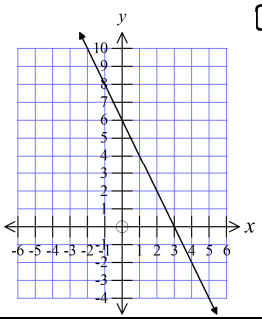
10. Which point does **not** lie on the line with equation $y = 4x + 7$?

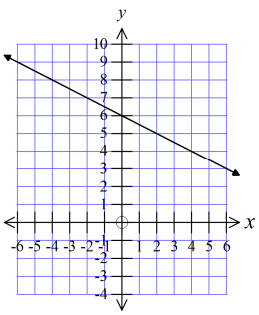
☐ (–1, 3) ☐ (0, 7) ☐ (3, 17) ☐ (4, 23)

11. Which line represents the equation $y = \frac{x}{2} + 6$?

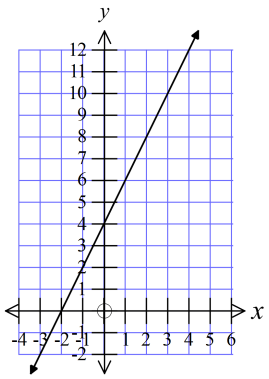
☐ 

☐ 

☐ 

☐ 

12. Which is the equation of the line shown



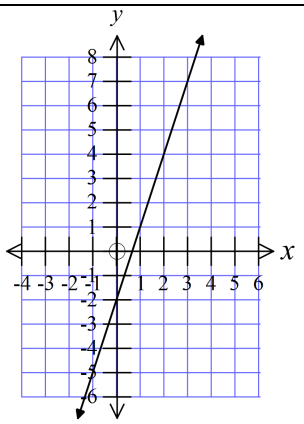
- ☐ $y = 2x - 4$
- ☐ $y = 2x + 4$
- ☐ $y = -2x + 4$
- ☐ $y = -2x - 4$

13. Which equation describes the ordered pairs in the table shown?

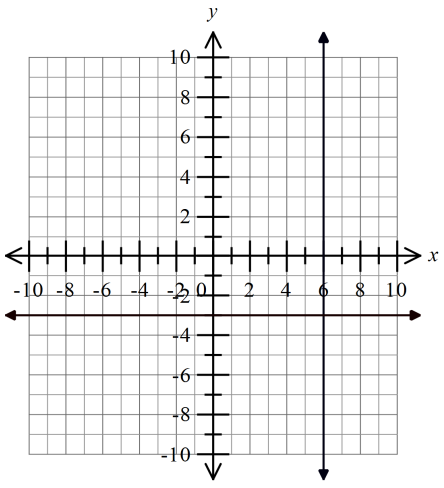
x	2	4	6
y	8	7	6

☐ $y = 10 - 2x$ ☐ $y = 9 - 2x$ ☐ $y = 10 - \frac{x}{2}$ ☐ $y = 9 - \frac{x}{2}$

14. Write the equation of the line shown



15. The lines shown are :

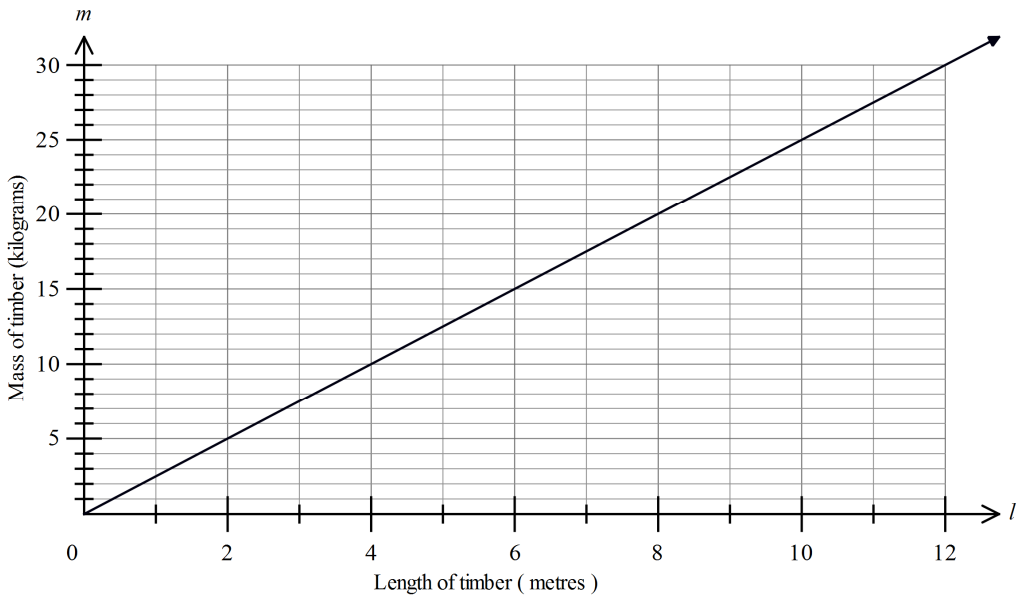


- ☐ $x = 6$ and $y = -3$
- ☐ $x = -6$ and $y = 3$
- ☐ $x = -3$ and $y = 6$
- ☐ $x = 3$ and $y = -6$

Question 16 – 18 refer to the information below.

The mass of a piece of timber with given cross section is related to its length.

The graph below shows the relationship between the mass and length of a certain size of timber.



16. What is the mass of a piece of timber which is 8 metres long?

☐ 2.6 kg ☐ 8 kg ☐ 16 kg ☐ 20 kg

17. A piece of this timber has a mass of 25 kilograms.

What is its length?

18. Write down an equation that links l and m for this size of timber.

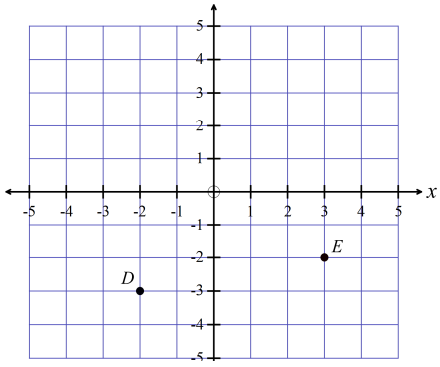
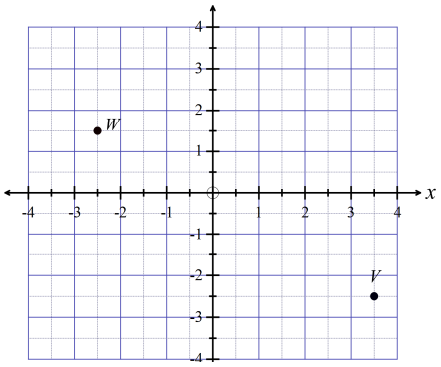
High School
Mathematics Test 2015

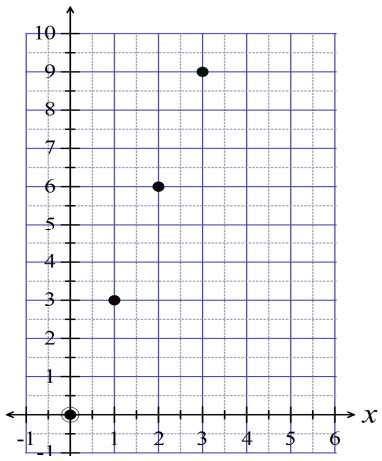
Year 8

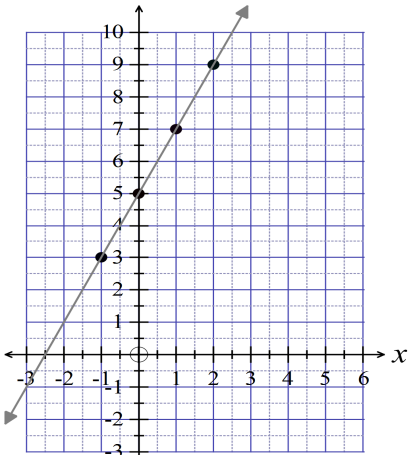
Linear Relations

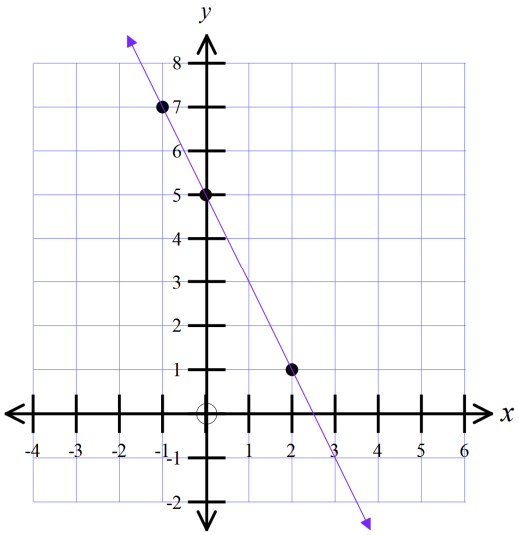
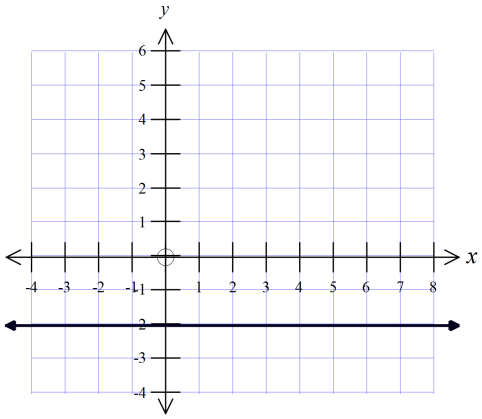
Non Calculator Section

ANSWERS

No.	WORKING	ANSWER
1.		See graph
2.	*S* (6, 8) T (-4, 0)	*S* (6, 8) T (-4, 0)
3.		See graph

<table>
<tr><td>4.</td><td>$G\left(1\frac{1}{4}, 2\frac{1}{2}\right)$
$H\left(-2\frac{1}{4}, -1\frac{1}{2}\right)$</td><td>$G\left(1\frac{1}{4}, 2\frac{1}{2}\right)$
$H\left(-2\frac{1}{4}, -1\frac{1}{2}\right)$</td></tr>
<tr><td>5.</td><td><table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>$y = 3x$</td><td>0</td><td>3</td><td>6</td><td>9</td></tr></table></td><td>See table</td></tr>
<tr><td>6.</td><td>  </td><td>See graph</td></tr>
<tr><td>7.</td><td>$y = x + 4$</td><td>2nd answer</td></tr>
<tr><td>8.</td><td><table><tr><td>x</td><td>–1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>$y = 2x + 5$</td><td>3</td><td>5</td><td>7</td><td>9</td></tr></table></td><td>See table</td></tr>
</table>

<table>
<tr><td>9.</td><td> 
</td><td>See graph</td></tr>
<tr><td>10.</td><td>The numbers increase by 3 each time, so 4th would be 15.</td><td>15</td></tr>
<tr><td>11.</td><td>Position 8 would be 4 more lots of 3 along in the pattern.
$15 + 4 \times 3 = 15 + 12 = 27.$</td><td>27</td></tr>
<tr><td>12.</td><td>Number = 3 × the position in the pattern + 3.</td><td>3 goes in both boxes</td></tr>
<tr><td>13.</td><td>24 is 15 + 9 so 4th term plus 3 lots of 3.
4th term plus 3 more is 7th position</td><td>7th Position</td></tr>
<tr><td>14.</td><td><table><tr><td>x</td><td>–1</td><td>0</td><td>2</td></tr><tr><td>$y = 10 - 3x$</td><td>13</td><td>10</td><td>4</td></tr></table></td><td>See table</td></tr>
<tr><td>15.</td><td><table><tr><td>x</td><td>-1</td><td>0</td><td>2</td></tr><tr><td>$y = -2x + 5$</td><td>7</td><td>5</td><td>1</td></tr></table></td><td>See table</td></tr>
</table>

16.		See graph
17.	$y = 15 - x$	3rd answer
18.		See graph

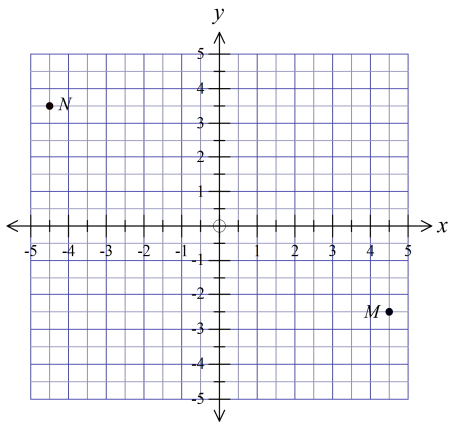
High School
Mathematics Test 2015

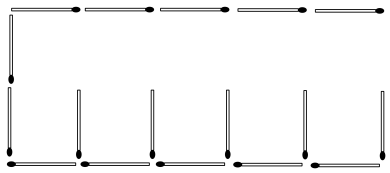
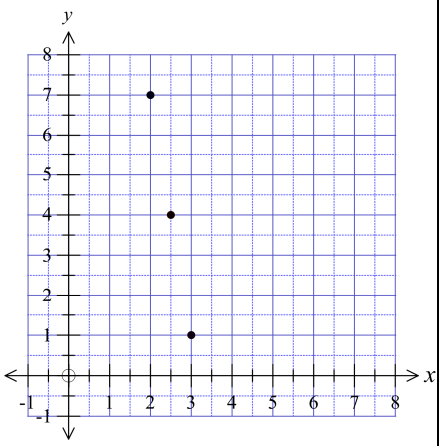
Year 8

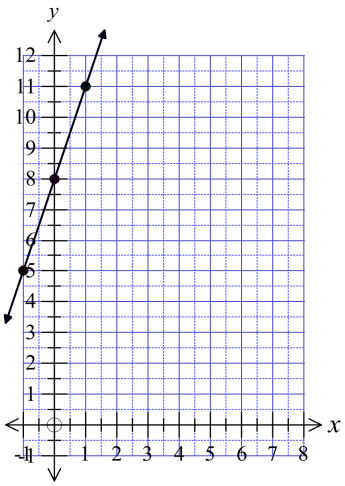
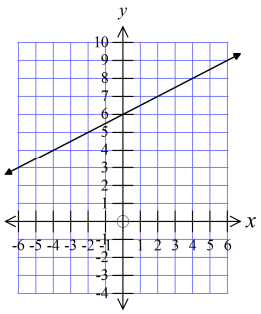
Linear Relations

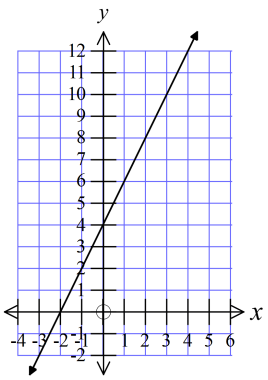
Calculator Allowed
Short Answer
Section

ANSWERS

No.	WORKING	ANSWER
1.		See graph
2.	$K \quad \left(3\frac{1}{2}, 0\right)$ $L \quad \left(-3, -2\frac{1}{2}\right)$	$K \quad \left(3\frac{1}{2}, 0\right)$ $L \quad \left(-3, -2\frac{1}{2}\right)$
3.	Increases by 3 each time, so 11 + 3 = 14	3rd answer

<table>
<tr><td>4.</td><td>  </td><td>See diagram</td></tr>
<tr><td>5.</td><td>Step 5 is 17, step 8 is 3 more steps along, so 3 lots of 3 more
$17 + 3 \times 3 = 17 + 9 = 26$</td><td>26</td></tr>
<tr><td>6.</td><td>Various possible descriptions; Examples are:
The pattern starts with 5 matches at step 1 and goes up by 3 matches for each new step.
Multiply the step number by 3 and add 2 to get the number of matches.</td><td>See examples</td></tr>
<tr><td>7.</td><td><table><tr><td>x</td><td>0</td><td>0.5</td><td>1</td></tr><tr><td>$y = 2x - 6$</td><td>-6</td><td>-5</td><td>-4</td></tr></table></td><td>See table</td></tr>
<tr><td>8.</td><td><table><tr><td>x</td><td>2</td><td>2.5</td><td>3</td></tr><tr><td>y</td><td>7</td><td>4</td><td>1</td></tr></table>  </td><td>See graph</td></tr>
</table>

9.		See graph
10.	(3, 17) $y = 4 \times 3 + 7$ $= 12 + 7$ $= 19 \neq 17$	3rd answer
11.	When x = 0, y = 6 When x = 2, y = 7 	1st answer

<table>
<tr><td>12.</td><td> 

When $x = 0$, $y = 4$
When $x = 1$, $y = 6$</td><td>2nd answer</td></tr>
<tr><td>13.</td><td>Substituting points into the equations gives $y = 9 - \frac{x}{2}$</td><td>4th answer</td></tr>
<tr><td>14.</td><td>Read off some ordered pairs.
<table><tr><td>x</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>-2</td><td>1</td><td>4</td></tr></table>
y goes up by 3 for each increase of 1 in x.
When $x = 0$, $y = -2$.

$y = 3x - 2$</td><td>$y = 3x - 2$</td></tr>
<tr><td>15.</td><td>Vertical line through 6 is $x = 6$ and horizontal line is $y = -3$</td><td>1st answer</td></tr>
<tr><td>16.</td><td>From graph when $l = 8$, $m = 20$</td><td>4th answer</td></tr>
<tr><td>17.</td><td>From graph when $m = 25$, $l = 10$</td><td>10 metres</td></tr>
<tr><td>18.</td><td>$m = 2.5l$</td><td>$m = 2.5l$</td></tr>
</table>