High School Mathematics Test 2014

Year 8

Linear Relations

Non Calculator Section

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)

Name_____

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

Writing the answer in the box provided.

or

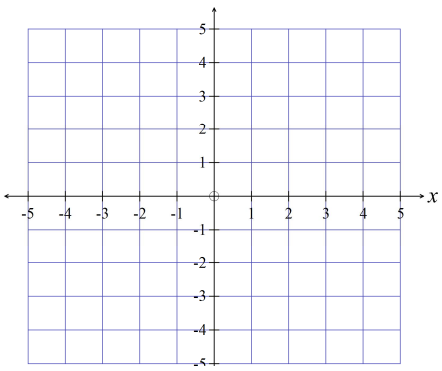
Shading in the bubble for the correct answer from the four choices provided.

Or

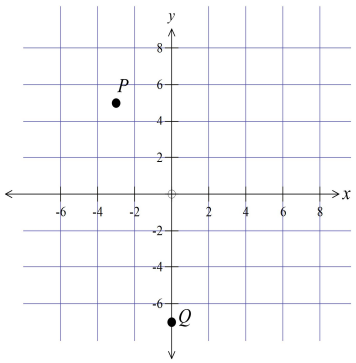
Completing a diagram.

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

1. Mark and label the points K (-4, -3) and L (-3, 2) on the number plane.



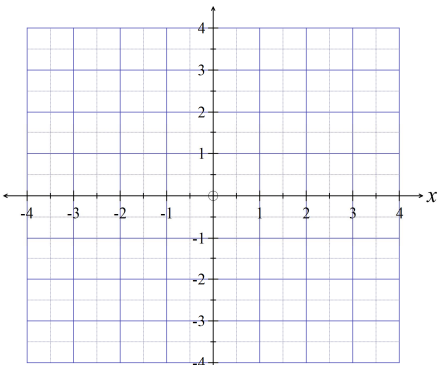
2. Write down the ordered pairs that describe the position of the points *P* and *Q*.



P (,)

Q (,)

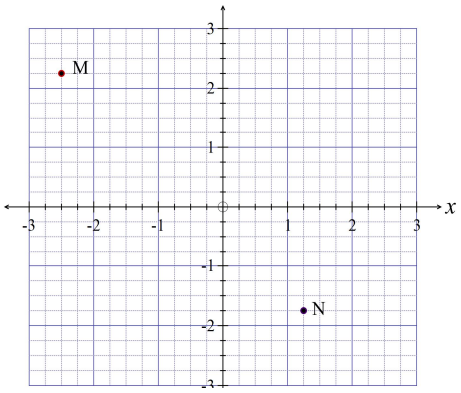
3. Mark and label the points R ($2\frac{1}{2}$, $-1\frac{1}{2}$) and S ($-3\frac{1}{2}$, $\frac{1}{2}$) on the number plane.



4. Write down the ordered pairs for the points M and N.

M (,)

N (,)



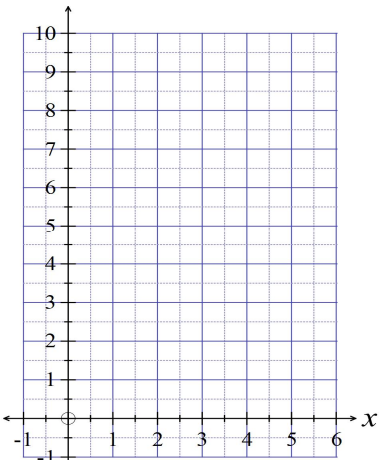
Questions 5 – 6 refer to the following:

The rule $y = x + 4$ describes a relationship between x and y values.

5. Use the rule $y = x + 4$ to complete the table of ordered pairs below.

x	0	2	3	5
$y = x + 4$				

6. Plot the points from the table on the grid.



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

x	1	3	4	6
y	2	6	8	12

☐ $y = x + 1$ ☐ $y = 2x$ ☐ $y = x + 3$ ☐ $y = 3x$

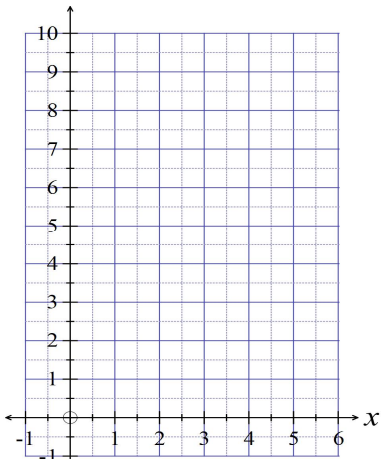
Questions 8 – 9 refer to the following:

The rule $y = 3x - 2$ describes a relationship between x and y values.

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

x	1	2	3	4
$y = 3x - 2$				

9. Plot the points from the table on the grid.



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

Position in pattern	Number
1	4
2	10
3	16
4	

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

11. What number would be at position 9 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 28? ☐

14. Complete the table for $y = 5 - 2x$.

x	0	1	2
y			

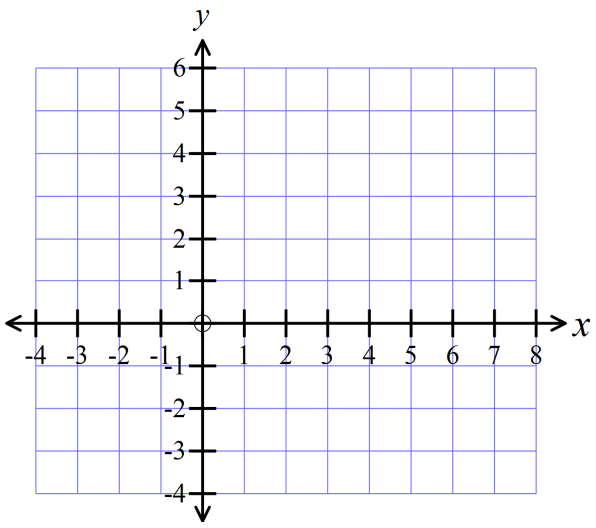
Questions 15 and 16 refer to the equation

$$y = 4 - x$$

15. Complete the table of ordered pairs for the equation $y = 4 - x$.

x	-1	0	2
y	5		

16. Use the ordered pairs to graph the line $y = 4 - x$ on the number plane.

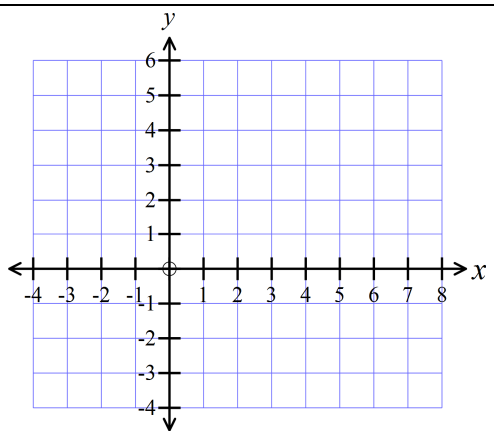


17. Which equation describes the ordered pairs in the table shown?

x	-1	0	1
y	-1	2	5

☐ $y = x + 2$ ☐ $y = 2x - 1$ ☐ $y = 3x + 2$ ☐ $y = 4x + 1$

18. Draw the line represented by $x = 3$ on the graph.



High School Mathematics Test 2014

Year 8

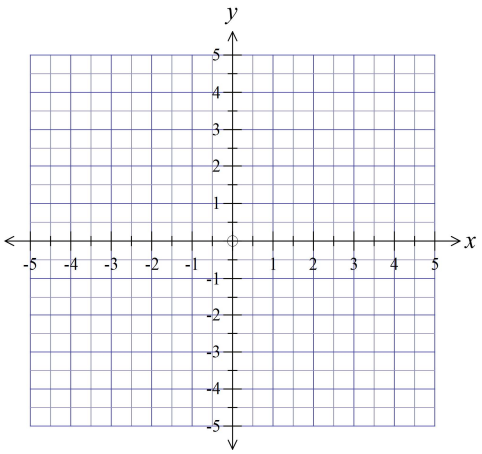
Linear Relations

Calculator Allowed Short Answer Section

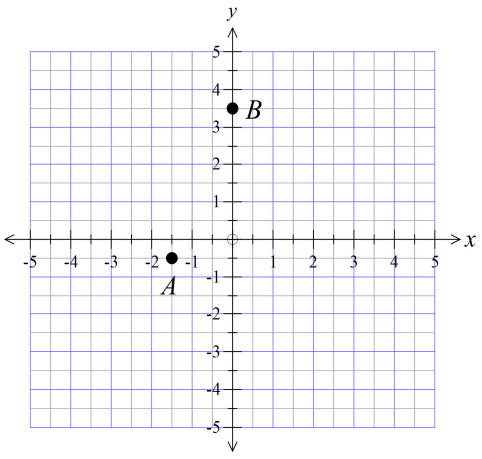
Name_____

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 *H* (3.5, 4.5) and *I* (-4.5, 0) on the number plane.



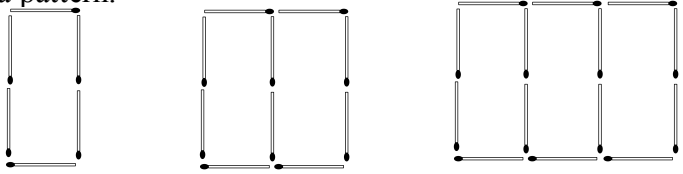
2. Give the ordered pairs that describe the points *A* and *B* below.



A (,)

B (,)

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



Step 1 6 matches | *Step 2* 10 matches | *Step 3* 14 matches

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

☐ 15 ☐ 16 ☐ 17 ☐ 18

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.

_____

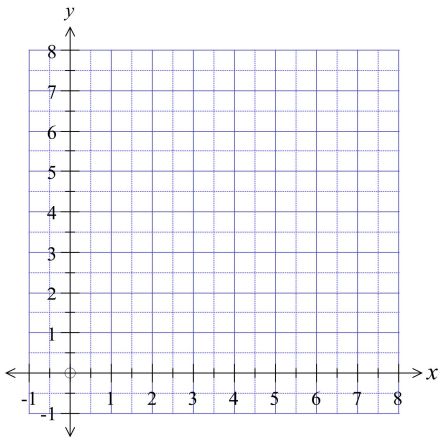
_____

7. Complete the table for the equation $y = 2x + 2.5$

x	0	0.5	1
y			

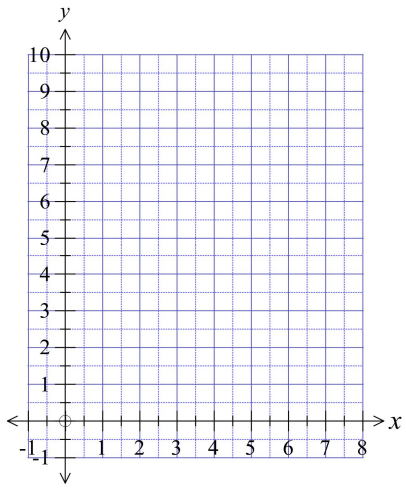
8. Plot the ordered pairs from the table on the graph provided.

x	1.5	3.5	5.5
y	4	6	8



9. Draw the line which represents the equation $y = 1.5x + 3$.
Three ordered pairs have been calculated in the table.

x	0	2	4
y	3	6	9

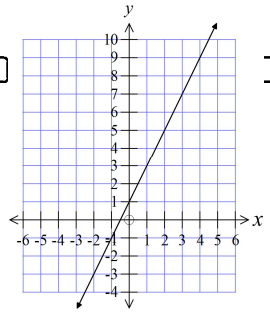


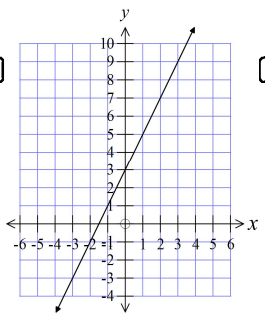
10. Which equation describes the ordered pairs in the table shown?

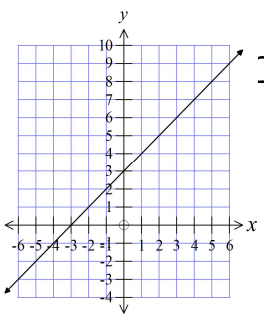
x	0.5	1	1.5
y	3	2	1

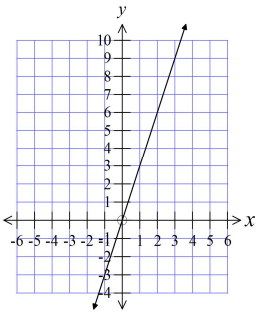
☐ $y = 4 - 2x$ ☐ $y = 4 - 4x$ ☐ $y = 6 - 2x$ ☐ $y = 6 - 4x$

11. Which line represents the equation $y = 2x + 3$?

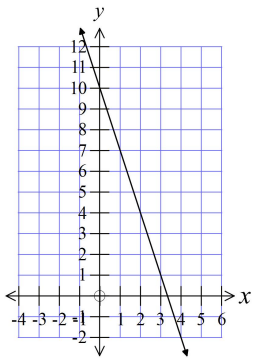
☐ 

☐ 

☐ 

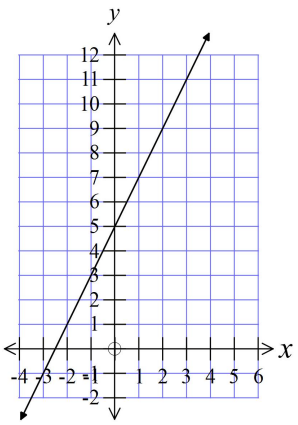
☐ 

12. Which is the equation of the line shown



- ☐ $y = 10 - x$
- ☐ $y = 3x + 10$
- ☐ $y = 10 - 3x$
- ☐ $y = 3x$

13. Write the equation of the line shown



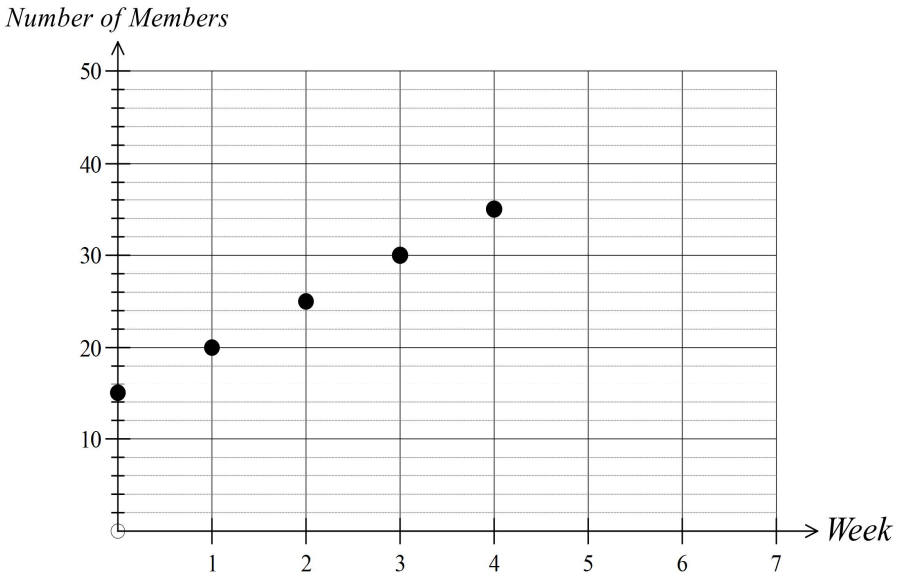
$y =$ ☐

14. The lines with equation $x = 8$ and $y = -4$ are

- ☐ both horizontal lines.
- ☐ both vertical lines.
- ☐ horizontal and vertical lines respectively.
- ☐ vertical and horizontal lines respectively.

Question 15 – 18 refer to the information below.

The Giants football club is recruiting members. The graph below shows the number of members the club has over the 7 weeks of a recruiting drive.



15. How many members were there when the recruiting drive started?

15	20	25	30
☐	☐	☐	☐

16. How many members would there be in *Week 7*, if this pattern of recruitment is continued?

_____ members.

17. On the graph mark the number of members in *Weeks 5, 6* and *7* following this pattern.

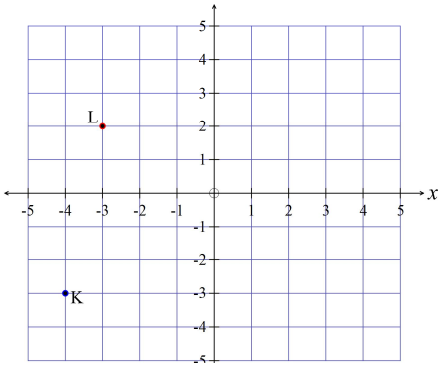
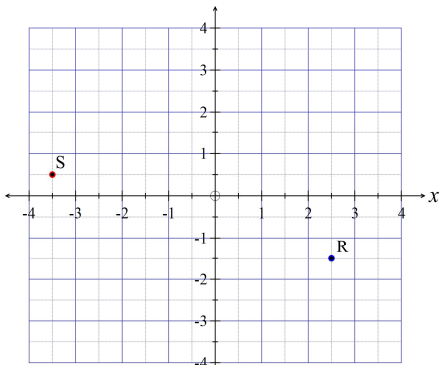
18. Describe in words the relationship between the number of weekss and the number of members.

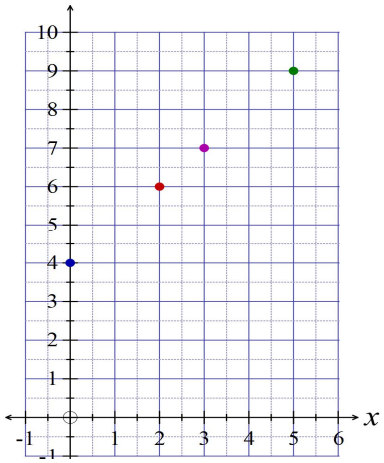
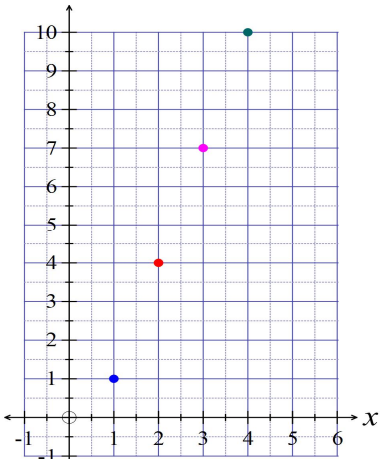
Members = _____ × *Number of weeks* + _____

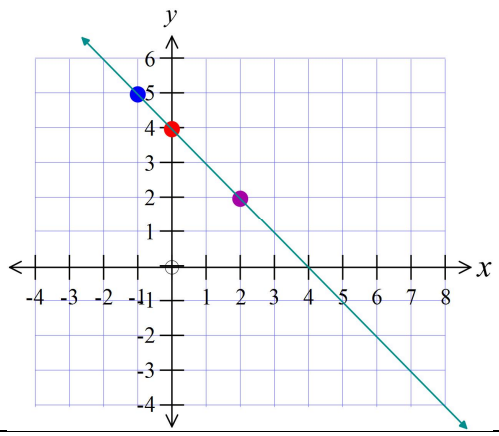
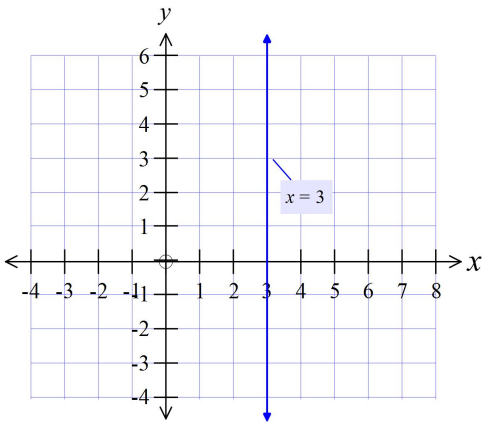
High School
Mathematics Test 2014

Linear Relations
ANSWERS

Non Calculator Section (1 mark each)

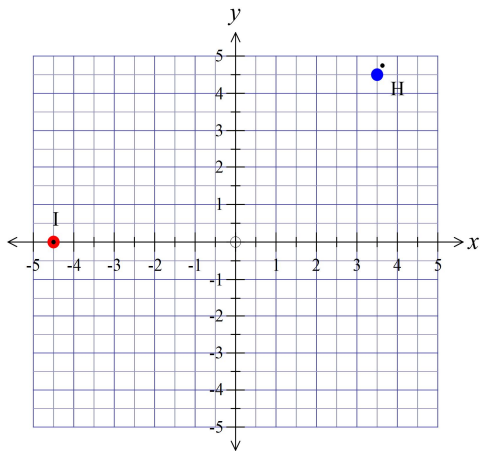
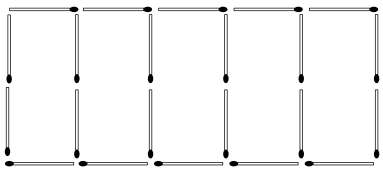
Q no		Answer
1.		See Graph
2.	P(-3, 5) Q(0,-7)	P(-3, 5) Q(0,-7)
3.		See graph
4.	$M\left(-2\frac{1}{2}, 2\frac{1}{4}\right)$ $N\left(1\frac{1}{4}, -1\frac{3}{4}\right)$	
5.	<table><tr><td>x</td><td>0</td><td>2</td><td>3</td><td>5</td></tr><tr><td>$y = x + 4$</td><td>4</td><td>6</td><td>7</td><td>9</td></tr></table>	See table

<table>
<tr><td>6.</td><td> 
</td><td>See graph</td></tr>
<tr><td>7.</td><td>$y = 2x$</td><td>2nd Answer</td></tr>
<tr><td>8.</td><td><table>
<tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>$y = 3x - 2$</td><td>1</td><td>4</td><td>7</td><td>10</td></tr>
</table></td><td></td></tr>
<tr><td>9.</td><td> 
</td><td></td></tr>
<tr><td>10.</td><td>Increasing by 6, so next is 22.</td><td>22</td></tr>
<tr><td>11.</td><td>Add another 5 lots of 6 to 22 gives 52.</td><td>52</td></tr>
<tr><td>12.</td><td>Number = 6 × the position in the pattern − 2</td><td></td></tr>
<tr><td>13.</td><td>22 plus 6 gives 28, so the 5th position</td><td>5th Position</td></tr>
<tr><td>14.</td><td><table>
<tr><td>x</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>$y=5-2x$</td><td>5</td><td>3</td><td>1</td></tr>
</table></td><td>See table</td></tr>
</table>

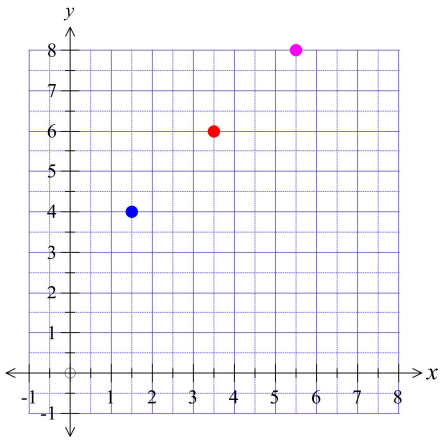
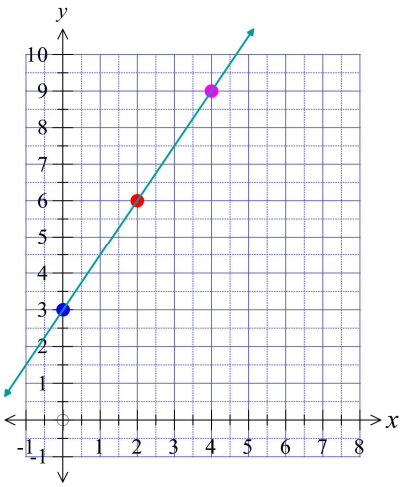
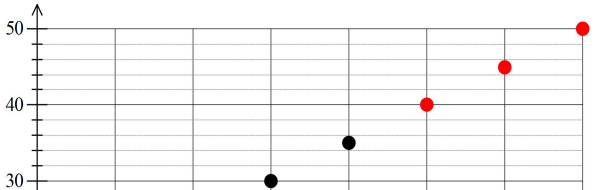
<table>
<tr><td>15.</td><td>
<table>
<tr><td>x</td><td>-1</td><td>0</td><td>2</td></tr>
<tr><td>y</td><td>5</td><td>4</td><td>2</td></tr>
</table>
</td><td></td></tr>
<tr><td>16.</td><td> 
</td><td></td></tr>
<tr><td>17.</td><td>$y = 3x + 2$ works for all values given</td><td>3rd Answer</td></tr>
<tr><td>18.</td><td> 
</td><td>See graph</td></tr>
</table>

High School
Mathematics Test 2014

Calculator Allowed Short Answer Section (1 mark each)

Q no		Answer
1.		
2.	A(-1.5, -0.5) B(0, 3.5)	A(-1.5, -0.5) B(0, 3.5)
3.	Goes up by 4 each time, so step 4 is 18	4th Answer
4.	Step 5 	See drawing
5.	Step 5 has 22, Step 6 has 26; Step 7 has 30 and Step 8 has 34.	34
6.	Various possible descriptions; Examples are: *The pattern starts with 6 matches at step 1 and goes up by 4 matches for each new step.* *Multiply the step number by four and add 2 to get the number of matches.*	Various see examples
7.		See table

x	0	0.5	1
y	2.5	3.5	4.5

<table>
<tr><td>8.</td><td> 
</td><td></td></tr>
<tr><td>9.</td><td> 
</td><td></td></tr>
<tr><td>10.</td><td>$y = 4 - 2x$ works for all values in the table.</td><td>1st Answer</td></tr>
<tr><td>11.</td><td>Use $y = 2x + 3$.
Sub x=0 gives $y = 3$, so only 2nd and 3rd.
Sub x=1 gives $y = 5$ so only 2nd.</td><td>2nd Answer</td></tr>
<tr><td>12.</td><td>Take ordered pairs from the graph and sub values into equations.
x=0, $y = 10$ First 3 work.
x= 1, $y = 7$, only the 3rd one works.</td><td>3rd Answer</td></tr>
<tr><td>13.</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>5</td><td>7</td><td>9</td></tr></table>y goes up by 2 for each increase of 1 in x.
When $x = 0$, $y = 5$.
$y = 2x + 5$</td><td>$y = 2x + 5$</td></tr>
<tr><td>14.</td><td>$x = 8$ is a vertical line and $y = -4$ is a horizontal line.</td><td>4th Answer</td></tr>
<tr><td>15.</td><td>Week 0 has 15 members</td><td>1st Answer</td></tr>
<tr><td>16.</td><td>Starts at 15 and goes up by 5 each week, so after 7 weeks increased by $7 \times 5 = 35$ so total numbers are $15 + 35 = 50$ members.</td><td>50</td></tr>
<tr><td>17.</td><td>Number of Members
 
</td><td></td></tr>
</table>

18.	Members = $5 \times$ *Number of weeks* $+ 15$	5 15