High School Mathematics Test 2013

Year 8

Linear Relationships

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:

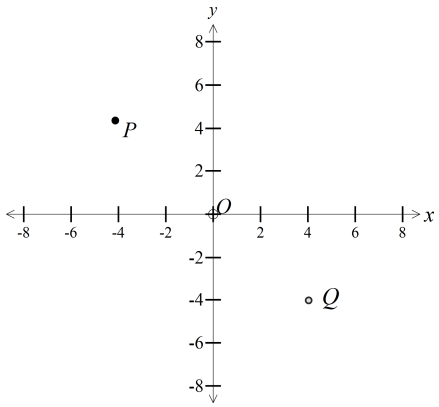
Writing the answer in the box provided.

or

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

Show any working out on the test paper.

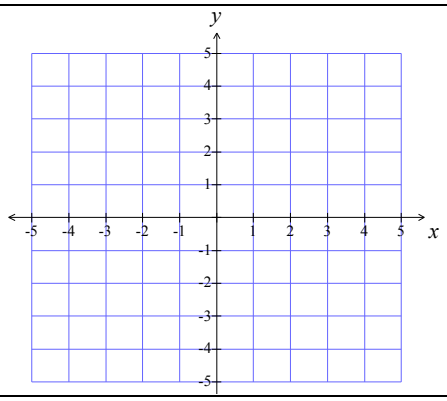
1. Which statement is true of the number plane below?



- ☐ P lies in the 1st quadrant and Q lies in the 3rd quadrant.
- ☐ P lies in the 2nd quadrant and Q lies in the 3rd quadrant.
- ☐ P lies in the 2nd quadrant and Q lies in the 4th quadrant.
- ☐ P lies in the 3rd quadrant and Q lies in the 1st quadrant.

---

2. Mark and label the points T (2, -4) and S (-4, 3) on the number plane.

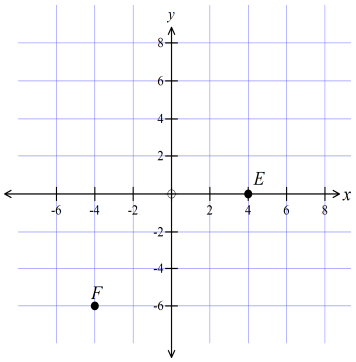


---

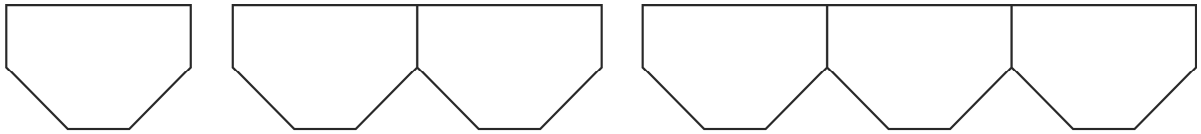
3. Write down the ordered pairs that describe the position of the points E and F.

E (,)

F (,)



Questions 4– 8 refer to the diagram below, of a repeated patterns of Shapes.



1 Shape
6 sides

2 Shapes
11 sides

3 Shapes
16 sides

4. How many sides would be needed to make the next stage of the pattern with 4 Shapes?

☐ sides.

5. How many sides would be needed to make this pattern with 9 Shapes?

☐ 44 sides ☐ 45 sides ☐ 46 sides ☐ 47 sides

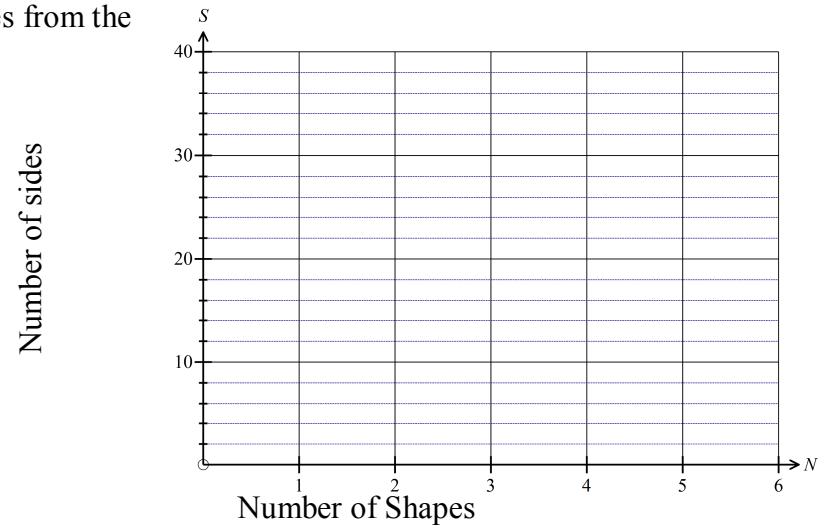
6. Complete the statement below.

The number of sides = ☐ × the number of Shapes + ☐

7. Fill in the two missing values in the table below.

Number of Shapes (N)	1	2	3	4	5
Number of Sides (s)	6	11	16		

8. Use the grid to plot the values from the table in question 8.



Questions 9 – 12 refer to the pattern of numbers below.

Position in pattern	Number
1	20
2	28
3	36
4	

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

10. What number would be at position 9 in the pattern?

11. Complete the statement below.

Number = ☐ × the position in the pattern + ☐

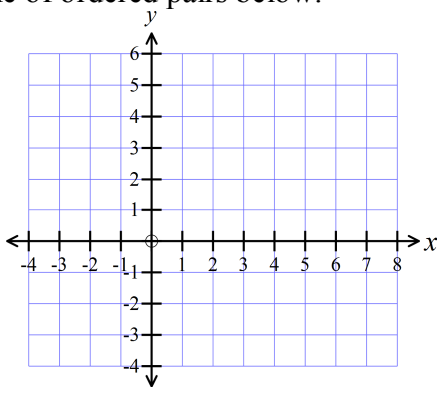
12. What position in the pattern would have a value of 124?

13. One value of y has been completed in the table for $y = 2x + 7$. Complete the other values.

x	0	1	2
y	7		

14. The equation $y = 2x + 1$ is used to produce the table of ordered pairs below.
Graph the ordered pairs on the number plane.

x	-2	0	2
y	-3	1	5

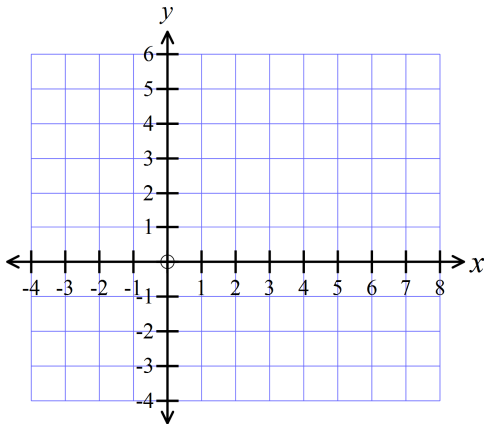


15. Which equation describes the ordered pairs in the table shown?

x	-1	0	1
y	-3	1	5

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

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



High School Mathematics Test 2013

Year 8

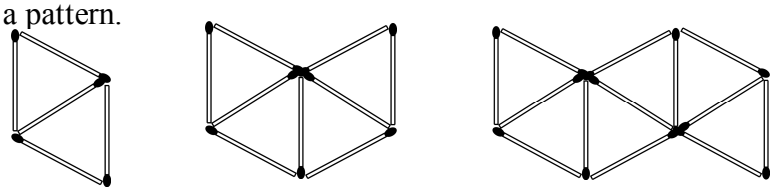
Linear Relationships

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.

Questions 1 – 5 refer to the diagram below, where matchsticks are used to make the first 3 steps in a pattern.

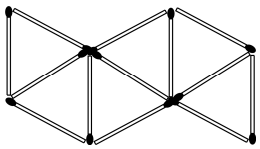


Step 1 5 matches | *Step 2* 9 matches | *Step 3* 13 matches

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

☐ 15 ☐ 16 ☐ 17 ☐ 18

2. Draw the extra matches that would be needed to make *Step 5* of the pattern.



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

☐ matches.

4. Describe in words the pattern that gives the number of matches.

_____

_____

5. What step in the pattern would use 45 matches?

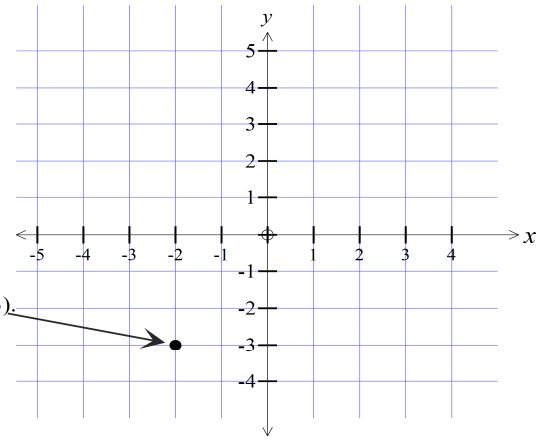
Step ☐.

6. One feature on the number plane has been labelled and indicated by an arrow. Draw arrows on the graph to show the position of the other two features indicated.

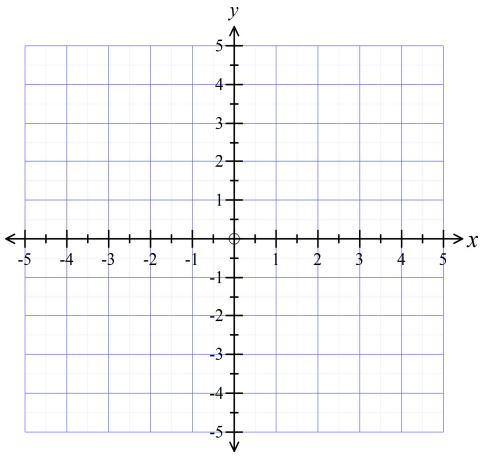
The Origin.

The point (-2, -3).

The y axis.



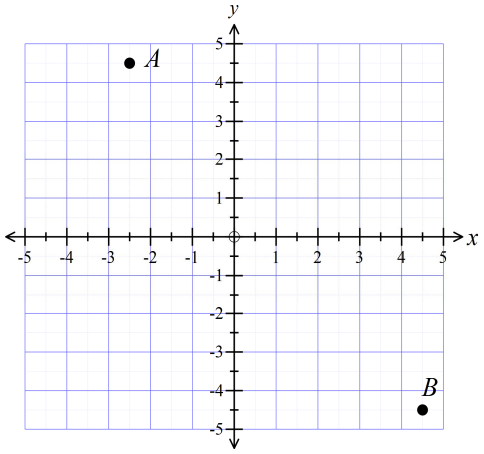
7. Mark and label the points K (-4.5, 3.5) and L (0, -2.5) on the number plane.



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

A (,)

B (,)

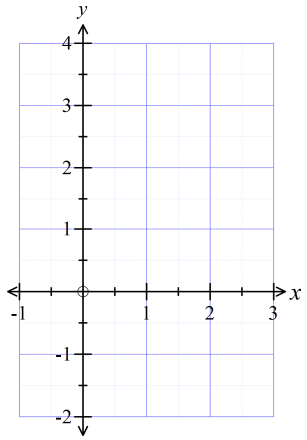


9. Complete the table for the equation $y = 4x - 1.5$

x	0	0.5	1
y			

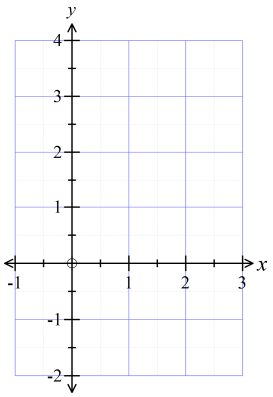
10. Plot the ordered pairs from the table on the graph provided.

x	0.5	1.5	2.5
y	-0.5	1.5	3.5



11. Draw the line which represents the equation $y = 0.5x + 2$.
Three ordered pairs have been calculated in the table.

x	0	1	2
y	2	2.5	3



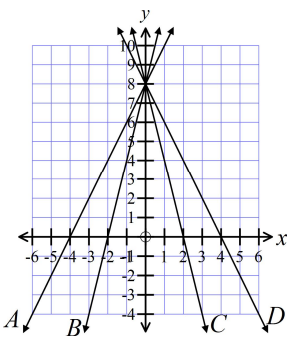
12. Which equation describes the ordered pairs in the table shown?

x	0.5	1	1.5
y	4	2	0

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

13. Which line represents the equation $y = 8 - 2x$?

☐ Line A ☐ Line B
☐ Line C ☐ Line D



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

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

High School Mathematics Test 2013

Year 8

Linear Relationships

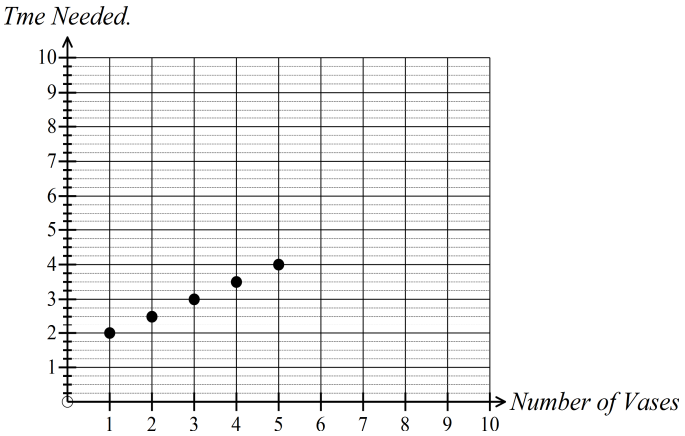
Calculator Allowed
Longer Answer Section

Name_____

Write all working and answers in the spaces provided on this test paper.
Marks may not be awarded if working out and/or answers are not clear.
Marks allocated are shown beside each question.
Calculators are allowed.

Marks

1. Ellen makes pottery vases. She takes note of how long it takes her, in hours, to make a given number of vases in a day. The graph below shows the time needed for various numbers of vases in a day.



(a) How long did Ellen take to make 4 vases? **1**

……..

(b) How long would Ellen take to make 6 vases if she maintains this pattern of production? **1**

……..

(c) On the graph mark the time taken to make 7 vases and 8 vases if she maintains this pattern. **1**

(d) What is the largest number of vases that she could make in a day if she works a maximum of $6\frac{1}{2}$ hours? Explain your answer. **2**

……..

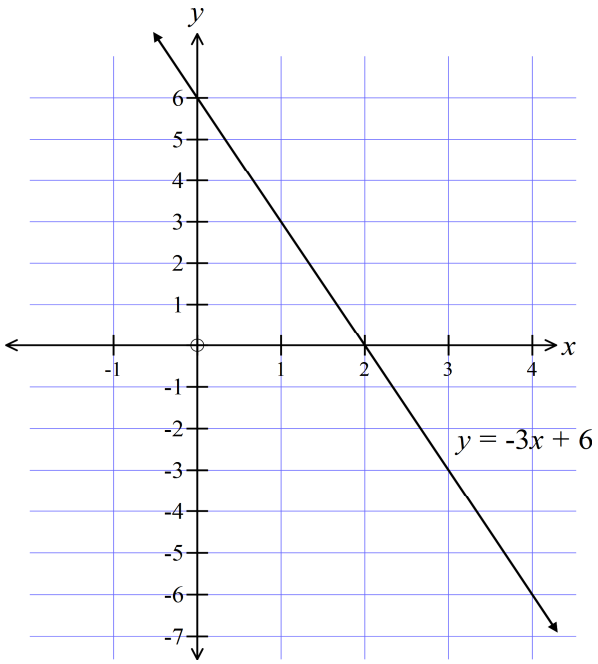
……..

Marks

2. (a) Complete the table for the equation $y = 2x - 4$. **1**

x	0	1	2
y			

(b) The line represented by the equation $y = -3x + 6$ is drawn on the graph below. **1**
From (a) above, draw the line represented by $y = 2x - 4$ on the same graph.



(c) On the same graph draw the graph of $y = -5$. **1**

(d) What is the point of intersection of $y = -3x + 6$ and $y = 2x - 4$? **1**

……..

(e) What is the point of intersection of $y = 2x - 4$? and $y = -5$? **1**

……..

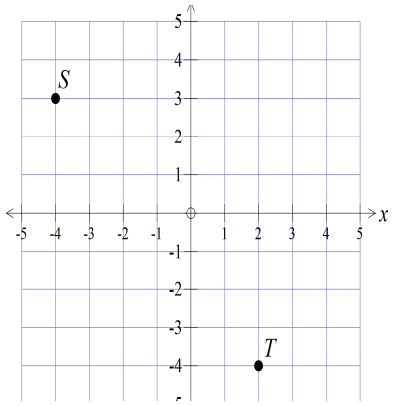
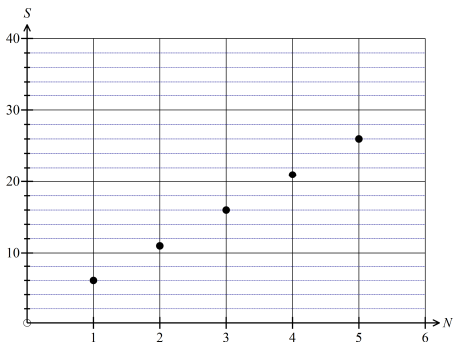
High School Mathematics Test 2013

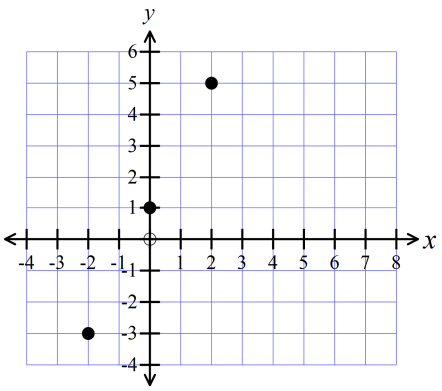
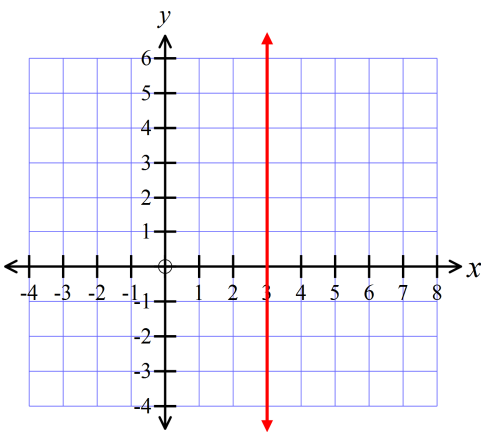
Year 8

Linear Relationships

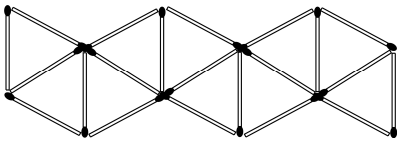
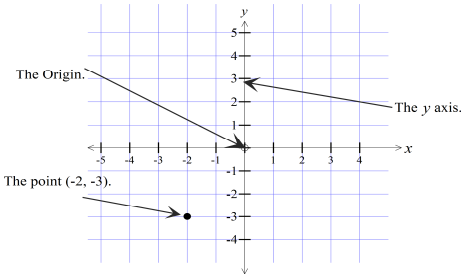
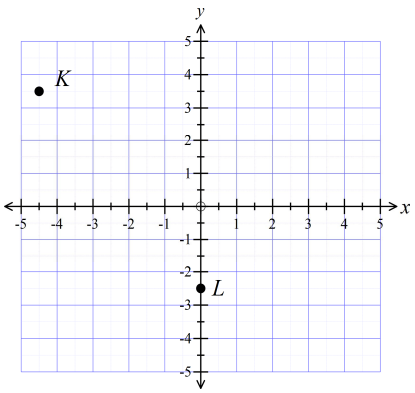
ANSWERS

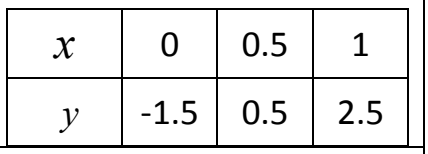
Non Calculator Section

1.	*P* lies in the 2nd quadrant and *Q* lies in the 4th quadrant
2.	
3.	E (4, 0) F (-4, -6)
4.	21 sides
5.	46 sides
6.	5 ×the number of Shapes + 1
7.	<table><tr><td>4</td><td>5</td></tr><tr><td>21</td><td>26</td></tr></table>
8.	
9.	44
10.	84

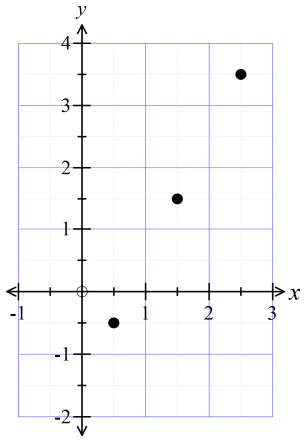
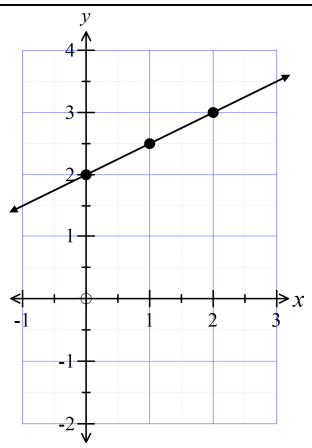
11.	8 × the position in the pattern +12
12.	Position 14
13.	<table><tr><td>x</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>7</td><td>9</td><td>11</td></tr></table>
14.	
15.	$y = 4x + 1$
16.	

Calculator Allowed Section

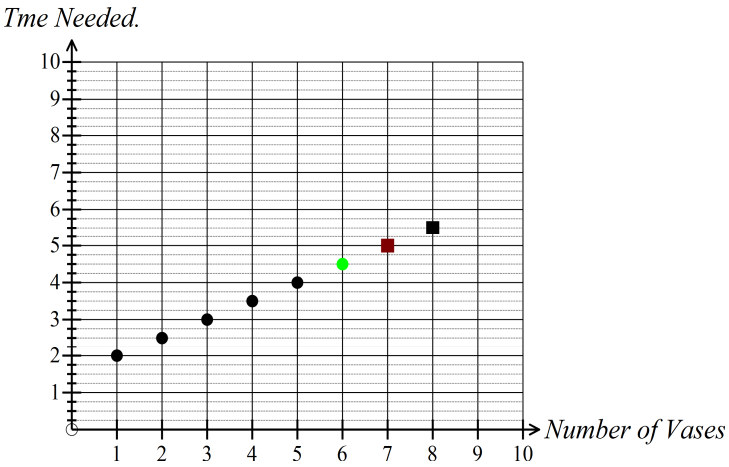
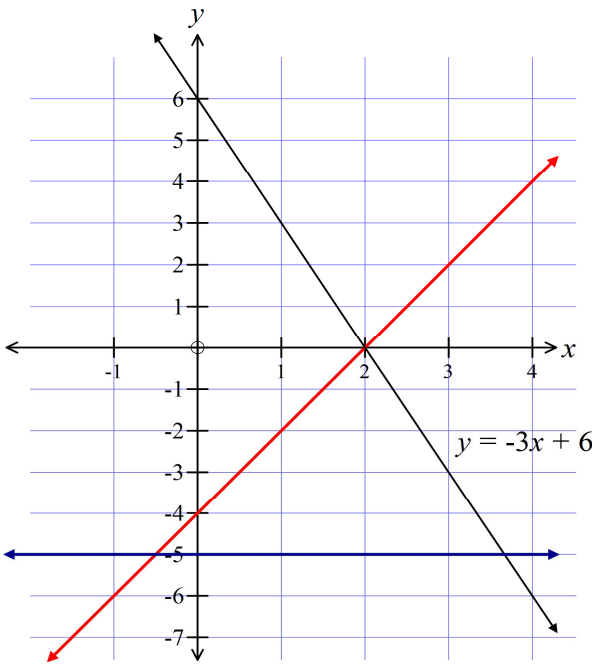
1.	17
2.	
3.	33 matches
4.	Multiply the step number by 4 and add 1, or Start with 5 and add 4 more at each new step.
5.	Step 11
6.	
7.	
8.	A (-2.5, 4.5) B (4.5, -4.5)

9.	

x	0	0.5	1
y	-1.5	0.5	2.5

10.	
11.	
12.	$y = 6 - 4x$
13.	Line D
14.	both horizontal lines

Calculator Allowed
Longer Answer Section

1.	(a) 3 ½ hours. (from graph)	1
	(b) 4 ½ hours. (extrapolating from the graph)	1
	(c) 	1 (1/2 for each of the points marked by a square)
	(d) 10 vases. Any explanation that follows the pattern or uses the graph. *e.g. "The time goes up by 0.5 hours for each vase. 5 vases takes 4 hours, so this leaves 2.5 hours to make up 6 hours. This is another 5 vases, so total is 10 vases."*	
2.	(a) $y = 2x - 4$	1
	(b) 	1

x	0	1	2
y	-4	-2	0

	(c) The horizontal line on the graph.	1
	(d) (2, 0)	1
	(e) (-0.5, -5)	1