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| Year  8 | | *Linear Relationships* | 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.***  **Show any working out on the test paper.** | | | |
|  | 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. | | |
|  | Mark and label the points T (2, -4) and  S (-4, 3) on the number plane. | | |
|  | 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. | | |
|  | How many sides would be needed to make the next stage of the pattern with 4 Shapes?  sides. | | |
|  | How many sides would be needed to make this pattern with 9 Shapes?  44 sides 45 sides 46 sides 47 sides | | |
|  | Complete the statement below.  The number of sides = × the number of Shapes + | | |
|  | 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 |  |  | | | |
|  | Use the grid to plot the values from the table in question 8.  Number of sides  Number of Shapes | | |
|  | Questions 9 – 12 refer to the pattern of numbers below. | | |
|  | What number would be at position 4 in the pattern? | | |
|  | What number would be at position 9 in the pattern? | | |
|  | Complete the statement below.  Number = × the position in the pattern + | | |
|  | What position in the pattern would have a value of 124? | | |
|  | One value of *y* has been completed in the table for . Complete the other values.     |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 1 | 2 | | *y* | 7 |  |  | | | |
|  | The equation  is used to produce the table of ordered pairs below.  Graph the ordered pairs on the number plane.   |  |  |  |  | | --- | --- | --- | --- | |  | -2 | 0 | 2 | | *y* | -3 | 1 | 5 | | | |
|  | Which equation describes the ordered pairs in the table shown?   |  |  |  |  | | --- | --- | --- | --- | |  | -1 | 0 | 1 | | *y* | -3 | 1 | 5 | | | |
|  | Draw the line represented by  on the graph. | | |

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| 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 Step 2* *Step 3*  5 matches 9 matches 13 matches | | |
|  | How many matches are needed to produce *Step 4* of the pattern?  15 16 17 18 | | |
|  | Draw the extra matches that would be needed to make *Step 5* of the pattern. | | |
|  | How many matches would be needed to make *Step 8* of the pattern?  matches. | | |
|  | Describe in words the pattern that gives the number of matches.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
|  | What step in the pattern would use 45 matches?  *Step*  . | | |
|  | 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. | | |
|  | Mark and label the points *K* (-4.5, 3.5) and  *L* (0, -2.5) on the number plane. | | |
|  | Give the ordered pairs that describe the points *A* and *B* below.  ( , )  *A*  ( , )  *B* | | |
|  | Complete the table for the equation   |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 0.5 | 1 | | *y* |  |  |  | | | |
|  | Plot the ordered pairs from the table on the graph provided.   |  |  |  |  | | --- | --- | --- | --- | |  | 0.5 | 1.5 | 2.5 | | *y* | -0.5 | 1.5 | 3.5 | | | |
|  | Draw the line which represents the equation  Three ordered pairs have been calculated in the table.   |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 1 | 2 | | *y* | 2 | 2.5 | 3 | | | |
|  | Which equation describes the ordered pairs in the table shown?   |  |  |  |  | | --- | --- | --- | --- | |  | 0.5 | 1 | 1.5 | | *y* | 4 | 2 | 0 | | | |
|  | Which line represents the equation    Line A Line B  Line C Line D | | |
|  | The lines with equation  and  are  both horizontal lines. horizontal and vertical lines respectively.  both vertical lines. vertical and horizontal lines respectively. | | |

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| 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** |
| --- | --- | --- |
|  | 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. |  |
|  | 1. How long did Ellen take to make 4 vases?   …………………………………………………………………………………….. | **1** |
|  | 1. How long would Ellen take to make 6 vases if she maintains this pattern of production?   …………………………………………………………………………………….. | **1** |
|  | 1. On the graph mark the time taken to make 7 vases and 8 vases if she maintains this pattern. | **1** |
|  | 1. What is the largest number of vases that she could make in a day if she works a maximum of  hours? Explain your answer.   ……………………………………………………………………………………..  …………………………………………………………………………………….. | **2** |
| 2. | |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 1 | 2 | |  |  |  |  |  1. Complete the table for the equation  . | **1** |
|  | 1. The line represented by the equation  is drawn on the graph below.   From (a) above, draw the line represented by  on the same graph. | **1** |
|  | 1. On the same graph draw the graph of | **1** |
|  | 1. What is the point of intersection of  and   …………………………………………………………………………………….. | **1** |
|  | 1. What is the point of intersection of  and   …………………………………………………………………………………….. | **1** |

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| Year  8 | *Linear Relationships* |

ANSWERS

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| Non Calculator Section |

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|  | *P* lies in the 2nd quadrant and *Q* lies in the 4th quadrant |
|  |  |
|  | E (4, 0) F (-4, -6) |
|  | 21 sides |
|  | 46 sides |
|  | 5 ×the number of Shapes + 1 |
|  | |  |  | | --- | --- | | 4 | 5 | | 21 | 26 | |
|  |  |
|  | 44 |
|  | 84 |
|  | 8 × the position in the pattern +12 |
|  | Position 14 |
|  | |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 1 | 2 | | *y* | 7 | 9 | 11 | |
|  |  |
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| Calculator Allowed Section |

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| --- | --- |
|  | 17 |
|  |  |
|  | 33 matches |
|  | Multiply the step number by 4 and add 1, or  Start with 5 and add 4 more at each new step. |
|  | Step 11 |
|  |  |
|  |  |
|  | A (-2.5, 4.5)  B (4.5, -4.5) |
|  | |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 0.5 | 1 | |  | -1.5 | 0.5 | 2.5 | |
|  |  |
|  |  |
|  |  |
|  | Line D |
|  | both horizontal lines |

|  |  |  |
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| Calculator Allowed  Longer Answer Section | | |
|  | 1. 3 ½ hours. (from graph) | 1 |
|  | 1. 4 ½ hours. (extrapolating from the graph) | 1 |
|  |  | 1  (1/2 for each of the points marked by a square) |
|  | 1. 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.”* |  |
|  | |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 1 | 2 | |  | -4 | -2 | 0 | | 1 |
|  | (b) | 1 |
|  | 1. The horizontal line on the graph. | 1 |
|  | 1. (2, 0) | 1 |
|  | 1. (-0.5, -5) | 1 |