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| Year  8 | Mathematics Test  Linear Relations | **Calculator Allowed**  **Test** |
|  | Name |  |

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| **Answer all questions in the spaces provided on this test paper by**  **Writing the answer in the boxes or lines provided.**  **or**  **Shading in the bubble for the correct answer from the four choices provided.**  **Show any working out on the test paper.** | |
|  | Questions 1 – 4 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 10 matches 15 matches |
| 1. | How many matches are needed to produce *Step 4* of the pattern?  10 15 20 25 |
| 2. | How many matches would be needed to make *Step 6* of the pattern?  matches. |
| 3. | Describe in words the pattern that gives the number of matches.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 4. | What step in the pattern would use 60 matches?  *Step*  . |
|  | Questions 5– 9 refer to the diagram below, of repeated patterns of octagons. |
| 5. | How many sides would be needed to make the next stage of the pattern with 4 octagons?  sides. |
| 6. | How many sides would be needed to make this pattern with 10 octagons?  70 sides 71 sides 80 sides 81 sides |
| 7. | Complete the statement below.  The number of sides = × the number of octagons + |
| 8. | Fill in the two missing values in the table below.     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Number of Octagons (N) | 1 | 2 | 3 | 4 | 5 | | Number of Sides (s) | 8 | 15 | 22 |  |  | |
| 9. | Use the grid to plot the values from the table in question 8.  Number of sides  Number of Octagons |
|  | Questions 10 – 12 refer to the pattern of numbers below. |
| 10. | What number would be at position 4 in the pattern? |
| 11. | What number would be at position 7 in the pattern? |
| 12. | Complete the statement below.  Number = ─ × the position in the pattern. |
| 13. | The points *A* and *B* are described by the ordered pairs  *A* (-2, -3) and *B* (2, -3) *A* (-3, 2) and *B* (3, 2)  *A* (-3, -2) and *B* (-3, 2) *A* (-3, -2) and *B* (3, -2) |
| 14. | Write down the ordered pairs that describe the position of the points *C* and *D.*  ( , )  ( , )  *C D* |
| 15. | Which statement is true of the number plane below?  *E* lies in the 2nd quadrant and *F* lies in the 3rd quadrant.  *E* lies in the 1st quadrant and *F* lies in the 3rd quadrant.  *E* lies in the 2nd quadrant and *F* lies in the 4th quadrant..  *E* lies in the 3rd quadrant and *F* lies in the 1st quadrant.. |
| 16. | Mark and label the points M (4, -3) and  N (-3, -2) on the number plane. |
| 17. | Mark and label the points S (6, 7) and  T (-5, 3) on the number plane. |
| 18. | Write down the ordered pairs that describe the position of the points *J* and *K.*  ( , )  ( , )  *J K* |
| 19. | The equation is used to produce the table of ordered pairs below.  Graph the ordered pairs on the number plane.   |  |  |  |  | | --- | --- | --- | --- | |  | -6 | -2 | 2 | | *y* | -3 | 1 | 5 | |
| 20. | Use the equation  to complete the table of ordered pairs.   |  |  |  |  | | --- | --- | --- | --- | |  | -1 | 1 | 3 | |  |  |  |  | |
| 21. | Plot the points from Question 20 on the graph. |
| 22. | Which equation describes the ordered pairs in the table below?     |  |  |  |  | | --- | --- | --- | --- | |  | 1 | 2 | 3 | |  | 1 | 4 | 7 | |
|  | ***Question 23 – 26 refer to the information below.***  Ellen makes pottery vases. She removes the same number of vases from her kiln each day and places them on a shelf. The graph below shows the number of vases on the shelf over a week. |
| 23. | How many vases did Ellen have on *Day 3*?  5 10 15 20 |
| 24. | How many vases would she have on *Day 7*, if she maintains this pattern of production?  vases. |
| 25. | On the graph mark the number of vases Ellen would have on her shelf on *Day 5* and *Day 6* if she maintains this pattern. |
| 26. | Describe in words the relationship between the number of days and the number of vases on the shelf.  The number of vases = × *Number of Days* |
| 27. | |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 1 | 3 | |  |  |  |  |   Complete the table for the equation  . |
| 28. | The line represented by the equation  is drawn on the graph below.  Draw the line represented by  on the same graph. |
| 29. | What is the point of intersection of the lines  and  ?  ( , ) |
| 30. | Draw the line  on the graph above. |
| 31. | Draw the line  on the graph above. |
| 32. | Use the graph to find the solution to the equation  .  *x =*  Explain how you used the graph to do this.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| Year  8 | Mathematics Test  Linear Relations |  |
|  | ANSWERS |  |

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| **Answer all questions in the spaces provided on this test paper by**  **Writing the answer in the boxes or lines provided.**  **or**  **Shading in the bubble for the correct answer from the four choices provided.**  **Show any working out on the test paper.** | |
|  | Questions 1 – 4 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 10 matches 15 matches |
| 1. | How many matches are needed to produce *Step 4* of the pattern?  10 15 20 25 |
| 2. | How many matches would be needed to make *Step 6* of the pattern?    matches. |
| 3. | Describe in words the pattern that gives the number of matches.  The number of matches is 3 times the step in the pattern. |
| 4. | What step in the pattern would use 60 matches?    *Step*  . |
|  | Questions 5– 9 refer to the diagram below, of repeated patterns of octagons. |
| 5. | How many sides would be needed to make the next stage of the pattern with 4 octagons?    sides. |
| 6. | How many sides would be needed to make this pattern with 10 octagons?  70 sides 71 sides 80 sides 81 sides |
| 7. | Complete the statement below.      The number of sides = × the number of octagons + |
| 8. | Fill in the two missing values in the table below.     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Number of Octagons (N) | 1 | 2 | 3 | 4 | 5 | | Number of Sides (s) | 8 | 15 | 22 | 29 | 36 | |
| 9. | Use the grid to plot the values from the table in question 8.  Number of sides  Number of Octagons |
|  | Questions 10 – 12 refer to the pattern of numbers below. |
| 10. | What number would be at position 4 in the pattern? |
| 11. | What number would be at position 7 in the pattern? |
| 12. | Complete the statement below.      Number = ─ × the position in the pattern. |
| 13. | The points *A* and *B* are described by the ordered pairs  *A* (-2, -3) and *B* (2, -3) *A* (-3, 2) and *B* (3, 2)  *A* (-3, -2) and *B* (-3, 2) *A* (-3, -2) and *B* (3, -2) |
| 14. | Write down the ordered pairs that describe the position of the points *C* and *D.*  ( 6 , 5 )  ( -3 , 6 )  *C D* |
| 15. | Which statement is true of the number plane below?  *E* lies in the 2nd quadrant and *F* lies in the 3rd quadrant.  *E* lies in the 1st quadrant and *F* lies in the 3rd quadrant.  *E* lies in the 2nd quadrant and *F* lies in the 4th quadrant..  *E* lies in the 3rd quadrant and *F* lies in the 1st quadrant.. |
| 16. | Mark and label the points M (4, -3) and  N (-3, -2) on the number plane. |
| 17. | Mark and label the points S (6, 7) and  T (-5, 3) on the number plane. |
| 18. | Write down the ordered pairs that describe the position of the points *J* and *K.*  ( 0 , -5 )  ( 3 , 0 )  *J K* |
| 19. | The equation is used to produce the table of ordered pairs below.  Graph the ordered pairs on the number plane.   |  |  |  |  | | --- | --- | --- | --- | |  | -6 | -2 | 2 | | *y* | -3 | 1 | 5 | |
| 20. | Use the equation  to complete the table of ordered pairs.   |  |  |  |  | | --- | --- | --- | --- | |  | -1 | 1 | 3 | |  | -3 | 1 | 5 | |
| 21. | Plot the points from Question 20 on the graph. |
| 22. | Which equation describes the ordered pairs in the table below?     |  |  |  |  | | --- | --- | --- | --- | |  | 1 | 2 | 3 | |  | 1 | 4 | 7 | |
|  | ***Question 23 – 26 refer to the information below.***  Ellen makes pottery vases. She removes the same number of vases from her kiln each day and places them on a shelf. The graph below shows the number of vases on the shelf over a week. |
| 23. | How many vases did Ellen have on *Day 3*?  5 10 15 20 |
| 24. | How many vases would she have on *Day 7*, if she maintains this pattern of production?    vases. |
| 25. | On the graph mark the number of vases Ellen would have on her shelf on *Day 5* and *Day 6* if she maintains this pattern. |
| 26. | Describe in words the relationship between the number of days and the number of vases on the shelf.    The number of vases = × *Number of Days* |
| 27. | |  |  |  |  | | --- | --- | --- | --- | |  | 0 | 1 | 3 | |  | -4 | -1 | 5 |   Complete the table for the equation  . |
| 28. | The line represented by the equation  is drawn on the graph below.  Draw the line represented by  on the same graph. |
| 29. | What is the point of intersection of the lines  and  ?  ( 2 , 2) |
| 30. | Draw the line  on the graph above. |
| 31. | Draw the line  on the graph above. |
| 32. | Use the graph to find the solution to the equation  .  *x =* 1  Explain how you used the graph to do this.  Find the intersection of *y* = 4 and  and read the *x* value. |