**Recognizing Linear Functions from Words, Tables and Graphs**

**Linear functions** have a **constant rate of change**. You can determine if a table contains a linear function by calculating rates of change. If the same number is added or subtracted to the dependent variable (the *y-*values), whenever the independent variable (the *x*-values) changes by some constant amount, the table contains a linear function. The table below contains a linear function because the *y*-values decrease by 3 whenever the *x*-values increase by 1.

 ***x:*** 2 3 4 5 6 7 8

 ***y:*** 8 5 2 -1 -4 -7 -10

 $rate of change=\frac{change in y}{change in x}=\frac{-3}{1}=-3$

1. Which graph shows a linear function? Explain.

 ** **

** **

1. Plot the points from the given table. State whether the graph represents a linear function.



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 1 | 2 | 3 | 4 | 5 |
| ***y*** | 0 | 2 | 4 | 6 | 8 |

Linear Function (Yes / No)

Why?

If it is linear what is $\frac{change in y}{change in x} $between
 coordinate pairs?

1. 

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 1 | 2 | 3 | 4 | 5 |
| ***y*** | 0 | 1 | 3 | 6 | 10 |

Linear Function (Yes / No)

Why?

If it is linear what is $\frac{change in y}{change in x} $between
 coordinate pairs?

1. 

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 0 | 1 | 3 | 4 | 5 |
| ***y*** | 9 | 6 | 0 | –3 | ­–6 |

Linear Function (Yes / No)

Why?

If it is linear what is $\frac{change in y}{change in x} $between
 coordinate pairs?

1. Now that you have seen the graphs of several function, explain how you can determine if a function is linear just by looking at its table.
2. Determine if the table represents a linear function.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 5 | 4 | 3 | 2 | 1 |
| ***y*** | 0 | -1 | -2 | -3 | -4 |

(Yes / No) Why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 0  | 5 | 10 | 20 | 30 |
| ***y*** | 18 | 14 | 10 | 2 | –6 |

(Yes / No) Why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | -4 | -2 | 0 | 2 | 4 |
| ***y*** | 3 | 6 | 11 | 18 | 27 |

(Yes / No) Why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | -4 | -1 | 0 | 2 | -2 |
| *y* | 7 | 1 | -1 | -5 | 3 |

1.

(Yes / No) Why?

1. Use the equation to complete the table. Tell whether the relationship is linear. If it is linear, identify $\frac{change in y}{change in x}$. If the function is not linear, explain why.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | -4 | -3 | -1 | 0 | 5 |
| ***y*** |  |  |  |  |  |

1. $y=3x-8$

Linear Function (Yes / No)

If it is linear what is $\frac{change in y}{change in x} $between coordinate pairs?

If not linear, why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 7 | 9 | 10 | 13 | 17 |
| ***y*** |  |  |  |  |  |

1. $y=4\left(x-7\right)+6$

Linear Function (Yes / No)

If it is linear what is $\frac{change in y}{change in x} $between coordinate pairs?

If not linear, why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 11 | 8 | 5 | 2 | -1 |
| ***y*** |  |  |  |  |  |

1. $y=x(x-2)$

Linear Function (Yes / No)

If it is linear what is $\frac{change in y}{change in x} $between coordinate pairs?

If not linear, why?

1. Every Friday, the mechanics for Griswold Public Schools record the miles driven and the gallons of gas used for each school bus. One week, the mechanics record these data.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Gas Used (gallons)** | 5 | 8 | 11 | 14 | 17 |
| **Miles Driven (miles)** | 30 | 48 | 66 | 84 | 102 |

1. Plot the data from the table on the coordinate plane below. ***Label*** and ***scale*** axes.



1. Is there a linear relationship between gas used and miles driven? Explain.
2. Use your graph to predict how much gas will be used if the bus is driven 6.5 miles.