**Using Tables to Determine If a Function Is Linear**

**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. Determine if each table represents a linear function. Explain why or why not. Comment on $\frac{change in y}{change in x} $between coordinate pairs.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 0 | 2 | 4 | 6 | 8 |
| ***y*** | 0 | -4 | -16 | -36 | -64 |

Linear Function (Yes / No)

Why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | -5 | 0 | 5 | 10 | 15 |
| ***y*** | 20 | 17 | 14 | 11 | 8 |

Linear Function (Yes / No)

Why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 9 | 6 | 3 | 0 | -3 |
| ***y*** | -15 | -11 | -7 | -3 | 1 |

Linear Function (Yes / No)

Why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | -4 | -2 | 0 | 2 | 4 |
| ***y*** | 1 | 3 | 6 | 10 | 15 |

 Linear Function (Yes / No)

Why?

1. Use the equation to complete the table. Tell whether the relationship is linear. Explain.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | -2 | 0 | 2 | 4 | 6 |
| ***y*** |  |  |  |  |  |

1. $y=7-4x$

Linear Function (Yes / No)

Why?

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

1. $y=-\frac{3}{4}x+2$

Linear Function (Yes / No)

Why?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 12 | 8 | 4 | 0 | -4 |
| ***y*** |  |  |  |  |  |

1. $y=x(3+x)$

Linear Function (Yes / No)

Why?

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

1. $y=3(6x-1)$

.

Linear Function (Yes / No)

Why?

1. For tax purposes, each year Taco Bell keeps track of the total income they bring in and the money they pay to keep the restaurant chain running.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **YEAR** | 2000 | 2001 | 2002 | 2003 | 2004 |
| **Income (in millions)** | 24.3 | 27.7 | 31.1 | 34.5 | 37.9 |
| **Expenses (in millions)** | 2.8 | 5.7 | 3.4 | 6 | 5.2 |

1. Is there a linear relationship between year and income? Explain.
2. Is there a linear relationship between income and expenses? Explain.
3. Is there a linear relationship between year and expenses? Explain.