4.2 Linear Relations

Jumpstart Your Thinking

Complete each table. What equation did you use?

1.

|  |  |  |
| --- | --- | --- |
| **a)** | *x* | *y* |
|  | 1 |  |
|  | 2 |  |
|  | 3 | 1 |
|  | 4 | 4 |
|  | 5 |  |

|  |  |  |
| --- | --- | --- |
| **b)** | *x* | *y* |
|  | 1 |  |
|  | 3 | 3 |
|  | 5 | –1 |
|  | 7 |  |
|  | 9 |  |

Let’s Look at the Math

Each of the tables and their equations above represent a linear relation.

Linear Relation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

When we want to graph a linear relation we plot the **dependent variable (y)** on the vertical axis and the **independent variable (x)** on the horizontal axis. When the two variables are related we have a relation.

Let’s graph each of the relations above.

**2.** For each table of values below:

y

x

8

8

-8

-8

y

x

8

8

-8

-8

**i)** Does it represent a linear relation?

**ii)** If the relation is not linear, explain how you know.

|  |  |  |
| --- | --- | --- |
| **a)** | *x* | *y* |
|  | 1 | 5 |
|  | 2 | 12 |
|  | 3 | 19 |
|  | 4 | 26 |
|  | 5 | 33 |

|  |  |  |
| --- | --- | --- |
| **b)** | *x* | *y* |
|  | 1 | 1 |
|  | 3 | 3 |
|  | 5 | 7 |
|  | 7 | 13 |
|  | 9 | 21 |

**3.** Create a table of values for each linear relation and then graph the relation.   
Use values of *x* from –2 to 2.

|  |  |  |
| --- | --- | --- |
|  | *x* | *y* |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**a)** *y* =2*x*+ 1 **b)** *y* = 5 – 2*x*

|  |  |  |
| --- | --- | --- |
|  | *x* | *y* |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

y

x

8

8

-8

-8

y

x

8

8

-8

-8

Jumpstart Your Thinking

4. Create a table of values for each linear relation and then graph the relation.

Use values of *x* from –2 to 2.

y

x

8

8

-8

-8

*y* = 3x-2

|  |  |  |
| --- | --- | --- |
|  | *x* | *y* |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Let’s Look at the Math

A lot of real life situations are linear. We can use what we know about linear relations to represent them.

5. A large pizza with no toppings costs $10.00; for each topping a charge of $1.50 is applied.

|  |  |  |
| --- | --- | --- |
|  | *Toppings, t* | *Cost, C* |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**a)** Create a table to show the relation between the number of toppings and the cost.

**b)** Is this relation linear? Justify your answer.

**c)** Graph the table.

y

x

**d)** Does it make sense to connnect the points in this situation. Explain.

**e)** Let t represent the number of toppings and *C*  represent the cost in dollars. Write an equations that relates *C*  and *t.*