5) RELATIONS & FUNCTIONS:
CONTINUOUS/DISCRETE & VERTICAL LINE TEST

Warm-Up: Students at Reynolds are selling t-shirts during lunch for $10 each.

a) Complete the following table of values:

<table>
<thead>
<tr>
<th>Number of t-shirts sold</th>
<th>Total amount of money made, in dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
</tr>
</tbody>
</table>

\[ y = x \cdot 10 = 10x \]

b) Graph the relation:
\((0,0), (1,10), (2,20), (3,30), (4,40), (5,50)\)

![](image)

b) Can the dots be connected? Explain.

**NO! Cannot sell part of a T-shirt... whole numbers only.**

d) Fill in the table below, and add in your own example in.

<table>
<thead>
<tr>
<th>Type of Data</th>
<th>Continuous</th>
<th>Discrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics</td>
<td>Graph will appear as <strong>Line</strong></td>
<td>Graph will appear as <strong>series of points (scatterplot)</strong></td>
</tr>
<tr>
<td></td>
<td>Occurs when quantities don’t “skip” values (or exclude)</td>
<td>Occurs when quantities can only be specific or whole items.</td>
</tr>
<tr>
<td></td>
<td>Occurs when having parts/fractions of quantities makes sense. (is allowed)</td>
<td>Occurs when part numbers do not make sense.</td>
</tr>
<tr>
<td>Example</td>
<td><strong>Time</strong></td>
<td><strong>T-shirts</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Temperature</strong></td>
<td><strong># students</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Age</strong></td>
<td><strong>pieces of cake</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Height</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Distance</strong></td>
<td></td>
</tr>
</tbody>
</table>

Introduction to Functions

A function is a **special type of relation**.

- For every \(x\)-value, there is only 1 \(y\)-value.

(if there are repeated \(x\)-values, it is not a function)
When a relation is presented as a graph, a quick method to determine whether or not it is a function is known as the **VERTICAL LINE TEST**.

If a vertical line intersects the graph at more than one point, the relation IS **NOT** a function.

**Example #1:** Do these graphs represent functions?

- **a)** Yes, a function
- **b)** No, not a function
- **c)** A dotted line is included instead of a vertical line to pass the VLT. The graph does not pass the VLT, so it is not a function.

**Example #2:** Do these relations represent functions? Justify your choice.

- **a)** \( \{(1, 3), (2, 4), (3, 5), (4, 3), (2, 1)\} \)
  - \( x = 2\) corresponds to \( y = 4 \) and \( y = 1 \) \( \therefore \) \( 2\) \( y \)-values for \( 1\) \( x \)-value. NOT a function.

- **b)**
  - **Name** | **Shoe Size**
  - --- | ---
  - Andrew | 10
  - Nathan | 11
  - Joel | 12
  - Aaron | 13
  - Simon | 12
  - **Yes, FUNCTION**

- **c)**
  - **Name** | **Sibling**
  - --- | ---
  - Anika | Jared
  - Anika | Joel
  - Anika | Nathan
  - Caroline | Aaron
  - Caroline | Simon
  - **repeats**
  - **NOT a function**

- **d)** \( y = 3x + 5 \)
  - **FUNCTION**

- **e)** \( y^2 = x \)
  - Only \( x \)-values are given: \( 1, 4, 9 \)
  - **repeating/multiple \( x \)-values**
  - **NOT a function**

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**Homework**

 ASSIGNMENT #5

Pages 25-29 Questions #91-109