Graphing Relationships
Continuous and Discrete Functions

Key Vocabulary

function (función)
A relation in which every domain value is paired with exactly one range value.

domain (dominio)
The set of all first coordinates (or x-values) of a relation or function.

range of a function or relation (rango de una función o relación)
The set of all second coordinates (or y-values) of a function or relation.

element (elemento)
Each member in a set.

What It Means For You
Learning to interpret a graph enables a deep visual understanding of all sorts of relationships.

EXAMPLE
A group of friends walked to the town market, did some shopping there, then returned home.

Distance from home

Time

What It Means For You

Learning to interpret a graph enables a deep visual understanding of all sorts of relationships.
**Relating Graphs to Situations**

The air temperature was constant for several hours at the beginning of the day and then rose steadily for several hours. It stayed the same temperature for most of the day before dropping sharply at sundown. Choose the graph that best represents this situation.

Step 1: Read the graphs from left to right to show time passing.
Step 2: List key words in order and decide which graph shows them.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Segment Description</th>
<th>Graphs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was constant</td>
<td>Horizontal</td>
<td>A and B</td>
</tr>
<tr>
<td>Rose steadily</td>
<td>Slanting upward</td>
<td>A and B</td>
</tr>
<tr>
<td>Stayed the same</td>
<td>Horizontal</td>
<td>B</td>
</tr>
<tr>
<td>Dropped sharply</td>
<td>Slanting downward</td>
<td>B</td>
</tr>
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</table>

Step 3: Pick the graph that shows all the key phrases in order.
- horizontal, slanting upward, horizontal, slanting downward

The correct graph is B.

1. The air temperature increased steadily for several hours and then remained constant. At the end of the day, the temperature increased slightly again before dropping sharply. Choose the graph above that best represents this situation.

**continuous graphs:** connected lines or graphs

**discrete graphs:** graphs that are distinct points
Sketching Graphs for Situations

Sketch a graph for each situation. Tell whether the graph is continuous or discrete.

A Simon is selling candles to raise money for the school dance. For each candle he sells, the school will get $2.50. He has 10 candles that he can sell.

The amount earned (y-axis) increases by $2.50 for each candle Simon sells (x-axis).
Since Simon can only sell whole numbers of candles, the graph is 11 distinct points.

The graph is discrete.

B Angelique's heart rate is being monitored while she exercises on a treadmill. While walking, her heart rate remains the same. As she increases her pace, her heart rate rises at a steady rate. When she begins to run, her heart rate increases more rapidly and then remains high while she runs. As she decreases her pace, her heart rate slows down and returns to her normal rate.

As time passes during her workout (moving left to right along the x-axis), her heart rate (y-axis) does the following:

- remains the same,
- rises at a steady rate,
- increases more rapidly (steeper than previous segment),
- remains high,
- slows down,
- and then returns to her normal rate.

The graph is continuous.
Sketch a graph for each situation. Tell whether the graph is continuous or discrete.

2a. Jamie is taking an 8-week keyboarding class. At the end of each week, she takes a test to find the number of words she can type per minute. She improves each week.

2b. Henry begins to drain a water tank by opening a valve. Then he opens another valve. Then he closes the first valve. He leaves the second valve open until the tank is empty.

When sketching or interpreting a graph, pay close attention to the labels on each axis. Both graphs below show a relationship about a child going down a slide. **Graph A** represents the child’s distance from the ground over time. **Graph B** represents the child’s speed over time.
Writing Situations for Graphs

Write a possible situation for the given graph.

**Step 1** Identify labels.
- x-axis: time
- y-axis: water level

**Step 2** Analyze sections.
- Over time, the water level
  - increases steadily,
  - remains unchanged,
  - and then decreases steadily.

**Possible Situation:** A watering can is filled with water. It sits for a while until some flowers are planted. The water is then emptied on top of the planted flowers.

3. Write a possible situation for the given graph.