Patterns and Linear Functions

Unit 4 Lesson 2
Students will be able to:
Represent a relationship using a table, graph, words, ordered pairs and functions

Key Vocabulary:
- Patterns
- Table, Graph, Words
- Ordered pair
- Linear Function
Patterns and their Representations

In mathematics, anything arranged following a certain rule or a set of rules represent a pattern. The relation represented in a pattern can be represented in the following ways:

• Table
• Graph
• Ordered Pairs
• Words
• Equation
Representation using table:

A table is made using the data in the patterns. There is an input and corresponding output associated with each input.

Representation using graph:

A graph can be made using the input and output values from the patterns.

Representation using ordered pairs:

The relationship between the data can also be represented using ordered pairs \((x, y)\) where \(x\) represents input and \(y\) represents output.
A relationship in a pattern can also be represented using words by using words for the mathematical operations like “times” for multiplication.

An equation can be used to represent the relation between variables using the equation notation like “\( y = ax + b \)”. 

**PATTERNS AND LINEAR FUNCTIONS**

**Representation using words:**

**Representation using an equation:**
Problem 1: For each diagram given below, find the relation between the number of shapes and the perimeter of the figure they form. Represent this relationship using a table, words, an equation and a graph.
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Using Table:

<table>
<thead>
<tr>
<th>Number of Squares</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

Using Words:

The pattern shows that the perimeter is two more than twice the number of squares.

PATTERNS AND LINEAR FUNCTIONS

1 square

2 squares

3 squares
Problem 1: For each diagram given below, find the relation between the number of shapes and the perimeter of the figure they form. Represent this relationship using a table, words, an equation and a graph.

Using Equation:

Perimeter = 2(number of squares) + 2

Using Graph:
Function

A function is a relation in which each input is related to one and only one output.

Linear Function

A function is a linear function whose graph makes a line.
Problem 2: Identify whether the data shown in the table represents a function or not. If yes, is the function linear?

<table>
<thead>
<tr>
<th>Day</th>
<th>Tickets Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
</tr>
</tbody>
</table>
Problem 2: Identify whether the data shown in the table represents a function or not. If yes, is the function linear?

For each value of input (Day), we have one and only one value of output (Ticket). So it is a function.

The graph of the function is a straight line, so it is a linear function.