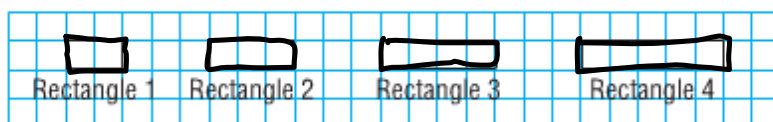


4.2 Linear Relations

Notes

Example: The first 4 rectangles in a pattern are shown below. The pattern continues. Each small square has side length 1 cm.



The perimeter of the rectangle is related to the rectangle number.

We can use words, a table, a graph, and an equation to represent this relationship.

Each representation tell us about the relationship between the rectangle number and its perimeter.

In Words: The perimeter is two times the rectangle number plus four.

In a Table:

| independent variable | dependent variable |
|-----------------------|---------------------|
| Rectangle Number, n | Perimeter, P (cm) |
| 1 | 6 |
| 2 | 8 |
| 3 | 10 |
| 4 | 12 |

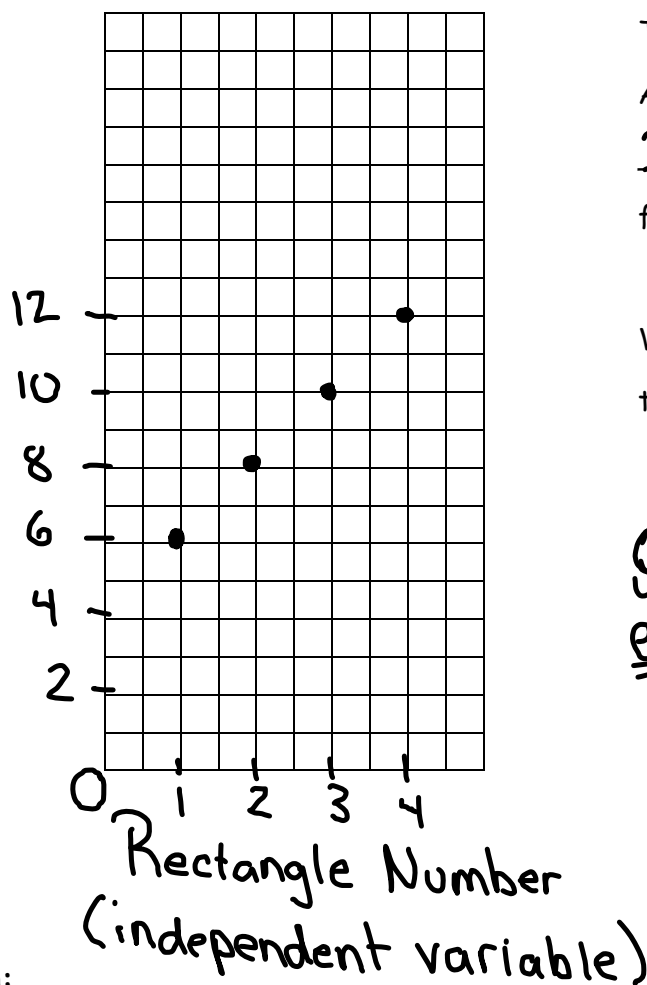
$$P = 2n + 4$$

Numerical coefficient (attached to independent variable).

This table represents a linear relation; a constant change in the rectangle number produces a constant change in the perimeter.

In a Graph:

Perimeter
(dependent
Variable).



The graph shows the pattern.

After the first point, each point is

1 unit right and 2 units up

from the preceding point.

We do not join the points because
the data are discrete.

Continuous data - join the points
ex: time, measurement, speed

In an Equation:

$$P = 2n + 4$$

The value of the variable P depends on the value of the variable n.

We say that P is the dependent variable and we plot it on the vertical axis. (y-axis)

The independent variable n is plotted on the horizontal axis. (x-axis)

When two variables are related, we have a relation.

Definition: When the graph of the relation is a straight line, we have a **LINEAR RELATION**.

In a linear relation, a constant change in one quantity produces a constant change in the related quantity.