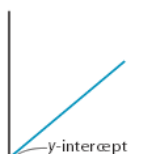


direct variation

- a linear relationship in which one variable is always a fixed multiple of the other variable, e.g., the y-value is always 3 times the x-value
- in a graph of a direct variation relationship, the slope of the line is the fixed multiple, and the y-intercept is always zero

**initial value**

- the value of the dependent variable when the independent variable is zero
- in a direct variation relationship, the initial value is always zero

rate of change

- the amount by which the dependent variable changes when the independent variable increases by 1 unit
- in a direct variation relationship, the rate of change is constant

Model a Direct Variation Relationship With a Table of Values

The dispatcher of a school bus company is monitoring the local weather forecast to decide whether to cancel school buses for the next day. At 9:00 p.m., there is no snow on the ground but it has started snowing. It is predicted that 2 cm of snow will fall each hour through the night and into the next morning.

- What is the **initial value**, that is, the amount of snow on the ground at 9:00 p.m. (0 h)?
- What is the expected **rate of change** in the depth of snow each hour?
- Create a table of values for 0 h to 10 h of snowfall. How does your table show the initial value and rate of change for the relationship?
- How does it show that the relationship has direct variation?
- Predict what a graph of the table of values would look like.
- What time will it be when there are 12 cm of snow on the ground?
- The decision to cancel buses must be made by 6:00 a.m. How much snow will be on the ground at that time?

Solution

- The initial value is 0 cm of snow at 9:00 p.m., or 0 h.
- The rate of change is 2 cm each hour.

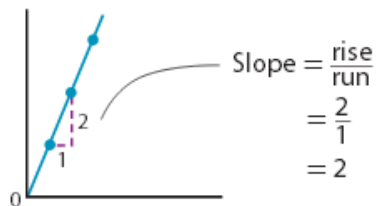
c)

Time (h)	Depth of Snow (cm)
0	0
1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16
9	18
10	20

initial value

rate of change

- d)** In a direct variation relationship, the initial value is zero, and one variable is a fixed multiple of the other because the variables vary directly.
- The table shows that the initial value is zero: the depth is 0 cm at 0 h.
 - The table shows that the depth of the snow is a fixed multiple of the time. For example, at 2 h, there is 2 times as much snow as at 1 h and at 6 h, there is 2 times as much snow as at 3 h.
- e)** The graph would be points in a line going upward starting at zero on the y-axis, the initial value, and the slope would be the rate of change per hour, which is 2.



- f)** There should be about 12 cm of snow 6 h after the snow started, which is 3:00 a.m.
- g)** 6:00 a.m. is 9 h after it started snowing. There should be about 18 cm of snow.