**Exploring Partial Variations**

Joe the plumber charges $50 for a service call to your home plus $60 per hour.

1. Create a table that shows the relationship between the plumber’s earnings and the time spent on the service call.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (h) | 0 | 1 | 2 | 3 | 4 |
| Earnings $ |  |  |  |  |  |

1. Graph this relation. Describe the shape of the graph.
2. Where does it meet the vertical axis?
3. Using your graph, interpolate how much Joe makes in 8

 hours?

 Show this on the graph.

1. Write an equation to find the plumber’s earnings,$ E$

 in dollars, that the plumber makes in $t$ min.

1. Using your equation, how much does Joe make in 8 hours?
2. How does your answer in f) compare to your answer using d)? What are the benefits of using an equation?

This example demonstrates a **PARTIAL VARIATION**.

Why?

1.
2.
3.

**Definition:** A Partial Variation is a relationship

*Recall*

In many cases in real life, the value of a variable may be made up of two parts.

One part is a **constant** and the other **varies directly** as another variable.

This type of relationship gives rise to **partial variation**.

**Example ➊** The cost of riding in a taxi depends on how far you travel plus a fixed cost. Beck, the taxi company, charges $1.50 per km and a fixed cost of $3.00.

**Variables**

1. Identify the dependent and independent variables. Explain why. Write let statements.

**Table of values**

1. Create a table showing the relationship between the cost,$ C$ in dollars, and distance, $d$ travelled in km.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |



**Equation**

1. Determine an equation relating the cost and the distance travelled.

**Graph**

1. Graph the relation.

**Solving Equation**

1. Determine the distance travelled if $58.25 was charged.

**Key Concepts:**

In the above example, we say that *Cost varies partially* with distance.

* The graph of a partial variation relationship is a straight line that does not pass through the origin.
* The equation of a partial relation has the form

$$ dpt=m\left(indpt\right)+number$$



where  is a number on the vertical axis and .

* The *constant of variation* is represented by  . Also known as the rate.
* The value of  is also called the fixed amount or initial value of $y$.

Direct variation part

Constant part

**Example ➋**

Write an equation for each scenario stated below. Identify the dependent and independent variables.

1. A book club charges $20 registration fee plus $8 per month.
2. At a school awards night the cost of renting a hall is $1500 and there is an additional $25 per person charge.
3. A car salesman earns $500 per month and 2% of total sales.
4. The cost of a yoga membership is $5 a visit and a fixed cost of $20.

**Example ➌** Students can choose from two different cafeteria milk plans.

*Plan A: Pay $0.75 per glass of milk*

*Plan B: Pay $10, plus $0.25 per glass of milk*

1. Write an equation for each plan. Plan A:

Plan B:

1. Determine the cost of 20 glasses for each plan.
2. Determine the cost of 30 glasses for each plan.
3. Which plan would you choose? Why?
4. Graph each relation.
5. At what point would it be best to choose Plan B? Would you adjust your answer in d)? Explain your reasoning.
6. Identify each plan as a direct or a partial variation.
7. How does the type of variation affect the cost?

Learning Goal:

❑ I can identify a partial variation given a scenario.

❑ I can use a table of values, graph, or equation to represent a partial variation.