Date: _____

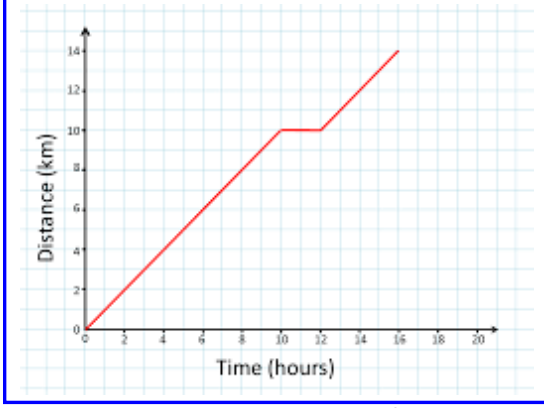
5.4 Slope as a Rate of Change & 5.5 First Differences

1) Slope as a Rate of Change

Previously, we discussed the idea that slope is a ratio of the rise to the run if both are measured in the same units. When we refer to slope as a rate, we are still comparing the rise to the run, but they have different units.

Remembering Previous Knowledge

State the speed for each section of the distance time graph shown below.



When you have a graph, you can find the rate of change in the exact same way that you found slope yesterday (draw a triangle, determine the rise and run, keeping the units in mind).

We can also write rates of change from descriptions.

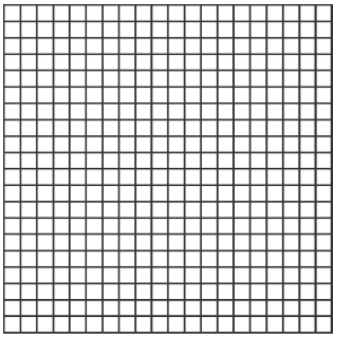
Example 1: The price of a carton of milk increased in a linear fashion from 1995 to 2002. If a carton of milk was $1.50 in 1995 and $2.65 in 2002, what was the yearly increase in the cost of a carton of milk?

We can also create a graph from a description because we know that a linear relationship will have a constant rate of change.

Example 2: The volume of gasoline in a car decreases at a rate of 12 L per 100 km. If a full tank contains 65 L of gasoline:

a) State the initial value and rate of change for the relation.

b) Graph the relationship.



c) Write an equation to model the relationship.

2) First Differences

Take a look at the table of values below. What do you think that the rate of change is for this relationship?

Time (s)	Distance (m)
0	5
1	8
2	11
3	14
4	17
5	20
6	23

Is this a direct or partial variation?

What would an equation for the relationship look like?

Try the same thing with the table below. Remember that we want to state our rate of change as a UNIT RATE!

Time (s)	Distance (m)
0	50
2	41
4	32
6	23
8	14
10	5

First Differences are the differences (subtract!) between consecutive y-values in a table of values with evenly spaced x - values. If a relationship is linear the first differences are equal. If a relationship is non-linear the first differences are not equal.

Example 3: Find first differences for each table below to determine if the relationship is linear or not.

x	y
-3	-12
-2	-7
-1	-2
0	3
1	8
2	13
3	18

x	y
-3	-17
-2	-11
-1	-6
0	-2
1	1
2	4
3	8

For the linear relationship above, identify if it is a direct or partial variation, and write an equation to model the relationship.