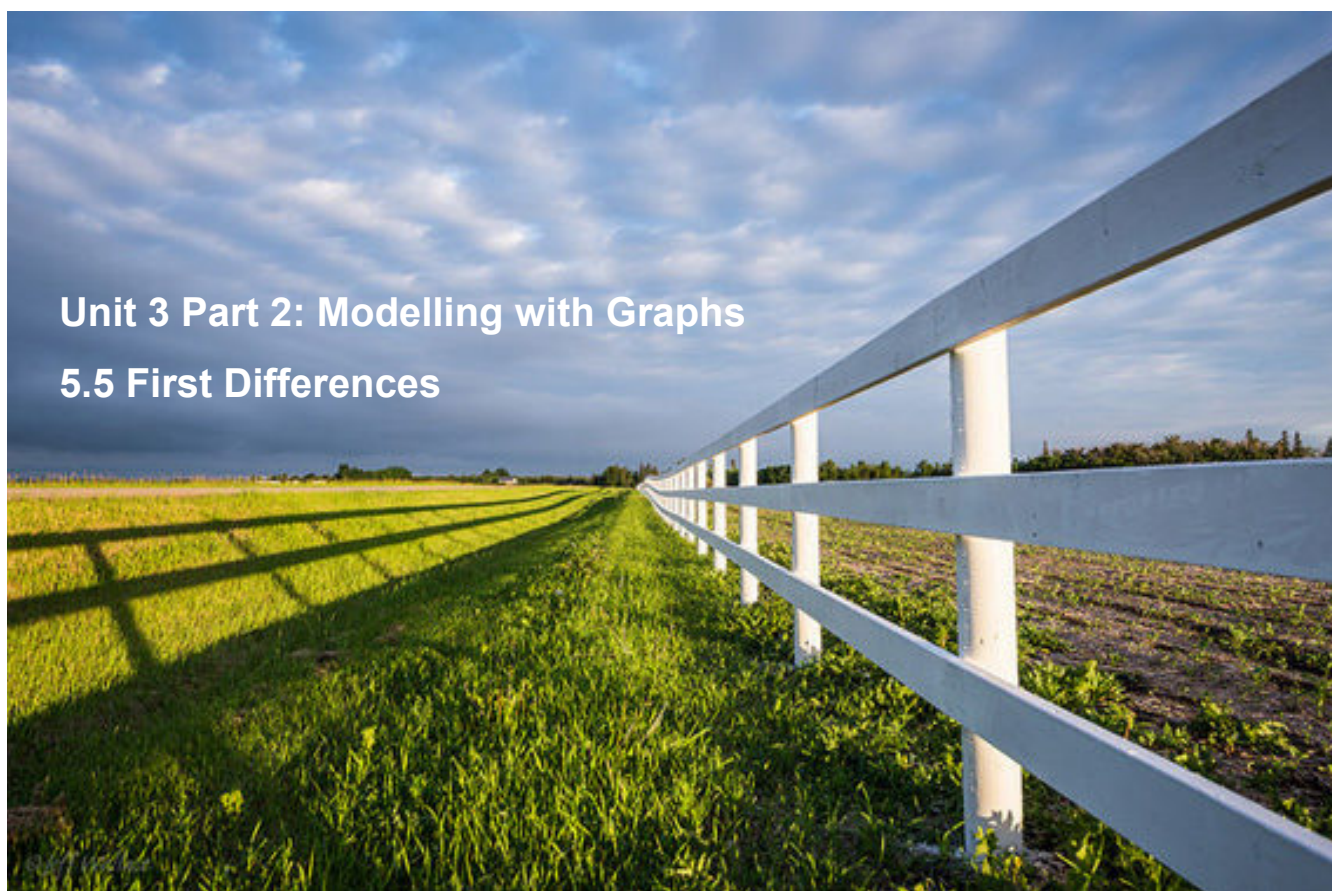


**Unit 3 Part 2: Modelling with Graphs**  
**5.5 First Differences**

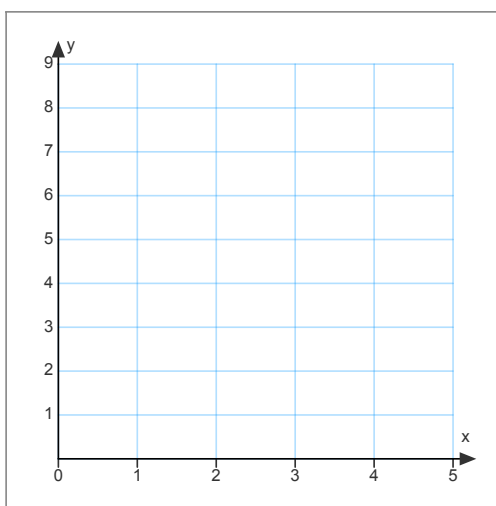


## First Differences

"First differences" are the differences between consecutive  $y$  - values in a table of values with evenly spaced  $x$  - values. They prove whether a relation is linear or not. If the first differences are all constant (the same) then the relation is linear.

Ex. Is this relation linear?

X	Y
0	0
1	2
2	4
3	6
4	8



How to calculate First Differences:

x	y	1st Diff
0	0	
1	2	
2	4	
3	6	
4	8	

Ex. Use first differences to determine if the following relations are linear or non-linear.

x	y	1st Diff
0	-3	
2	-1	
4	3	
6	9	
8	17	

x	y	1st Diff
0	7	
1	10	
2	13	
3	16	

x	y	1st Diff
0	7	
1	10	
3	16	
6	25	

Jacob's rate of pay is \$10.15. If you made a table of values of his earnings, how would his hourly wage relate to the first differences?

Ex. Look at each equation. Predict whether it represents a linear relation or a non-linear relation.

a)  $y = 5x + 6$

b)  $y = -3x - 2$

c)  $y = 4x^2 + 1$

d)  $y = 10^x$

e)  $y = -\frac{4}{3}x + \frac{1}{2}$

f)  $y = \frac{6}{x}$

