7C – Using an explicit rule for linear growth or decay

**THE EXPLICIT RULE FOR LINEAR GROWTH OR DECAY**

If you want to know the value of any particular term (Vn) you can use the following explicit rules (instead of recurrence relations):

LINEAR GROWTH LINEAR DECAY

where…. V0 is the initial value

n is the term number

D is the common difference

Note that for **simple interest investments** or **flat rate depreciation**, D can still be worked out using:

*For the following arithmetic sequences, write the explicit rule and find V*20:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sequence** | **V0** | **D** | **Explicit Rule** | **V20** |
| 7, 10, 13, … |  |  |  |  |
| 51, 44, 37, … |  |  |  |  |

*If $3000 is invested at 6.5% p.a. simple interest, use an explicit rule to determine the total amount of the investment after 10 years:*

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**REARRANGEMENTS OF THE EXPLICIT RULE TO FIND OTHER UNKNOWNS**

To find the **term number (n)** to get to a particular final value:

LINEAR GROWTH LINEAR DECAY

*Eg: For a simple interest investment of $3000 at 7.5% p.a., how many years is it until the amount exceeds $9000?*

To find the **common difference (D)**:

LINEAR GROWTH LINEAR DECAY

*Eg: A piece of machinery was worth $5000 new. After 7 years of flat rate depreciation, it was worth $3250. By how much did it depreciate each year (the common difference)?*

To find the **interest rate (r)** if you know the common difference:

*Eg: In the above example, what is the simple interest rate of depreciation that is applied to the initial value of the machinery?*