7D – Modelling Geometric Growth or Decay

**GEOMETRIC SEQUENCES**

For a geometric sequence the previous term is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the same

amount each time.

This amount is called the common \_\_\_\_\_\_\_\_\_\_\_ and has the symbol R.

For geometric **growth** sequences, R is a positive number larger than \_\_\_\_.

For geometric **decay** sequences, R is a \_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

between 0 and 1.

To find the value of R in a geometric sequence, \_\_\_\_\_\_\_\_\_\_\_\_\_ any term by the

previous one:

When geometric sequences are plotted on a graph, they form a \_\_\_\_\_\_\_\_\_\_\_\_\_:

|  |  |
| --- | --- |
| Increasing Geometric Sequence | Decreasing Geometric Sequence |
|  |  |

*For the following geometric sequences:*

* *Find the common ratio*
* *Write the recurrence relation*
* *Use NestList to generate the next 3 terms*
* *Use ListPlot to examine the graph and see if it is an exponential curve shape*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sequence** | **R** | **Recurrence Relation** | **Next 3 Terms** | **Shape** |
| 2, 6, 18, … |  |  |  |  |
| 24, 18, 13.5, ... |  |  |  |  |
| 8, 9.6, 11.52, … |  |  |  |  |

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**COMPOUND INTEREST INVESTMENTS AND LOANS (as geometric sequences)**

If you invest an initial amount of money (V0) at a compound interest rate (r %), the the **common ratio (R)** is the decimal value that you multiply by to increase by that percentage each time period:

The value of the investment over time can then be represented by the recurrence relation:

where…. Vn is the value of the investment after n time periods

R is the common ratio between consecutive terms

*For a compound interest investment of $1000 at 8.0% per annum, calculate the common ratio and then write a recurrence relation for the value of the investment:*

*Use the recurrence relation in NestList to calculate the value of the investment over a 4-year period:*

V0 = V1 = V2 = V3 = V4 =

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**REDUCING BALANCE DEPRECIATION (as a geometric sequence)**

If an asset depreciates (loses value) by an annual percentage from the year before (r%), the **common ratio (R)** is the **decimal proportion of the value it keeps** each time period:

The value of the asset over time can then be represented by the recurrence relation:

where…. Vn is the value of the asset after n time periods

R is the common ration between consecutive terms

*A car with a purchase price of $18500 depreciates at a reducing balance rate of 10% per annum. Calculate the common ratio and then write a recurrence relation for the value of the car:*

*Use the recurrence relation in NestList to calculate the value of the car over a 4-year period:*

V0 = V1 = V2 = V3 = V4 =