Linear & Exponential Sequences

**Formula Sheet**

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| **Name** | **Definition** | **Formula** |
| Arithmetic Sequence | An arithmetic sequence is a list of terms (numbers) that progress by adding or subtracting each term by the same amount each time, called the common difference.  | For example, this arithmetic sequence has a common difference of 3.* Explicit Formula: $$a\_{n}=a\_{1}+\left(n−1\right)d$$
* Recursive Formula: $$a\_{1}=first term$$, $$a\_{n}=a\_{n−1}+d$$

Where:*d =* common difference$$a\_{1}$$= first term$$a\_{n}$$= the nth term*n =* term number |
| Geometric Sequence | A geometric sequence is a list of terms (numbers) that progress by multiplying or dividing each term by the same amount each time, called the common ratio.  | For example, this geometric sequence has a common ratio of 2.* Explicit Formula: $$a\_{n}=a\_{1}⋅r^{\left(n−1\right)}$$
* Recursive Formula: $$a\_{1}=first term$$, $$a\_{n}=r⋅a\_{n−1}$$

Where,*d =* common difference$$a\_{1}$$= first term$$a\_{n}$$= the nth term*n =* term number |
| Function Notation | A way in which a function can be represented using symbols and signs read as “*f of x*”. Functions can be named with different letters other than *f*. | $$y=f\left(x\right)$$For example: |
| Linear Function | An equation of a form in which the variables appear only in the first degree, are multiplied by constants, and are combined only by addition and subtraction.  | $$f\left(x\right)=mx+b$$$$m= $$slope or rate of change$$b= $$*y-*intercept$$x= $$independent variable$$f\left(x\right)= $$dependent variable |
| Slope Formula | The slope of a line is defined by the change in *y* coordinate with respect to the change in *x* coordinate of the line.  | $$\frac{∆y}{∆x}=\frac{change in y}{chang in x}=\frac{y\_{2}−y\_{1}}{x\_{2}−x\_{1}}$$Where $$\left(x\_{1},y\_{1}\right)$$ is the first point and $$\left(x\_{2},y\_{2}\right)$$ is the second point. |
| Exponential Function | Exponential functions are used to model growth and decay such as bacteria, population, interest, and depreciation.  | $$f\left(x\right)=a\left(b\right)^{x}$$$$a= $$initial value$$b= $$multiplier/ growth or decay factorThe multiplier is calculated from the rate, *r*. Growth Factor: $$b=1+r $$Decay Factor: $$b=1−r $$ |
| Key Features of Exponential Graphs | The graph of an exponential function may model growth or decay and shows a quick increase or decrease. | * The y-intercept is at the point $$\left(0,a\right)$$, where $$a $$is the initial value.
* The line $$y=0 $$is the horizontal asymptote.
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