## SEQUENCES REFERENCE SHEET

Arithmetic Sequence: A series of terms where the same number is added each time to produce the next term.
Geometric Sequence: A series of terms where each term is multiplied by the same number to produce the next term.

Recursive Formula: A formula that relies on the previous term for finding each term in the sequence. The first term must be given.

Explicit Formula: A formula you can use to find any term in a sequence.

|  | Arithmetic Sequence | Geometric Sequence |
| :---: | :---: | :---: |
| Recursive Formulas | $f(n)=f(n-1)+d$ <br> $a_{n}=a_{n-1}+d$ | $f(n)=r \times f(n-1)$ |
|  | $f(n)$ <br> Explicit Formulas | $f(n)=f(1)+d(n-1)$ <br> $a_{n}=a_{1}+d(n-1)$ |
|  | $f(n)=f(1) \times a_{n-1}^{n-1}$ <br> $a_{n}=a_{1} \times r^{n-1}$ |  |

Practice: Write each sequence in the correct table (arithmetic or geometric).
$0,1,2,3,4,5,6 \ldots$
2, 6, 18, 54...
31, 27, 23, 19, 15...
$-8,-2,4,10,16$...
$-5,10,-20,40 \ldots$
100, 1000, 10000...

Arithmetic Sequences

| Sequence | Common <br> Difference (d) | First term <br> f(1) or a $a_{1}$ | Recursive <br> Formulas | Explicit Formulas | $\mathbf{f ( 1 5 )}$ | $\mathbf{a}_{40}$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
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## Geometric Sequences

| Sequence | Common <br> Ratio (r) | First term <br> $f(1)$ or $a_{1}$ | Recursive <br> Formulas | Explicit Formulas | $f(15)$ | $a_{40}$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
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## Sequences Reference Sheet Answer Key

Arithmetic Sequence: A series of terms where the same number is added each time to produce the next term.
Geometric Sequence: A series of terms where each term is multiplied by the same number to produce the next term.

Recursive Formula: A formula that relies on the previous term for finding each term in the sequence. The first term must be given.

Explicit Formula: A formula you can use to find any term in a sequence.

|  | Arithmetic Sequence | Geometric Sequence |
| :---: | :---: | :---: |
| Recursive Formulas | $f(n)=f(n-1)+d$ | $f(n)=r \times f(n-1)$ |
| $a_{n}=a_{n-1}+d$ | $a_{n}=r \times a_{n-1}$ |  |
| Explicit Formulas | $f(n)=f(1)+d(n-1)$ | $f(n)=f(1) \times r^{n-1}$ |
| $a_{n}=a_{1}+d(n-1)$ | $a_{n}=a_{1} \times r^{n-1}$ |  |

Practice: Write each sequence in the correct table (arithmetic or geometric).
$0,1,2,3,4,5,6 \ldots$
2, 6, 18, 54...
31, 27, 23, 19, 15...
$-8,-2,4,10,16 \ldots$
$-5,10,-20,40 \ldots$
100, 1000, 10000...

Arithmetic Sequences

| Sequence | Common Difference (d) | First term $f(1)$ or $a_{1}$ | Recursive Formulas | Explicit Formulas | f(15) | $\mathrm{a}_{40}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{gathered} 0,1,2,3,4 \\ 5,6 \ldots \end{gathered}$ | 1 | 0 | $\begin{gathered} f(1)=0 \\ f(n)=f(n-1)+1 \\ a_{1}=0 \\ a_{n}=a_{n-1}+1 \end{gathered}$ | $\begin{aligned} & f(n)=0+1(n-1) \\ & a_{n}=0+1(n-1) \end{aligned}$ | 14 | 39 |
| $\begin{gathered} 31,27,23 \\ 19,15 \ldots \end{gathered}$ | -4 | 31 | $\begin{gathered} f(1)=31 \\ f(n)=f(n-1)-4 \\ \\ a_{1}=31 \\ a_{n}=a_{n-1}-4 \end{gathered}$ | $\begin{gathered} f(n)=31-4(n-1) \\ a_{n}=31-4(n-1) \end{gathered}$ | -25 | -125 |
| $\begin{gathered} -8,-2,4,10 \\ 16 \ldots \end{gathered}$ | 6 | -8 | $\begin{gathered} f(1)=-8 \\ f(n)=f(n-1)+6 \\ a_{1}=-8 \\ a_{n}=a_{n-1}+6 \end{gathered}$ | $\begin{gathered} f(n)=-8+6(n-1) \\ a_{n}=-8+6(n-1) \end{gathered}$ | 76 | 226 |

## Geometric Sequences

| Sequence | Common <br> Ratio (r) | First term $\mathrm{f}(1)$ or $\mathrm{a}_{1}$ | Recursive Formulas | Explicit Formulas | f(15) | $\mathrm{a}_{40}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $2,6,18,54 \ldots$ | 3 | 2 | $\begin{gathered} f(1)=2 \\ f(n)=3 \times f(n-1) \\ a_{1}=2 \\ a_{n}=3 \times a_{n-1} \\ \hline \end{gathered}$ | $\begin{gathered} f(n)=2 \times 3^{n-1} \\ a_{n}=2 \times 3^{n-1} \end{gathered}$ | 9565938 | $\begin{aligned} & 8.105 \\ & \times 10^{18} \end{aligned}$ |
| $\begin{aligned} & -5,10,-20, \\ & 40 \ldots \end{aligned}$ | -2 | -5 | $\begin{gathered} f(1)=-5 \\ f(n)=-2 \times f(n-1) \\ a_{1}=-5 \\ a_{n}=-2 \times a_{n-1} \end{gathered}$ | $\begin{gathered} f(n)=-5 \times(-2)^{n-1} \\ a_{n}=-5 \times(-2)^{n-1} \end{gathered}$ | -81920 | 2748779069440 |
| $\begin{gathered} \text { 100, 1000, } \\ 10000 \ldots \end{gathered}$ | 10 | 100 | $\begin{gathered} f(1)=100 \\ f(n)=10 \times f(n-1) \\ a_{1}=-5 \\ a_{n}=10 \times a_{n-1} \end{gathered}$ | $\begin{aligned} & f(n)=100 \times 10^{n-1} \\ & a_{n}=100 \times 10^{n-1} \end{aligned}$ | $1 \times 10^{16}$ | $1 \times 10^{41}$ |



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## Suggested Resources



