# Pre-AP Pre- Calculus Sequences and Series Test Review

1. Find the next 3 terms of the recursive sequence $\frac{4+a_{n-1}}{2}$ where $a_1 = 8$

$a_2 = \frac{4+8}{2} = 6$

$a_3 = \frac{4+6}{2} = 5$

$a_4 = \frac{4+5}{2} = 4.5$

2. Write the sum using sigma notation

$9x + 10x^2 + 11x^3 + 12x^4 + \ldots + 98x^{90}$

$\sum_{n=1}^{90} (n+8)x^n$ or $\sum_{n=9}^{98} nx^{n-8}$

3. Find the sum.

$\sum_{k=1}^{4} k2^k$ $\quad 1\cdot 2 + 2\cdot 4 + 3\cdot 8 + 4\cdot 16 = 98$

4. Find the 18th term of the arithmetic sequence.

$-t, -t+3, -t+6, -t+9 \ldots$

$a_{18} = -t + 3(18-1)$

$-t + 51$

5. How many terms are in the arithmetic sequence 3, 8, 13,...73 ?

$73 = 3 + 5(n-1)$

$n = 15$

6. A partial sum of an arithmetic sequence is given. Find the sum.

$3 + 7 + 11 + \ldots + 39$

$39 = 3 + 4(n-1)$

$36 = 4(n-1)$

$9 = n-1$

$n = 10$

$S_{10} = \frac{10}{2}[2\cdot 3 + 4(10-1)] = \boxed{210}$

7. Determine whether the sequence is geometric, arithmetic, or neither

6, 24, 96, 384...

geometric

$r = 4$

8. Determine the *n*th term of the geometric sequence.

$x, \frac{x^2}{5}, \frac{x^3}{25}, \frac{x^4}{125}, \ldots$

$a_n = x\left(\frac{x}{5}\right)^{n-1}$ or $\frac{x^n}{5^{n-1}}$

9. How many terms are in the geometric sequence 5, 20, 80, . . .20480 ?

$20480 = 5(4)^{n-1}$

$4096 = 4^{n-1}$

$4^6 = 4^{n-1}$

$\boxed{n = 7}$

10. Find the sum.

$1 + 4 + 16 + \ldots + 4096$

$4096 = 1(4)^{n-1}$

$4^6 = 4^{n-1}$

$n = 7$

$S_7 = 1\left(\frac{1-4^7}{1-4}\right)$

$= \boxed{5461}$

11. Find the sum of the infinite geometric series.

$1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \ldots$

$r = \frac{1}{3}$

$S = \frac{1}{1 - 1/3} = 3/2$ or $1.5$

12. Use the Binomial Theorem to expand the expression $(3-x)^5$.

$\binom{5}{0}3^5 + \binom{5}{1}3^4(-x) + \binom{5}{2}3^3(-x)^2 + \binom{5}{3}3^2(-x)^3 + \binom{5}{4}3(-x)^4 + \binom{5}{5}3^0(-x)^5$

$1\cdot 243 + -5\cdot 81x + 10\cdot 27x^2 - 10\cdot 9x^3 + 5\cdot 3x^4 - 1\cdot 1\cdot x^5$

$\boxed{243 - 405x + 270x^2 - 90x^3 + 15x^4 - x^5}$

13. Find the 4th term in the expansion of $(x+2y)^{15}$.

$\frac{15!}{3!\,12!} = \frac{15\cdot 14\cdot 13}{3\cdot 2} = 455$

$\binom{15}{3}x^{12}(2y)^3$

$455x^{12}\cdot 8y^3$

$\boxed{3640x^{12}y^3}$

14. Find the middle term in the expansion of $\left(x^4+1\right)^{20}$.

$\frac{20!}{10!\,10!} = 184756$

$\binom{20}{10}(x^4)^{10}(1)^{10}$

$\boxed{184756x^{40}}$

15. Find the term containing $x^6$ in the expansion of $(x+2y)^{10}$.

$\frac{10!}{4!\,6!}$ =

$\binom{10}{4}x^6(2y)^4$

$210x^6\cdot 16y^4$

$\boxed{3360x^6y^4}$

16. Find the sum.

$\sum_{k=2}^{6} 2^{k-2} =$ 31

$2^0+2^1+2^2+2^3+2^4$

17. The 12th term of an arithmetic sequence is 34, and the fifth term is 20. Find the 20th term.

$a_{20} =$ 50

12→5 7 terms

20→34 14 #s

$d = 14/7 = 2$

$34 = a + 2(12-1)$

$a = 12$ $a_{20} = 12 + 2(20-1)$

18. A partial sum of an arithmetic sequence is given. Find the sum.

$\sum_{n=0}^{20}(1-7n)$

$S =$ −1449

19. An arithmetic sequence has first term $a_1 = 7$ and fourth term $a_4 = 22$. How many terms of this sequence must be added to get 3,402? $d = 15/3 = 5$

$n =$ 36

$\underbrace{3402}_{y_1} = \frac{n}{2}\underbrace{[2\cdot 7 + 5(n-1)]}_{y_2}$

find intersection

20. Find the sum of the infinite geometric series.

$4 + \frac{4}{3} + \frac{4}{9} + \frac{4}{27} + \cdots$ $S = \frac{4}{1-1/3} = 6$

$r = \frac{1}{3}$

21. Write the sum using sigma notation.

4 + 8 + 12 + 16 + 20 + 24 + 28 + 32 + 36 + 40

$\sum_{n=1}^{10} 4+4(n-1)$ or $\sum_{n=1}^{10} 4n$ or $\sum_{n=0}^{9} 4n+4$

22. Determine whether the sequence is arithmetic, geometric, or neither.

5, 11, 13, 23, ...

neither

23. Find the sum of the infinite geometric series.

$1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \cdots$ $S = \frac{1}{1-1/3} = 3/2$ or 1.5

24. Find the sum of the infinite geometric series.

$\frac{1}{16} + \frac{1}{8} + \frac{1}{4} + \ldots$ $\boxed{\text{diverges}}$

$r = 2$