

Unit 5: Sequences and Series

Unit Objectives

- Determine n th terms of sequences
- Determine i th partial sums of series
- Use the binomial theorem

Unit 5 Lesson 1: Determine Terms of Sequences

Lesson Objectives

- Determine initial terms of a sequence
- Determine the n th term of a sequence

Sequence

- A list of values given by continuing a _____
- Not really much different than an _____

1. Write the first four terms of the sequence given by $a_n = 3n - 2$
2. Write the first four terms of the sequence given by $a_n = 3 + (-1)^n$
3. Determine the apparent n th term of the sequence
3, 6, 9, 12, 15, ..., a_n

4. Determine a_n
 $1, 4, 9, 16, 25, \dots, a_n$

5. Determine a_n
 $1, 3, 5, 7, 9, \dots, a_n$

6. Determine a_n
 $1, -2, 3, -4, 5, -6, \dots, a_n$

~~~U5L1 Classwork~~~

1. Write the first four terms of the sequence given by  $a_n = \frac{(-1)^n}{2n - 1}$

2. Write the first four terms of the sequence given by  $a_n = 2^n$

3. Write the first four terms of the sequence given by  $a_n = \frac{(-1)^n}{n^2}$

4. Determine the apparent  $n$ th term of the sequence  
4, 1, -2, -5, -8, ...,  $a_n$

5. Determine the apparent  $n$ th term of the sequence  
3, 9, 27, 81, 243, ...,  $a_n$

6. Determine the apparent  $n$ th term of the sequence  
 $-\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}, \frac{1}{16}, -\frac{1}{32}, \dots, a_n$

## Unit 5 Lesson 2: Calculate Series

### Lesson Objectives

- Determine the  $i$ th partial sum of a sequence

1.  $\sum_{i=1}^5 3i$

2.  $\sum_{k=3}^6 (1 + k^2)$

3.  $\sum_{j=2}^4 \frac{1}{j}$

4.  $\sum_{j=0}^{10} \cos(\pi x)$

~~~U5L2 Classwork~~~

1. $\sum_{k=1}^4 k^2$

2. $\sum_{j=0}^3 (j+1)(j-2)$

3. $\sum_{i=1}^{10} \sin(\pi i)$

4. $\sum_{i=1}^{10} \cos(2\pi i)$

5. $\sum_{i=0}^{10} \sin\left(\frac{\pi}{2}i\right)$

6. $\sum_{i=0}^{12} \cos\left(\frac{\pi}{6}i\right)$

$$7. \sum_{i=1}^{11} (-1)^n n$$

$$8. \sum_{i=1}^{30} 10$$

$$9. \sum_{i=1}^{30} (-1)^n 10$$

$$10. \sum_{i=1}^{10} \left(\frac{1}{n} - \frac{1}{n+1} \right)$$

11. Extra Credit: Solve for x

$$300 = \sum_{i=1}^x 20$$

Unit 5 Lesson 3: Expand Using the Binomial Theorem

Lesson Objectives

- Use the binomial theorem to expand binomials more quickly

Pascal's Triangle

1. Expand $(x + 3)^4$

2. Expand $(x + 2)^5$

3. Expand $(x - 4)^4$

4. Expand $(x - 2)^6$

5. Expand $(x + 2y)^3$

6. Expand $(x^2 - \frac{1}{y})^4$

7. Expand $(-2q + 3a^3)^5$


~~~U5L3 Classwork~~~

1. Expand  $(x + 3)^5$

2. Expand  $(2x - 4)^4$

3. Expand  $(x + 2)^7$

4. Expand  $(\frac{b}{2} - 4a^2)^3$

5. Expand  $(\frac{3}{\pi n^2} + \pi q)^6$

6. Expand  $(\sin(x) - 2\cos(x))^4$

## Unit 5 Lesson 4: Review for Quiz on Sequences and Series

### Lesson Objectives

- Get a grade that'll make Mama proud
1. Write the first four terms of the sequence given by  $a_n = n^2 - n$
  2. Write the first four terms of the sequence given by  $a_n = n + (-1)^n$
  3. Determine  $a_n$  given the following list of terms  
-8, -4, 0, 4, 8, ...,  $a_n$

4.  $\sum_{j=11}^{40} 100$

5.  $\sum_{n=0}^3 n(n+1)$

6.  $\sum_{n=1}^8 \sin\left(\pi x - \frac{\pi}{2}\right)$

7. Extra Credit: Solve for x

$$60 = \sum_{n=1}^x (-1)^n n$$

8. Expand  $(x + 2)^6$

9. Expand  $(\frac{3}{2a} + 4b^2)^4$