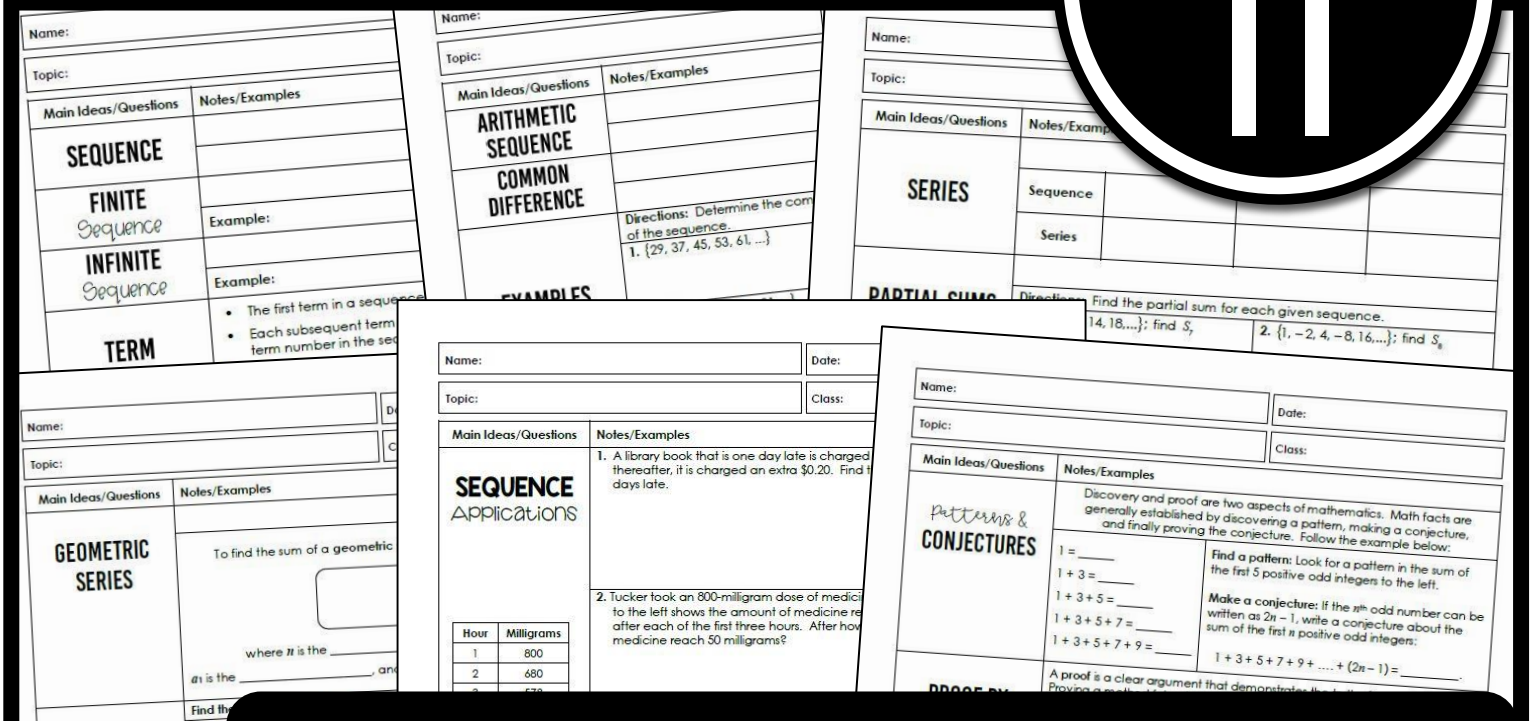
PRE-CALCULUS

Unit 11



SEQUENCES & SERIES

NOTES • HOMEWORK • QUIZZES • TEST

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Unit 11 – Sequences & Series: Sample Unit Outline

	TOPIC	HOMEWORK
DAY 1	Explicit and Recursive Sequences	HW #1
DAY 2	Arithmetic Sequences	HW #2
DAY 3	Geometric Sequences	HW #3
DAY 4	**Quiz 11-1**	None
DAY 5	Series & Sigma Notation; Arithmetic Series	HW #4
DAY 6	Geometric Series (Finite and Infinite)	HW #5
DAY 7	Arithmetic vs. Geometric Sequences and Series (including mixed applications)	HW #6
DAY 8	**Quiz 11-2**	None
DAY 9	Mathematical Induction	HW #7
DAY 10	Binomial Expansion: Pascal's Triangle & The Binomial Theorem	HW #8
DAY 11	Unit 11 Review	Study For Test
DAY 12	**UNIT 11 TEST**	None

Name: Date:

Topic: Class:

Main Ideas/Questions	Notes/Examples
SEQUENCE	
FINITE *Sequence*	Example:
INFINITE *Sequence*	Example:
TERM NOTATION	• The first term in a seq • Each subsequent ter term number in the s Example: Given {2, 5, 8,

Name: Date:

Topic: Class:

Main Ideas/Questions	Notes/Examples
ARITHMETIC SEQUENCE	
COMMON DIFFERENCE	
	Directions: Det of the sequenc 1. {29, 37, 45, 5

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Topic: Class:

Main Ideas/Questions	Notes/Examples
GEOMETRIC SEQUENCE	
COMMON RATIO	
EXAMPLES	Directions: Determine the common ratio, then find t the sequence. 1. {8, 24, 72, 216, ...} 2. {512, −12

Name: Date:

Topic: Class:

Main Ideas/Questions	Notes/Examples
SERIES	Sequence

...}; find S_6

...}; find S_5

S_4

S_n

denote the sum.

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Topic: Class:

Main Ideas/Questions	Notes/Examples
ARITHMETIC SERIES	To find the sum of an **arithmetic series**, use the followi

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Main Ideas/Questions	Notes/Examples
GEOMETRIC SERIES	To find the sum of a **geometric series**, use the following formula: where n is the _____. a_1 is the and r is the
EXAMPLES	Fin 1.

Name: Date:

Topic: Class:

Main Ideas/Questions	Notes/Examples
Arithmetic vs. Geometric **SEQUENCES**	Directions: Determine whether the sequence is arithmetic, geometric, or neither. If arithmetic or geometric, write an explicit formula to find the n^{th} term, then find a_7. 1. {14, −42, 126, −378,...} 2. {1, −1, 2, −2,...} 3. {53, 44, 35, 26,...} 4. $\left\{-\frac{15}{4}, -\frac{13}{4}, -\frac{11}{4}, -\frac{9}{4}, \ldots\right\}$ 5. {...} 6. {320, 80, 20, 5,...}

Name: Date:

Topic: Class:

Main Ideas/Questions	Notes/Examples
SEQUENCE *Applications*	1. A library book that is one day late is charged a $ thereafter, it is charged an extra $0.20. Find the f days late. 2. Tucker took an 800-milligram dose of medicine for to the left shows the amount of medicine remaini after each of the first three hours. After how mar medicine reach 50 milligrams?
SERIES *Applications*	3. Stocks at a company were initiallly issued at $9.80 the shares has increased by 25% each year. If Ari year since they were issued, find her total investm 4. Evan got a job with a starting salary of $36,000, w subsequent year. How many years will it take for reach $1,000,000?
MIXED *Applications*	5. A ball is dropped from a tower. The table below ball after each of the first three bounces. Find th the 12th bounce.

Hour	Milligrams
1	800
2	680
3	578

Bounce	Height (ft)
1	50
2	45
3	40.5

Name: Date:

Topic: Class:

Main Ideas/Questions	Notes/Examples
Patterns & **CONJECTURES**	Discovery and proof are two a generally established by disco and finally proving the cor 1 = _____ 1 + 3 = _____ 1 + 3 + 5 = _____ 1 + 3 + 5 + 7 = _____ 1 + 3 + 5 + 7 + 9 = _____ Find a the firs Make written sum of 1 + 3
PROOF BY *Mathematical* **INDUCTION**	A **proof** is a clear argument that d Proving a method false simply req conjecture true requires a more fo is called **mathematical induction.** **The Principle of Mathematical Indu** Let P_n be a statement depending P_n is true for all positive integers n i • _____ is true. • If _____ is true for any positiv The main steps to prove a conject ❶ **Base Case:** Prove P_1 is true. ❷ **Inductive Hypothesis:** For any ❸ **Inductive Step:** Prove $P_k + 1$ is t
EXAMPLES	**Use induction to prove each con** 1. $1 + 3 + 5 + 7 + \ldots + (2n - 1) = n^2$

Unit 11 Test Study Guide
(Sequences & Series)

Name: _____

Date: _____

Topic 1: Recursive & Explicit Sequences

Directions: List the first five terms of each sequence.

1. $a_1 = -4; a_n = -3a_{n-1} + 7$ (for $n \geq 2$)
2. $a_1 = 70, a_2 = 30; \frac{a_{n-2} - a_{n-1}}{2}$ (for $n \geq$
3. $a_n = n^3 - (2n+1)^2$
4. $a_n = 5n + n!$

Topic 2: Arithmetic vs. Geometric Sequences

Directions: Determine whether the sequence is arithmetic, geometric, or neither. If a geometric, give the common difference or common ratio.

3. $\left\{5, \frac{5}{6}, \frac{5}{36}, \frac{5}{216}, \ldots\right\}$
4. {1, −16, 81, −256,...}
5. {−16, −9, −2, 5

Directions: Write an explicit and recursive formula to find the n^{th} term of each sequen

6. {−7, −14, −28, −56,...}
7. $\left\{\frac{3}{2}, \frac{13}{6}, \frac{17}{6}, \frac{7}{2}, \ldots\right\}$

Explicit: Explicit:

Recursive: Recursive:

8. {160, 120, 90, 67.5, ...}
9. {8, 3, −2, −7,...}

Explicit: Explicit:

Recursive: Recursive:

Name: _____

Date: _____ Per: _____

Unit 11 Test
Sequences & Series

List the first five terms of each sequence:

1. $a_1 = 80; a_n = \frac{1}{2}a_{n-1} + 8$ (for $n \geq 2$)
2. $a_1 = \frac{1}{4}, a_2 = \frac{3}{8}; a_n = \frac{a_{n-2}}{a_{n-1}}$ (for $n \geq 3$)
3. $a_n = (n-5)^2 + 2n$
4. $a_n = n - \frac{2}{n}$

Describe the sequence as arithmetic, geometric, or neither. If arithmetic or geometric, give the common difference or common ratio.

5. {3, −15, 75, −375, 1875,...}

Type of Sequence:
Common Difference/Ratio:

6. {−18, −6, 6, 18, 30,...}

Type of Sequence:
Common Difference/Ratio:

7. $\left\{256, 96, 36, \frac{27}{2}, \frac{81}{16}, \ldots\right\}$

Type of Sequence:
Common Difference/Ratio:

Write an explicit and recursive formula to find the n^{th} term of each sequence.

8. {−2880, −720, −180, −45, ...}

Explicit:
Recursive:

9. $\left\{\frac{25}{24}, \frac{7}{8}, \frac{17}{24}, \frac{13}{24}, \frac{3}{8}, \ldots\right\}$

Explicit:
Recursive: