Advanced Algebra
Chapter 11 Outline

11-1
16, 18, 20, 24, 26, 29, 30, 32, 34, 38, 41, 42, 43, 44, 46, 48, 52, 54, 58, 59 (20)

11-2
16, 18, 20, 22, 24, 27, 28, 29, 30, 31, 32, 33, 34, 36, 39, 42, 44, 45, 54, 55 (20)

11-3
13, 14, 15, 16, 21, 22, 23, 24, 28, 30, 32, 34, 36, 37, 38, 40, 42, 44, 46, 52, 53, 54, 56 (23)

11-4
16, 18, 20, 22, 24, 26, 29, 30, 31, 32, 33, 35, 36, 37, 42, 44, 47, 50, 51, 55, 57 (21)

Wksts on 11-1, 11-2, 11-3, and 11-4

Quiz on 11-1 through 11-4

11-5
14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 40, 42, 50, 51, 52, 54 (16)

11-6
13, 14, 15, 16, 17, 18, 19, 23, 28, 29, 30, 31, 32, 33, 34, 39, 42, 43, 44, 47, 49 (21)

11-7
13, 14, 15, 16, 17, 18, 19, 20, 23, 26, 27, 32, 33, 34, 35, 36, 44, 45, 46, 48 (20)

11-8
Skip???

Review P.622-626 2-48 Even, and Quiz on 11-5 and 11-6

Review P.627 1-25 (Answers attached to packet)

Chapter 11 Test

11-1 Arithmetic Sequences

Objective: Use arithmetic sequences.
Find arithmetic means.

Sequence: A sequence is a list of numbers in a particular order. Each number in a sequence is called a term.

Arithmetic Sequence: is a sequence in which each term after the first is found by adding a constant, called the difference, to the previous term.

$a_n = a_1 + (n-1)d$, where n is any positive integer.

a_n is the nth term. a_1 is the first term. d is positive or negative, depending on if increasing or decreasing.

EX 1. Find the next 4 terms: -8, -6, -4, ...

EX 2. Rent-A-Crane

Months	Cost
1	75,000
2	90,000
3	105,000
4	120,000

A. How much does it cost to rent the crane for 12 months?

B. How much for 24 months?

EX 3. Write an equation for the nth term of the sequence -8, -6, -4, ...

Arithmetic Mean : Sometimes you are given 2 terms of a sequence, but they are not successive terms. The terms between any 2 non-successive terms of an arithmetic sequence are called arithmetic means.

EX 4. Find the 3 arithmetic means between 21 and 45.

EX 5. Find 4 arithmetic means between 16 and 91.

11-2 Arithmetic Series

Objective: Find sums of arithmetic series.
Use sigma notation.

Series: An indicated sum of the terms of a sequence.

18, 22, 26, 30-Arithmetic sequence.

18+22+26+30-arithmetc series.

EX 1. Find the sum of the first 20 even numbers, beginning with 2.

EX 2. Find the sum of the first 100 positive integers.

EX 3. A radio station considered giving away $4000 everyday in August, which would equal $124,000. But they decided to increase the amount given everyday, but give the same total. They want to increase $100 a day, so how much should they give away the first day?

EX 4. Find the first 4 terms of the arithmetic sequence in which $a_1=14$, $a_n=29$, $S_n=129$.

Sigma Notation-shortens writing out series.

upper limit

$\sum$ formula

lower limit

Ex 5. 3+6+9+12+...+30.

EX 6. Evaluate $\sum_{k=3}^{10} (2k+1)$

EX 7. $\sum_{j=5}^{8} (3j-4)$

Ex 8. 6 + 13 + 20 + 27+ ... + 97

11-3 Geometric Sequences

Objective: Use geometric sequences and find geometric means.

A geometric sequence is a sequence in which every term after the first is found by multiplying the previous term by a constant r, called the common ratio.

EX 1. 324, 108, 36, 12, _____.

EX 2. 8, 20, 50, 125, _____.

nth term of a geometric sequence.

$a_n = a_1(r)^{n-1}$ n=any positive integer.

a_n=nth term | a_1=first term | r=common ratio

EX 3. Find the 6^{th} term of the geometric sequence for which $a_1=-3$, $r=-2$.

EX 4. Write an equation for the nth term of the geometric sequence 5, 10, 20, 40, ...

EX 5. Find the 7^{th} term of the geometric sequence for which $a_3=96$, $r=2$.

Geometric Means: are the missing terms between 2 non-successive terms of a geometric sequence.

EX 6. Find the 3 geometric means between 2.25 and 576.

11-4 Geometric Series

Objective: Find sums of geometric series.
Find specific terms of geometric series.

Geometric sequence vs. **Geometric series**

1, 2, 4, 8, 16 1+2+4+8+16

Sum of a geometric series

$S_n = \frac{a_1 - a_1 r^n}{1-r}$ or $S_n = \frac{a_1(1-r^n)}{1-r}$ r does not equal 1.

EX 1. $a_1=2$, $r=2$, $n=15$ Find the sum of the first 15 terms .

EX 2. Evaluate $\sum_{n=1}^{6} 5(2)^{n-1}$

EX 3. Evaluate $\sum_{n=1}^{12} 3(2)^{n-1}$

EX 4. Find the sum of a geometric series of $a_1=15{,}625$, $a_n=-5$, $r=(-1/5)$.

EX 5. Find a_1 in a geometric series for which $S_8=39{,}360$, $r=3$.

11-5 Infinite Geometric Series

Objective: Find the sum of an infinite geometric series.
Write repeating decimals as fractions.

I. Read P.599 and go over **

Infinite geometric series : goes on forever.

Partial Sum: S_n is called a partial sum for this series.

Convergent series: An infinite series that has a sum.

II. Sum of an infinite geometric series.

$S = \frac{a_1}{1-r}$ $-1<r<1$ S=sum

Terms at the end of a sequence approach 0, so there will be a sum if $-1<r<1$.

EX 1. $(1/2)+(3/8)+(9/32)+\ldots$ Find the sum, if it exists.

EX 2. $3-(3/2)+(3/)-(3/8)+\ldots$

EX 3. $(-4/3)+4-12+36-108+\ldots$

III. Infinite Series in Sigma Notation

EX 4. Evaluate $\sum_{n=1}^{\infty} 24(-1/5)^{n-1}$

EX 5. $\sum_{n=1}^{\infty} 5(1/2)^{n-1}$

IV. Write a repeating decimal as a fraction.

EX 6. .3939...

EX 7. .2525...

11-6 Recursion and Special Sequences

Objective: Recognize and use Special Sequences.
Iterate functions.

Fibonacci Sequence : Each term in the sequence is a sum of the two previous terms...found many places in nature.
1, 1, 2, 3, 5, 8, 13, ...

Recursive Formula : Each term is formulated from one or more previous terms...must be given value(s) of first term(s) so you can start sequence.

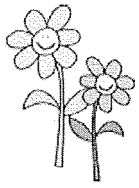
EX 1. Find the first 5 terms of the sequence if $a_1=4$, $a_{n+1}=3a_n-2$, $n\geq 1$.

EX 2. Find the first 4 terms of the sequence if $a_1=5$, $a_{n+1}=2a_n+7$, $n\geq 1$.

EX 3. Mr. Yazaki discovered that there were 225 dandelions in his garden on the first Saturday of Spring. He had time to pull out 100, but by the next Saturday, there were twice as many as he had left. Each Saturday in spring, he removed 100 dandelions, only to find that the number of remaining dandelions had doubled by the following Saturday.

a. Write a recursive formula for the number of dandelions Mr. Yazaki finds in his garden each Saturday.

b. Find the number of dandelions Mr. Yazaki would find on the fifth Saturday.



EX 4. Dr. Elliot is growing cells in lab dishes. She starts with 108 cells Monday morning and then removes 20 of these for her experiment. By Tuesday the remaining cells have multiplied by 1.5. She again removes 20. This pattern repeats each day in the week.

a. Write a recursive formula for the number of cells Dr. Elliot finds each day before she removes any.

b. Find the number of cells she will find on Friday morning.

Iteration: on top of page 608

EX 6. Find the first 3 iterates x_1, x_2, x_3 of the function $f(x)=3x-1$ for an initial value of $x_0=5$.

11-7 The Binomial Theorem

Objective: Use Pascal's Triangle to expand powers of binomials.
Use the Binomial Theorem to expand powers of binomials.

Pascal's Triangle

$(a+b)^0$ 1

$(a+b)^1$ 1 1

$(a+b)^2$ 1 2 1

$(a+b)^3$ 1 3 3 1

$(a+b)^4$ 1 4 6 4 1

$(a+b)^5$

$(a+b)^6$

$(a+b)^7$

Use Pascal's Triangle

Ex 1. Expand $(p+q)^5$.

Binomial Theorem

$(a+b)^n =$

First, what is a factorial? $5! = 5 \times 4 \times 3 \times 2 \times 1$.

Evaluate

EX 2. $\frac{8!}{3!5!}$

EX 3. Use the Binomial Theorem to expand $(2x+y)^5$.

EX 4. $(3x-y)^4$.

Chap 11 Prac test

1. arithmetic.
2. series.
3. Pascal's triangle.
4. 27, 22, 17, 12.
5. 158.
6. 1, 6, 11.
7. 2077.
8. $\frac{1}{3}$, 1.
9. -160.
10. 21, 63.
11. 203.
12. -52.
13. does not exist.
14. 651.
15. 8.
16. 1, 4, 7, 10, 13.
17. -3, -2, 2, 11, 27.
18. -2, 10, 70.
23. 8 rows, 77 red bricks.
24. 193.75 ft.
25. D.