

Foundations of Math

Chapter 5 Packet

Name:

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INTRO TO SEQUENCES

Can you find the pattern?

1) 4, 7, 10, 13, 16, 19, _____, _____, _____

2) 100, 50, 25, $\frac{25}{2}$, $\frac{25}{4}$, $\frac{25}{8}$

3) 3, 15, 21, 32, 39, 46

4) 2, 8, 32, 128, 512, 2048, _____, _____, _____

5) 5, 13, 21, 26, 33, 41

6) 150, 133, 116, 99, 82, 65, _____, _____, _____

the pattern must be _____ through the _____ sequence!

If I am given for a_4 , I am looking for the _____ term in the sequence.

If I am given for a_{1000} , I am looking for the _____ term in the sequence.

If I am given for a_n , I am looking for the _____ term in the sequence.

Define:

What if you wanted to identify those terms? What would we call them?

1) 4, 7, 10, 13, 16, 19

2) 100, 50, 25, $\frac{25}{2}$, $\frac{25}{4}$, $\frac{25}{8}$

Compare the number 12 and 13.

Describe how 12 is related to 13:

How do you go from 13 to 12?

Describe how 13 is related to 12:

How do you go from 12 to 12?

Arithmetic Recursive Sequences

Review:

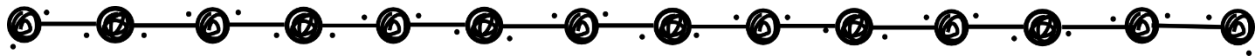
Find the pattern of the following:

1.) $-2, 2, 6, 10, 14$

2.) $85, 80, 75, 70, 65, 60$

3.) $62, 54, 46, 38, 30, 22$

4.) $12, 21, 30, 39, 48$



$-2, 2, 6, 10, 14$

$a_1 =$

$a_2 =$

$a_3 =$

$a_4 =$

$a_5 =$

How would we find the 6th term? The 7th term?

Yesterday, we said that we can refer to the **PREVIOUS TERM** as _____

Can I use that to come up with a formula to find future terms?

Rewrite the Arithmetic Recursive Formula:

Find the next 3 terms of the sequences.

#2: 85, 80, 75, 70, 65, 60

#3: 62, 54, 46, 38, 30, 22

Write the recursive formula for the following pattern:

18, 7, -4, -15, -26, -37

Name: _____

Notes #52.5

arithmetic recursive sequences - day 2

Find the following common difference of the following:

1.) 88, 82, 76, 70, 64

3.) -18, -13, -8, -3, 2

2.) 15, 11, 7, 2, -2

4.) 17, 30, 43, 56, 69

What is the general RECURSIVE FORMULA: _____

IF there is a common difference write the Recursive Formula for each sequence from #1-4 above.

1) 88, 82, 76, 70, 64

2) 15, 11, 7, 2, -2

3) -18, -13, -8, -3, 2

4) 17, 30, 43, 56, 69

IF there is a formula use it to find terms a_6 , a_7 , and a_8 of the sequence.

1) 88, 82, 76, 70, 64	2) 15, 11, 7, 2, -2	4) 17, 30, 43, 56, 69
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Write the recursive formula for the following patterns:

5.) 115, 40, -35, -75, -150

6.) -42, -23, -4, 15, 30

Name: _____

Notes #53

ARITHMETIC EXPLICIT SEQUENCES

Review: Find the common difference and write the Recursive Formula.

General Recursive Formula: _____

1.) 6, 11, 16, 21

2.) 5, 2, -1, -4

3.) 8, 12, 16, 20

What if we wanted the 100th term? Would it make sense to find a recursive formula?

Let's find another way...

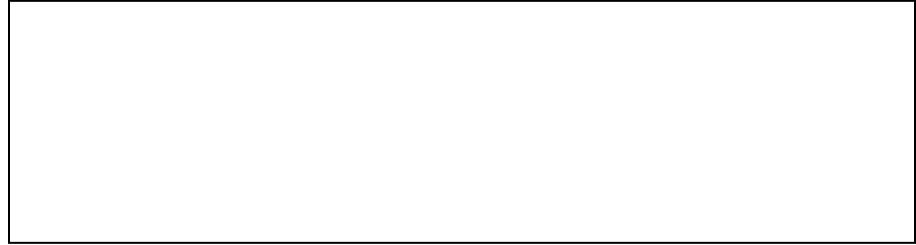
Remember: $d =$ _____

#1: 6, 11, 16, 21

What is the 100th term?

This much more useful method is called the _____.

EXPLICIT FORMULA:



Find the arithmetic sequence:

Ex 2) 3, 7, 11, 15

Ex 3) 9, 15, 21, 27

Ex 4) 5, 2, -1, -4

Ex 5) 8, 11, 14, 17

arithmetic explicit formulas- day 2

Review:

1.) What is the General Recursive Formula: _____

2.) What is the EXPLICIT FORMULA: _____

3.) Give the following sequences: write the general Recursive Formula and the Explicit Formula.

Then find a_6 , and a_{250} .a) $-22, -15, -8, -1$ b) $32, 26, 20, 14$ Arithmetic
Recursive:Arithmetic
Recursive:Arithmetic
Explicit:Arithmetic
Explicit:

EXPLICIT Formulas can be simplified too. Rewrite the Explicit Formulas from a) and b) and simplify.

a)

b)

Find the Explicit Arithmetic Sequence Formula and then find the 42nd term and the 176th term.

1.) 9, 14, 19, 24, ...

2.) -3, -23, -43, -63, ...

3.) 35, 32, 29, 26, ...

4.) 7, 12, 17, 22, ...

5.) -11, -4, 3, 10, ...

6.) 65, 15, -35, -85

↓↓ HEY YOU! YOU'RE SMART! DO THIS PROBLEM NOW!! ↓↓

**Write your own arithmetic sequence using 5 numbers and then write its explicit formula.
Find a_{123} using your formula.**

Name: _____

Notes #54

Geometric Recursive Sequences

Review:

Find the arithmetic sequence in simplified form:

1.) $-20, -5, 10, 25, \dots$

2.) $8, -3, -14, -25, \dots$

Find the following pattern:

1.) $3, 6, 12, 24, \dots$

2.) $30, 10, \frac{10}{3}, \frac{10}{9}, \dots$

When the pattern is _____, the common ratio, r , is the _____.

3.) $54, 9, \frac{3}{2}, \frac{1}{4}, \dots$

4.) $3, -12, 48, -192, \dots$

Geometric Recursive Formula:

Compare the Geometric Recursive Formula to the Arithmetic Recursive Formula:

Let's write the geometric recursive formulas and find the next four terms for #1-4 from the front.

1.) 3, 6, 12, 24

2.) 30, 10, $\frac{10}{3}$, $\frac{10}{9}$

3.) 54, 9, $\frac{3}{2}$, $\frac{1}{4}$, ...

4.) 3, -12, 48, -192, ...

Name: _____

Notes #54.5

Geometric Explicit Formula

Review:

What is the arithmetic recursive formula? _____

What is the geometric recursive formula? _____

How do you know when to use arithmetic or geometric?

Write the recursive formula for the following sequences:

1.) 9, 27, 81, 243,...

2.) 100, 25, $\frac{25}{4}$, $\frac{25}{16}$, ...

3.) 8, 2, -4, -10, ...

4.) 80, 40, 20, 10, ...

Do we always want to use the recursive formula?

a_{100} means that we have to find _____ terms before we can find the 100th.

How could we find higher terms?

With the _____!!



Write the Geometric Explicit Rule for each of the following and then find a_{11} .

1.) 9, 27, 81, 243,...

3.) 6400, 1600, 400, 100, ...

2.) 56, 28, 14, 7,

4.) 10, 50, 250, ...

Sequences Review

1.) What is the Recursive Formula for Arithmetic Sequences? _____

2.) What is the Explicit Formula for Arithmetic Sequences? _____

3.) What is the Recursive Formula for Geometric Sequences? _____

4.) What is the Explicit Formula for Geometric Sequences? _____

5.) Write the Recursive **AND** Explicit formula for the Sequences below:

a.) 3, 12, 48, 192, ...

b.) 8, 3, -2, -7, ...

R:

R:

E:

E:

c.) 80, 20, 5, $\frac{5}{4}$, ...

d.) 600, 150, $\frac{75}{2}$, $\frac{75}{8}$, ...

R:

R:

E:

E:

Write the Explicit Formula for the sequences below. Then, use the formula to find the indicated term in the sequence.

1.) 1000, 200, 40, 8, ...

(Find a_9)

2.) 6, 18, 54, 216, ...

(Find a_{15})

3.) 500, 250, 125, $\frac{125}{2}$, ...

(Find a_{15})

4.) $\frac{1}{8}, \frac{1}{2}, 2, 8, \dots$

(Find a_{15})

5.) 3, 10, 17, 24,

(Find a_{15})

6.) 18, 6, $2, \frac{2}{3}, \dots$

(Find a_{10})

SIMPLE INTEREST

Simple Interest: $I = Prt$

- I _____
- P _____
- r _____
- t _____

We need to convert ALL _____ to _____.
To do this you have to divide the _____ by _____.

Convert 8% to a decimal:

Convert 25% to a decimal:

1. Jion needs \$200 to buy a really cool pair of overpriced shoes. He borrows the money from a bank that charges 4% simple interest per year. How much will he owe if he waits 1 year to pay back the loan? If he waits 3 years?

2. Madelyn has \$500 in her savings account. The bank offers a simple interest of 7.2%. She wants to earn \$300 in interest. How long does she have to leave her money in this account?

Compound Interest:

Review: Nico has \$500 to invest. The bank offers a simple interest rate of 6%. How much money will Nico have after 3 years?

Simple interest takes interest ONLY on the original _____

Compound interest takes interest of the original principal **and** all the interest that was previously earned.

Most banks compound interest more than once a year.

Annually = _____ time per year

Quarterly = _____ times per year

Semi-annually = _____ times per year

Monthly = _____ times per year

Weekly = _____ times per year

- When interest is compounded a certain number of times per year (n) such as monthly or quarterly, use the formula, where:

Compounding Interest
(n) Times a year

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

A = _____ r = _____

P = _____ n = _____

t = _____

- Timone needs \$200 to start a snow cone stand for this hot summer. He borrows the money from a bank that charges 3% compounded interest per year. How much will he owe if he waits 1 year to pay back the loan? If he waits 2 years? If he waits 5 years?

A =

P =

r =

n =

t =

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

2. You borrowed \$59,000 for 2 years at 11% which was compounded annually. What total will you pay back?

A =

P =

r =

n =

t =

3. Your 3 year investment of \$20,000 received 5.2% interest compounded semi annually. What is your total return?

A =

P =

r =

n =

t =

4. After 15 years of 3.9% interest compounded monthly, an account has 102,393.44. What was the original deposit amount?

A =

P =

r =

n =

t =

Exponential Growth

Exponential growth is a growth whose rate becomes more and more _____ in proportion to the growing total number or size.

We use this formula: $y = a \cdot (1 + r)^x$

y= _____ r= _____ *decimal only!

a= _____ x= _____

- 1) In 2000, Florida's population was about 16 million. Since 2000, the state's population has grown about 2% each year.
 - a.) Write an equation to model Florida's population growth.

y =

a =

r =

x =

- b.) What was Florida's population in 2014?

- 2) Suppose your parents deposited \$1500 in an account paying 4% interest compounded annually. Find the balance after 18 years.

y =

a =

r =

x =

- 3) The current population of the Brentwood Student Center is 2,000. The enrollment at the center increases at a rate of 4% each year. To the nearest whole number, what will the student population be in 3 years?

y =

a =

r =

x =

- 4) A position at a local company has a starting salary of \$15,000. The salary is expected to increase by 5% each year. What will the salary be after 5 years?

y =

a =

r =

x =

- 5) The projected worth (in millions of dollars) of a large company is modeled by the equation $y = 246(1.11)^x$. The variable x represents the number of years since 2008. What is the projected annual percent of growth, and what should the company be worth in 2018?

y =

a =

r =

x =

EXPONENTIAL decay

Review:

- 1.) In 1990, the population of Florida was 12 million. The population grew by 2% each year. Predict the population in 2018. Round the population to the nearest whole number.

Exponential decay relates to a rate that DECREASES more and more rapidly in proportion to the initial number or size.

We use this formula: $y = a \cdot (1 - r)^x$

y= _____

r= _____ *decimal only!

a= _____

x= _____

- 1) Since 1980 the number of gallons of whole milk each person in the US drinks each year has decreased by 4.1%. In 1980 each person drank an average of 16.5 gallons of whole milk per year.
- a.) Write an equation to model the gallons of whole milk drunk per person.

y =

a =

r =

x =

- b.) Use the equation to approximate the number of gallons of whole milk drunk per person in 2000.

- 2) In 1990, the population of Buffalo, NY was about 328,000 people. Since then the population has decreased by about 1.1% per year. Predict the population in 2018.

y =

a =

r =

x =

- 3) Samantha plans to purchase a car that depreciates at a rate of 14% per year. The initial cost of the car is \$21,000. What is the value, v , of the car after 3 years?

y =

a =

r =

x =

- 4) Robert's print shop purchased a new printer for \$35,000. Each year it depreciates at a rate of 5%. What will the approximate value be at the end of the fourth year?

y =

a =

r =

x =

- 5) If the initial population of a city was 2,000,000 in 2014 and the population is decreasing at a rate of 3%, what is the estimated population of the city in 2027?

y =

a =

r =

x =

EXPONENTIAL GROWTH/DECAY REVIEW

Exponential Growth	Exponential Decay
<i>Formula:</i> <i>Key Words:</i>	<i>Formula:</i> <i>Key Words:</i>

- 1) Kayla invested \$1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the nearest cent, at the end of 5 years.

y =

a =

r =

x =

Growth or Decay? Why?

- 2) Jaylen plans to purchase a car that depreciates at a rate of 14% per year. The initial cost of the car is \$21,000. How much will his car be worth in 6 years?

Growth or Decay? Why?

- 3) Given the equation $A = 21000(.88)^t$

a. Is it a model of exponential growth or exponential decay? Explain how you know.

b. What is the rate (percent) of change per time period?

- 4) The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.6)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.

Growth or Decay? Why?

- 5) The population of Henderson City was 104,000 in 1994, and is growing at an annual rate of 4.6%. If this growth rate continues, what will the approximate population of Henderson City be in the year 2018?

Growth or Decay? Why?

- 6) This table shows information about the population of two countries in South America.

Country	Population (est., mid-1994)	Annual Population Growth Rate
Chile	14,000,000	1.7%
Ecuador	10,782,000	2.5%

Will the population of Ecuador surpass the population of Chile by mid-1999?

Chile:

Ecuador:

Chapter 5 Test Review Part 1

Arithmetic Sequence Formulas:

Geometric Sequence Formulas:

Determine if the following sequences are geometric, arithmetic, or neither. Then, state the common difference or the common ratio.

1.) 12, 4, -4, -12, ...

2.) 2, -12, 72, -432, ...

3.) 3, 6, 12, 18, 36, ...

Given the following sequences write the recursive equation:

4.) 12, 4, -4, -12, ...

5.) 2, -12, 72, -432, ...

6.) 3, 6, 12, 18, 36, ...

7.) 225, 75, 25, $\frac{25}{3}$, ...

8.) -75, -61, -47, -33, ...

9.) $1, \frac{3}{4}, \frac{1}{2}, \frac{1}{4}, \dots$

For questions 10-15, given the following sequences

- a. Write the recursive formula
- b. Write the rule that represents the sequence
- c. Find the 10th term in the sequence

10.) 12, 4, -4, -12, ...

11.) 2, -12, 72, -432, ...

12.) 3, 6, 12, 18, 36, ...

13.) 225, 75, 25, $\frac{25}{3}$, ...

14.) -75, -61, -47, -33, ...

15.) 480, -240, 120, -60 ...

Name: _____

Notes #60.5

CHAPTER 5 TEST REVIEW PART 2

Exponential Growth Formula:

Exponential Decay Formula:

Compound interest formula:

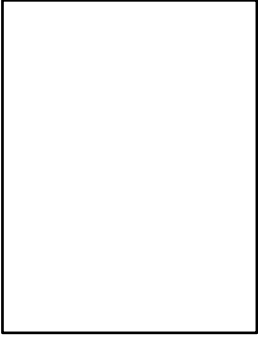
Simple interest formula:

- 1) The population in Buffalo was 375,000 in 1985. The population declines at a rate of 1.4% each year. Find the population in 2017 to the nearest person.

- 2) The value of a diamond ring appreciates at a rate of 12% each year. Find the value of the ring after 7 years if the ring was originally \$7,000.

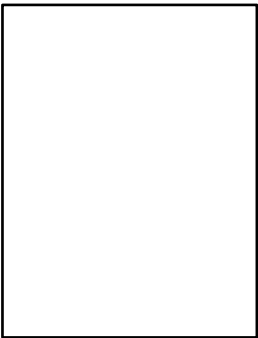
- 3) If Zyera earned \$645.12 in interest on an investment at 4.2% interest after 3 years. What was her initial investment?

- 4) Destiny borrowed \$10,000 from her bank to purchase a vehicle. If the bank charges 5.8% interest compounded monthly, how much will she owe the bank if it takes her 7 years to pay off the loan?



- b. How much interest does she have to pay?

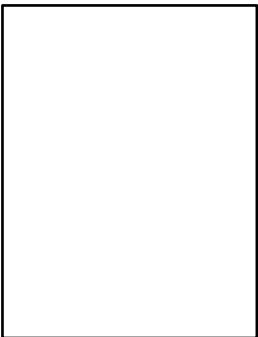
- 5) Louis invested \$2,500.00 in the bank that has 5.3% interest compounded annually. How much will he have in 10 years?



- b. How much interest did he earn?

- 6) A new car that costed \$40,000 depreciates at a rate of 15% per year.

- a. Write a rule that models the value of the car.



- b. Find the value of the car after 5 years.

1. You are going to invest \$2,500 into a savings account with 4.8% interest compounded monthly.
 - a. How much money will there be in the account after 6 years?

- b. How much interest was earned in those 6 years?

2. Find the next 3 terms of the sequence:

2, 5, 8, 11 ...

3. Write the Explicit rule and find the 30th term:

48, 44, 40, 36 ...

4. A Video Game console worth \$500 depreciates at a rate of 15% per year. How much will the console be worth in 3 years?

5. Tell whether the sequence is arithmetic, geometric or neither.

a. 0, 1, 2, 3 ... _____

b. $-10, -5, -\frac{5}{2}, -\frac{5}{4}, \dots$ _____

c. $y = 19x + 12$ _____

d. $y = 7 \cdot 5^x$ _____

6. Find the common ratio, the recursive formula, the explicit formula, and the 6th term of the given sequence. Label each part.

1000, 100, 10, 1 ...

Name: _____

Homework 58

1.) A diamond ring was purchased twenty years ago for \$500. The value of the ring increased by 8% each year. What is the value of the ring today?

2.) In 1995 the tuition at a private college was \$15000. Tuition increases by 7.2% each year. Estimate the tuition in 2015.

1. If you invest \$2000.00 in an account with an interest rate of 5% compounded annually, how much money will there be in your account after 30 years?

2. If you invest \$1,500.00 in an account that has an interest rate of 1.5% compounded monthly, how much will be in the account after 7 years? (Assume the account remains untouched).

Name: _____

Homework 56

1) Ms. Rich borrows \$1,500 from the bank to buy Ms. Cole a gift. The bank charged Ms. Rich 10% simple interest per year. How much **interest** will Ms. Rich owe to the bank if she waits 3 years to pay back the loan?

2) How much money will Ms. Rich owe the bank in **total** if she waits 3 years to pay back the loan?

Given the following sequences write the **Recursive Formula**:

1.) 4, 12, 36, 108, ...

Arithmetic Recursive Formula: $a_n = a_{n-1} + d$

Geometric Recursive Formula: $a_n = a_{n-1} \cdot r$

2.) 200, 25, $\frac{25}{8}$, $\frac{25}{64}$, ...

3.) 55, 61, 67, 73, ...

Given the following sequences in questions 4-5 write the **Explicit Formula** and **find a_{10}** .

4.) 4, 12, 36, 108, ...

Arithmetic Explicit Formula: $a_n = a_1 + d(n - 1)$

Geometric Explicit Formula: $a_n = a_1 \cdot r^{n-1}$

5.) 55, 61, 67, 73, ...

Name: _____

Homework 54

Write the common ratio (rule) for each sequence:

1.) 4, 12, 36, 108, ...

3.) $-8, 32, -128, 512, \dots$

2.) $18, 9, \frac{9}{2}, \frac{9}{4}, \dots$

4.) $36, 6, 1, \frac{1}{6}, \dots$

Given the sequence rule, find the first, fourth and eighth term of the sequence.

5.) $a_n = 2 \cdot 3^{n-1}$

Given the first term and the common difference of an arithmetic sequence find the explicit formula.

1) $a_1 = 28, d = 10$

2) $a_1 = -38, d = -100$

Given the sequence find the explicit formula. Then find the 75th term of each.

3.) $-34, -64, -94, -124, \dots$

4.) $-4, 4, 12, 20, \dots$

5.) $15, 5, -5, -15, \dots$

6.) $31, 45, 59, 73, \dots$

Name: _____

Homework #52

Find the Common Difference:

1.) $-94, -80, -66, -52, -38$

2.) $14, 6, -2, -10, -18$

3.) $12, 8, 4, 0, -4$

4.) $-6, -9, -12, -18, -21$

IF there is a common difference from #1-4 above write the recursive formula for the sequence below and find the next two terms:

1.

2.

3.

4.

Name: _____

Homework #51

IF there is a pattern, identify the pattern.

1.) 2, -10, 50, -250, 1250, -6250

2.) 2, 8, 14, 17, 22, 28

3.) 4, 11, 18, 25, 32, 39

4.) 117, 39, 13, $\frac{13}{3}$, $\frac{13}{9}$

Find the additional terms that would complete the pattern:

5.) 54, 46, 38, 30, 22 Find: a_7 , and a_{11}

6.) 7, 21, 63, 189, 567 Find: a_7 , and a_{10}

