Date: _____

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) recognize the characteristics of geometric sequences.
b) write the general term.

Last day's work: pp. 424-425 #1 – 13, 15, 16

2a, 6b, 16, 12

7c

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2. State the general term and the recursive formula for each arithmetic sequence.

a) 28, 42, 56, ...

$t_n = a + (n-1)d$

$a = 28$

$d = 14$

$t_n = 28 + (n-1)(14)$

$= 28 + 14n - 14$

$= 14n + 14$

b) 53, 49, 45, ...

$a = 53, d = -4$

$t_1 = 53$

$t_n = t_{n-1} - 4$

$n \in \mathbb{N}, n > 1$

c) $-1, -111, -221, \ldots$

$t_n = a + (n-1)d$

$= 53 + (n-1)(-4)$

$= 53 - 4n + 4$

$= 57 - 4n$

$or = -4n + 57$

$t_1 = 28,$

$t_n = t_{n-1} + 14, n \in \mathbb{N}, n > 1$

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6. Determine the recursive formula and the general term for the arithmetic sequence in which

a) the first term is 19 and consecutive terms increase by 8

b) $t_1 = 4$ and consecutive terms decrease by 5

c) the first term is 21 and the second term is 26

d) $t_4 = 35$ and consecutive terms decrease by 12

b) a, seq.

$t_1 = 4$

$a = 4$

$d = -5$

$t_n = a + (n-1)d$

$= 4 + (n-1)(-5)$

$= 4 - 5n + 5$

$= -5n + 9$

$t_1 = 4$

$t_n = t_{n-1} - 5, n \in \mathbb{N}, n > 1$

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7. i) Determine whether each recursive formula defines an arithmetic sequence, where $n \in \mathbf{N}$ and $n > 1$.

ii) If the sequence is arithmetic, state the first five terms and the common difference.

a) $t_1 = 13, t_n = 14 + t_{n-1}$

b) $t_1 = 5, t_n = 3t_{n-1}$

c) $t_1 = 4, t_n = t_{n-1} + n - 1$

d) $t_1 = 1, t_n = 2t_{n-1} - n + 2$

$t_2 = t_1 + (2) - 1$ $\quad t_3 = t_2 + (3) - 1$

$= 4 + 2 - 1$ $\quad = 5 + 3 - 1$

$= 5$ $\quad = 7$

$\therefore$ 4, 5, 7 are the 1ST 3 terms.

$\therefore$ this is NOT an arithmetic.

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12. Phil invests $5000 in a high-interest savings account and earns 3.5% simple interest per year. How long will he have to leave his money in the account if he wants to have $7800?

$I = Prt$ Simple Interest formula.

$= 5000(0.035)(1)$

$= 175$

$\therefore$ as a seq.: $5000, 5175, 5350, \ldots$

$t_n = a + (n-1)d$ $\therefore a = 5000$ $d = 175$ $t_n = 7800$

$t_n = 5000 + (n-1)(175)$

$= 5000 + 175n - 175$

$7800 = 175n + 4825$

$7800 - 4825 = 175n$

$\frac{2975}{175} = n$

$n = 17$ $\therefore$ Phil must wait 16 years. b/c 5175 is the end of the FIRST year, and so on.

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13. Determine the number of terms in each arithmetic sequence.

a) 7, 9, 11, 13, ... , 63

b) −20, −25, −30, −35, ... , −205

c) 31, 27, 23, 19, ... , −25

d) 9, 16, 23, 30, ... , 100

e) −33, −26, −19, −12, ... , 86

f) 28, 19, 10, 1, ... , −44

If short on time, reveal #13 a

a) $a = 7 \quad d = 2$

$t_n = a + (n-1)d$

$= 7 + (n-1)(2)$

$= 7 + 2n - 2$

$63 = 2n + 5$

$63 - 5 = 2n$

$58 = 2n$

$n = 29$

∴ there are 29 terms in the sequence.

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15. The 50th term of an arithmetic sequence is 238 and the 93rd term is 539. State the general term.

If short on time, reveal #15

a. seq.

$t_{50} = a + 49d$ (238)

$t_{93} = a + 92d$ (539)

$a + 49d = 238$

$-a - 92d = -539$

$-43d = -301$

$d = 7$

$\therefore a + 49(7) = 238$

$a + 343 = 238$

$a = 238 - 343$

$= -105$

$\therefore t_n = -105 + (n-1)(7)$

$= -105 + 7n - 7$

$= 7n - 112$

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16. Two terms of an arithmetic sequence are 20 and 50.

C a) Create three different arithmetic sequences given these terms. Each of the three sequences should have a different first term and a different common difference.

b) How are the common differences related to the terms 20 and 50?

i) $a = 20, d = 30$

$\therefore t_1 = 20, t_2 = 50, t_3 = 80$

ii) $d = 10$

$t_1 = 0$

$t_2 = 10$

$t_3 = 20$

$t_4 = 30$

$t_5 = 40$

$t_6 = 50$

iii) $d = 15$

$t_1 = 5$

$t_2 = 20$

$t_3 = 35$

$t_4 = 50$

7.2 Geometric Sequences

Date: May 27/19

Geometric Sequence:
A sequence that has a common **ratio** between the terms.
(ie. you multiply by some number to move from one term to the next).

Ex.1 Consider the following sequence: 2, 6, 18, 54, ...

In a geometric sequence, the first term is ***a*** and the common **ratio** is ***r***
the terms are $a, ar, ar^2, ar^3, \ldots$

$t_1\ t_2\ t_3\ t_4$

often only 3 terms given

The general term is $t_n = ar^{n-1}$

The recursive formula is $t_1 = a, t_n = rt_{n-1}$, n **N**, n > 1

a) What is the 11th term?

gsq
$a=2$
$r=3$
$t_n=ar^{n-1}$
$n=11$

$t_{11}=2(3)^{11-1}$
$=2(3)^{10}$
$=118\,098$

$r_1=\frac{t_2}{t_1}$ $r_2=\frac{t_3}{t_2}$
$=\frac{6}{2}$ $=\frac{18}{6}$
$=3$ $=3$

t_{11}=118 098

Ex.2 The fifth term of a geometric sequence is 48, and the 13th term is 12288. Determine the first 4 terms.

g.seq

$a=$

$r=$

$t_n = ar^{n-1}$

$t_5 = 48$

$n=5$

$t_5 = ar^4$

$48 = ar^4$

$t_{13} = 12288$

$n=13$

$12288 = ar^{12}$

$\left(\frac{t_{13}}{t_5}\right) \quad \frac{ar^{12}}{ar^4} = \frac{12288}{48}$

$r^{12-4} = 256$

$r^8 = 256$

$r = \sqrt[8]{256}$

$= 2$

Sub $r=2$

$48 = ar^4$

$48 = a(2)^4$

$48 = a(16)$

$a = 3$

$\therefore 3, 6, 12, 24$ are the first 4 terms.

$a = 3, r = 2$

$t_1 = 3,\ t_2 = 6,\ t_3 = 12,\ t_4 = 24$

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 424-425 #1 – 13, 15, 16

Study for the Unit 6 Summative!

Today's Homework Practice includes:

p. 426 A – H

pp. 430-432 #1 – 3, 5 – 11 [18-20]