

Honors.

check w/ A.

Unit 7 Recursion

Name: Swilley

Arithmetic and Geometric Sequences

Date: _____

Write the general arithmetic sequences where t_1 is the first term and d is the common difference.

$$t_n = t_1 + (n-1)d$$

Write the general geometric sequence t_1 is the first term and r is the common ratio.

$$t_n = t_1(r^{n-1})$$

For each sequence if the first term is t_1

- Tell whether the sequence is arithmetic, geometric, or neither
- Write the next two terms, in most cases t_4 and t_5
- Find t_{100}
- Find the number of the last term listed in the sequence
- Find the sum of the first 20 terms

1. 27, 31, 35, ..., 783 Arithmetic $d=4$

$$t_4 = 39$$

$$t_5 = 43$$

$$t_{100} = 27 + (99)(4)$$

$$= 423$$

$$783 = 27 + (n-1)(4)$$

$$756 = 4(n-1)$$

$$189 = n-1$$

$$190 = n$$

$$t_{190} = 783$$

$$S_{20} = \frac{(27+103)(20)}{2}$$

$$= 1300$$

$$t_{20} = 27 + 19(4) = 103$$

2. 100, 90, 81, ..., 3.090315438

Geom $d = .9$

$$t_4 = 72.9$$

$$t_5 = 65.61$$

$$t_{100} = 100(.9^{99}) = .0029512665$$

graphically

$$3.090315438 = 100(.9^{n-1})$$

$$.03090315438 = .9^{n-1}$$

$$33 = n-1$$

$$n = 34$$

$$S_{20} = \frac{100(.9^{20}-1)}{.9-1}$$

$$S_{20} = 878.4233454$$

3. 58, 45, 32, ..., -579 arith $d = -13$

$$t_4 = 19$$

$$t_5 = 6$$

$$t_{100} = 58 + 99(-13)$$

$$= -1229$$

$$-579 = 58 + (n-1)(-13)$$

$$49 = n-1$$

$$n = 50$$

$$t_{50} = -579$$

$$t_{20} = 58 + 19(-13)$$

$$= -189$$

$$S_{20} = \frac{(58 + -189)(20)}{2}$$

$$S_{20} = -1310$$

4. 54.8, 137, 342.5, ..., 3266334.534 Geom $r=2.5$

$t_4 = 856.25$

$3266334.534 = 54.8(2.5^{n-1})$

$t_5 = 2140.625$

graph. $n=13$

$S_{20} = \frac{54.8(2.5^{20} - 1)}{2.5 - 1}$

$t_{100} = 54.8(2.5^{99})$
 $1.364084949 \times 10^{14}$

$S_{20} = 3322,687,274$

$n=1 \quad 2 \geq 4$

5. 0, 3, 8, 15, 24, ..., 675 Neither

$t_n = n^2 - 1$

Next Terms = 35 + 48

$S_{20} = 2850$ No shortcut
 so add Terms.

$t_{100} = 100^2 - 1 = 9999$

$0+3+8+15+24+35+48+63+80+99$
 $+120+143+168+195+224+255+288+323$
 $+360+399$

$t_{26} = 675$

6. 500, -300, 180, ..., -1.81398528 Geom $r = -.6$

$t_4 = -108$

$-1.81398528 = 500(-.6)^{n-1}$

$t_5 = 64.8$

$S_{20} = \frac{500((-0.6)^{20} - 1)}{(-0.6 - 1)}$

$n=12$

$t_{100} = 500(-.6)^{99}$
 $= -5.4443219 \times 10^{-20}$

$S_{20} = 312.4885745$

7. Insert three numbers between 47 and 84 so that the five numbers form an arithmetic sequence.

47 56.25 65.5 74.75 84

$\frac{84-47}{4} = d = 9.25$

8. Insert three numbers between 5 and 750.3125 so that the five numbers form a geometric sequence. Is there only one possible set of numbers that meet these conditions? No.

5 17.5 61.25 214.375 750.3125
 $r=3.5$

$\sqrt[4]{\frac{750.3125}{5}} = \sqrt[4]{150.0625} = \pm 3.5 = r$

OR -17.5 61.25 -214.375
 $r = -3.5$