PreCalculus
Quest 9 Review

an^2+bn+c

Name Key
Date________ **Block** ________

Find the following:

a.) Identify whether the sequence is arithmetic, geometric, or neither.
b.) If arithmetic or geometric, identify the common difference or common ratio.
c.) If arithmetic or geometric, write a recursive rule.
d.) Write an explicit rule.
e.) Find a_{13}.

1.) 5, 2 -1, -4, -7, ...

-3 -3 -3 -3

a) arithmetic
b) cd: -3
c) $a_n = a_{n-1} - 3$
d) $a_n = 5 - 3(n-1)$
e) $a_{13} = -31$

2.) $1, \frac{1}{8}, \frac{1}{27}, \frac{1}{64}, \frac{1}{125}, ...$ Neither

$a_n = \frac{1}{n^3}$

$a_{13} = \frac{1}{13^3} = \frac{1}{2197}$

3.) 5, -15, 45, -135, ...

a) geometric
b) cr: -3
c) $a_n = -3(a_{n-1})$
d) $a_n = 5(-3)^{n-1}$
e) $a_{13} = 2657205$

4.) 1, 8, 17, 28, 41, ...

+7 +9 +11 +13

a) Quadratic - Neither

$a+b+c=1$
$4a+2b+c=8$
$9a+3b+c=17$

$a_n = n^2+4n-4$

$a_{13} = 217$

4.) Find the sum of the first 55 terms for the series: $4+11+18+25+...$

$S = \frac{55(4+7(55)-3)}{2}$

$a_n = 4+7(n-1)$
$a_n = 4+7n-7$
$a_n = 7n-3$

$S_{55} = 10615$

5.) For the given series, $105+111+117+...$, find which term gives the sum of 6336.

+6

$6336 = \frac{n(105+6n+99)}{2}$

$12672 = 204n + 6n^2$

$\boxed{6n^2+204n-12672=0}$

$n = 32$

$a_n = 105+6(n-1)$
$a_n = 105+6n-6$
$\boxed{a_n = 6n+99}$

6.) Find "n" if you know that $S_n = 59046$ in the series $6+18+54+162+\ldots$ $a_n = 6(3)^{n-1}$

$59046 = \frac{6(1-3^n)}{1-3}$

$-118092 = 6(1-3^n)$

$-19682 = 1-3^n$

$-1 \quad -1$

$-19683 = -3^n$

$-19683 = 3^n$

$\log_3 19683 = n$

$n=9$

7.) Find: $\sum_{n=1}^{8}(-2n^2+7n)$

$5 + 6 + 3 + -4 + -15 + -30 + -49 + -72$

1 2 3 4 5 6 7

-156

8.) Write the following in summation notation: $5+10+15+20+\ldots+60$.

$\sum_{i=1}^{12} 5i$

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

$5+5n-5$

$a_n = 5n$

9.) Determine if the sequence converges or diverges. If converges, state the limit.

a.) $\{2n-3\}$ Diverges

b.) $\left\{\frac{5n^2+1}{2n^2-3}\right\}$ Converges $\frac{5}{2}$

c.) $\{(3)^n\}$ Diverges

d.) $a_n = \left\{\frac{9n}{14n^2}\right\}$ Converges 0

10.) A runner begins training by running 3 miles one week. The second week she runs a total of 5 miles. The third week she runs 7 miles. Assume this pattern continues. $a_n = 3+2(n-1)$

a.) How far will she run in the tenth week?

21 miles

b.) At the end of the tenth week, what will be the total distance she has run since she started training?

$S_{10} = \frac{10(3+21)}{2} = 120$ miles

c.) Express the total distance with summation notation.

$\sum_{i=1}^{10} 2n+1$

11.) Use patterns in Pascal's Triangle to complete the next row.

1	11	55	165	330	462	462	330	165	55	11	1

1 12 66 220 495 792 924 792 495 220 66 12 1

12.) Evaluate the expression by hand (using the formula – show all work): $\binom{18}{7}$

$$\frac{18!}{7!\,11!} = 31824$$

13.) Find the coefficient of x^3y^2 term in the expansion of $(2x-y)^5$.

1 5 10 10 5 1

x^5 x^4 x^3

$10a^3b^2$

$10(2x)^3(-y)^2 = 80x^3y^2$

14.) Fully expand and simplify the binomial: $(2x+y)^6$.

1 6 15 20 15 6 1

a^6 a^5b a^4b^2 a^3b^3 a^2b^4 ab^5 b^6

$1(2x)^6 + 6(2x)^5(y) + 15(2x)^4(y^2) + 20(2x)^3y^3 + 15(2x)^2y^4 + 6(2x)y^5 + y^6$

$\boxed{64x^6 + 192x^5y + 240x^4y^2 + 160x^3y^3 + 60x^2y^4 + 12xy^5 + y^6}$

15.) Find the fifth term (simplified) in: $(3x-2y)^7$.

1 7 21 35 35 21 7 1

a^3b^4

$35(3x)^3(-2y)^4$

$35\cdot 27x^3\cdot 16y^4 = 15120\,x^3y^4$

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