Name Key

Period ____ Date ____

Chapter 11 Review

Write the first four terms of the sequence whose general term is given.

1) $a_n = 3(3n - 2)$ $a_1 = 3(3-2) = 3$ | $a_2 = 3(6-2) = 3(4) = 12$ | $a_3 = 3(9-2) = 3(7) = 21$ | $a_4 = 3(12-2) = 3(10) = 30$ 1) D

A) 3, 6, 9, 12 B) 1, 4, 7, 10 C) −6, 3, 12, 21 D) 3, 12, 21, 30

2) $a_n = 2^n$ $a_1 = 2^1 = 2$ | $a_2 = 2^2 = 4$ | $a_3 = 2^3 = 8$ | $a_4 = 2^4 = 16$ 2) B

A) 4, 8, 16, 32 B) 2, 4, 8, 16 C) 1, 2, 4, 8 D) 1, 4, 9, 16

Write the first four terms of the sequence defined by the recursion formula.

3) $a_1 = 4$ and $a_n = 4a_{n-1} - 4$ for $n \geq 2$ $a_1 = 4$ | $a_2 = 4a_1 - 4 = 4(4) - 4 = 12$ | $a_3 = 4a_2 - 4 = 4(12) - 4 = 44$ | $a_4 = 4a_3 - 4 = 4(44) - 4 = 176 - 4 = 172$ 3) A

A) 4, 12, 44, 172 B) 4, 20, 84, 340 C) 4, 16, 64, 256 D) 4, 12, 60, 252

4) $a_1 = -6$ and $a_n = -3a_{n-1}$ for $n \geq 2$ $a_1 = -6$ | $a_2 = -3a_1 = -3(-6) = 18$ | $a_3 = -3a_2 = -3(18) = -54$ | $a_4 = -3a_3 = -3(-54) = 162$ 4) C

A) 6, −18, 54, −162 B) −6, 20, −56, 164

C) −6, 18, −54, 162 D) −6, −18, −54, −162

Write the first four terms of the sequence whose general term is given.

5) $a_n = \frac{n^5}{(n-1)!}$ $a_1 = \frac{1^5}{(1-1)!} = 1$ | $a_2 = \frac{2^5}{(2-1)!} = 32$ | $a_3 = \frac{3^5}{(3-1)!} = \frac{243}{2}$ | $a_4 = \frac{4^5}{(4-1)!} = \frac{1024}{6} = \frac{512}{3}$ 5) D

A) $\frac{1}{0}, \frac{32}{0}, \frac{243}{2}, \frac{512}{3}$ B) $5, 10, \frac{15}{2}, \frac{10}{3}$

C) $\frac{5}{0}, \frac{10}{0}, \frac{15}{2}, \frac{10}{3}$ D) $1, 32, \frac{243}{2}, \frac{512}{3}$

6) $a_n = 2(n+2)!$ $a_1 = 2(1+2)! = 2(6) = 12$ | $a_2 = 2(2+2)! = 2(4)! = 2(24) = 48$ | $a_3 = 2(3+2)! = 2(5!) = 240$ | $a_4 = 2(6)! = 1440$ 6) C

A) 4, 24, 144, 960 B) 12, 96, 720, 5760 C) 12, 48, 240, 1440 D) 4, 12, 48, 240

Evaluate the factorial expression.

7) $\frac{10!}{8!}$ $\frac{10 \cdot 9 \cdot 8!}{8!} = 90$ 7) B

A) 10 B) 90 C) $\frac{10}{8}$ D) 2!

8) $\frac{(n+10)!}{n+10}$ $\frac{(n+10)(n+9)!}{(n+10)} = (n+9)!$ 8) A

A) (n + 9)! B) 1 C) n + 10! D) 10!

Find the indicated sum.

9) $\sum_{i=1}^{4} (3i - 2)$ $[3(1)-2] + [3(2)-2] + [3(3)-2] + [3(4)-2]$ 9) D

$= 1 + 4 + 7 + 10 = 22$

A) 10 B) 21 C) 13 D) 22

10) $\sum_{k=1}^{4} (-1)^k(k + 7)$ $[(-1)^1(1+7)] + [(-1)^2(2+7)] + [(-1)^3(3+7)] + [(-1)^4(4+7)]$ 10) B

$= -8 + 9 - 10 + 11$

A) -38 B) 2 C) 38 D) 30

Use the formula for the general term (the nth term) of an arithmetic sequence to find the indicated term of the sequence with the given first term, a_1, and common difference, d.

11) Find a_8 when $a_1 = 3$, $d = -2$. $a_n = a_1 + (n-1)d$ $a_8 = 3 + (8-1)(-2) = 3 + (7)(-2)$ $3 - 14 = -11$ 11) B

A) -13 B) -11 C) 19 D) 17

12) Find a_{33} when $a_1 = 3$, $d = -1$. $a_n = a_1 + (n-1)d$ $a_{33} = 3 + (33-1)(-1)$ $3 + (32)(-1)$ $3 - 32 = -29$ 12) C

A) 36 B) 35 C) -29 D) -30

Find the indicated sum.

13) Find the sum of the first 40 terms of the arithmetic sequence: 17, 24, 31, 38, ... 13) C

$d = 7$ $S_n = \frac{n}{2}(a_1 + a_n)$ $n = 40$ $a_1 = 17$ $a_{40} = 17 + (40-1)(7)$ $= 17 + 39(7)$ $= 6140$

A) 6147 B) 6280 C) 6140 D) 297

14) Find the sum of the first 70 terms of the arithmetic sequence: 1, –7, –15, –23, . . . 14) A

$S_{70} = \frac{70}{2}(1 - 551) = -19250$ $n = 70$ $a_1 = 1$ $d = -8$ $a_{70} = 1 + (70-1)(-8) = 1 + (69)(-8) = -551$

A) –19,250 B) –559 C) –19,241 D) –19,530

Use the formula for the sum of the first n terms of an arithmetic sequence to find the indicated sum.

15) $\sum_{i=1}^{36} (5i + 8)$ $i=1: 5(1)+8=13$, $i=2: 5(2)+8=18$, $i=3: 5(3)+8=23$ $d = 5$ $a_1 = 13$ $n = 36$ 15) C

$a_{36} = 13 + (36-1)(5) = 188$ $S_{36} = \frac{36}{2}(13 + 188) = 3618$

A) 3906 B) 3528 C) 3618 D) 3780

16) $\sum_{i=1}^{29} (-6i + 7)$ $i=1: -6(1)+7=1$, $i=2: -6(2)+7=-5$, $i=3: -6(3)+7=-11$ $d = -6$ $a_1 = 1$ $n = 29$ $a_{29} = 1 + (28)(-6) = -167$ 16) D

$S_{29} = \frac{29}{2}(1 - 167) = -2407$

A) –2320 B) –2189.5 C) –2291 D) –2407

Write the first five terms of the geometric sequence.

17) $a_1 = 4$; $r = -2$ $a_1 = 4$, $a_2 = (4)(-2) = -8$, $a_3 = (-8)(-2) = 16$, $a_4 = 16(-2) = -32$, $a_5 = -32(-2) = 64$ 17) B

A) 4, 2, 0, –2, –4
B) 4, –8, 16, –32, 64
C) 4, 8, 16, –32, 64
D) –2, –8, 16, –32, 64

18) $a_1 = 6$; $r = 5$ $a_1 = 6$, $a_2 = (6)(5) = 30$, $a_3 = 30(5) = 150$, $a_4 = 150(5) = 750$, $a_5 = 750(5) = 3750$ 18) A

A) 6, 30, 150, 750, 3750
B) 5, 30, 180, 1080, 6480
C) 6, 11, 16, 21, 26
D) 30, 150, 750, 3750, 18,750

Use the formula for the general term (the nth term) of a geometric sequence to find the indicated term of the sequence with the given first term, a_1, and common ratio, r.

19) Find a_6 when $a_1 = 3$, $r = 4$. $a_n = a_1 r^{n-1}$ $a_6 = 3(4)^{6-1} = 3(4)^5 = 3072$ 19) D

A) 1024 B) 60 C) 12,288 D) 3072

20) Find a_4 when $a_1 = 2$, $r = -3$. $a_n = a_1 r^{n-1}$ $a_4 = (2)(-3)^{4-1} = 2(-3)^3 = -54$ 20) B

A) 54 B) –54 C) –27 D) 162

Use the formula for the sum of the first n terms of a geometric sequence to solve.

21) Find the sum of the first five terms of the geometric sequence: 2, 6, 18, ... 21) A

$S_n = \frac{a_1(1-r^n)}{1-r} = \frac{2(1-(3)^5)}{(1-3)} = 242$

A) 242 B) 47 C) 26 D) 121

22) Find the sum of the first 11 terms of the geometric sequence: 7, 14, 28, 56, 112, ... 22) D

$S_n = \frac{a_1(1-r^n)}{(1-r)} = \frac{7(1-7^{11})}{(1-7)} = 14329$

A) 14,309 B) 14,331 C) 14,366 D) 14,329

Find the indicated sum. Use the formula for the sum of the first n terms of a geometric sequence.

23) $\sum_{i=1}^{5} 2 \cdot 4^i$ 23) C

$i=1: 2(4)^1 = 8$ ④
$i=2: 2(4)^2 = 32$ ④
$i=3: 2(4)^3 = 128$

$r=4, n=5, a_1=8$

$S_n = \frac{8(1-4^5)}{1-4} = 2728$

A) 264 B) 40 C) 2728 D) 5140

24) $\sum_{i=1}^{8} \left(\frac{4}{3}\right)^i$ 24) B

$i=1: (4/3)^1 = 4/3$ ④/3
$i=2: (4/3)^2 = 16/9$
$i=3: (4/3)^3 = 64/27$ ④/3

$r = 4/3, a_1 = 4/3, n = 8$

$S_8 = \frac{(4/3)(1-(4/3)^8)}{(1-4/3)} = \frac{235,900}{6561}$

A) $\frac{58,975}{2187}$ B) $\frac{235,900}{6561}$ C) $-\frac{56,788}{6561}$ D) $-\frac{14,197}{2187}$

Find the sum of the infinite geometric series, if it exists.

25) $3 + \frac{3}{4} + \frac{3}{16} + \frac{3}{64} + \ldots$ 25) B

$a_1 = 3$

$r = \frac{3/4}{3} = 1/4$

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

$S = \frac{3}{1-1/4} = \frac{3}{3/4} = 4$

A) $\frac{15}{4}$ B) 4 C) $\frac{3}{4}$ D) does not exist

26) $5 - \frac{5}{4} + \frac{5}{16} - \frac{5}{64} + \ldots$ 26) C

$a_1 = 5$

$r = \frac{-5/4}{5} = -1/4$

$S = \frac{5}{1-(-1/4)}$

$= \frac{5}{1+1/4} = \frac{5}{5/4} = 4$

A) $\frac{15}{4}$ B) $-\frac{5}{4}$ C) 4 D) does not exist

Use the Binomial Theorem to expand the binomial and express the result in simplified form.

27) $(x + 3)^3$ $(1)(x)^3(3)^0 + (3)(x)^2(3)^1 + (3)(x)^1(3)^2 + (1)(x)^0(3)^3$ $= x^3 + 9x^2 + 27x + 27$ 27) D

A) $3x + 9$
B) $x^3 + 27$
C) $x^3 + 3x^2 + 9x + 27$
D) $x^3 + 9x^2 + 27x + 27$

28) $(4x + 2)^3$ $(1)(4x)^3(2)^0 + (3)(4x)^2(2)^1 + (3)(4x)^1(2)^2 + (1)(4x)^0(2)^3$ $64x^3 + 96x^2 + 48x + 8$ 28) C

A) $16x^6 + 8x^3 + 64$
B) $16x^2 + 16x + 4$
C) $64x^3 + 96x^2 + 48x + 8$
D) $64x^3 + 96x^2 + 96x + 8$

Find the term indicated in the expansion.

29) $(2x + 5)^5$; 5th term $(1)(2x)^5(5)^0 + (5)(2x)^4(5)^1 + (10)(2x)^3(5)^2 + (10)(2x)^2(5)^3 + (5)(2x)^1(5)^4 + (1)(2x)^0(5)^5$ 29) C

A) 1250x
B) 15,625
C) 6250x
D) $2500x^2$

30) $(x^3 + y^4)^8$; 5th term $(1)(x^3)^8(y4)^0 + (8)(x^3)^7(y4)^1 + (28)(x^3)^6(y4)^2 + (56)(x^3)^5(y4)^3 + (70)(x^3)^4(y4)^4 + (56)(x^3)^3(y4)^5 + (28)(x^3)^2(y4)^6 + (8)(x^3)^1(y4)^7 + (1)(x^3)^0(y4)^8$ 30) A

A) $70x^{12}y16$
B) $420x^{12}y16$
C) $70x^7y^8$
D) $420x^7y^8$

1 — 0 row
1 1 — 1st row
1 2 1 — 2nd row
1 3 3 1 — 3rd row
1 4 6 4 1 — 4th row
1 5 10 10 5 1 — 5th row
1 6 15 20 15 6 1 — 6th row
1 7 21 35 35 21 7 1 — 7th row
1 8 28 56 70 56 28 8 1 — 8th row