

## Review –Chapter 11

1. Write the formula for the general term of the arithmetic sequence:  $-23, -27, -31, -35, \dots$   
and use the formula to find the 20<sup>th</sup> term of the sequence.

2. Find the sum  $\sum_{k=5}^{33} (3k - 1)$

3. Use the formula for the sum of the first  $n$  terms of a geometric sequence to find the sum of the

a) first five terms of the geometric sequence  $\frac{3}{2}, \frac{3}{8}, \frac{3}{32}, \dots$

b) First eight terms of the geometric sequence  $-5, -10, -20, -40, \dots$

4. Write first five terms of the arithmetic sequence for which  $a_1 = 2$  and  $d = -\frac{4}{3}$

5. Find the 9<sup>th</sup> term of a geometric sequence for which  $a_1 = 5$  and  $r = -3$

6. Find the coefficient of  $x^5$  in the expansion of  $(2x-3)^9$

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

a)  $a_n = (-1)^{n+1}(n+9)$

b)  $a_n = \frac{n^2}{(n+1)!}$

c)  $a_n = \frac{n+1}{2n-1}$

8. Express the given sum using sigma notation

$$\frac{1}{y} + \frac{r}{2y} + \frac{r^2}{3y} + \dots + \frac{r^{n-1}}{ny}$$

9. Write the first five terms of the geometric sequence for which

a)  $a_1 = 4$  and  $r = -2$

b)  $a_1 = -3; a_n = -3a_{n-1}$

10. Write out as a sum and find the exact value

a)  $\sum_{i=3}^6 (3i - 5)$

b)  $\sum_{i=0}^4 \frac{(i+2)!}{i!}$

11. Use the Binomial Theorem to find the term that contains  $x^9$  in the expansion of  $(x+3y)^{11}$

12. Find the first term, the common difference and give the recursive formula for the arithmetic sequence whose 10<sup>th</sup> term is  $-21$  and 16<sup>th</sup> term is  $-39$

13. Write a formula for the general term of the geometric sequence:  $3, -9, 27, -81, \dots$

14. Use the Binomial Theorem to find the coefficient of  $x^8$  in the expansion of  $(x^2 - 3)^7$

15. Write out as the sum. Do not evaluate

$$\sum_{k=0}^{n-1} (3k + 1)$$

16. Find the sum  $\sum_{k=1}^7 \left(\frac{2^k}{3}\right)$ . Use the formula for the sum of the first n terms of a geometric sequence.

17. Express the sum using sigma notation. Use 1 as the lower limit of summation and i for the index of summation

a)  $3^2 + 6^3 + 9^4 + \dots + 24^9$

b)  $a + 1 + \frac{a+2}{2} + \frac{a+3}{3} + \dots + \frac{a+6}{6}$

18. Bob decides to train for a marathon. He begins by jogging 13 minutes one day per week and decides to increase the time by 6 minutes each week. Write the general formula for the number of minutes he will jog in n-th week and find how many weeks it will take him to run for one hour.

19. Find the sum of the first 60 terms of the arithmetic sequence : 16, 12, 8, 4, ....

20. Find the common difference for the arithmetic sequence: -15, -17, -19, -21, ....

21. Evaluate the binomial coefficient without using a calculator  $\binom{10}{5}$

22. Write the first four terms of the sequence given recursively

$$a_1 = 2, a_2 = 5, a_n = a_{n-2} - 3a_{n-1}$$

23. Jane put \$25 into her bank account on January 1, 2014, \$35 on February 1, \$45 on March 1, and so forth. If she continues this pattern, how much will she have in her account on Dec 30, 2016?

24. Find the common ratio of the geometric sequence

$$\frac{1}{2}, -\frac{3}{4}, \frac{9}{8}, -\frac{27}{16}, \dots$$

25. Determine whether given sequence is arithmetic, geometric or neither. If the sequence is arithmetic, find the common difference; if it is geometric, find common ratio

a)  $a_n = 5^{n^2}$

b)  $a_n = \left(\frac{4}{3}\right)^n$

c)  $a_n = 2 - 3n$

26. Sequence  $\{a_n\}$  is arithmetic. Find  $a_{17}$ , if  $a_1 = -7$  and  $d = -2$ .

27. Find the following sum:  $\sum_{k=1}^{16} (2k + 7)$

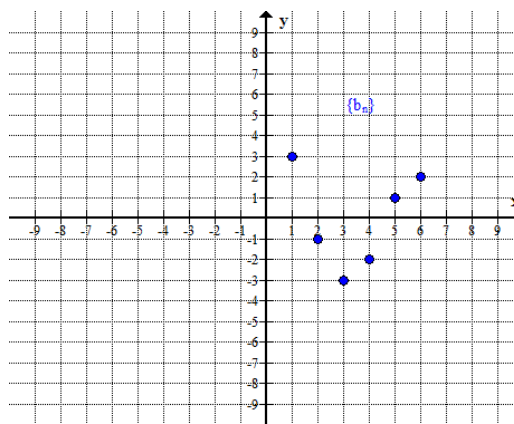
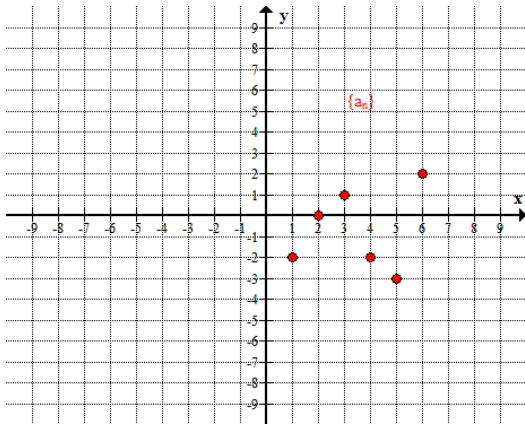
28. Write the first four terms of the sequence  $\left\{ \frac{3n}{(n+1)!} \right\}_{n \geq 1}$

29. Use the definition to check whether the given sequences are arithmetic

a)  $\{3n - 9\}_{n \geq 1}$

b)  $\{n^2 - 1\}_{n \geq 1}$

30. The graph of the sequences  $\{a_n\}$  and  $\{b_n\}$  are given below. Find the indicated sums



a)  $\sum_{k=1}^5 (a_k + 2b_k)$       b)  $\sum_{k=1}^5 \left( \frac{a_k}{b_k^2} \right)$

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

a)  $(x+2y)^6$   
 b)  $(x^2 - 5y)^4$

32. Find  $a_2$  and  $a_3$  for the geometric sequence  $2, a_2, a_3, 3/32$

**Answers:**

1)  $a_n = -4n - 19$  ;  $a_{20} = -99$

2) 1,624

3) a) 1023/512    b) -1275

4)  $2, \frac{2}{3}, -\frac{2}{3}, -2, -\frac{10}{3}$

5) 32,805

6) 326,592

7) a) 10, -11, 12, -13 ;    b)  $\frac{1}{2}, \frac{2}{3}, \frac{3}{8}, \frac{2}{15}$  ;    c)  $2, 1, \frac{4}{5}, \frac{5}{7}$

8)  $\sum_{k=1}^n \frac{r^{k-1}}{ky}$

9) a) 4, -8, 16, -32, 64 ;    b) -3, 9, -27, 81, -243

10) a)  $4+7+10+25=46$ ;    b)  $\frac{2!}{0!} + \frac{3!}{1!} + \frac{4!}{2!} + \frac{5!}{3!} + \frac{6!}{4!} = 70$

11)  $495x^9y^2$

12)  $a_1 = 6, d = -3, a_{n+1} = a_n - 3$

13)  $a_n = (-1)^{n+1} \cdot 3^n$

14) -945

15)  $1+4+7+ \dots +(3n-2)$

16) 254/3

17) a)  $\sum_{i=1}^8 (3i)^{i+1}$ ; b)  $\sum_{i=1}^6 \frac{a+i}{i}$

18)  $6n+7$ ; 9 weeks

19)  $-6,120$

20)  $d = -2$

21) 252

22) 2, 5, -13, 44

23) 7,200

24)  $r = -3/2$

25) a) neither; b) geometric,  $r = 4/3$ ; c) arithmetic,  $d = -3$

26) -39

27) 384

28)  $\frac{3}{2}, 1, \frac{3}{8}, \frac{1}{10}$

29) a) yes, b) no

30) a) -10; b)  $65/18$

31) a)  $x^6 + 12x^5y + 60x^4y^2 + 160x^3y^3 + 240x^2y^4 + 192xy^5 + 64y^6$ ; b)  $x^8 - 20x^6y + 150x^4y^2 - 500x^2y^3 + 625y^4$

32)  $\frac{\sqrt[3]{3}}{2}, \frac{\sqrt[3]{9}}{8}$