**Precalc Unit 10 Review Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***BINOMIAL EXPANSION(9.2)***

**Use binomial expansion to expand.**

 1. 

 2. 

 3. .

**Use binomial expansion to find the term you are asked for.**

 4. 5th term of (4*x* - 3*y*)8

 5. 3rd term of 

 6. 4th term of 

 7. 2nd term of 

***SEQUENCES & SERIES(9.4)***

**Describe the pattern in the sequence. Find the next three terms.**

 8. 13, 15, 17, 19, ...

 9. 4, 8, 16, 32, ...

 10. 1, 2, 6, 16, 44,...

 11. 625, 250, 100, 40,...

 12. Suppose you drop a tennis ball from a height of 15 feet. After the ball hits the floor, it rebounds to 85% of its previous height. How high will the ball rebound after its third bounce? Round to the nearest tenth.

 13. Orlando is making a design for a logo. He begins with a square measuring 24 inches on a side. The second square has a side length of 19.2 inches, and the third square has a side length of 15.36 inches. Which square will be the first square with a side length of less than 12 inches?

 14. Write a recursive formula for the sequence 8, 10, 12, 14, 16, .... Then find the next term.

 15. Write a recursive formula for the sequence 15, 26, 48, 92, 180, .... Then find the next term.

 16. Write an explicit formula for the sequence 7, 2, –3, –8, –13, ... Then find .

 17. Write an explicit formula for the sequence , , , , , .... Then find .

 18. The table shows the predicted growth of a particular bacteria after various numbers of hours. Write an explicit formula for the sequence of the number of bacteria.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Hours (*n*) | 1 | 2 | 3 | 4 | 5 |
| Number of Bacteria | 19 | 38 | 57 | 76 | 95 |

 19. Is the formula  is *explicit* or *recursive*? Find the first five terms of the sequence.

**Is the sequence arithmetic? If so, identify the common difference.**

 20. 13, 20, 27, 34, ...

 21. 14, 21, 42, 77, ...

 22. –2.4, 9.8, 22, 34.2, ...

 23. Find the 50th term of the sequence 5, –2, –9, –16, ...

 24. Find the missing term of the arithmetic sequence 22, , 34,...

**Is the sequence geometric? If so, identify the common ratio.**

 25. 6, 12, 24, 48, ...

 26. 2, –4, –16, –36, ...

 27. , , , , ,...

**Write the explicit formula for the sequence. Then find the fifth term in the sequence.**

 28. 

 29. 

**Find the missing term of the geometric sequence.**

 30. 45, , 1620, ...

 31. 1250,, 50, ...

 32. Kaylee is painting a design on the floor of a recreation room using equilateral triangles. She begins by painting the outline of Triangle 1 measuring 50 inches on a side. Next, she paints the outline of Triangle 2 inside the first triangle. The side length of Triangle 2 is 80% of the length of Triangle 1. She continues painting triangles inside triangles using the 80% reduction factor. Which triangle will first have a side length of less than 29 inches?

 33. A rope is swinging in such a way that the length of the arc is decreasing geometrically. If the first arc is 18 feet long and the third arc is 8 feet long, what is the length of the second arc?

**Use the finite sequence. Write the related series. Then evaluate the series.**

 34. 26, 29, 32, 35, 38, 41, 44

 35. 7.6, 6.3, 5, 3.7, 2.4, 1.1, –0.2, –1.5

 36. The sequence 15, 21, 27, 33, 39, ..., 75 has 11 terms. Evaluate the related series.

 37. The sequence –5, 0, 5, 10, ..., 65 has 15 terms. Evaluate the related series.

 38. The sequence 2, 4, 6, 8, ..., 24 has 12 terms. Evaluate the related series.

 39. A large asteroid crashed into a moon of a planet, causing several boulders from the moon to be propelled into space toward the planet. Astronomers were able to measure the speed of one of the projectiles. The distance (in feet) that the projectile traveled each second, starting with the first second, was given by the arithmetic sequence 26, 44, 62, 80, . . . . Find the total distance that the projectile traveled in seven seconds.

 40. Use summation notation to write the series 49 + 54 + 59 + ... for 14 terms.

 41. Use summation notation to write the series 2 + 4 + 6 + 8 + ... for 10 terms.

 42. Use summation notation to write the series 6.6 + 15.4 + 24.2 + ... for 5 terms.

 43. For the series , find the number of terms in the series.

 44. For the series , find the number of terms in the series.

 45. For the series , find the first and the last term.

 46. For the series , find the first and the last term.

 47. Evaluate the series .

 48. Evaluate the series .

 49. Evaluate the series 1 + 4 + 16 + 64 + 256 + 1024.

 50. Evaluate the series 6 – 24 + 96 – 384 + ... to .

 51. Evaluate the series 1000 + 500 + 250 + ... to .

 52. Justine earned $17,000 during the first year of her job at city hall. After each year she received a 4% raise. Find her total earnings during the first five years on the job.

 53. A rubber ball dropped on a hard surface takes a sequence of bounces, each one  as high as the preceding one. If this ball is dropped from a height of 10 feet, what is the total vertical distance it has traveled after it hits the surface the 5th time?

 54. Evaluate the series 1 + 2 + 4 + 8 to .

 55. In June, Cory begins to save money for a video game and a TV he wants to buy in December. He starts with $20. Each month he plans to save 10% more than the previous month. How much money will he have at the end of December?

**Does the infinite geometric series diverge or converge? Explain.**

 56. 

 57. 

**Evaluate the infinite geometric series. Round to the nearest hundredth if necessary.**

 58. 

 59. 1 + 0.1 + 0.01 + ...

***PERMUTATIONS & COMBINATIONS***

 60. A sandwich is made with only one type of bread, one type of meat, and one type of cheese. There are 3 types of bread: white, wheat, or rye; 2 types of meat: turkey or roast beef; and 2 types of cheese: American or Swiss. Find the number of sandwich choices.

 61. You can order a skirt with the three different lengths (knee, mid-calf, ankle) and the four different colors (navy, black, khaki, denim). Find the number of choices.

 62. A lunch menu consists of 5 different sandwiches, 2 different soups, and 5 different drinks. How many choices are there for ordering a sandwich, a bowl of soup, and a drink?

 63. Ms. Wong is redecorating her office. She has a choice of 7 colors of paint, 4 kinds of curtains, 3 colors of carpet, and 2 styles of furniture. How many different ways are there to redecorate if she can choose two different colors of paint, one kind of curtain, one color of carpet, and one style of furniture?

\_\_\_\_ 64. There are many different license-plate systems being used in the United States. Which system provides for the greatest possible number of license plates?

|  |  |
| --- | --- |
| a. | License plates display three letters and three digits. |
| b. | License plates display two letters and four digits. |
| c. | License plates display five letters. |
| d. | License plates display four letters and two digits. |

 65. Suppose *x* coins are tossed. Write an expression to represent the number of possible outcomes.

**Find the number of possibilities for the following...**

 66. How many different ways can you choose 8 winning lottery numbers when the numbers are chosen at random from 0 to 9

 67. In how many different ways can you arrange 7 books on a shelf?

 68. There are 4 children in Maria’s family. In how many ways can you list the children in all possible age orders?

 69. How many permutations can be made using the letters S, T, U, D, Y, H, A, R, D?

 70. How many 3-letter permutations are possible for the letters S, T, U, D, Y, H, A, R, D?

**Simplify the expression.**

 71. 

 72. 

 73. 

 74. 

 75. In how many ways could you choose two different letters from the letters M, A, T, H?

 76. In how many ways could you choose two different letters from the letters C, O, U, N, T?

 77. The Burger Diner offers burgers with or without any or all of the following: catsup, lettuce, and mayonnaise. How many different burgers can you order?

 78. A panel of judges must consist of four women and three men. A list of potential judges includes six women and five men. How many different panels could be created from this list?

**Does the problem involve *permutations* or *combinations*? Explain.**

\_\_\_\_ 79. In how many different ways could a committee of 5 students be chosen from a class of 25 students?

|  |  |
| --- | --- |
| a. | Permutations; the order matters. |
| b. | Permutations; the order does not matter. |
| c. | Combinations; the order does not matter. |
| d. | Combinations; the order matters. |

\_\_\_\_ 80. In how many ways could six horses come in first, second or third in a race?

|  |  |
| --- | --- |
| a. | Combinations; the order does not matter. |
| b. | Combinations; the order matters. |
| c. | Permutations; the order does not matter. |
| d. | Permutations; the order matters. |

 81. In how many different orders can you line up 8 cards on a shelf?

 82. Verne has 6 math books to line up on a shelf. Jenny has 4 English books to line up on a shelf. In how many more orders can Verne line up his books than Jenny?

**Evaluate the expression.**

 83. 5!

 84. 

 85. 

 86. 

 87. 

 88. 

 89. There are 10 students participating in a spelling bee. In how many ways can the students who go first and second in the bee be chosen?

 90. The Booster Club sells meals at basketball games. Each meal comes with a choice of hamburgers, pizza, hot dogs, cheeseburgers, or tacos, and a choice of root beer, lemonade, milk, coffee, tea, or cola. How many possible meal combinations are there?

 91. In how many ways can 3 singers be selected from 5 who came to an audition?

 92. There are 6 people on the ballot for regional judges. Voters can vote for any 4. Voters can choose to vote for 0¸ 1¸ 2¸ 3¸ or 4 judges. In how many different ways can a person vote?

***MORE SEQ/SERIES***

 93. Consider the sequence 1, , , , ,...

|  |  |
| --- | --- |
| **a.** | Describe the pattern formed in the sequence. |
| **b.** | Find the next three terms. |

 94. Consider the sequence 16, –8, 4, –2, 1, ...

|  |  |
| --- | --- |
| **a.** | Describe the pattern formed in the sequence. |
| **b.** | Find the next three terms. |

 95. Consider the sequence 8, 6, 3, –1, –6, ...

|  |  |
| --- | --- |
| **a.** | Find the next two terms of the sequence. |
| **b.** | Write an explicit formula for the sequence. |
| **c.** | Write a recursive formula for the sequence. |

 96. Consider the infinite geometric series .

|  |  |
| --- | --- |
| **a.** | Write the first four terms of the series. |
| **b.** | Does the series *diverge* or *converge*? |
| **c.** | If the series has a sum, find the sum. |

 97. Dante is making a necklace with 18 rows of tiny beads in which the number of beads per row is given by the series 3 + 10 + 17 + 24 + ...

|  |  |
| --- | --- |
| **a.** | Use summation notation to write the series. Explain what the numbers in the summation notation represent in this situation and how you found the expression used in the summation. |
| **b.** | Find the total number of beads in the necklace. Explain your method for finding the total number of beads. |

 98. Yvette is creating a design in which she draws squares within squares as shown. She begins with a square having a perimeter of 15 inches. Each inner square has a perimeter that is 90% of the perimeter of the previous square. Calculate the sum of the perimeters of all squares if she could continue this process indefinitely. (Round to the nearest hundredth, if necessary.) Explain your method.



 99. Consider the sequence –7, –5.6, –4.2, –2.8, –1.4, ...

|  |  |
| --- | --- |
| **a.** | Write an explicit formula for the sequence. Explain your steps. |
| **b.** | Write a recursive formula for the sequence. Explain your steps. |
| **c.** | Suppose you need to find the 50th term of the sequence. Explain which formula you would use. |
| **d.** | Which term is the number 103.6? Explain your method for solving this problem. |

***EXTRA***

 100. Arlene was given four pictures and asked to present four different combinations of all four pictures. Is this possible? Explain.

 **FORMULAS YOU WILL BE GIVEN:**

 a n = a1 + d(n – 1) ; a n = a1(r)n – 1  ; S n = (a1 + a n) ; S n = a1 ; S = 

**Precalc Unit 10 Review**

**Answer Section**

 1. 

 2. 

 3. 

 4. 

 5. 

 6. 

 7. 

 8. Add 2; 21, 23, 25.

 9. Multiply by 2; 64, 128, 256.

 10. Add the two previous terms and then multiply by 2; 120, 328, 896

 11. Divide by 2.5; 16, 6.4, 2.56.

 12. 9.2 feet

 13. fifth square

 14. ; 18

 15. ; 356

 16. ; –58

 17. 

 18. 

 19. explicit; 0, –8, –24, –48, –80

 20. yes, 7

 21. no

 22. yes, 12.2

 23. –338

 24. 28

 25. yes, 2

 26. no

 27. yes, 

 28. ; 243

 29. ; 0.972

 30. 270

 31. 250

 32. Triangle 4

 33. 12 feet

 34. 26 + 29 + 32 + 35 + 38 + 41 + 44 = 245

 35. 7.6 + 6.3 + 5 + 3.7 + 2.4 + 1.1 + (–0.2) + (–1.5) = 24.4

 36. 495

 37. 450

 38. 156

 39. 560 feet

 40. 

 41. 

 42. 

 43. 8 terms

 44. 6 terms

 45. 5, 9

 46. –16, –28

 47. 26

 48. 165

 49. 1365

 50. 19,662

 51. 1937.5

 52. $92,077.48

 53. 36 feet

 54. 1023

 55. $189.74

 56. It converges; it has a sum.

 57. It diverges; it does not have a sum.

 58. 16

 59. 1.11

 60. 

 61. 

 62. 50 choices

 63. 1,008 ways

 64. D

 65. 

 66. 

 67. 5,040 ways

 68. 24 ways

 69. 362,880 permutations

 70. 504 permutations

 71. 120

 72. 95,040

 73. 10

 74. 153

 75. 6 ways

 76. 10 ways

 77. 8 burgers

 78. 150 panels

 79. C

 80. D

 81. 40,320

 82. 696

 83. 120

 84. 604,800

 85. 35

 86. 3,024

 87. 7

 88. 

 89. 90 ways

 90. 30

 91. 10

 92. 57

 93.

|  |  |
| --- | --- |
| **a.** | Add 1 to the numerator and 2 to the denominator of the previous term. |
| **b.** | , ,  |

 94.

|  |  |
| --- | --- |
| **a.** | Divide the previous term by –2. |
| **b.** | , ,  |

 95.

|  |  |
| --- | --- |
| **a.** | –12, –19 |
| **b.** |  |
| **c.** |  |

 96.

|  |  |
| --- | --- |
| **a.** |  |
| **b.** | converge |
| **c.** | –6 |

 97.

|  |  |  |
| --- | --- | --- |
| [4] | **a.** | The series written in summation notation is . The lower limit is 1 for the first row and the number 18 is the upper limit for the 18th row. The expression 7*n* – 4 can be found by using the expression . In this case,  is 3 and *d* is 7. Substituting the values into the expression and simplifying results in 7*n* – 4. |
|  | **b.** | To find the total number of beads, use the formula . In this case, *n* is 18 and is 7(18) – 4 or 122. Substitute into the formula: , or 1125. There are 1125 beads in the necklace. |
| [3] | correct procedures used with one minor mathematical error |
| [2] | correct procedures used with two minor mathematical errors |
| [1] | incomplete procedures or correct answer with no explanation or work shown |

 98.

|  |  |
| --- | --- |
| [4] | The first square has a perimeter of 15, so = 15. The ratio from term to term is 90% or 0.9, so *r* = 0.9. Now, use the formula for the sum of an infinite geometric series, . Substitute into the formula: . The result is 150. So, the sum of the perimeters of all the squares continued indefinitely would be 150 inches. |
| [3] | one error in computation |
| [2] | two errors in computation or incomplete explanation |
| [1] | correct answer with no work shown |

 99.

|  |  |
| --- | --- |
| **a.** | To write the explicit formula, use the general explicit formula . You can see that the first term, , is –7 and the common difference, *d*, is 1.4. Substitute these values into the formula: . Simplify the formula to . |
| **b.** | To write the recursive formula, use the general recursive formula . You can see that the first term is –7 and the common difference *d* is 1.4. Substitute these values into the formula: . |
| **c.** | Answers may vary. Sample: It would be easier to use the explicit formula since it does not depend upon knowing the previous term. You can just substitute 50 for *n* in the explicit formula to find the 50th term. |
| **d.** | Substitute 103.6 for  in the formula  and solve for *n*. ; 112 = 1.4*n*; *n* = 80. The term 103.6 is the 80th term of the sequence. |

 100. Answers may vary. Sample: It is not possible. There is only one combination of all four pictures. There are, however, 4!, or 24, different permutations or arrangements of the four pictures.