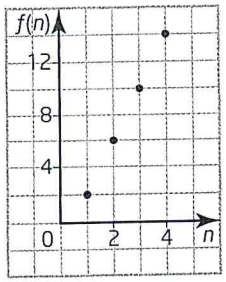
A

For questions 1 to 5, select the best answer.

1. Which is a recursion formula for the sequence shown?



A $f(n) = f(n - 1) + 4$

B $f(n) = 4n - 2$

C $f(n) = 2 + (n - 1)(4)$

D $f(1) = 2$, $f(n) = f(n - 1) + 4$

2. Which expressions represent the missing terms in the binomial expansion shown?

$(x + y)^7 = x^7 + 7x^6y +$ $\quad$ $+ 35x^4y^3 + 35x^3y^4$ $+ 21x^2y^5 +$ $\quad$ $+ y^7$

A $21y^5x^2, 7yx^6$

B $21x^5y^2, 7xy^6$

C $-21x^5y^2, -7xy^6$

D x^5y^2, xy^6

3. What is the formula for the general term of an arithmetic sequence with $a = 8$ and $d = 2$?

A $t_n = 2 + (n + 1)(8)$

B $t_n = 8 + (n - 1)(2)$

C $t_n = 8 + (n + 1)(2)$

D $t_n = 2 + (n - 1)(8)$

4. What are the first three terms of a geometric sequence with $a = 3$ and $r = 2$?

A 3, 5, 7

B 2, 6, 18

C 3, 6, 12

D 2, 5, 8

5. Which series is neither arithmetic nor geometric?

A $9 + 15 + 21 + 27 + \cdots$

B $1 + 8 + 27 + 64 + \cdots$

C $64 - 32 + 16 - 8 + \cdots$

D $2 - 2.7 + 3.4 - 4.1 + \cdots$

6. Determine the first five terms of each sequence. Graph the sequence and state whether it is arithmetic, geometric, or neither.

a) $t_n = 9 - 5n$

b) $f(n) = 2n^2 + 3n - 4$

c) $f(n) = \frac{1}{8}(4)^{n-1}$

d) $t_n = 0.2n + 0.8$

e) $t_n = \frac{n + 4}{2}$

f) $f(n) = -3(2)^n$

7. Write an explicit formula and a recursion formula for each sequence.

a) 64, 32, 16, 8, ...

b) $-20, -17, -14, -11, \ldots$

c) 80, 76, 72, 68, ...

d) $-4000, 1000, -250, 62.5, \ldots$

e) $-3, -6, -12, -24, \ldots$

f) $-12\sqrt{2}, -10\sqrt{2}, -8\sqrt{2}, -6\sqrt{2}, \ldots$

8. Write t_{11} for each sequence.

a) 6, 10, 14, 18, ...

b) $-3, -6, -12, -24, \ldots$

c) $5, -10, 20, -40, \ldots$

d) $-5, -10, -15, -20, \ldots$

9. Given the explicit formula, write t_{15} for each sequence.

a) $f(n) = 2(-3)^{n+1}$

b) $t_n = 25n + 50$

c) $t_n = 10(0.1)^{2n}$

d) $f(n) = \frac{-3n}{4}$

10. Determine the number of terms in each sequence.

a) 5, 8, 11, ..., 62

b) $-4, 12, -36, \ldots, -19\,131\,876$

11. A new lake is being excavated. One day, 1.6 t of material is removed from the lake bed. On each of 10 days after that, 5% more is removed.

a) Write the first three excavation amounts as a sequence.

b) Write a recursion formula to represent the amount removed each day. Use this to determine the amount removed on the fifth day.

12. Determine the specified sum for each series.

a) S_{10} for $200 + 100 + 50 + \cdots$

b) S_{18} for $12 + 5 - 2 + \cdots$

13. Determine the sum of each arithmetic series.

a) $120 + 110 + 100 + \cdots - 250$

b) $8 + 24 + 40 + \cdots + 280$

14. Determine the sum of each geometric series.

a) $\frac{2}{81} + \frac{4}{27} + \frac{8}{9} + \cdots + 6912$

b) $5 + 10 + 20 + \cdots + 2560$

15. Use Pascal's triangle to help you expand each expression.

a) $(b - 3)^5$ **b)** $(2x - 5y)^6$

16. The sum of the first three terms of a series is 32. Determine the fourth term if the sum of the first four terms is

a) 40 **b)** 25

17. Determine the sum of the first 15 terms of an arithmetic series if the middle term is 92.

18. Which is greater, A or B? Explain your reasoning.

$A = 50^2 - 49^2 + 48^2 - 47^2 + \cdots + 2^2 - 1^2$

$B = 50 + 49 + 48 + 47 + \cdots + 2 + 1$

(Unit 6 Review) MCR 3U

A

19. In the arrangement of letters shown, starting from the top, proceed to the row below by moving diagonally to the immediate right or left. Determine the number of different paths that will spell the name PASCAL.

P

A A

S S S

C C C C

A A A A A

L L L L L L

20. A new wood stain loses 6.5% of its colour every year in a city that experiences a lot of hot, sunny days. What percent of colour will a fence in this city have 6 years after being stained?

21. In an arithmetic series, the 4th term is 62 and the 14th term is 122. Determine the sum of the first 30 terms.

22. A sailboat worth \$140 000 depreciates 18% in the first year and 10% every year after that. How much will it be worth 8 years after it is bought?

B

8. What row number of Pascal's triangle has each row sum?

a) 256 b) 2048

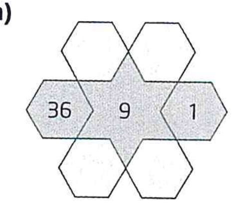
c) 16 384 d) 65 536

9. Write each as the difference of two terms in the form $t_{n,r}$.

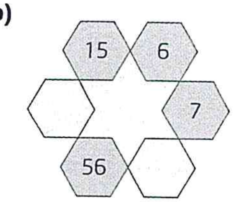
a) $t_{4,2}$ b) $t_{6,3}$ c) $t_{12,9}$ d) $t_{28,14}$

10. Look for patterns in Pascal's triangle. What are the missing numbers in each diagram?

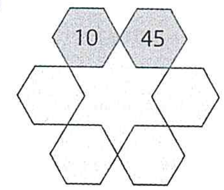
a)



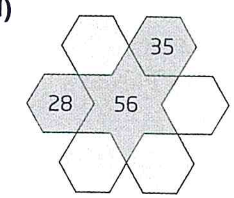
b)



c)



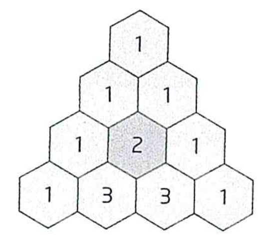
d)



11. **Chapter Problem**

You can find fractal qualities in Pascal's triangle.

Use a copy of Pascal's triangle and colour all even numbers one colour and all odd numbers another colour. Describe the pattern that emerges.



A

Solutions

1. D 2. B 3. B 4. C 5. B

6. a) 4, −1, −6, −11, −16 b) 1, 10, 23, 40, 61

c) $\frac{1}{8}, \frac{1}{2}$, 2, 8, 32 d) 1, 1.2, 1.4, 1.6, 1.8

e) 2.5, 3, 3.5, 4, 4.5

f) −6, −12, −24, −48, −96

7. a) $f(n) = 64\left(\frac{1}{2}\right)^{n-1}$; $t_1 = 64$, $t_n = t_{n-1} \times \frac{1}{2}$

b) $f(n) = -23 + 3n$; $t_1 = -20$, $t_n = t_{n-1} + 3$

c) $f(n) = 84 - 4n$; $t_1 = 80$, $t_n = t_{n-1} - 4$

d) $f(n) = -4000\left(-\frac{1}{4}\right)^{n-1}$; $t_1 = -4000$, $t_n = t_{n-1} \times \left(-\frac{1}{4}\right)$

e) $f(n) = -3(2)^{n-1}$; $t_1 = -3$, $t_n = t_{n-1} \times 2$

f) $f(n) = -14\sqrt{2} + 2\sqrt{2}n$; $t_1 = -12\sqrt{2}$, $t_n = t_{n-1} + 2\sqrt{2}$

8. a) 46 b) −3072 c) 5120 d) −55

9. a) 86 093 442 b) 425

c) 1.0×10^{29} d) −11.25

10. a) 20 b) 15

11. a) 1.6, 1.68, 1.764 b) $t_1 = 1.6$, $t_n = 1.05t_{n-1}$

12. a) $\frac{25\ 575}{64}$ b) −855

13. a) −2740 b) 2592

14. a) $\frac{671\ 846}{81}$ b) 5115

15. a) $b^5 - 15b^4 + 90b^3 - 270b^2 + 405b - 243$

b) $64x^6 - 960x^5y + 6000x^4y^2 - 20\ 000x^3y^3 + 37\ 500x^2y^4 - 37\ 500xy^5 + 15\ 625y^6$

16. a) 8 b) −7

17. 1380

18. Answers may vary. Sample answer: A is equal to B. Each pair of numbers in A could be factored as a difference of squares as follows:

$A = (50 + 49)(50 - 49) + (48 + 47)(48 - 47) + \ldots + (4 + 3)(4 - 3) + (2 + 1)(2 - 1)$

$= (99)(1) + (95)(1) + \ldots + (7)(1) + (3)(1)$

$= 99 + 95 + \ldots + 7 + 3.$

The sum of this series is 1275. The sum of series B is $50 + 49 + 48 + 47 + \ldots + 2 + 1$, or 1275.

19. 32 paths

20. 66.8%

21. 3930

22. \$54 908.48

B

8. a) 8 b) 11 c) 14 d) 16

9. Answers may vary. Sample answers:

a) $t_{5,2} - t_{4,1}$ b) $t_{7,3} - t_{6,2}$

c) $t_{13,9} - t_{12,8}$ d) $t_{29,14} - t_{28,15}$

10. a) top row: 8, 1; bottom row: 45, 10

b) middle left: 35; bottom right: 28

c) middle left: 11; middle right: 165; bottom row: 66, 220

d) top left: 21; middle right: 70; bottom row: 84, 126