

Use Scantron 882E to transfer the answers. Be sure you keep your scantron CLEAN and FLAT before its submission.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Evaluate the factorial expression.

1) $8!$ 1) _____
 A) 16 B) 40,320 C) 12 D) 56

2) $\frac{5!}{7!}$ 2) _____
 A) 42 B) $2!$ C) $\frac{1}{42}$ D) $\frac{1}{2!}$

3) $\frac{2!6!}{5!}$ 3) _____
 A) 6 B) $\frac{361}{60}$ C) $\frac{1}{60}$ D) 12

4) $\frac{5!}{3!2!}$ 4) _____
 A) 0 B) 1 C) 10 D) 5

Write out the first five terms of the sequence.

5) $\{s_n\} = \{3n - 1\}$ 5) _____
 A) $s_1 = 2, s_2 = 3, s_3 = 4, s_4 = 5, s_5 = 6$ B) $s_1 = 4, s_2 = 7, s_3 = 10, s_4 = 13, s_5 = 16$
 C) $s_1 = -2, s_2 = -5, s_3 = -8, s_4 = -11, s_5 = -14$ D) $s_1 = 2, s_2 = 5, s_3 = 8, s_4 = 11, s_5 = 14$

6) $\{s_n\} = \{n^2 - n\}$ 6) _____
 A) $s_1 = 0, s_2 = 2, s_3 = 6, s_4 = 12, s_5 = 20$ B) $s_1 = 0, s_2 = 3, s_3 = 8, s_4 = 15, s_5 = 24$
 C) $s_1 = 1, s_2 = 4, s_3 = 9, s_4 = 16, s_5 = 25$ D) $s_1 = 2, s_2 = 6, s_3 = 12, s_4 = 20, s_5 = 30$

7) $\{s_n\} = \{3^n\}$ 7) _____
 A) $s_1 = 1, s_2 = 8, s_3 = 27, s_4 = 64, s_5 = 125$ B) $s_1 = 1, s_2 = 3, s_3 = 9, s_4 = 27, s_5 = 81$
 C) $s_1 = 3, s_2 = 9, s_3 = 27, s_4 = 81, s_5 = 243$ D) $s_1 = 9, s_2 = 27, s_3 = 81, s_4 = 243, s_5 = 729$

8) $\{c_n\} = \left\{ \frac{2n + 5}{2n} \right\}$ 8) _____
 A) $c_1 = \frac{7}{2}, c_2 = \frac{9}{2}, c_3 = \frac{11}{9}, c_4 = \frac{13}{2}, c_5 = \frac{15}{2}$
 B) $c_1 = \frac{9}{2}, c_2 = \frac{11}{2}, c_3 = \frac{13}{2}, c_4 = \frac{15}{2}, c_5 = \frac{17}{2}$
 C) $c_1 = \frac{9}{4}, c_2 = \frac{11}{6}, c_3 = \frac{13}{8}, c_4 = \frac{3}{2}, c_5 = \frac{17}{12}$
 D) $c_1 = \frac{7}{2}, c_2 = \frac{9}{4}, c_3 = \frac{11}{6}, c_4 = \frac{13}{8}, c_5 = \frac{3}{2}$

9) $\{s_n\} = \left\{ \frac{4^n}{3^{n+3}} \right\}$ 9) _____

A) $s_1 = \frac{2}{3}, s_2 = \frac{8}{9}, s_3 = 1, s_4 = \frac{16}{15}, s_5 = \frac{10}{9}$

B) $s_1 = \frac{4}{3}, s_2 = \frac{32}{15}, s_3 = \frac{64}{21}, s_4 = \frac{512}{123}, s_5 = \frac{1024}{183}$

C) $s_1 = \frac{8}{9}, s_2 = 1, s_3 = \frac{16}{15}, s_4 = \frac{10}{9}, s_5 = \frac{8}{7}$

D) $s_1 = \frac{2}{3}, s_2 = \frac{4}{3}, s_3 = \frac{32}{15}, s_4 = \frac{64}{21}, s_5 = \frac{512}{123}$

10) $\{s_n\} = \left\{ (-1)^{n-1} \left(\frac{n+3}{2n-1} \right) \right\}$ 10) _____

A) $s_1 = 4, s_2 = -\frac{5}{3}, s_3 = \frac{6}{5}, s_4 = -1, s_5 = \frac{8}{9}$

B) $s_1 = -4, s_2 = \frac{5}{3}, s_3 = \frac{6}{5}, s_4 = -1, s_5 = \frac{8}{9}$

C) $s_1 = -4, s_2 = \frac{5}{3}, s_3 = -\frac{6}{5}, s_4 = 1, s_5 = -\frac{8}{9}$

D) $s_1 = 4, s_2 = \frac{5}{3}, s_3 = \frac{6}{5}, s_4 = 1, s_5 = \frac{8}{9}$

11) $\{s_n\} = \left\{ \frac{n}{n^2+2} \right\}$ 11) _____

A) $s_1 = \frac{1}{3}, s_2 = \frac{1}{3}, s_3 = \frac{3}{11}, s_4 = \frac{2}{9}, s_5 = \frac{5}{27}$

B) $s_1 = \frac{1}{3}, s_2 = \frac{1}{3}, s_3 = \frac{3}{8}, s_4 = \frac{2}{5}, s_5 = \frac{5}{12}$

C) $s_1 = \frac{1}{4}, s_2 = \frac{1}{3}, s_3 = \frac{3}{8}, s_4 = \frac{2}{5}, s_5 = \frac{5}{12}$

D) $s_1 = \frac{1}{2}, s_2 = \frac{1}{3}, s_3 = \frac{3}{8}, s_4 = \frac{2}{5}, s_5 = \frac{5}{12}$

The given pattern continues. Write down the n th term of the sequence $\{a_n\}$ suggested by the pattern.

12) 1, 4, 7, 10, 13, ... 12) _____
 A) $a_n = 1(3)^{n-1}$ B) $a_n = 2n - 3$ C) $a_n = 3n - 2$ D) $a_n = n + 3$

13) 0, 2, 6, 12, 20, ... 13) _____
 A) $a_n = 2^{n-1} - 1$ B) $a_n = 4n - 6$ C) $a_n = n^2 - n$ D) $a_n = 2n - 2$

14) 4, 16, 64, 256, 1024, ... 14) _____
 A) $a_n = 4 + 12(n-1)$ B) $a_n = 4^n$
 C) $a_n = 4^{n-1} + 3$ D) $a_n = 12n$

15) 4, -8, 12, -16, ... 15) _____
 A) $a_n = (-1)^n \cdot 4n$ B) $a_n = (-1)^{n+1} \cdot 4$
 C) $a_n = (-1)^{n+1} \cdot 4n$ D) $a_n = (-1)^n \cdot 4$

16) $\frac{1}{1 \cdot 3}, \frac{1}{2 \cdot 4}, \frac{1}{3 \cdot 5}, \frac{1}{4 \cdot 6}, \dots$ 16) _____
 A) $a_n = \frac{1}{n(n+2)}$ B) $n(n+2)$ C) $a_n = \frac{1}{2n}$ D) $a_n = \frac{1}{n \cdot 2n}$

Solve.

- 17) The number of students in a school in year n is estimated by the model $a_n = 5n^2 + 14n + 84$. About how many students are in the school in each of the first three years? 17) _____
- A) 103, 132, 171 B) 103, 132, 156 C) 108, 132, 171 D) 117, 146, 185

The sequence is defined recursively. Write the first four terms.

- 18) $a_1 = 2; a_n = a_{n-1} - 5$ 18) _____
- A) $a_1 = -5, a_2 = -10, a_3 = -15, a_4 = -20$ B) $a_1 = 2, a_2 = -1, a_3 = -6, a_4 = -11$
C) $a_1 = 2, a_2 = -3, a_3 = -8, a_4 = -13$ D) $a_1 = 2, a_2 = 7, a_3 = 12, a_4 = 17$
- 19) $a_1 = 5; a_n = 4a_{n-1}$ 19) _____
- A) $a_1 = 16, a_2 = 64, a_3 = 256, a_4 = 512$ B) $a_1 = 5, a_2 = 19, a_3 = 18, a_4 = 17$
C) $a_1 = 5, a_2 = 22, a_3 = 82, a_4 = 322$ D) $a_1 = 5, a_2 = 20, a_3 = 80, a_4 = 320$
- 20) $a_1 = 4; a_n = 3a_{n-1} - 1$ 20) _____
- A) $a_1 = 4, a_2 = 12, a_3 = 36, a_4 = 108$ B) $a_1 = 4, a_2 = 11, a_3 = 35, a_4 = 107$
C) $a_1 = 4, a_2 = 11, a_3 = 32, a_4 = 95$ D) $a_1 = 4, a_2 = 13, a_3 = 40, a_4 = 121$

Solve.

- 21) Given that $a_1 = -4, a_2 = -4$ and $a_{n+2} = a_{n+1} - 4a_n$, what is the fifth term of this recursively defined sequence? 21) _____
- A) $a_5 = -20$ B) $a_5 = 28$ C) $a_5 = -308$ D) $a_5 = 764$

Write out the sum.

- 22) $\sum_{k=1}^n (2k + 2)$ 22) _____
- A) $2n + 2$ B) $4 + 6 + 8 + \dots + (2n + 2)$
C) $2 + 4 + 6 + \dots + (2n + 2)$ D) $1 + 2 + 3 + \dots + n$
- 23) $\sum_{k=1}^n (k + 3)^2$ 23) _____
- A) $(n + 3)^2$ B) $16 + 25 + 36 + \dots + (n + 3)^2$
C) $1 + 2 + 3 + \dots + n$ D) $4 + 5 + 6 + \dots + (n + 3)^2$
- 24) $\sum_{k=0}^n \left(\frac{1}{2}\right)^k$ 24) _____
- A) $0 + 1 + 2 + 3 + \dots + n$ B) $0 + \frac{1}{2} + \frac{1}{4} + \dots + \left(\frac{1}{2}\right)^n$
C) $1 + \frac{1}{2} + \frac{1}{4} + \dots + \left(\frac{1}{2}\right)^n$ D) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \left(\frac{1}{2}\right)^n$

25) $\sum_{k=0}^{n-1} \frac{1}{2^{k+1}}$ 25) _____

A) $1 + \frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{2^n}$

B) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \frac{1}{2^{n+1}}$

C) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \frac{1}{2^n}$

D) $0 + \frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{2^n}$

Express the sum using summation notation.

26) $3 + 6 + 9 + \dots + 18$

26) _____

A) $\sum_{k=1}^6 3k$

B) $\sum_{k=1}^6 k^2$

C) $\sum_{k=0}^6 3k$

D) $\sum_{k=1}^6 3k^2$

27) $2^4 + 3^4 + 4^4 + \dots + 7^4$

27) _____

A) $\sum_{k=3}^7 (k-1)^4$

B) $\sum_{k=1}^7 k^4$

C) $\sum_{k=2}^7 k^4$

D) $\sum_{k=2}^n k^4$

28) $3 + 12 + 27 + \dots + 75$

28) _____

A) $\sum_{k=0}^5 3k^2$

B) $\sum_{k=1}^5 3^2k$

C) $\sum_{k=1}^5 k^2$

D) $\sum_{k=1}^5 3k^2$

Find the sum of the sequence.

29)

29) _____

$\sum_{k=1}^{11} 7$

A) 77

B) 4

C) 11

D) 7

30)

30) _____

$\sum_{k=1}^5 k$

A) 20

B) 15

C) 5

D) 4

31)

31) _____

$\sum_{k=1}^5 (k-12)$

A) -18

B) -38

C) -7

D) -45

32)

32) _____

$\sum_{k=2}^5 (3k-3)$

A) 18

B) 30

C) 24

D) 27

33) $\sum_{k=1}^4 3^k$ 33) _____
 A) 84 B) 30 C) 39 D) 120

34) $\sum_{k=3}^5 (k^2 + 11)$ 34) _____
 A) 57 B) 45 C) 83 D) 110

35) $\sum_{k=2}^4 k(k - 5)$ 35) _____
 A) -20 B) -16 C) 3 D) -10

36) $\sum_{k=1}^4 \left(-\frac{1}{2}\right)^k$ 36) _____
 A) $\frac{5}{16}$ B) $-\frac{5}{16}$ C) $-\frac{1}{16}$ D) $\frac{15}{16}$

37) $\sum_{k=1}^4 (-1)^k \cdot -2k$ 37) _____
 A) 16 B) -4 C) -20 D) 20

Determine whether the sequence is arithmetic.

38) 4, 12, 36, 108, 972, ... 38) _____
 A) Arithmetic B) Not arithmetic

39) 2, 4, 6, 10, 12, ... 39) _____
 A) Arithmetic B) Not arithmetic

40) 5, -15, 45, -135, 405, ... 40) _____
 A) Arithmetic B) Not arithmetic

Find the indicated term of the sequence.

41) The twenty-fourth term of the arithmetic sequence 6, 0, -6, ... 41) _____
 A) -138 B) 150 C) 144 D) -132

42) The ninth term of the arithmetic sequence 0, 13, 26, ... 42) _____
 A) 104 B) 117 C) 96 D) 130

43) The ninth term of the arithmetic sequence 29, 23, 17, ... 43) _____
 A) -25 B) 77 C) -19 D) -48

A geometric sequence is given. Find the common ratio and write out the first four terms.

- 44) $\{s_n\} = \{3^n\}$ 44) _____
A) $r = 3n$; $s_1 = 3$, $s_2 = 9$, $s_3 = 27$, $s_4 = 81$ B) $r = 3$; $s_1 = 3$, $s_2 = 9$, $s_3 = 27$, $s_4 = 81$
C) $r = 3n$; $s_1 = 3$, $s_2 = 6$, $s_3 = 9$, $s_4 = 12$ D) $r = 3$; $s_1 = 3$, $s_2 = 6$, $s_3 = 9$, $s_4 = 12$

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

- 45) 2, 4, 7, 11, ... 45) _____
A) Geometric; $r = 4$ B) Geometric; $r = 2$
C) Arithmetic; $d = 2$ D) Neither
- 46) 1, -3, 9, -27, 81, ... 46) _____
A) Geometric; $r = -3$ B) Geometric; $r = 3$
C) Arithmetic; $d = -4$ D) Neither

Find the fifth term and the n th term of the geometric sequence whose initial term, a , and common ratio, r , are given.

- 47) $a = 6$; $r = 4$ 47) _____
A) $a_5 = 1536$; $a_n = 6 \cdot (4)^n$ B) $a_5 = 6144$; $a_n = 6 \cdot (4)^n$
C) $a_5 = 1536$; $a_n = 6 \cdot (4)^{n-1}$ D) $a_5 = 6144$; $a_n = 6 \cdot (4)^{n-1}$
- 48) $a = -3$; $r = -2$ 48) _____
A) $a_5 = 24$; $a_n = -3 \cdot (-2)^n$ B) $a_5 = -48$; $a_n = -3 \cdot (-2)^{n-1}$
C) $a_5 = 24$; $a_n = -3 \cdot (-2)^{n-1}$ D) $a_5 = -48$; $a_n = -3 \cdot (-2)^n$

Solve.

- 49) A new piece of equipment cost a company \$66,000. Each year, for tax purposes, the company depreciates the value by 25%. What value should the company give the equipment after 7 years? 49) _____
A) \$11,747 B) \$4 C) \$16 D) \$8810
- 50) A particular substance decays in such a way that it loses half its weight each day. How much of the substance is left after 10 days if it starts out at 128 grams? 50) _____
A) $\frac{1}{4}$ gram B) $\frac{1}{8}$ gram C) 8 grams D) 4 grams