

For #1 – 4, find the first 4 terms of each described sequence.

1) general term: $a_n = 2(3n - 1)$ 2) recursive formula: $a_1 = -2$ and $a_n = a_{n-1} - 3$ for $n \geq 2$

3) arithmetic sequence: $a_1 = 4; d = -1$ 4) geometric sequence: $a_1 = 12; r = \frac{1}{3}$

For #5 – 6, write a formula for the general term (the n^{th} term) of each described sequence. Then find a_9 .

5) arithmetic sequence: 1, 5, 9, 13, 17, ... 6) geometric sequence: 5, -10, 20, -40, ...

For #7 – 11, find the indicated sum.

7) $\sum_{i=1}^3 4^i$

8) Find $2 + 4 + 6 + 8 + \cdots$, the sum of the first 40 positive even integers.

9) $\sum_{n=1}^{30} 4i$ (hint: this is arithmetic)

10) Find the sum of the first 5 terms of this geometric sequence: $\frac{1}{3}, \frac{4}{3}, \frac{16}{3}, \dots$

11) Find the sum of this infinite geometric series, if it exists: $3 - 1 + \frac{1}{3} - \frac{1}{9} + \cdots$

For #12 – 14, simplify each factorial expression.

12) $\frac{(n+2)!}{n!}$

13) $\frac{n+1}{(n+1)!}$

14) $\frac{(n+5)!}{(n+5)(n+4)(n+3)}$

For #15 – 16, write each repeating decimal as a fraction in lowest terms.

15) $0.\overline{8}$

16) $0.\overline{186}$

For #17 – 18, solve each problem. Round to the nearest dollar, unless otherwise specified.

17) Looking ahead to retirement, you sign up for automatic savings in a fixed-income 401K plan that pays 5% per year compounded annually. You plan to invest \$3500 at the end of each year for the next 15 years. How much will your account have in it at the end of 15 years?

18) Sergio deposits \$150 each month into an account paying annual interest of 6.5% compounded monthly. How much will his account have in it at the end of 5 years? How much interest will he have earned over the 5 years?

For #19 – 12, solve each problem. Round to the nearest dollar, unless otherwise specified.

19) Lani invests \$225 each quarter in a fixed-interest mutual fund paying annual interest of 5% compounded quarterly. How much will her account have in it at the end of 6 years?

20) A small business owner made \$50,000 the first year he owned his store and made an additional 9% over the previous year in each subsequent year. Find how much he made during his 4th year of the business. Also, find his total earnings during the first four years. Round to the nearest cent.

21) A job pays a salary of \$34,000 the first year. During the next 8 years, the salary increases by 4% each year. What is the salary for the 9th year? What is the total salary over the 9-year period? Round to the nearest cent.

22) A hockey player signs a contract with a starting salary of \$810,000 per year and an annual increase of 6.5% each year, beginning in the 2nd year. What will the athlete's salary be, to the nearest dollar, in the 8th year?

23) Evaluate the combination: $\binom{10}{5}$

24) Expand: $(2x - 1)^5$

25) Find the 6th term of the expansion of $(x^2 + y^4)^9$

26) Find the common ratio of the geometric sequence: $80, 20, 5, \frac{5}{4}, \dots$

27) Expand: $(3x + 2y)^6$

28) Find the 8th term of the expansion: $(4a - 7b)^{10}$

Answers:

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|--|------------------------------------|---|--------------------------------------|
| 1) 4, 10, 16, 22 | 2) $-2, -5, -8, -11$ | 3) 4, 3, 2, 1 | 4) $12, 4, \frac{4}{3}, \frac{4}{9}$ |
| 5) $a_n = 4n - 3; a_9 = 33$ | 6) $a_n = 5(-2)^{n-1}; a_9 = 1280$ | 7) 84 | |
| 8) 1640 | 9) 1860 | 10) $\frac{341}{3}$ | 11) $\frac{9}{4}$ |
| 12) $(n + 2)(n + 1)$ or $n^2 + 3n + 2$ | 13) $\frac{1}{n!}$ | 14) $(n + 2)!$ | 15) $\frac{8}{9}$ |
| 16) $\frac{62}{333}$ | 17) \$75,525 | 18) \$10,601; \$1601 | |
| 19) \$6252 | 20) \$64,751.45; \$228,656.45 | 21) \$46,531.35; \$359,815.04 | |
| 22) \$1,258,729 | 23) 252 | 24) $32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$ | |
| 25) $126x^8y^{20}$ | 26) $\frac{1}{4}$ | | |
| 27) $729x^6 + 2916x^5y + 4860x^4y^2 + 4320x^3y^3 + 2160x^2y^4 + 576xy^5 + 64y^6$ | | | |
| 28) $-6,324,810,240a^3b^7$ | | | |