

1. Find the next four terms in the arithmetic sequence -5, -2, 1, ...

$$d = -2 - (-5) = 3$$

4, 7, 10, 13

2. Find the 47th term in the arithmetic sequence -4, -1, 2, 5, ...

$$d = -1 - (-4) = 3 \quad a_{47} = -4 + (47-1)3$$

$$a_{47} = 134$$

3. Find the first term in the arithmetic sequence for which $a_{19} = 42$ and $d = \frac{-2}{3}$.

$$42 = a_1 + (19-1)\left(\frac{-2}{3}\right)$$

$$a_1 = 54$$

4. Write an arithmetic sequence that has five arithmetic means between 4.9 and 2.5.

$$2.5 = 4.9 + (7-1)d$$

$$d = -0.4$$

4.9, 4.5, 4.1, 3.7, 3.3, 2.9, 2.5

5. Find the sum of the first 60 terms in the arithmetic series $9 + 14 + 19 + \dots + 304$.

$$S_{60} = \frac{60}{2} (9 + 304)$$

$$S_{60} = 9390$$

6. Determine the common ratio and find the next three terms in the geometric sequence

$$1, \frac{-1}{2}, \frac{1}{4}, \dots$$

$$r = \frac{-1/2}{1} = -\frac{1}{2}$$

$$-\frac{1}{8}, \frac{1}{16}, -\frac{1}{32}$$

$$-1.25, .0625, -0.3125$$

7. Find the 12th term in the geometric sequence -24, 26.4, -29.04, ...

$$r = \frac{26.4}{-24} = -1.1 \quad S_{12} = -24(-1.1)^{11}$$

$$68.5$$

8. Write a sequence that has two geometric means between 48 and -750.

$$-750 = 48r^3$$

$$r = -2.5$$

$$48, -120, 300, -750$$

9. Find the sum of the first ten terms of the geometric series $16 - 48 + 144 - 432 + \dots$

$$-48 \div 16 = -3 \quad S_{10} = \frac{16 - 16(-3)^{10}}{1 - (-3)}$$

$$S_{10} = -236,192$$

$$\frac{-944765}{4}$$

10. If $r = -2$ and $a_8 = -384$, what is the first term of the geometric sequence?

$$\frac{-384}{-128} = a_1(-2)^7$$

$$3 = a_1$$

Write each expression in expanded form and then find the sum.

11. $\sum_{i=1}^4 (n^2 - 3) = (1^2 - 3) + (2^2 - 3) + (3^2 - 3) + (4^2 - 3) = 18$

12. $\sum_{i=1}^7 (3^i + 1) = (3^1 + 1) + (3^2 + 1) + (3^3 + 1) + (3^4 + 1) + (3^5 + 1) + (3^6 + 1) + (3^7 + 1) = 3244$

13. $\sum_{i=3}^8 (6 - 4b) = (6 - 4(3)) + (6 - 4(4)) + (6 - 4(5)) + (6 - 4(6)) + (6 - 4(7)) + (6 - 4(8)) = -96$

Simplify.

14. $10! = 3,628,800$

15. $\frac{12!}{8!4!} = 495$

Expand each binomial.

16. $(x + y)^6$
 $x^6 + 6x^5y + 15x^4y^2 + 20x^3y^3 + 15x^2y^4 + 6xy^5 + y^6$

17. $(4x + 2y)^5$
 $1024x^5 + 2560x^4y + 2560x^3y^2 + 1280x^2y^3 + 320xy^4 + 32y^5$

18. $(2x - 3y)^3$
 $8x^3 - 36x^2y + 54xy^2 - 27y^3$

Find the designated term of each binomial expansion.

19. 5th term of $(4a + 3b)^7$

$$\frac{7!}{4!(7-4)!} (4a)^{7-4} (3b)^4 = 35 \cdot 181,440 a^3 b^4$$

20. 4th term of $(2x - 3y)^6$

$$\frac{6!}{3!(6-3)!} (2x)^{6-3} (-3y)^3 = 20 \cdot -4320 x^3 y^3 = -86,400 x^3 y^3$$