

Pre-Calc

Name _____

Sequence and Series

Date _____ Per _____

Decide whether the sequence is arithmetic, geometric, or neither. Explain your answer.

1. 1, -4, 16, -64, ...

2. 2, 5, 10, 13, ...

3. -5, 5, 7, -7, ...

4. 3, 6, 9, 12

5. 3, 12, 21, 30

6. $5, \frac{5}{2}, \frac{5}{4}, \frac{5}{8}, \dots$

Write the rule for the nth term of the arithmetic sequence. Then find a_{20} .

7. 1, 7, 13, 19, 25, ...

8. 5, -2, -9, -16, -23, ...

9. $\frac{9}{2}, 5, \frac{11}{2}, 6, \frac{13}{2}, \dots$

Write a rule for the nth term of the arithmetic sequence.

10. $d = -4, a_1 = 7$

11. $d = 2, a_{12} = 18$

12. $a_7 = -22, a_{11} = -34$

For part (a) find the sum of the first n terms of the arithmetic series. For part (b), find n for the given sum S_n .

13. $25 + 35 + 45 + 55 + \dots$

a) $n = 15$ b) $S_n = 3105$

14. $32 + 24 + 16 + 8 + 0 + \dots$

a) $n = 30$ b) $S_n = -880$

Find the sum of the series

$$15. \sum_{i=1}^{36} (-5 - 3i)$$

$$16. \sum_{i=1}^{22} (2 - 7i)$$

$$17. \sum_{i=1}^{50} (4 + \frac{1}{2}i)$$

18. A well drilling company charges \$15 for drilling the first foot of a well, \$15.25 for drilling the second foot, \$15.50 for drilling the third foot, and so on. How much would it cost to have the company drill a 100-foot well?

19. As a farmer bales a field of hay, each trip around the field gets shorter. On the first trip around the field, there were 230 bales of hay. On the second trip, there were 219. The number of bales on each succeeding trip decreases arithmetically. The total number of trips is 10. How many bales of hay does the farmer get from the field?

Write a rule for the nth term of the geometric sequence. Then find a_8 .

$$20. -3, \frac{3}{4}, -\frac{3}{16}, \frac{3}{64}, \dots$$

$$21. 2, -8, 32, -128, \dots$$

$$22. 7, 28, 112, 448, \dots$$

Write a rule for the nth term of the geometric sequence.

$$23. a_1 = -4, r = \frac{1}{2}$$

$$24. a_3 = 18, a_6 = -486$$

$$25. a_3 = -64, a_7 = -\frac{1}{4}$$

Find the sum of the first n terms of the geometric series.

26. $1 + (-4) + 16 + (-64) + \dots$
 $n = 8$

27. $-2 + 3 + \left(-\frac{9}{2}\right) + \frac{27}{4} + \dots$
 $n = 14$

Find the sum.

28. $\sum_{i=1}^8 (-3)^{i-1}$

29. $\sum_{i=1}^{10} -2 \left(-\frac{3}{2}\right)^{i-1}$

30. $\sum_{i=0}^{11} 7 \left(\frac{1}{2}\right)^i$

31. A certain bacteria culture initially contains 5000 bacteria and increases by 15% every hour. Write a rule for the number of bacteria a_n present after n hours. How many bacteria are present after 12 hours?

32. The yearly depreciation rate of a certain automobile is 25% of its value at the beginning of the year. The original cost of the automobile was \$25,000. Write a rule for the current value of the automobile a_n in the terms of the year. After many years will the automobile be worth \$12,000?

Find the sum of the infinite geometric series if it has one.

$$33. \sum_{n=1}^{\infty} 3 \left(-\frac{1}{3}\right)^{n-1}$$

$$34. \sum_{n=0}^{\infty} 0.6(0.1)^n$$

$$35. \sum_{n=1}^{\infty} 3 \left(\frac{7}{2}\right)^{n-1}$$

Find the common ratio of the infinite geometric series with the given sum and first term.

$$36. S = 4, a_1 = 7$$

$$37. S = \frac{8}{9}, a_1 = \frac{2}{3}$$

$$38. S = -\frac{16}{15}, a_1 = -4$$

Write the repeating decimal as a fraction. Reduce your answer to simplest form.

$$39. 0.\overline{8}$$

$$40. 0.\overline{40}$$

$$41. 0.\overline{653}$$

Evaluate the factorial.

$$42. 6!$$

$$43. 10!$$

$$44. 0!$$

Simplify

$$45. \frac{8! \cdot 3!}{4! \cdot 5!}$$

$$46. \frac{(3n+3)!}{(3n)!}$$