Name _____ **Arithmetic and Geometric Sequences**

Determine if the sequence is arithmetic or geometric, and then find the next three terms.

1. -2, -4, -8, -16, _____, _____, _____   2. 65, 60, 55, 50, 45, _____, _____, _____

3. 8, 13, 18, 23, 28, _____, _____, _____   4. 1, 1.5, 2.25, 3.375, _____, _____, _____

Determine if the sequence is arithmetic or geometric, and then find the given term.

1. 11th term: 5, 3, 1, –1, … _____

2. 23rd term: 0.1, 0.15, 0.2, 0.25, … _____

3. 6th term: 25, 75, 225, 675, … _____

4. 22nd term: –2, –5, –8, –11, –14, … _____

5. 10th term: $a_1 = 320$, $r = 0.5$

6. 50th term: –9, 2, 13, 24, 35, … _____

7. Mariano received a bonus of $50 for working the day after Thanksgiving, plus his regular wage of $9.45 an hour. If his total wages for the day were $135.05, how many hours did he work?

12. Heather makes $6.50 per hour. Every three months, she is eligible for a 2% raise. How much will she make after 2 years if she gets a raise every time she is eligible?

For each sequence, state if it is arithmetic, geometric, or neither.

1) −3, −18, −108, −648, −3888, ...

2) 2, 4, 12, 48, 240, ...

3) −35, 165, 365, 565, 765, ...

4) −2, 6, −18, 54, −162, ...

5) −7, 93, 193, 293, 393, ...

6) 8, 14, 20, 26, 32, ...

7) −1, −2, −6, −24, −120, ...

8) −18, −12, −6, 0, 6, ...

9) −2.5, −5, −10, −20, −40, ...

10) 1, 2, 6, 24, 120, ...

Find the next three terms in each sequence.

11) 2, 4, 12, 48, 240, ...

12) 2, 5, 10, 17, 26, ...

13) 1, 9, 25, 49, 81, ...

14) 4, 16, 36, 64, 100, ...

15) −6, −2, 0, 1, $\frac{3}{2}$, ...

16) −9, −7, −4, 0, 5, ...

17) −2, −4, −12, −48, −240, ...

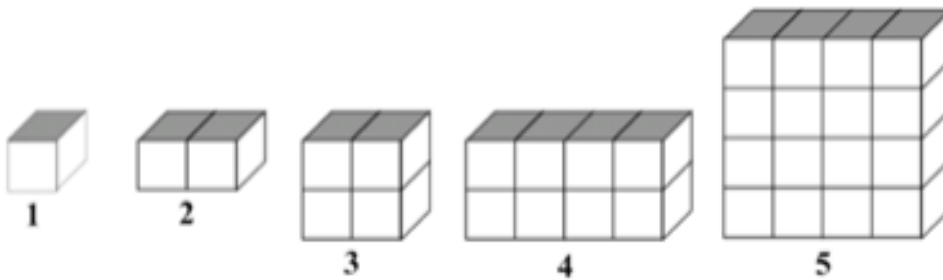18) 6, 8, 11, 15, 20, ...

19) −30, −14, −6, −2, 0, ...

20) −2, 1, 6, 13, 22, ...

Visual Representation of sequences

Does this pattern represent an arithmetic or geometric sequence? Explain.

Find how many dots would be in the next figure?

Does this pattern represent an arithmetic or geometric sequence? Explain.

Find how many cubes would be in the next figure?

Given that the following are arithmetic sequences, determine the number of terms in the sequences

2,5,8,……….299

9,5, 1,……-251

Write a rule for the nth term of the arithmetic sequence given two terms.

. $a_{20}=240$, $a_{15}=170$ $a_{16}=6$, $a_{20}=7$

Write a rule for the nth term of the geometric sequence given two terms.

. $a_2=36$, $a_4=576$ $a_2=4$, $a_5=\dfrac{256}{27}$

Find the sum of the following _arithmetic_ series.

$3 + 6 + 9 + 12 + 15 + 18 + ... ; n = 25$

$-1 + 2 + 5 + 8 + 11 + 14 + ... ; n = 20$

$\displaystyle .\sum_{i=1}^{20} (-2i + 14)$

$\displaystyle \sum_{i=4}^{9} (6i - 30)$

Find the sum of the following _geometric_ series.

$\dfrac{1}{2} + 1 + 2 + 4 + ... ; n = 15$

$1000 + 500 + 250 + 125 + ... ; n = 20$

$\displaystyle \sum_{i=1}^{8} 90\left(\frac{1}{3}\right)^{i-1}$

$\displaystyle \sum_{i=0}^{7} 1000\left(\frac{1}{2}\right)^{i}$

1. For each of the following arithmetic progressions, find the values of a, d, and the u_n indicated.

   (a) $1, 4, 7, \ldots, (u_{10})$

   (b) $-8, -6, -4, \ldots, (u_{12})$

   (c) $8, 4, 0, \ldots, (u_{20})$

   (d) $-20, -15, -10, \ldots, (u_6)$

   (e) $40, 30, 20, \ldots, (u_{18})$

   (f) $-6, -8, -10, \ldots, (u_{12})$

   (g) $2, 2\frac{1}{2}, 3, \ldots, (u_{19})$

   (h) $6, 5\frac{3}{4}, 5\frac{1}{2}, \ldots, (u_{10})$

   (i) $-7, -6\frac{1}{2}, -6, \ldots, (u_{14})$

   (j) $0, -5, -10, \ldots, (u_{15})$

2. For each of the following arithmetic progressions, find the values of a, d, and the S_n indicated.

   (a) $1, 3, 5, \ldots, (S_8)$

   (b) $2, 5, 8, \ldots, (S_{10})$

   (c) $10, 7, 4, \ldots, (S_{20})$

   (d) $6, 6\frac{1}{2}, 7, \ldots, (S_8)$

   (e) $-8, -7, -6, \ldots, (S_{14})$

   (f) $-2, 0, 2, \ldots, (S_5)$

   (g) $-20, -16, -12, \ldots, (S_4)$

   (h) $40, 35, 30, \ldots, (S_{11})$

   (i) $12, 10\frac{1}{2}, 9, \ldots, (S_9)$

   (j) $-8, -5, -2, \ldots, (S_{20})$

3. Find the term indicated for each of the geometric progressions.

   (a) $1, 3, 9, \ldots, (u_9)$

   (b) $4, -8, 16, \ldots, (u_{10})$

   (c) $18, -6, 2, \ldots, (u_{12})$

   (d) $1000, 100, 10, \ldots, (u_7)$

   (e) $32, -8, 2, \ldots, (u_{14})$

   (f) $-0.005, -0.05, -0.5, \ldots, (u_{10})$

   (g) $-6, -12, -24, \ldots, (u_6)$

   (h) $1.4, 0.7, 0.35, \ldots, (u_5)$

   (i) $68, -34, 17, \ldots, (u_9)$

   (j) $8, 2, \frac{1}{2}, \ldots, (u_{11})$

4. Find the sum indicated for each of the following geometric series

   (a) $6 + 9 + 13.5 + \cdots \ (S_{10})$

   (b) $18 - 9 + 4.5 + \cdots \ (S_{12})$

   (c) $6 + 3 + \frac{3}{2} + \cdots \ (S_{10})$

   (d) $6000 + 600 + 60 + \cdots \ (S_{20})$

   (e) $80 - 20 + 5 + \cdots \ (S_9)$

Determine the number of terms n in each arithmetic series

$a_1 = 19, \quad a_n = 96, \quad S_n = 690$ $a_1 = 16, \quad a_n = 163, \quad S_n = 4475$

$a_1 = -3, \quad d = 2, \quad S_n = 21$ $a_1 = 4, \quad d = 7, \quad S_n = 229$

$(-2) + (-12) + (-22) + (-32) \dots, S_n = -224$ $(-16) + (-26) + (-36) + (-46) \dots, S_n = -1818$

Determine the number of terms n in each geometric series

$a_1 = 10 \qquad a_n = 810 \qquad S_n = 1210$ $a_1 = 8 \qquad r = 11 \qquad S_n = 1064$

Evaluate each infinite geometric series described.

$$\sum_{i=1}^{\infty} 4.7 \cdot 0.8^{i-1}$$

$$\sum_{k=1}^{\infty} -108 \cdot \left(-\frac{1}{3}\right)^{k-1}$$

$$\sum_{m=1}^{\infty} 4 \cdot \left(-\frac{1}{3}\right)^{m-1}$$

$$\sum_{m=1}^{\infty} -6 \cdot \left(\frac{1}{4}\right)^{m-1}$$

$$6 - \frac{6}{5} + \frac{6}{25} - \frac{6}{125} \dots$$

$$1 - \frac{1}{4} + \frac{1}{16} - \frac{1}{64} \dots$$

$$a_1 = 243, \ r = -\frac{1}{3}$$

$$a_1 = -\frac{6}{5}, \ r = \frac{2}{5}$$

Applications

A ball is dropped from a height of 8 meters. Each time it hits the ground, it rebounds ⅌ the distance it has fallen. In theory, how far will the ball travel before coming to rest?