Arithmetic and Geometric Sequences WS

Key

For each sequence, write the explicit formula, convert it to function form, and find the 10th term.

1) 10, 0, −10, −20, ... $d = -10$

$a_n = 10 - 10(n-1)$

$= 10 - 10n + 10$

$f(n) = -10n + 20$

$f(10) = -10(10) + 20$

$f(10) = -80$

2) 19, 14, 9, 4, ... $d = -5$

$t_n = 19 - 5(n-1)$

$= 19 - 5n + 5$

$g(n) = -5n + 24$

$g(10) = -5(10) + 24$

$g(10) = -26$

3) −17, −11, −5, 1, ... $d = 6$

$a_n = -17 + 6(n-1)$

$= -17 + 6n - 6$

$h(n) = 6n - 23$

$h(10) = 6(10) - 23$

$h(10) = 37$

4) −19, −26, −33, −40, ... $d = -7$

$a_n = -19 - 7(n-1)$

$= -19 - 7n + 7$

$f(n) = -7n - 12$

$f(10) = -7(10) - 12$

$f(10) = -82$

5) 3, −97, −197, −297, ... $d = -100$

$t_n = 3 - 100(n-1)$

$= 3 - 100n + 100$

$g(n) = -100n + 103$

$g(10) = -100(10) + 103$

$g(10) = -897$

6) 28, 34, 40, 46, ... $d = 6$

$t_n = 28 + 6(n-1)$

$= 28 + 6n - 6$

$h(n) = 6n + 22$

$h(10) = 6(10) + 22$

$h(10) = 82$

7) −5, 95, 195, 295, ... $d = 100$

$a_n = -5 + 100(n-1)$

$= -5 + 100n - 100$

$f(n) = 100n - 105$

$f(10) = 100(10) - 105$

$f(10) = 895$

8) −14, −5, 4, 13, ... $d = 9$

$a_n = -14 + 9(n-1)$

$= -14 + 9n - 9$

$f(n) = 9n - 23$

$f(10) = 9(10) - 23$

$f(10) = 67$

9) 37, 33, 29, 25, ... $d = -4$

$a_n = 37 - 4(n-1)$

$= 37 - 4n + 4$

$f(n) = -4n + 41$

$f(10) = -4(10) + 41$

$f(10) = 1$

10) 33, 23, 13, 3, ... $d = -10$

$a_n = 33 - 10(n-1)$

$= 33 - 10n + 10$

$f(n) = -10n + 43$

$f(10) = -10(10) + 43$

$f(10) = -57$

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11) $-1, 4, -16, 64, \ldots$ $r=-4$

$g_n = -1(4)^{n-1}$

$g_n = -(4)^{n-1}$

$= -1 \cdot 4^n \cdot 4^{-1}$

$= -1 \cdot 4^n \cdot \frac{1}{4}$

$g(n) = -\frac{1}{4}(4)^n$

$g(10) = -\frac{1}{4} \cdot 4^{10}$

$g(10) = -262,144$

12) $-4, 12, -36, 108, \ldots$ $r=-3$

$g_n = -4(-3)^{n-1}$

$= -4 \cdot (-3)^n \cdot (-3)^{-1}$

$= -4 \cdot -\frac{1}{3} \cdot (-3)^n$

$g(n) = \frac{4}{3}(-3)^n$

$g(10) = \frac{4}{3}(-3)^{10}$

$g(10) = 78,732$

13) $2, -12, 72, -432, \ldots$ $r=-6$

$g_n = 2(-6)^{n-1}$

$= 2(-6)^n(-6)^{-1}$

$= 2(-\frac{1}{6})(-6)^n$

$g(n) = -\frac{1}{3}(-6)^n$

$g(10) = -\frac{1}{3}(-6)^{10}$

$g(10) = -20,155,392$

14) $-3, 18, -108, 648, \ldots$ $r=-6$

$g_n = -3(-6)^{n-1}$

$= -3(-6)^n(-6)^{-1}$

$= -3(-\frac{1}{6})(-6)^n$

$g(n) = \frac{1}{2}(-6)^n$

$g(10) = \frac{1}{2}(-6)^{10}$

$g(10) = 30,233,088$

15) $4, -24, 144, -864, \ldots$ $r=-6$

$g_n = 4(-6)^{n-1}$

$= 4(-6)^n(-6)^{-1}$

$= 4(-\frac{1}{6})(-6)^n$

$g(n) = -\frac{2}{3}(-6)^n$

16) $-3, -15, -75, -375, \ldots$ $r=5$

$g_n = -3(5)^{n-1}$

$= -3(5)^n(5)^{-1}$

$= -3(\frac{1}{5})(5)^n$

$g(n) = -\frac{3}{5}(5)^n$

$g(10) = -\frac{3}{5}(5)^{10}$

$g(10) = -5,859,375$

17) $-2, -4, -8, -16, \ldots$ $r=2$

$g_n = -2(2)^{n-1}$

$= -2(2)^n(2)^{-1}$

$= -2(\frac{1}{2})(2)^n$

$g(n) = -2^n$

$g(10) = -2^{10}$

$g(10) = -1,024$

18) $-1, 6, -36, 216, \ldots$ $r=-6$

$g_n = -(6)^{n-1}$

$= -1(6)^n(6)^{-1}$

$= -1(\frac{1}{6})(6)^n$

$g(n) = -\frac{1}{6}(6)^n$

$g(10) = -\frac{1}{6}(6)^{10}$

$g(10) = -10,077,696$

19) $1, 6, 36, 216, \ldots$ $r=6$

$g_n = 6^{n-1}$

$= 6^n \cdot 6^{-1}$

$g(n) = \frac{1}{6}(6)^n$

$g(10) = \frac{1}{6}(6)^{10}$

$g(10) = 10,077,696$

20) $-3, 6, -12, 24, \ldots$ $r=-2$

$g_n = -3(-2)^{n-1}$

$= -3(-2)^n(-2)^{-1}$

$= -3(-\frac{1}{2})(-2)^n$

$g(n) = \frac{3}{2}(-2)^n$

$g(10) = \frac{3}{2}(-2)^{10}$

$g(10) = 1,536$