

$$a_1 = 14, \quad a_2 = 61$$

$$a_2 = a_1 + 3d = 14 + 3d = 61$$

$$3d = 47 \quad 14, 47, \dots$$

$$d = 15 \quad a_n = 15n + 14$$

$$15n + 14 = 150$$

$$15n = 136 \quad \boxed{n = 9}$$

$$101, 118, 135, \dots, 994$$

$$15n + 14 = 994$$

$$994 - 14 = 980$$

$$980 = 15n$$

$$n = 65 \quad \boxed{n = 65}$$

$$a_{12} + a_1 = 2a + 12d$$

$$a_{n+1} = -9n + 12$$

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$$n = n + 1$$

$$a_n = -9(n-1) + 12 = -9n + 21$$

$$a_1 = -9 \times 1 + 12 = 3$$

$$a_{12} = -9 \times 12 + 12 = -108$$

$$3 - 108 = -105$$

$$a_n = -9n + 12$$

$$a_n = 2^n - 1$$

$$a_1 - a_n = a_{12} - a_1$$

$$a_1 = 2^1 - 1 = 1$$

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

$$a_{12} = 2^{12} - 1$$

$$2^{12} - 2^1 = 2^{12} - 2^1 - 1$$

$$2^{n+1} = 2^{12} - 2^1 - 1$$

$$2^n = 12 \Rightarrow n = 12 \quad 12 + 1 + 12 = 25 \quad \boxed{25}$$

$$a + 9d = a_1$$

$$a + 11d = a_{12}$$

$$a + 11d - a - 9d = 0$$

$$2d = 0$$

$$d = 0$$

$$a_{12} = a + 11d$$

$$-12 \cdot 0 + 0 = 0 \quad \boxed{0}$$

$$a + 11d + a + 9d = 2a + 20d = 20$$

$$2a + 0 = 20 \quad a = 10$$

$a_1 + a_2 + a_3 + a_4 + a_5 = 5a_1 + 10d$ $a_2 + a_3 + a_4 + a_5 = 4a_1 + 10d$ $\frac{10a + 10d}{10} = \frac{4a + 10d}{10}$ $10a + 10d = 4a + 10d$ $10a = 4a$ $d = 2a$ $a_2 = a_1 + d \Rightarrow a_2 = a + 2a = 3a$ $\frac{a_2}{a} = 3$	6
$t_n = t_{n-1} + d$ $d = \frac{10}{1} = 10$ $t_1 + 10 + 10 + 10 + 10 + 10 = 5t_1 + 40$ $(t + 10) - (t + 10) = 100 + 10t$ $t_v = t + 10$ $\frac{t + 10 + 10 + 10 + 10 + 10}{t + 10} = \frac{5(t + 10)}{t + 10} = 5$	7
$d = \frac{a_{12} - a_1}{12} = \frac{(1 + 12\sqrt{3}) - (1 - 12\sqrt{3})}{12}$ $\frac{24\sqrt{3}}{12}$	8
$(r_{n-1}) + r = r_n - 1$ $a_{n+1} = 11$ $a_k = a_1 + (k-1)d = 1 + (k-1)d$ $a_{r_{n-1}} = 11 \quad (r_{n-1})d = 10 \quad d = \frac{10}{r_{n-1}-1}$	9
$a_{17} + a_{19} = a_{18} + a_{18}$ $17n + 15d = 18n$ $n = 1$ $a_1 = 17 \times a_{17}$ $a + 16d = 17a + 16d$ $16a = -16d$ $a = -d$	$a_k = a_1 + (k-1)d$ $a_k = a_1 + (k-1)(-a_1)$ $= a_1 [1 - (k-1)] = a_1$ $a_1 (1 - k) = 0$ $1 - k = 0$ $k = 1$