Theta (Seq/Series) Solutions

$d = a_n - a_{n-1}$

① $a_1 + (n-1)d$
$10 + (40-1)3$
$10 + 117 = \boxed{127}$

② $16^2 = 256$

③ $9 - 12 = -3$

④ $0+1+2+3+\ldots 49$
$n\left[\frac{a_1 + a_n}{2}\right]$
$50\left[\frac{0+49}{2}\right] = 1225$

⑤ $\frac{a_n}{a_{n-1}} = r$
$\frac{9}{6} = \frac{3}{2}$

⑥ $1+4+9+16+25+\ldots 121$
506

⑦ $2(1)+1 = 3$
$2(2)+1 = 5$
$2(3)+1 = 7$
$\vdots$
$2(6)+1 = 13$
$3+5+7+\ldots 13 = 48$

⑧ $S_{20} = \frac{1(2^{20}-1)}{2-1}$
$1,048,575$

⑨ $2^3 - 1 = 7$
$2^4 - 1 = 15$
$2^5 - 1 = 31$
$2^6 - 1 = 63$
$2^7 - 1 = 127$
$7+15+31+63+127 = 243$

⑩ $2+3+5+7+11+13+17+19+23 =$
100

⑪ $-2 \_ \_ \_ \_ 6$
$6 = -2 + (6-1)d$
$6 = -2 + 5d$
$8 = 5d$
$1.6 = d$
$-2 + 1.6 = -0.4$
$-0.4 + 1.6 = 1.2$
$1.2 + 1.6 = 2.8$
$2.8 + 1.6 = 4.4$

⑫ $2 \_ \_ \_ 32$
$32 = 2 \cdot r^4$
$16 = r^4$
$r = \pm 2$

$2 \underset{\times 2}{4} \underset{\times 2}{8} \underset{\times 2}{16} 32$

$2 \underset{*-2}{-4} \underset{*-2}{8} \underset{*-2}{-16} 32$

⑬ $48 = -3 + (n-1)3$
$51 = (n-1)3$
$17 = n-1$
$18 = n$

(14) $a_n = a_1 \cdot r^{n-1}$

$524{,}288 = 2 \cdot 4^{n-1}$

$262{,}144 = 4^{n-1}$

$4^9 = 4^{n-1}$

$n-1 = 9$

$n = 10$

(15) $644 = \frac{n[2(4)+(n-1)2]}{2}$

$644 = \frac{n[-8+2n-2]}{2}$

$644 = \frac{n(2n-10)}{2}$

$644 = n(n-5)$

$0 = n^2 - 5n - 644$

$(n-28)(n+23)$

$n = 28$

(16) $S_n = \frac{a_1(r^n-1)}{r-1}$

$177144 = \frac{6(3^n-1)}{3-1}$

$177144 = 3(3^n-1)$

$59048 = 3^n - 1$

$59049 = 3^n$

$3^{10} = 3^n$

$n = 10$

(17) $S \approx \frac{a_1}{1-r} \Rightarrow \frac{1}{1-1/3} = \frac{1}{2/3} = 3/2$

$\frac{1}{3}^0 = 1$

$\frac{1}{3}^1 = 1/3$

$\frac{1}{3}^2 = 1/9$

(18) $a_1 = 13$

$a_2 = 2(13)+3 = 29$

$a_3 = 2(29)+3 = 61$

$a_4 = 2(61)+3 = 125$

$a_5 = 2(125)+3 = 253$

$a_6 = 2(253)+3 = 509$

$a_7 = 2(509)+3 = 1021$

$a_8 = 2(1021)+3 = 2045$

$a_8 - a_4 = 2045 - 125 = 1920$

(19) $a_1 = 13$

$a_2 = 16$

$a_3 = 19$

$a_4 = 22$

1	2	3	4
13	16	19	22
	+3	+3	+3

$y = 3x + b$

$13 = 3 \cdot 1 + b$

$10 = b$

$y = 3x + 10$

(20) . ∴ ∴∴

1 3 6 10 15 21

+2 +3 +4 +5 +6

21 28 36 45 55

+7 +8 +9 +10

(21) $3y+2 + 6y+2 + 9y+2 + 12y+2 + 15y+2 + 18y+2 = 317$

$63y + 12 = 317$

$63y = 305$

$y = 5$

(22) $(-2)^{1-1} = 1$

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

$(-2)^{3-1} = (-2)^2 = 4$

$(-2)^{4-1} = (-2)^3 = -8$

(23) $i^1 + i^2 + i^3 + i^4 + i^5 + i^6 + i^7 + i^8 + i^9 + i^{10}$

$i + -1 + -i + 1 + i + -1 + -i + 1 + i + -1$

$i + -1$

(24) $2 \_\_ 16$

$16 = 2 \cdot r^2$

$8 = r^2$

$r = \pm 2\sqrt{2}$

$2 * \pm 2\sqrt{2} =$

$\pm 4\sqrt{2}$

(25) $a_n = a_1 + (n-1)d$

$a_n = (-2x+1) + 29(x+1)$

$-2x+1 + 29x+29$

$27x+30$

(26) $\frac{\_\_ + 16 + \_\_}{3} = 16$

$\_\_ + 16 + \_\_ = 48$

$\_\_ + \_\_ = 32$

(27) #1 $30000 * 1.05^x$

#2 $30000 + 3000x$

x = # of 6 month period

put in y_1 & y_2 & use table

at $x=27$ $y_1 = 112{,}004$

$y_2 = 111{,}000$

$\frac{27}{2} = 13.5$ years

(28) $\sum_{n=1}^{62} (4n-1)$

1 2 3 ... __

3 7 11 ... 247

4 4

$3 = 4(1) + b$

$-1 = b$

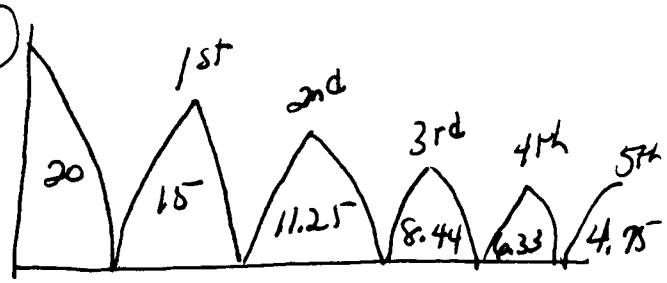
$247 = 3 + (n-1)4$

$244 = 4(n-1)$

$61 = n-1$

$62 = n$

(29)



$20 + 2(15) + 2(11.25) + 2(8.44) + 2(6.33) + 4.75 =$

106.79

(30) $(\log n + \log 2) = \log 2n$

$n=1 \Rightarrow \log 2$

$n=2 \Rightarrow \log 4$

$n=3 \quad \log 6$

$n=4 \quad \log 8$

$n=5 \quad \log 10$

$\log 2 + \log 4 + \log 6 + \log 8 + \log 10$

$\log 3840$

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