12) if $\log 2 = 0.3010$, find the value of $\log\log 4$

$\log\log 4 = \log(2)^{10}$

$10\log 2$

$10 \times (.3010)$

3.010 //

Characteristic
&
mantissa

Characteristic we can calculate

mantissa needs log table Always tive

NOTE: (No. of digits in integral part -1)

NOTE: $-$[No. of zeroes immediately after decimal point)+1]

applying these rule

before decimal

$\log 7.23 = >1 = 1-1=0$

$\log 71.3271 \quad 2-1=1$

$\log 0.0723 < 1 \Rightarrow$

$-[-1]+1 = 2-1$

Immediate zero

13) find the number of digits in $4^{10} \times 6^{10}$

$\log(4^{10} \times 6^{10}) = \log[(2^2)^{10} \times (2\times 3)^{10}]$ No. of digits in $\log$ Characteristic i.e.

$\log[2^{20} \times 2^{10} \times 3^{10}] = \log[2^{30} \times 3^{10}]$

Product rule

$30\log 2 + 10\log 3$

$30(0.3010) + 10(0.4771)$

$9.030 + 4.771 = 13.801$

$13.801 + 1$

14 //

Arithmetic Progression

$a_1, a_2, a_3 \cdots a_n$ $\quad a_2 - a_1 = a_3 - a_2 \cdots$

common difference $= d$

$a, a+d, a+2d, a+3d$

$a_n = a + (n-1)d$

$n-1\,d = a_n - a$ $\qquad n = \frac{\text{last term} - \text{first term}}{d} + 1$

$n = \left(\frac{a_n - a}{d} + 1\right)$

$1, 3, 5, 7 \cdots 95$

$n = \left(\frac{15-1}{2} + 1\right) = 8$

8^{th} term $= 15$

$a_8 = a + (n-1)d$

$1 + (8-1)2 = 1 + 14 = 15$

$a, a+d, a+2d \cdots + a + (n+1)d$

$(a + a + a \cdots n \text{ times}) + \{d + 2d + \cdots + (n-1)d\}$

na $\qquad \frac{n(n-1)}{2} d$

$\frac{+(n-1)d}{2}$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$\frac{n}{2}[a + \{a + (n-1)d\}]$

$S_n = \frac{n}{2}(\text{first term} + \text{last term})$

Arithmetic mean

eg.) A b C $\quad b = \frac{a+c}{2}$

$a_1, a_2 \cdots a_n = \frac{(a_1 + a_2 + \cdots + a_n)}{n}$

Inserting Arithmetic mean

$a, m_1, m_2 \cdots m_n, b$

$d = \frac{b-a}{n+1}$, first mean $m_1 = a + \frac{b-a}{n+n}$

$m_2 = a + 2d$

Add / subtract a particular number of terms of an AP $\quad 1, 3, 5, 7 \quad \cdots \quad 35\,7q$ - AP

$+2 \; +2 \; +2 \; +2$

though u add it results in AP

Multiply / Divide all terms by constant

$1 \; 3 \; 5 \; 7$

$\times 2 \; \times 2 \; \cdots$

$2, 6, 10, 14$ - They are an AP

4

Add two AP series - Resulting is also an AP

$2, 4, 6, 8$

$3, 6, 9, 12$

$5, 10, 15$ - An AP

$d = 5$

1.) If 3rd a
find its

2.) 5th t
which

i.) an

ii.)

3.) T
A

1.) If 3rd and 7th terms of an AP are 14 & 22 find its first term.

$$a+6d = 22$$
$$a+2d = 14$$
$$4d = 16$$
$$d = 2.5$$
$$a + 2(2.5) = 14 \quad a = 14$$

2.) 5th term of an AP is 7 while its 7th term is 17. which of the following is its nth term?

i.) $8n-30$ ii.) $1/2*(10n-36)$ iii.) n^2-25

$8n-30 = 8(5)-30 = 10 \neq 7$

ii.) $\frac{1}{2}(10n-36) = \frac{1}{2}(10\times5-36) = 7$, $\frac{1}{2}(10\times7-36) = 17$

Satisfies

3.) The ratio of 2nd to 7th term of an AP is 1:3 4th term is 9. find 15th term. find AP of this AP with 1st term.

$$\frac{a+d}{a+6d} = \frac{1}{3}$$

$$3a+3d = a+6d$$

$$2a = 3d \quad \frac{a}{d} = \frac{3}{2} \quad a = 3x \quad d = 2x$$

$4^{th} = a + 3d = 9$

$3x + 3(-x) = 9$

$9x = 9 \quad , x = 1$

$a = 3x = 3 \quad d = 2$

$a_{15} = a + 14d = 3 + 28 = 31$

AM = 3 ... 31

− 15 −

$a_8 = 3 + 14 = 17$

$a_{15} = 31$

$a_m = 17$

6) 12^{th} term of
of first
term and

a_{1+11}

S_n [a1+

$36 = (a$

$18 =$

4.) find the values of 10^{th} term of the AP, if 6 times its 6^{th} term is equal to 10 times its 10^{th} term.

$6(a+5d) = 10(a+9d)$

$6a + 30d = 10a + 90d$

$4a = -60d \quad a = -15d$

$a_{16} = (a+15) = -15d + 15d = 0$

7) what
AP

5) If $T_p = a$, $T_q = b$, $T_r = c$. what is the value of $a(q-r) + b(r-p) + c(p-q)$?

$T_p = x + (p-1)d = a \quad T_q = x + (q-1)d = b \quad T_r = x + (r-1)d = c$

just multiply term

$[x + (p-1)d](q-r) + [x + (q-1)d](r-p) + [x + (r-1)d](p-q)$

$= 0$

6) 11th term of an AP is -10 and the sum of first 4 terms is 36. find the first term and common difference

$a_1 + 11d = -10$ — ①

$S_n = \left[\frac{a_1 + a_n}{2}\right] n$

$36 = \left(\frac{a_1 + a_4}{2}\right) \times 4^2$

$18 = 2a_1 + 3d$ — ②

Solving ① and ②

$2a_1 + 3d = 18$

$a_1 + 11d = -10$ ×2

$d = -2$

$a_1 + 11(-2) = 10$

$a_1 = 27$

7) what is the greatest possible sum of AP 25 21 19 ... ?

highest possible sum = 1 so only find

$S_n = \left(\frac{a+l}{2}\right) \times n$

$25\frac{3+1}{2} \times n$ — ①

$a + (n-1)d = l$

$25 + (n-1)(-2) = 1$

$n = 13$

$S_n \left(\frac{25+1}{2}\right) \times 13 = 169$

8.) 1+3+4+5+7+7 ... +60 term

(1+3) +4 +5 +7+7 +10+9 +... +60+...

There are 2 series
so take 2, and add

1+3 = 4 4+5=9 7+7=14

4, 9, 14, 19 - now they are in s...

4, 9, 14 ... 30 term

$S_n = \frac{n}{2}(2a+(n-1)d)$

$\frac{30}{2}(8+(29)5) = \frac{2295}{2}$

9.) ~~for~~ first term of an AP is 3. The sum of first 5 terms is equal to 1/4 of the sum of next five terms. what is the 25th term

$S_5 = \frac{1}{4}(S_{10} - S_5)$

$4S_5 = S_{10} - S_5$

$5S_5 = S_{10}$ - (1)

$5\left[\frac{5}{2}(2+3+(5-1)d\right]$

$2d = -18$

$d = -9$

$a_{25} = a+(24)\times(-9)$

-213

10.) Sum of ... Sum ... is the ...

11.) ...

i.) ...

10) Sum of three numbers in an AP is 18, sum of their squares is 158. What is the smallest number

for convenience

$a-d + a + a+d = 18$

$3a = 18$

$a = 6$

$(a-d)^2 + a^2 + (a+d)^2 = 158$

$2d^2 = 50$

$d = \pm 5$

$a = 6$

11 6(1) − 1 =

1 6 11

11) what is the sum of numbers in n^{th} row of following series

i) n^2+1 ii) $(2n)^2-1$ iii) $n^3+(n-1)^3$

1 1

9 2 3 4

35 5 6 7 8 =

$n(1) = 9$

$n^2+1 = 2^2+1 = 5 \neq 9$

$2(n)^2 - 1 = 16-1 = 15 \neq 9$

$n^3+(n-1)^3 = 9 = 9$

So 3

2