UDAAN

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Arithmetic Progression

Mathematics | Lecture - 02

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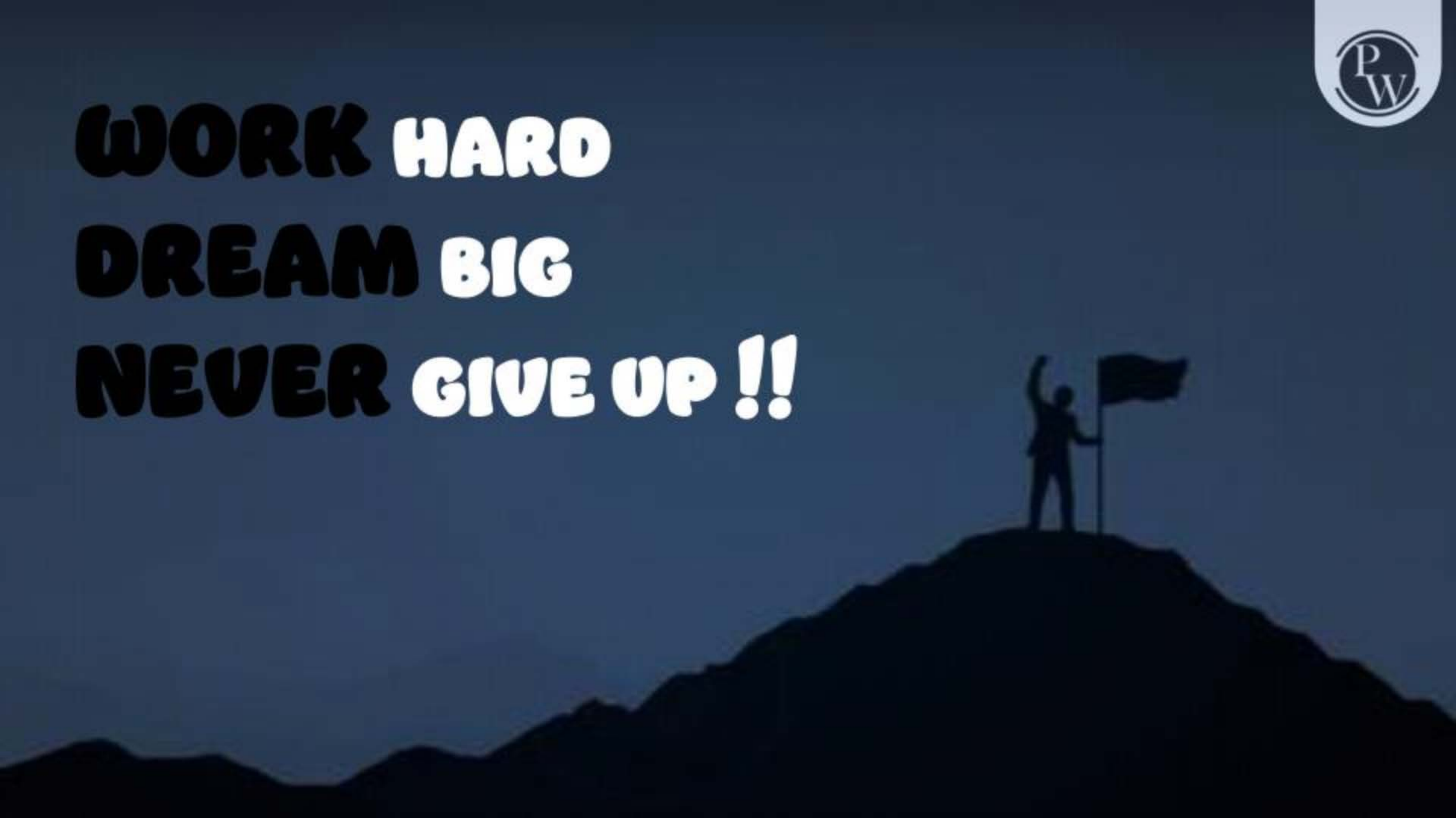
Topics *to be covered*

Questions

on nth Term Formula


WORK HARD
DREAM BIG
NEVER GIVE UP !!

Recap

1, 4, 9, 16, 25. . . .

5, 10, 15, 20, 25. . . . . .

a_n = n^{th} term
(n^{th} position par jo term)

general term → n^{th} term → koi bhi term de sakte hai.

Ex.

$a_n = 3n+2$

$a_1 = 3(1)+2$

$a_2 = 3(2)+2$

$a_{100} = a + 99d$

$a_{199} = a + 198d$

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

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a, $a+d$, $a+d+d$, $a+d+d+d$ - - - - - - -

$a+0d$, $a+1d$, $a+2d$, $a+3d$, $a+4d$ - - - - - -

a_1 a_2 a_3 a_4 a_5

$a_p = a + (p-1)d$

p^{th} term

Topic : General Term of an AP

#Q. Write an A.P. whose first term and common difference are −1.25 and −0.25 respectively.

$a = a_1 = -1.25$.

$d = -0.25$.

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

$-1.25, -1.25+(-0.25), -1.25+2(-0.25),$ - - - -

$-1.25, -1.5, -1.75, -2, -2.25, -2.5$ - - - - - -

Topic : General Term of an AP

#Q. For the following arithmetic progression write the first term and common difference

(i) $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}, \ldots$

$a = \frac{1}{3}$

$d = \frac{5}{3} - \frac{1}{3} = \boxed{\frac{4}{3}}$

(ii) 0.6, 1.7, 2.8, 3.9, ...

$a = \boxed{0.6}$

$d = a_2 - a_1$

$= 1.7 - 0.6$

$= \boxed{1.1}$

Topic : General Term of an AP

#Q. The first term of an A.P. is –7 and the common difference 5. Find its 18th term and the general term.

A) 78, 5n-14

B) 78, 5n-12

C) 76, 5n-12

D) NOTA

$a = -7$

$d = 5$

$a_{18} = a + 17d$

$= -7 + 17(5)$

$= -7 + 85$

$\boxed{a_{18} = 78}$

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

$a_n = -7 + (n-1)5$

$= -7 + 5n - 5 = \boxed{5n-12}$

Topic : General Term of an AP

#Q. The n^{th} term of an A.P. is $6n + 2$. Find the common difference. [NCERT]

A) 8

B) 6

C) -6

D) NOTA

$a_n = 6n + 2$

$a_1 = 6(1) + 2$

$= 8$

$a_2 = 6(2) + 2$

$= 14$

$d = a_2 - a_1$

$d = 14 - 8 = 6$

Topic : General Term of an AP

#Q. Determine the 10^{th} term from the end of the A.P. 4, 9, 14, ..., 254.

$4, 9, 14 \ldots\ldots -, 244, 249, 254$

$254, 249, 244 \ldots\ldots\ldots -14, 9, 4.$

$a_{10} = a + 9d$

$= 254 + 9(-5)$

$= 254 - 45$

$a_{10} = 209$

Topic : General Term of an AP

#Q. Find the 8^{th} term from the end of the A.P. 7, 10, 13, .., 184 [CBSE 2005]

A) 164

B) 166

C) 165

D) ~~NOTA~~

7, 10, 13, 16, 19 ..... 175, 178, 181, 184.

184, 181, 178, 175 - - - - - - - 7.

$a_8 = a + 7d$

$= 184 + 7(-3)$

$= 184 - 21$

$= \boxed{163}$

Topic : General Term of an AP

#Q. Which term of the sequence –1, 3, 7, 11, ... is 95 ?

$-1, 3, 7, 11 \ldots\ldots\ldots\ldots\ldots$

Let n^{th} term $= 95$.

$a_n = 95$

$a + (n-1)d = 95$

$-1 + (n-1)4 = 95$

$(n-1)4 = 96$

$n-1 = \frac{96}{4}$

$n-1 = 24$

$n = 25$

$a_n = 95$

$a_{25} = 95$

Which term of the sequence is 18?

$3, 6, 9, 12, 15, 18, 21, 24, 27.$

a_6

Topic : General Term of an AP

#Q. Which term of the sequence 4, 9, 14, 19, ... is 124 ?

A) 25^{th}
B) 26^{th}
C) 27^{th}
D) NOTA

Let $a_n = 124$

$a + (n-1)d = 124$

$4 + (n-1)5 = 124$

$(n-1)5 = 120$

$n-1 = \frac{120}{5}$

$n-1 = 24$

$n = 25$

$a_n = 124$

$a_{25} = 124$

Topic : General Term of an AP

#Q. Which term of the arithmetic progression 5, 15, 25, ... will be 130 more than its 31st term? [CBSE 2006C]

5, 15, 25. . . . .

Let n^{th} term be 130 more than a_{31}.

$$a_n = 130 + a_{31}$$

$$a+(n-1)d = 130 + a + 30d$$

$$5+(n-1)10 = 130 + 5 + 30(10)$$

$$= 130 + 5 + 300$$

$$5+(n-1)10 = 435$$

$$(n-1)10 = 430$$

$$n-1 = 43$$

$$n = 44$$

$$a_{44} = 130 + a_{31}$$

$a_{44} = a + 43d$

$= 5 + 43(10)$

$a_{44} = 435$

$a_{31} = a + 30d$

$a_{31} = 5 + 30(10)$

$a_{31} = 305$

$+ 130$

Topic : General Term of an AP

#Q. Which term of the A.P. 3, 10, 17, .. will be 84 more than its 13th term?

[CBSE 2004]

A) a_{25}

B) a_{27}

C) a_{26}

D) NOTA

Let, $a_n = 84 + a_{13}$

$a + (n-1)d = 84 + a + 12d$

$(n-1)7 = 84 + 12(7)$

$(n-1)7 = 168$

$n-1 = \frac{168}{7}$

$n-1 = 24$

$n = 25$

Topic : General Term of an AP

#Q. Which term of the arithmetic progression 8, 14, 20, 26, ... will be 72 more than its 41st term?

[CBSE 2006C]

A) a_{47}

B) a_{48}

C) a_{50}

D) NOTA

$a_n = 72 + a_{41}$

$a + (n-1)d = 72 + a + 40d$

$(n-1)6 = 72 + 40(6)$

$(n-1)6 = 72 + 240$

$(n-1)6 = 312$

$6n - 6 = 312$

$6n = 318$

$n = \frac{318}{6} = 53$

$n - 1 = \frac{312}{6}$

$n - 1 = 52$

$n = 53$

$+72$

a_{53} a_{41}

Topic : General Term of an AP

#Q. How many terms are there in the sequence 3, 6, 9, 12, ..., 111 ?

last term ki position.

Let n^{th} term = 111.

$a_n = 111$

$a + (n-1)d = 111$

$3 + (n-1)3 = 111$

$(n-1)3 = 108$

$(n-1) = \frac{108}{3}$

$n - 1 = 36$

$\boxed{n = 37}$

$a_n = 111$

$\therefore a_{37} = 111$

Total terms = 37

Topic : General Term of an AP

#Q. Is 184 a term of the sequence 3, 7, 11,...?

3, 7, 11, ... (184) ..... .

Let n^{th} term = 184.

$a_n = 184$

$a + (n-1)d = 184$

$3 + (n-1)4 = 184$

$(n-1)4 = 181$

$n - 1 = \frac{181}{4}$

$n - 1 = 45.25$

$n = 46.25$

no. of terms is in decimal which is not possible.

$\therefore$ 184 is not a term of sequence.

Topic : General Term of an AP

a, d

#Q. If the 8th term of an A.P. is 31 and the 15th term is 16 more than the 11th term, find the A.P.

[CBSE 2006C]

$a_8 = 31$

$a_{15} = 16 + a_{11}$

$a + 7d = 31$

$a + 14d = 16 + a + 10d$

$14d - 10d = 16$

$4d = 16$

$d = 4$

$a + 7d = 31$

$a + 7(4) = 31$

$a = 3$

$a, a+d, a+2d, a+3d \ldots$

3, 7, 11, 15, 19 . . . .

Ans.

Topic : General Term of an AP

#Q. If the 10^{th} term of an A.P. is 52 and 17^{th} term is 20 more than the 13^{th} term, find the A.P. **[CBSE 2006C]**

$a_{10} = 52$

$\boxed{a+9d=52}$ ①

$a+9(5)=52$

$a+45=52$

$\boxed{a=7}$

$a_{14} = 20+a_{13}$

$a+16d = 20+a+12d$

$4d=20$

$\boxed{d=5}$

$a, a+d, a+2d \cdots$

$7, 12, 17, 22 \cdots$

Topic : General Term of an AP

#Q. The 10^{th} term of an A.P. is 52 and 16^{th} term is 82. Find the 32^{nd} term and the general term.

$a_{10} = 52$

$a+9d = 52$ ①

$a_{16} = 82$

$a+15d = 82$ ②

$a+9d = 52$

$a+15d = 82$

$-6d = -30$

$d = 5$

$a+15d = 82$

$a+15(5) = 82$

$a+75 = 82$

$a = 7$

$a_{32} = a+31d$

$= 7+31(5)$

$a_{32} = 162$

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

$a_n = 7+(n-1)5$

$= 7+5n-5$

$a_n = 5n+2$

Topic : General Term of an AP

#Q. The sum of 5^{th} and 9^{th} terms of an A.P. is 72 and the sum of 7^{th} and 12^{th} terms is 97. Find the A.P. [CBSE 2009]

$a_5 + a_9 = 72$

$a+4d + a+8d = 72$

$2a + 12d = 72$ ①

$a_7 + a_{12} = 97$

$a+6d + a+11d = 97$

$2a + 17d = 97$ ②

① − ②

$2a + 12d = 72$

$2a + 17d = 97$

$-5d = -25$

$d = 5$

HW

Topic : General Term of an AP

#Q. The 17^{th} terms of an A.P. is 5 more than twice 8^{th} term. If the 11^{th} term of the A.P. is 43 find the n^{th} term. [CBSE 2012]

$a_{17} = 5 + 2(a_8)$

$a + 16d = 5 + 2[a + 7d]$

$a + 16d = 5 + 2a + 14d$

$\boxed{-a + 2d = 5}$ ①

$a_{11} = 43$

$\boxed{a + 10d = 43}$ ②

$-a + 2d = 5$

$\oplus \quad a + 10d = 43$

$12d = 48$

$\boxed{d = 4}$

$-a + 2d = 5$

$-a + 8 = 5$

$\boxed{3 = a}$

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

$= 3 + (n-1)4$

$= 3 + 4n - 4$

$\boxed{a_n = 4n - 1}$

Topic : General Term of an AP

#Q. How many three digit numbers are divisible by 7? [NCERT]

105, 112, 119, ... 994

This sequence is an A.P with $a = 105, d = 7$.

994 last term ki position.

let $a_n = 994$

$a + (n-1)d = 994$

$105 + (n-1)7 = 994$

$(n-1)7 = 889$

$n - 1 = 889/7$

$n - 1 = 127$

$n = 128$

$a_n = 994$

$a_{128} = 994$

Total terms = 128

∴ there are 128 '3' digit nos divisible by 7.

Topic : General Term of an AP

#Q. If five times the fifth term of an A.P. is equal to 8 times its eighth term, show that its 13^{th} terms is zero.

Topic : General Term of an AP

#Q. The 7^{th} term of an A.P. is 32 and its 13^{th} term is 62. Find the A.P.

[CBSE 2004]

Hw

Topic : General Term of an AP

#Q. How many multiples of 4 lie between 10 and 250? [NCERT]

Topic : General Term of an AP

#Q. The sum of 4^{th} and 8^{th} terms of an A.P. is 24 and the sum of 6^{th} and 10^{th} terms is 44. Find the A.P. [CBSE 2009]

Homework

DPP

THANK YOU