29.6.21

Ex - 5.2

Q1. Fill the blanks in table, given that a is the first term, d the common difference & a_n the n^{th} term of AP

(i) $a = 7$, $d = 3$, $n = 8$, $a_n = ?$

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

$= 7 + (8-1)3 = 7 + (7)3 = 7 + 21 = 28$

(ii) $a = -18$, $n = 10$, $a_n = 0$, $d = ?$

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

$0 = -18 + (10-1)d \Rightarrow 18 = 9d \Rightarrow d = \frac{18}{9} = 2$

(iii) $d=3$, $n=18$, $a_n=-5$

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

$\Rightarrow -5 = a+(18-1)(-3) \Rightarrow -5 = a+(17)(-3) \Rightarrow -5 = a-51$

$\Rightarrow a = 51-5 \Rightarrow a = 46$

(iv) $a=-18.9$, $d=2.5$, $n=?$, $a_n=3.6$

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

$\Rightarrow 3.6 = -18.9+(n-1)2.5 \Rightarrow 3.6+18.9 = (n-1)2.5$

$\Rightarrow 22.5 = (n-1)2.5 \Rightarrow (n-1) = \frac{22.5}{2.5} \Rightarrow n-1 = 9$

$\Rightarrow n = 10$

(v) $a=3.5$, $d=0$, $n=105$, $a_n=?$

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

$a_n = 3.5+(105-1)0 \Rightarrow a_n = 3.5+104\times 0$

$\Rightarrow a_n = 3.5$

2. Choose the correct choice in following & justify:

(i) 30^{th} term of AP: 10, 7, 4, ---- is

A. (c) $a=10$, $d=7-10=-3$

$a_{30} = 10+(30-1)(-3)$

$a_{30} = 10+(29)(-3) \Rightarrow a_{30} = 10-87 = -77$

(ii) 11^{th} term of AP: $-3, -\frac{1}{2}, +2, ----$ is

A. (b) $a=-3$, $d = -\frac{1}{2}-(-3) = \frac{5}{2}$

$a_{11} = -3+(11-1)\left(\frac{5}{2}\right)$

$a_{11} = -3+(10)\left(\frac{5}{2}\right)$

$a_{11} = -3+25 \Rightarrow a_{11} = 22$

3. In the following APs, find the missing term in the boxes

(i) 2, $\boxed{14}$, 26

A. $a = 2$

$a_5 = 26$

$a_5 = 2 + (5-1)d$

$26 = 2 + 2d \Rightarrow 24 = 2d \Rightarrow d = \frac{24}{2} = 12$

$a_2 = 2 + (2-1)12$

$= 14$

(iii) 18, 13, 8, 3

$a_2 = 13 \quad \& \quad a_4 = 3$

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

$a_3 = a + (2-1)d$

$\Rightarrow 13 = a + 1d$ —— (1) $\Rightarrow a = 13 - d$ —— (1)

$a_4 = a + (4-1)d$

$\Rightarrow 3 = a + 3d$ —— (2) $a = 3 - 3d$ —— (2)

$-10 = 2d$

$13 - d = 3 - 3d$

$\Rightarrow 13 - 3 = d - 3d \Rightarrow 10 - 2d \Rightarrow \frac{10}{-2} = d \Rightarrow -5 = d$

$a = 13 - d$

$= 13 - (-5) \quad = 13 + 5 = 18$

$a_3 = a + (n-1)d$

$= 18 + (3-1)x - 5 \quad = 18 + 2x - 5 = 18 - 10 = 8$

(iv) 5, $\frac{13}{2}$, 8, $a_4 \frac{1}{2}$

$a_1 = 5 \quad + \quad a_4 = a\frac{1}{2} = \frac{19}{2}$

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

$a_4 = a + (4-1)d$

$\Rightarrow \frac{19}{2} = 5 + 3d \Rightarrow \frac{19}{2} - 5 = 3d \Rightarrow \frac{19 - 2(5)}{2} = 3d$

$\Rightarrow \frac{9}{2} = 3d \Rightarrow \frac{9}{2} \times \frac{1}{3} = d \Rightarrow \frac{3^2}{6_2} = d$

$a = 5 \quad , \quad d = \frac{3}{2}$

a_2

$a_2 = a + (2-1)d$

$a_2 = a + (2) = a + d$

$= 5 + \frac{3}{2}$

$= \frac{5(2)+3}{2} = \frac{13}{2}$

a_3

$a_3 = a + (3-1)d$

$= a + 2d$

$= 5 + 2\left(-\frac{3}{2}\right)$

$= 5 + 3 = 8$

(iv) $-4, \boxed{-2}, \boxed{0}, \boxed{2}, \boxed{4}, 6$

A. $a = -4$, $a_6 = 6$

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

$a_6 = a + (6-1)d \Rightarrow 6 = -4 + 5d \Rightarrow 10 = 5d \Rightarrow d = 2$

$a_2 = a + d = -4 + 2 = -2$

$a_3 = a + 2d = -4 + 2(2) = 0$

$a_4 = a + 3d = -4 + 3(2) = 2$

$a_5 = a + 4d = -4 + 4(2) = 4$

(v) $\boxed{53}, 38, \boxed{23}, \boxed{8}, \boxed{-7}, -22$

$a_2 = 38$, $a_6 = -22$

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

$a_2 = a + (2-1)d$

$38 = a + d$

$38 - d = a$

$a = 38 - d$ — (1)

$a_6 = a + (6-1)d$

$-22 = a + 5d$

$-22 - 5d = a$

$a = -22 - 5d$ — (2)

$38 - d = -22 - 5d$

$\Rightarrow 38 + 22 = d - 5d$

$\Rightarrow 60 = -4d \Rightarrow \frac{60}{-4} = d \Rightarrow -15 = d$

$a = 38 - d$

$= 38 - (-15) = 38 + 15 = 53$

$a_3 = a + (3-1)d = 53 + 2(-15) = 53 - 30 = 23$

$a_4 = a + (4-1)d = a + 3d = 53 + 3(-15) = 53 - 45 = 8$

$a_5 = a + (5-1)d = a + 4d = 53 + 4(-15) = 53 - 60 = -7$

4. Which term of AP: 3, 8, 13, 18, ... is 78?

A. 3, 8, 13, 18, ...

$a = 3$, $d = 8 - 3 = 5$

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

$78 = 3 + (n-1)5 \Rightarrow 75 = (n-1)5 \Rightarrow (n-1) = 15$

$\Rightarrow n = 16$

5. Find the no. of terms in each of following APs.

(i) 7, 13, 19, ... 205

$a = 7$, $d = 13 - 7 = 6$

$a_n = 205$

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

$205 = 7 + (n-1)6$

$198 = (n-1)6 \Rightarrow (n-1) = 33 \Rightarrow n = 34$

(ii) $18, 15\frac{1}{2}, 13, \ldots, -47$

A. $a = 18$, $d = 15\frac{1}{2} - 18 = \frac{31 - 36}{2} = \frac{-5}{2}$

$a_n = -47$

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

$\Rightarrow -47 = 18 + (n-1)\left(\frac{-5}{2}\right)$

$\Rightarrow -47 - 18 = (n-1)\left(\frac{-5}{2}\right)$

$\Rightarrow -65 = (n-1)\left(\frac{-5}{2}\right)$

$\Rightarrow (n-1) = \frac{+130}{+5} \Rightarrow (n-1) = 26 \Rightarrow n = 27$