

Exercise No. 5.1

Multiple Choice Questions:**Question: 1**

Choose the correct answer from the given four options in the following questions:

1. In an AP, if $d = -4, n = 7, a_n = 4$, then a is

- A. 6
- B. 7
- C. 20
- D. 28

Solution:

(D) 28

In an A.P,

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

(a = first term, an is nth term and d is the common difference)

$$4 = a + (7 - 1)(-4)$$

$$4 = a - 24$$

$$a = 24 + 4$$

$$= 28$$

2. In an AP, if $a = 3.5, d = 0, n = 101$, then a_n will be

- A. 0
- B. 3.5
- C. 103.5
- D. 104.5

Solution:

(B) 3.5

In an A.P,

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

(a = first term, an is nth term and d is the common difference)

$$a_n = 3.5 + (101 - 1)0$$

$$= 3.5$$

(Since, $d = 0$, it's a constant A.P)

- 3. The list of numbers $-10, -6, -2, 2, \dots$ is**
- A. an AP with $d = -16$**
 - B. an AP with $d = 4$**
 - C. an AP with $d = -4$**
 - D. not an AP**

Solution:

In the given A.P,

$$a_1 = -10$$

$$a_2 = -6$$

$$a_3 = -2$$

$$a_4 = 2$$

$$a_2 - a_1 = 4$$

$$a_3 - a_2 = 4$$

$$a_4 - a_3 = 4$$

$$a_2 - a_1 = a_3 - a_2$$

$$= a_4 - a_3$$

$$= 4$$

So, it is an A.P with $d = 4$.

- 4. The 11th term of the AP: $-5, \frac{-5}{2}, 0, \frac{5}{2}, \dots$ is**
- A. -20**
 - B. 20**
 - C. -30**
 - D. 30**

Solution:

According to the given A.P.

$$a = -5$$

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

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

$$n = 11$$

Also,

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

Here, (a = first term, a_n is nth term and d is the common difference)

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

$$a_{11} = -5 + 25$$

$$= 20$$

5. The first four terms of an AP, whose first term is -2 and the common difference is -2 , are

A. $-2, 0, 2, 4$

B. $-2, 4, -8, 16$

C. $-2, -4, -6, -8$

D. $-2, -4, -8, -16$

Solution:

First term,

$$a = -2$$

Second Term,

$$d = -2$$

$$a_1 = a$$

$$= -2$$

Also,

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

Where,

a = first term, a_n is nth term, d is the common difference

Therefore,

$$a_2 = a + d$$

$$= -2 + (-2)$$

$$= -4$$

Similarly,

$$a_3 = -6$$

$$a_4 = -8$$

So the A.P is $-2, -4, -6, -8$.

- 6. The 21st term of the AP whose first two terms are -3 and 4 is**
- A. 17**
 - B. 137**
 - C. 143**
 - D. -143**

Solution:

First two terms of an AP are $a = -3$ and $a_2 = 4$.

We know, n th term of an AP is

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

Here, a = first term, a_n is n th term, d is the common difference

$$a_2 = a + d$$

$$4 = -3 + d$$

$$d = 7$$

Common difference,

$$d = 7$$

$$a_{21} = a + 20d$$

$$= -3 + (20)(7)$$

$$= 137$$

7. If the 2nd term of an AP is 13 and the 5th term is 25, what is its 7th term?

- A. 30
- B. 33
- C. 37
- D. 38

Solution:

In an A.P.

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

Here, a = first term, a_n is n th term, d is the common difference

$$a_2 = a + d$$

$$= 13 \quad \dots(i)$$

$$a_5 = a + 4d$$

$$= 25 \quad \dots (ii)$$

From equation (i),

$$a = 13 - d$$

Using this in equation (ii),

$$13 - d + 4d = 25$$

$$13 + 3d = 25$$

$$3d = 12$$

$$d = 4$$

$$a = 13 - 4$$

$$= 9$$

$$a_7 = a + 6d$$

$$= 9 + 6(4)$$

$$= 9 + 24$$

$$= 33$$

8. Which term of the AP: 21, 42, 63, 84... is 210?
- A. 9th
B. 10th
C. 11th
D. 12th

Solution:

Let nth term of the given AP be 210.

According to question,

First term,

$$a = 21$$

Common difference,

$$d = 42 - 21$$

$$= 21$$

$$a_n = 210$$

We know that the nth term of an AP is $a_n = a + (n - 1)d$

Where, a = first term, a_n is nth term, d is the common difference

$$210 = 21 + (n - 1)21$$

$$189 = (n - 1)21$$

$$n - 1 = 9$$

$$n = 10$$

So, 10th term of an AP is 210.

9. If the common difference of an AP is 5, then what is $a_{18} - a_{13}$?
- A. 5
B. 20
C. 25

D. 30

Solution:

Given, $d = 5$

Now,

As we know, n th term of an AP is

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

Here, a = first term, a_n is n th term, d is the common difference

$$a_{18} - a_{13} = a + 17d - (a + 12d)$$

$$= 5d$$

$$= 5(5)$$

$$= 25$$

10. What is the common difference of an AP in which $a_{18} - a_{14} = 32$?

- A. 8**
- B. -8**
- C. -4**
- D. 4**

Solution:

(a)

$$a_{18} - a_{14} = 32$$

$$[a + (18 - 1)d] - [a + (14 - 1)d] = 32 \quad [a_n = a + (n - 1)d]$$

$$a + 17d - a - 13d = 32$$

$$4d = 32$$

$$d = 8$$

So, (a) is the correct answer.

11. Two APs have the same common difference. The first term of one of these is -1 and that of the other is -8 . Then the difference between their 4th terms is

- A. -1**
- B. -8**
- C. 7**
- D. -9**

Solution:

(c)

According to question,

a_1 (for the first AP)= -1 and a_1 (for the second AP)

$$= - 8$$

Let d be the same common difference of two A.Ps.

$$d_1 = d,$$

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

Now,

a_4 of first AP - a_4 of second AP

$$(-1 + 3d) - [-8 + 3d]$$

$$- 1 + 3d + 8 - 3d = 7$$

So, the required answer is (c).

12. If 7 times the 7th term of an AP is equal to 11 times its 11th term, then its 18th term will be

- A. 7**
- B. 11**
- C. 18**
- D. 0**

Solution:

(d)

$$a_{18} = a + (18 - 1)d$$

$$= a + 17d$$

Also,

$$7a_7 = 11a_{11} \quad \text{(Given)}$$

$$7[a + (7 - 1)d] = 11[a + (11 - 1)d]$$

$$7[a + 6d] = 11[a + 10d]$$

$$7a + 42d = 11a + 110d$$

$$0 = 11a - 7a + 110d - 42d$$

$$0 = 4a + 68d$$

$$0 = a + 17d$$

$$a_{18} = 0$$

So, (d) is the correct answer.

13. The 4th term from the end of the AP: -11, -8, -5, ..., 49 is

A. 37

B. 40

C. 43

D. 58

Solution:

(b)

Reversing the A.P., we get

49... -5, -8, and -11

$$\begin{aligned} d &= -8 - (-5) \\ &= -8 + 5 \\ &= -3 \end{aligned}$$

$$a = 49 \text{ and } n = 4$$

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

$$a_4 = 49 + (4 - 1)(-3)$$

$$\begin{aligned} a_4 &= 49 + 3(-3) \\ &= 49 - 9 \end{aligned}$$

$$a_4 = 40$$

So, the required value of a_4 is 40 and answer is (b).

14. The famous mathematician associated with finding the sum of the first 100 natural numbers is

- A. Pythagoras
- B. Newton
- C. Gauss
- D. Euclid

Solution:

(c)

Gauss is the famous mathematician associated with finding the sum of first 100 natural numbers, i.e., $1 + 2 + 3 + 4 + 5 + \dots + 100$

$$a = 1, d = 1, n = 100$$

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

$$S_{100} = \frac{100}{2} [2(1) + (100 - 1)1]$$

$$= \frac{100}{2} [2 + 99]$$

$$= 50 \times 101$$

$$= 5050$$

15. If the first term of an AP is -5 and the common difference is 2, then the sum of the first 6 terms is

- A. 0
- B. 5
- C. 6
- D. 15

Solution:

(a)

$$a = -5,$$

$$d = 2,$$

$$n = 6$$

We have,

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

$$S_6 = \frac{6}{2} [2(-5) + (6 - 1)2]$$

$$= 3[-10 + 5 \times 2]$$

$$= 3[-10 + 10]$$

$$= 3[0]$$

$$S_6 = 0$$

So, (a) is the correct answer.

16. The sum of first 16 terms of the AP: 10, 6, 2,... is

A. -320

B. 320

C. -352

D. -400

Solution:

(a)

$$a = 10,$$

$$n = 16,$$

$$d = 6 - 10$$

$$= -4$$

$$S_n = [2a + (n - 1)d]$$

$$S_{16} = [2 \times 10 + (16 - 1)(-4)]$$

$$= 8[20 + 15(-4)]$$

$$= 8[20 - 60]$$

$$= 8 \times (-40)$$

$$S_{16} = -320$$

So, the required answer is (a).

17. In an AP if $a = 1, a_n = 20$ and $S_n = 399$, then n is

- A. 19**
- B. 21**
- C. 38**
- D. 42**

Solution:

(c)

$$S_n = [2a + (n - 1)d]$$

$$S_n = [a + a + (n - 1)d]$$

$$399 = [a + a_n] \quad (a_n = \text{last term})$$

$$399 = [1 + 20]$$

$$n = 38$$

So, (c) is the correct answer.

18. The sum of first five multiples of 3 is

- A. 45**
- B. 55**
- C. 65**
- D. 75**

Solution:

(a)

1st five multiples of 3 are 3, 6, 9, 12, 15,

$$a = 3,$$

$$n = 5,$$

$$d = 6 - 3$$

$$= 3$$

$$S_5 = \frac{5}{2} [2 \times 3 + (5 - 1)3]$$

$$S_5 = \frac{5}{2} [6 + 12]$$

$$\begin{aligned} &= \frac{5}{2} \times 18 \\ &= 45 \end{aligned}$$

(a) is the correct answer.

