

Mathematics

1. In an Arithmetic Progression, if $a=28$, $d=-4$, $n=7$, then a_n is:

- (a) 4
- (b) 5
- (c) 3
- (d) 7

Answer: **a**

Explanation: For an AP,

$$\begin{aligned} a_n &= a + (n-1)d \\ &= 28 + (7-1)(-4) \\ &= 28 + 6(-4) \\ &= 28 - 24 \end{aligned}$$

$$a_n = 4$$

2. If $a=10$ and $d=10$, then first four terms will be:

- (a) 10, 30, 50, 60
- (b) 10, 20, 30, 40
- (c) 10, 15, 20, 25
- (d) 10, 18, 20, 30

Answer: **b**

Explanation: $a = 10$, $d = 10$

$$a_1 = a = 10$$

$$a_2 = a_1 + d = 10 + 10 = 20$$

$$a_3 = a_2 + d = 20 + 10 = 30$$

$$a_4 = a_3 + d = 30 + 10 = 40$$

3. The first term and common difference for the A.P. 3, 1, -1, -3 is:

- (a) 1 and 3
- (b) -1 and 3

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(c) 3 and -2

(d) 2 and 3

Answer: **c**

Explanation: First term, $a = 3$

Common difference, $d = \text{Second term} - \text{First term}$

$$\Rightarrow 1 - 3 = -2$$

$$\Rightarrow d = -2$$

4.30th term of the A.P: 10, 7, 4, ..., is

(a) 97

(b) 77

(c) -77

(d) -87

Answer: **c**

Explanation: Given,

A.P. = 10, 7, 4, ...

First term, $a = 10$

Common difference, $d = a_2 - a_1 = 7 - 10 = -3$

As we know, for an A.P.,

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

Putting the values;

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

$$a_{30} = 10 + (29)(-3)$$

$$a_{30} = 10 - 87 = -77$$

5.11th term of the A.P. -3, -1/2, ,2 Is

(a) 28

(b) 22

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(c)-38

(d)-48

Answer: **b**

Explanation: A.P. = -3, -1/2, 2 ...

First term $a = -3$

Common difference, $d = a_2 - a_1 = (-1/2) - (-3)$

$$\Rightarrow (-1/2) + 3 = 5/2$$

Nth term;

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

Putting the values;

$$a_{11} = 3 + (11-1)(5/2)$$

$$a_{11} = 3 + (10)(5/2)$$

$$a_{11} = -3 + 25$$

$$a_{11} = 22$$

6. The missing terms in AP: __, 13, __, 3 are:

(a) 11 and 9

(b) 17 and 9

(c) 18 and 8

(d) 18 and 9

Answer: **(c)**

Explanation: $a_2 = 13$ and

$$a_4 = 3$$

The nth term of an AP;

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

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

$$13 = a + d \dots\dots\dots (i)$$

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

$$3 = a + 3d \dots\dots\dots (ii)$$

Subtracting equation (i) from (ii), we get,

$$-10 = 2d$$

$$d = -5$$

Now put value of d in equation 1

$$13 = a + (-5)$$

$$a = 18 \text{ (first term)}$$

$$a_3 = 18 + (3-1)(-5)$$

$$= 18 + 2(-5) = 18 - 10 = 8 \text{ (third term).}$$

7. Which term of the A.P. 3, 8, 13, 18, ... is 78?

(a) 12th

(b) 13th

(c) 15th

(d) 16th

Answer: **(d)**

Explanation: Given, 3, 8, 13, 18, ... is the AP.

First term, $a = 3$

Common difference, $d = a_2 - a_1 = 8 - 3 = 5$

Let the n th term of given A.P. be 78. Now as we know,

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

Therefore,

$$78 = 3 + (n-1)5$$

$$75 = (n-1)5$$

$$(n-1) = 15$$

$$n = 16$$

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8. The 21st term of AP whose first two terms are -3 and 4 is:

- (a) 17
- (b) 137
- (c) 143
- (d) -143

Answer: **b**

Explanation: First term = -3 and second term = 4

$$a = -3$$

$$d = 4 - a = 4 - (-3) = 7$$

$$a_{21} = a + (21-1)d$$

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

$$= -3 + 140$$

$$= 137$$

9. If 17th term of an A.P. exceeds its 10th term by 7. The common difference is:

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Answer: **(a)**

Explanation: Nth term in AP is:

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

$$a_{17} = a + (17-1)d$$

$$a_{17} = a + 16d$$

In the same way,

$$a_{10} = a + 9d$$

Given,

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$$a_{17} - a_{10} = 7$$

Therefore,

$$(a + 16d) - (a + 9d) = 7$$

$$7d = 7$$

$$d = 1$$

Therefore, the common difference is 1.

10. The number of multiples of 4 between 10 and 250 is:

(a) 50

(b) 40

(c) 60

(d) 30

Answer: (c)

Explanation: The multiples of 4 after 10 are:

12, 16, 20, 24, ...

So here, $a = 12$ and $d = 4$

Now, $250/4$ gives remainder 2. Hence, $250 - 2 = 248$ is divisible by 4.

12, 16, 20, 24, ..., 248

So, nth term, $a_n = 248$

As we know,

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

$$248 = 12 + (n-1) \times 4$$

$$236/4 = n-1$$

$$59 = n-1$$

$$n = 60$$

11. 20th term from the last term of the A.P. 3, 8, 13, ..., 253 is:

(a) 147

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(b)151

(c)154

(d)158

Answer: **(d)**

Explanation: Given, A.P. is 3, 8, 13, ..., 253

Common difference, $d = 5$.

In reverse order,

253, 248, 243, ..., 13, 8, 5

So,

$$a = 253$$

$$d = 248 - 253 = -5$$

$$n = 20$$

By nth term formula,

$$a_{20} = a + (20-1)d$$

$$a_{20} = 253 + (19)(-5)$$

$$a_{20} = 253 - 95$$

$$a_{20} = 158$$

12. The sum of the first five multiples of 3 is:

(a)45

(b)55

(c)65

(d)75

Answer: **(a)**

Explanation: The first five multiples of 3 is 3, 6, 9, 12 and 15

$$a = 3 \text{ and } d = 3$$

$$n = 5$$

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

$$S_5 = 5/2[2(3)+(5-1)3]$$

$$=5/2[6+12]$$

$$=5/2[18]$$

$$=5 \times 9$$

$$= 45$$

13. The midpoints of a line segment joining two points A(2, 4) and B(-2, -4)

(a) (-2,4)

(b) (2,-4)

(c) (0, 0)

(d) (-2,-4)

Answer: c

Explanation: As per midpoint formula, we know;

$$x=[2+(-2)]/2 = 0/2 = 0$$

$$y=[4+(-4)]/2=0/2=0$$

Hence, (0,0) is the midpoint of AB.

14. The distance of point A(2, 4) from x-axis is

(a)2

(b)4

(c)-2

(d)-4

Answer: b

Explanation: Distance of a point from x-axis is equal to the ordinate of the point.

15. If O(p/3, 4) is the midpoint of the line segment joining the points P(-6, 5) and Q(-2, 3). The value of p is:

(a)7/2

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(b)-12

(c)4

(d)-4

Answer: b

Explanation: Since, $(p/3, 4)$ is the midpoint of line segment PQ, thus;

$$p/3 = (-6-2)/2$$

$$p/3 = -8/2$$

$$p/3 = -4$$

$$p = -12$$

Therefore, the value of p is -12.

16. The points which divides the line segment of points P(-1, 7) and (4, -3) in the ratio of 2:3 is:

(a)(-1, 3)

(b)(-1, -3)

(c)(1, -3)

(d)(1, 3)

Answer: d

Explanation: By section formula we know:

$$x = [(2.4) + (3.(-1))] / (2+3) = (8-3) / 5 = 1$$

$$y = [(2.(-3)) + (3.7)] / (2+3) = (-6+21) / 5 = 3$$

Hence, the required point is (1,3)

17. The ratio in which the line segment joining the points P(-3, 10) and Q(6, - 8) is divided by O(-1, 6) is:

(a)1:3

(b)3:4

(c)2:7

(d)2:5

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Answer: c

Explanation: Let the ratio in which the line segment joining P(-3, 10) and Q(6, -8) is divided by point O(-1, 6) be $k:1$.

$$\text{So, } -1 = \frac{6k-3}{k+1}$$

$$-k - 1 = 6k - 3$$

$$7k = 2$$

$$k = \frac{2}{7}$$

Hence, the required ratio is 2:7.

18. The coordinates of a point P, where PQ is the diameter of circle whose centre is (2, -3) and Q is (1, 4) is:

(a) (3, -10)

(b) (2, -10)

(c) (-3, 10)

(d) (-2, 10)

Answer: a

Explanation: By midpoint formula, we know;

$$\left[\frac{x+1}{2}, \frac{y+4}{2}\right] = (2, -3) \text{ (Since, O is the midpoint of PQ)}$$

$$\frac{x+1}{2} = 2$$

$$x+1=4$$

$$x=3$$

$$\frac{y+4}{2} = -3$$

$$y+4=-6$$

$$y=-10$$

So, the coordinates of point P is (3, -10).

19. The area of a rhombus if its vertices are (3, 0), (4, 5), (-1, 4) and (-2, -1) taken in order, is:

(a) 12 sq. unit

(b) 24 sq. unit

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(c) 30 sq. unit

(d) 32 sq. unit

Answer: 24

Explanation: To find the area of the rhombus, we need to find the length of its diagonals and use the below formula:

$$\text{Area} = \frac{1}{2} (\text{Diagonal}_1)(\text{Diagonal}_2)$$

$$\text{Area} = \left(\frac{1}{2}\right) (AC)(BD)$$

$$\text{Diagonal}_1 = \sqrt{[(3-(-1))^2 + (0-4)^2]} = 4\sqrt{2}$$

$$\text{Diagonal}_2 = \sqrt{[(4-(-2))^2 + (5-(-1))^2]} = 6\sqrt{2}$$

$$\text{Area} = \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2} = 24 \text{ sq. unit.}$$