# 1.RELATIONS AND FUNCTIONS

1. If $f : R \to R$defined by , $f(x) = x^2 + 2$ then the pre-images of 27 are

(1) 5, –5 (2) $\sqrt{5}, -\sqrt{5}$ (3) 5,0 (4) 0 ,5

2. If $f\left(x - \frac{1}{x}\right) = x^2 + \frac{1}{x^2}$ then f(x) = _____.

(1) $x^2 + 2$ (2) $x^2 - 2$ (3) $x^2 + \frac{1}{x^2}$ (4) $x^2 - \frac{1}{x^2}$

3. If A= { a,b.c} , B= {2,3} and C = { a , b, c, d} then n[(A∩C)xB] is

(1) 4 (2) 8 (3) 6 (4) 12

4. If the ordered pairs $(a , -1)$and $(5 , b)$ belong to ,$\{(x, y)/ y = 2x + 3\}$ then the values of *a* and *b* are

(1) –13,2 (2) 2,13 (3) 2, –13 (4) –2,13

5. The function $f : N \to N$ is defined by f(x) = 2x . Then the function *f* is

(1) Not one-one but onto
(2) one-one but not onto
(3) One-one and onto
(4) not one-one and not onto

6. If f(x)= x + 1 , then $f\left(f\left(f(y + 2)\right)\right)$ is

(1) y + 3 (2) y + 5 (3) y + 7 (4) y + 9

7. If f(x)= mx + n , where *m* and *n* are integers, $f(-2) = 7$ and $f(3) = 2$, then *m* and *n* are equal to

(1) –1,5 (2) –1, –5 (3) 1,–9 (4) 1,9

8. The function *t* which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$. The Fahrenheit degree is 95 then the value of *C* will be

(1) 37 (2) 36 (3) 35 (4) 29

9. If $f(x) = ax - 2 , g(x) = 2x - 1$ *and* $f \circ g = g \circ f$ then the value of *a* is

(1) –3 (2) 3 (3) $\frac{1}{3}$ (4) 13

10. If $f(x) = \frac{1}{x}$ and $g(x) = \frac{1}{x^3}$ , then $f \circ g \circ f(y)$ is

(1) $\frac{1}{y^8}$ (2) $\frac{1}{y^6}$ (3) $\frac{1}{y^4}$ (4) $\frac{1}{y^3}$

11. If f(x)= 2 – 3x then $f \circ f(1-x) = ?$

(1) 9x – 5 (2) 5x – 9 (3) 5x + 9 (4) 5 - 9x

12. If f(x) + f(1-x) =2 then $f\left(\frac{1}{2}\right)$ is

(1) 1 (2) –1 (3) 5 (4) –9

13. If *f* is a constant function of value $\frac{1}{10}$. Then the value of f(1) + f(2) + . . . . . + f(100) is

(1) $\frac{1}{10}$ (2) 10 (3) 100 (4) $\frac{1}{100}$

14. If $f(x) = \frac{x+1}{x-2}$ and $g(x) = \frac{1+2x}{x-1}$ then $f \circ g(x)$ is

(1) Constant function (2) Identity function
(3) Quadratic function (4) Cubic function

15. If *f* is a identity function, then the value of f(1) - 2f(2) + f(3) is

(1) 1 (2) 0 (3) –1 ( 4) –3

16. $f = \{(2,a),(3,b),(4,b),(5,c)\}$ *is a* – – – – – – – – – – – – – – –

(1) *identy function* (2) $1-1$ *function*

(3) *many – one function* (4) *constant function*

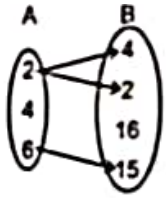
17. If n(A) = p , n(B)= q then total number of relations that exit between A and B

(1) $2^p$ (2) $2^q$ (3) $2^{p+q}$ (4) $2^{pq}$

18. *Given* $f(x) = (-1)^x$ *is a function from* $N \to R$. *Then the range of f is*

(1) {1} (2) *N* (3) {1 , –1} (4) *z*

19 The given diagram represents




(1) An onto function (2) a constant function
(2) (3) an 1-1 function (4) not a function

20. If $f: A \to B$ is a bijective function and if $n(A) = 5$, then $n(B)$ is equal to

(1) 10 (2) 4 (3) 5 (4) 25

21. If $f = \{(6, 3), (8, 9), (5, 3), (-1, 6)\}$, then the pre-images of 3 are

(1) 5 and –1 (2) 6 and 8 (3) 8 and –1 (4) 6 and 5.

22. If {(a,8),(6,b)}represents an identity function, then the value of a and b are respectively
(1) (8,6) (2) (8,8) (3) (6,8) (4) (6,6)

23. A={a,b,C},B={2,3},C={a,b,C,d}then n[(A∩C)XB] is
(1) 6 (2) 8 (3) 4 (4) 12

24. If {(a,8),(6,b)}represents an identity function, then the value of a and b are respectively
(1) (8,6) (2) (8,8) (3) (6,8) (4) (6,6)

25. If the ordered pairs (a+2,4) and (5,2a+b) are equal then (a,b) is
(1) (2,-2) (2) (5,1) (3) (2,) (4) (3,-2)

## 2. Numbers and Sequences

1. What is the HCF of the least prime number and the least composite number?

(1) 1 (2) 2 (3) 3 (4) 4

2. If ' $a$ ' and ' $b$ 'are two positive integers where a >b and ' $b$ ' is a factor of '$a$' then HCF of (a,b) is

(1) b (2) a (3) ab (4) $\frac{a}{b}$

3. If $m$ and $n$ are co-prime numbers, then $m^2$and $n^2$ are
(1) co-prime (2) not co-prime (3) even (4) odd

4. If 3 is the least prime factor of number a and 7 is the least prime factor of b then the least prime factor of a + b is
(1) a + b (2) 2 (3) 5 (4) 10

5. The remainder when the difference between 60002 and 601 is divided by 6 i s
(1) 2 (2) 1 (3) 0 (4) 3

6. $44 \equiv 8\ (mod\ 12),\quad 113 \equiv (mod\ 12), thus\ 44 \times 113 \equiv --------(mod\ 12)$
(1) 4 (2) 3 (3) 2 (4) 1

7. Given $a_1 = -1$ and $a_n = \frac{a_{n-1}}{n+2}$ then $a_4$ is

(1) $-\frac{1}{20}$ (2) $-\frac{1}{4}$ (3) $-\frac{1}{840}$ (4) $-\frac{1}{120}$

8. The first term of an A.P. whose $8^{th}$ and $12^{th}$ terms are 39 and 59 respectively is

(1) 5 (2) 6 (3) 4 (4) 3

9. In the arithmetic series, $S_n = k + 2k + 3k + \ldots + 100$, $k$ is a positive integer and $k$ is a factor of 100 then $S_n$ is

(1) $5000 + \frac{50}{k}$ (2) $\frac{5000}{k} + 50$ (3) $\frac{1000}{k} + 10$ (4) $1000 + \frac{10}{k}$

10. How many terms are there in the G. P 5,20,80,320,....,20480 ?

(1) 5 (2) 6 (3) 7 (4) 9

11. If $p^{th}$, $q^{th}$ and $r^{th}$ terms of an A.P. are $a$, $b$, $c$ respectively then $a(q-r)+b(r-p)+c(p-q)$ is

(1) 0 (2) $a+b+c$ (3) $p+q+r$ (4) $pqr$

12. Sum of infinite terms of a G.P is 12 and the first term is 8. What is the fourth term of the G.P?

(1) $\frac{8}{27}$ (2) $\frac{4}{27}$ (3) $\frac{8}{20}$ (4) $\frac{1}{3}$

13. A square is drawn by joining the mid points of the sides of a given square in the same way and this process continues indefinitely. If the side of the first square is 4 cm, then the sum of the areas of all the squares is

(1) 8 $cm^2$ (2) 16 $cm^2$ (3) 32 $cm^2$ (4) 64 $cm^2$

14. A boy saves ₹1 on the first day ₹2 on the second day, ₹4 on the third day and so on. How much did the boy will save up to 20 days?

(1) $2^{19}+1$ (2) $2^{19}-1$ (3) $2^{20}-1$ (4) $2^{21}-1$

15. The sum of first 'n' terms of the series $a, 3a, 5a, \ldots$ is

(1) $na$ (2) $(2n-1)a$ (3) $n^2a$ (4) $n^2a^2$

16. If $p, q, r, x, y, z$ are in A.P, then $5p+3, 5q+3, 5r+3, 5x+3, 5y+3, 5z+3$ form

(1) a G.P (2) an A.P
(3) a constant sequence (4) neither an A.P nor a G.P

17. In an A. P if the $p$ th term is '$q$' and the $q$ th term is $p$, then its n th term is

(1) $p+q-n$ (2) $p+q+n$
(3) $p+q-n$ (4) $p-q-n$

18. Sum of first 'n' terms of the series $\sqrt{2}+\sqrt{8}+\sqrt{18}+\ldots\ldots$ is

(1) $\frac{n(n+1)}{2}$ (2) $\sqrt{n}$ (3) $\frac{n(n+1)}{\sqrt{2}}$ (4) 1

19. The sequence -3, -3, -3, . . . . . is

(1) an A.P only (2) a G.P only (3) neither A.P nor G.P (4) both A.P and G.P

20. 2+4+6+. . . . . +2K= 90 then be the value of k is

(1) 8 (2) 9 (3) 10 (4) 11

21. If a, b, c are in A. P then $\frac{a-b}{b-c}$ is equal to

(1) $\frac{a}{b}$ (2) $\frac{b}{c}$ (3) $\frac{a}{c}$ (4) 1

22. If a, b, c are in G. P , then $\frac{a-b}{b-c}$ is equal to

(1) $\frac{a}{b}$ (2) $\frac{b}{a}$ (3) $\frac{a}{c}$ (4) $\frac{c}{b}$

23. The common ratio of the G. P . $a^{m-n}, a^{m}, a^{m+n}$ is

(1) $a^{m}$ (2) $a^{-m}$ (3) $a^{n}$ (4) $a^{-n}$

24. If $1+2+3+\cdots..+n=k$ then $1^3+2^3+3^3+\cdots\ldots\ldots+n^3$ is equal to

(1) $k^2$ (2) $k^3$ (3) $\frac{k(k+1)}{2}$ (4) $(k+1)$

25. Given $F_1=1, F_2=3$ and $F_n=F_{n-1}+F_{n-2}$ then $F_5$ is

(1) 3 (2) 5 (3) 8 (4) 11

# 3.ALGEBRA

1. Which of the following are linear equation in three variables

(i) $2x = z$ (ii) $2\sin(x) + y\cos(y) + z\tan z = 2$

(iii) $x + 2y^2 + z = 3$ (iv) $x - y - z = 7$

(1) (i) and (iii) only (2) (i) and (iv) only (3) (iv) only (4) A ll

2. Graphically an infinite number of solutions represents

(1) three planes with no point in common
(2) three planes intersecting at a single point
(3) three planes intersecting in a line or coinciding with one another
(4) None

3. Which of the following is correct

(i) Every polynomial has finite number of multiples
(ii) LCM of two polynomials of degree 2 may be a constant
(iii) HCF of 2 polynomials may be a constant
(iv) Degree of HCF of two polynomials is always less then degree of LCM.

(1) (i) and (ii) (2) (iii) and (iv) (3) (iii) only (4) (iv) only

4. The HCF of two polynomials p(x) and q(x) is and LCM is 2x(x+2) and L.C.M is $24x(x+2)^2(x-2)$. *If* $p(x) = 8x^3 + 32x^2 + 32x$ *then* $q(x)$ *is equal to*

(1) $4x^3 - 16x$ (2) $6x^3 - 24x$ (3) $12x^3 + 24x$ (4) $12x^3 - 24x$

5. Consider the following statements:

(i) The HCF of ( x + y) and $(x^8 - y^8)$ is ( x + y)
(ii) The HCF of ( x + y) and $(x^8 + y^8)$ is ( x + y)
(iii) The HCF of ( x - y) and $(x^8 + y^8)$ is ( x - y)
(iv) The HCF of ( x - y) and $(x^8 - y^8)$ is ( x - y)

Which of the statements given above are correct?

(1) (i) and (ii) (2) (ii) and (iii) (3) (i) and (iv) (4) (ii) and (iv)

6. For what set of values is $\frac{x^2+5x+6}{x^2+8x+15}$ *is undefined*

(1) -3,-5 (2) -5 (3) -2,-3,-5 (4) -2,-3

7. $\frac{x^2+7x+12}{x^2+8x+15} \times \frac{x^2+5x}{x^2+6x+8} =$

(1) $x + 2$ (2) $\frac{x}{x+2}$ (3) $\frac{35x^2 + 60x}{48x^2 + 120}$ (4) $\frac{1}{x+2}$

8. If $\frac{p}{q} = a$ then $\frac{p^2+q^2}{p^2-q^2}$ is

(1) $\frac{a^2+1}{a^2-1}$ (2) $\frac{1+a^2}{1-a^2}$ (3) $\frac{1-a^2}{1+a^2}$ (4) $\frac{a^2-1}{a^2+1}$

9. *The square root of* $4m^2 - 24m + 36 = 0$ *is*

(1) $4(m-3)$ (2) $2(m-3)$ (3) $(2m-3)^2$ (4) $(m-3)$

10. *The square root of the quadratic equation* $x^2 - x - 1 = 0$ *are*

(1) $1, 1$ (2) $-1, 1$ (3) $\frac{1+\sqrt{5}}{2}, \frac{1-\sqrt{5}}{2}$ (4) No real roots

11. The product of the sum and product of roots of equation

$(a^2 - b^2)x^2 - (a+b)^2 x + (a^3 - b^3) = 0$ *is*

(1) $\frac{a^2+ab+b^2}{a-b}$ (2) $\frac{a+b}{a-b}$ (3) $\frac{a-b}{a+b}$ (4) $\frac{a-b}{a^2+ab+b^2}$

12. A quadratic polynomial whose one zero is 5 and sum of the zeroes is 0 is given by

(1) $x^2 - 25$ (2) $x^2 - 5$ (3) $x^2 - 5x$ (4) $x^2 - 5x + 5$

13. Axis of symmetry in the term of vertical line separates parabola into

(1) 3 equal halves (2) 5 equal halves

(3) 2 equal halves (4) 4 equal halves

14. The parabola is $y = -3x^2$ is

(1) Open upward (2) Open downward

(3) Open rightward (4) Open leftward

15. *The LCM of* $(x^3 - a^3)$ *and* $(x - a)^2$ *is*

(1) $(x^3 - a^3)(x + a)$ (2) $(x^3 - a^3)(x - a)^2$

(3) $(x - a)^2\ (x^2 + ax + a^2$ (4) $(x + a)^2\ (x^2 + ax + a^2$

16. *The excluded value of the rational expression* $\frac{x^3+8}{x^2-2x-8}$

(1) 8 (2) 2 (3) 4 (4) 1

17. *LCM of* $6x^2y\ , 9x^2y\,z\ ,\ 12\,x^2\,y^2z$ *is*

(1) $36x\,y^2z^2$ (2) $36x^2y^2z$ (3) $36x^2y^2z^2$ (4) $3x^2y$

18. If a and b are positive integers where a>0 and b is a factor of a , then HCF of a and b

(1) $b$ (2) $a$ (3) $3ab$ (4) $\frac{a}{b}$

19. If the polynomial is a perfect square then its factors will be repeated ------- number of times

(1) odd (2) zero (3) even (4) none of the above

20. *The solution of* $x^2$ *is*

(1) no real roots (2) real and equal roots
(3) real and unequal roots (4) imaginary roots

21. *On dividing* $\frac{x^2-25}{x+3}$ *by* $\frac{x+5}{x^2-9}$ *is equal to*

(1) (x-5)(x-3) (2) (x-5)(x+3) (3) (x+5)(x-3) (4) (x+5)(x+3)

22. Choose the correct answer

(i) Every scalar matrix is an identity matrix

(ii) Every identity matrix is a scalar matrix

(iii) Every diagonal matrix is an identity matrix

(iv) Every null matrix is a scalar matrix

(1) (i) and (iii) only (2) (iii) only (3) (iv) only (4) (ii) and (iv) only

23. $2A+3B=\begin{pmatrix}2 & -1 & 4\\ 3 & 2 & 5\end{pmatrix}$ and $A+2B=\begin{pmatrix}5 & 0 & 3\\ 1 & 6 & 2\end{pmatrix}$ then $B=$

(1) $\begin{pmatrix}8 & -1 & -2\\ -1 & 10 & -1\end{pmatrix}$ (2) $\begin{pmatrix}8 & -1 & 2\\ -1 & 10 & -1\end{pmatrix}$ (3) $\begin{pmatrix}8 & 1 & 2\\ 1 & 10 & 1\end{pmatrix}$ (4) $\begin{pmatrix}8 & 1 & 2\\ -1 & 10 & -1\end{pmatrix}$

24. *If* $(4 \quad 3 \quad 2)\begin{pmatrix}1\\ -2\\ x\end{pmatrix}=(6)$ *then* $x$ *is*

(1) 4 (2) 3 (3) 2 (4) 1

25. *If* $A=\begin{pmatrix}y & 0\\ 3 & 4\end{pmatrix}$ *and* $I=\begin{pmatrix}1 & 0\\ 0 & 1\end{pmatrix}$ *then* $A^2=16I$ *Find* $y$ *is*

(1) 4 (2) 5 (3) -4 (4) 16

26. If *P* and *Q* are matrices, then which of the following is true?

(1) $PQ \neq QP$ (2) $(P^T)^T \neq P$ (3) $P+Q \neq Q+P$ (4) *All are true*

27. *If* $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}_{3X2}$ , $B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}_{2X3}$

then which of the following products can be made from these matrices

$(i)\ A^2$ $(ii)\ B^2$ $(iii)\ AB$ $(iv)\ BA$

(1) (i) only (2) (ii) and (iii) only (3) (iii) and (iv) only (4) All the above

28. For the given matrix $A = \begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \end{bmatrix}$ *the order of matrix* $(A^T)^T$ *is*

(1) 2x3 (2) 3x2 (3) 3x4 (4) 4x3

29. The non-diagonal elements in any unit matrix are ----------

(1) 0 (2) 1 (3) m (4) n

30. A is of order mxn and B is of order pxq addition of A and B is possible only if

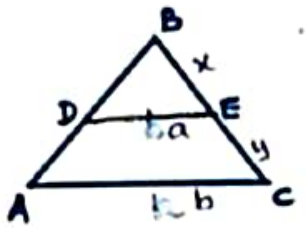
(10 m=p (2) n=q (3)n=p (4) m=p, n=q

## 4.GEOMETRY

1. If triangle $PQR$ is similar to triangle $LMN$ such that $4PQ = LM$ and $QR = 6cm$ then $MN$ is equal to

(1) 12 cm (2) 24 cm (3) 10 cm (4) 36 cm

2. In the given figure $DE \parallel AC$ which of the following is true.

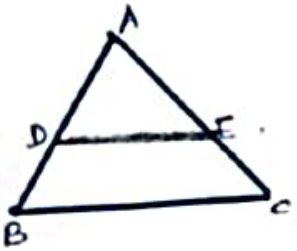



(1) $x = \frac{ay}{b+a}$ (2) $x = \frac{a+b}{ay}$ (3) $x = \frac{ay}{b-a}$ (4) $\frac{x}{y} = \frac{a}{b}$

3. $S$ and $T$ are points on sides $PQ$ and $PR$ respectively of $\Delta PQR$ . If $PS = 3cm$ , $SQ = 6cm$ , $PT = 5cm$ and $TR = 10cm$ then $QR$

(1) $4ST$ (2) $5ST$ (3) $3ST$ (4) $3QR$

4. In figure $DE \parallel BC$, if $BD = x - 3$ , $BA = 2x$ , $CE = x - 2$ and $AC = 2x + 3$ . Find the value of $x$ .




(1) 3 (2) 6 (3) 9 (4) 12

5. The ratio of the areas of two similar triangles is equal to

(1) The ratio of their corresponding sides
(2) The cube of the ratio of their corresponding sides
(3) The ratio of their corresponding altitudes
(4) The square of the ratio of their corresponding sides

6. If $ABC$ is a triangle and $AD$ bisects $\angle A$, $AB = 4cm$, $BD = 6cm$, $DC = 8cm$ then the value of $AC$ is

(1) $\frac{16}{3}cm$ (2) $\frac{32}{3}cm$ (3) $\frac{3}{16}cm$ (4) $\frac{1}{2}cm$

7. In a triangle, the internal bisector of an angle bisects the opposite side. Find the nature of the triangle.

(1) right angle (2) equilateral
(3) scalene (4) isosceles

8. The height of an equilateral tria $\frac{\sqrt{3}}{4}a$ ngle of side $a$ is

(1) $\frac{a}{2}$ (2) $\sqrt{3}a$ (3) $\frac{\sqrt{3}}{2}a$ (4)

9. The perimeter of a right triangle is 40 cm. Its hypotenuse is 15cm, then the area of the triangle is

(1) $100cm^2$ (2) $200cm^2$ (3) $160cm^2$ (4) $225cm^2$

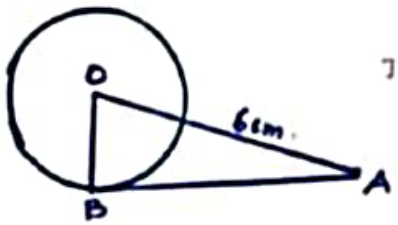
10. A line which intersects a circle at two distinct points is called

(1) Point of contact (2) secant (3) diameter (4) tangent

11. If the angle between two radii of a circle is $130°$, the angle between the tangents at the end of the radii is

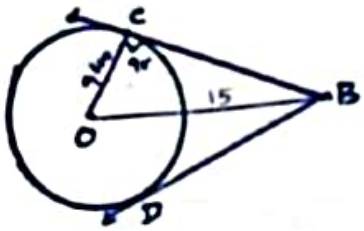
(1) $50°$ (2) $90°$ (3) $40°$ (4) $70°$

12. In figure $\angle OAB = 60°$ and $OA = 6\ cm$ then radius of the circle is




(1) $\frac{3}{2}\sqrt{3}cm$ (2) $2cm$ (3) $3\sqrt{3}cm$ (4) $2\sqrt{3}cm$

13. In the given figure if $OC = 9cm$ and $OB = 15cm$ then $OB + BD$ is equal to




(1) $23cm$ (2) $24cm$ (3) $27cm$ (4) $30cm$

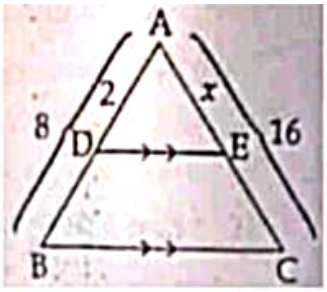
14. Two concentric circles of radii $a$ and $b$ where $a > b$ are given. The length of the chord of the larger circle which touches the smaller circle is

(1) $\sqrt{a^2 - b^2}$ (2) $2\sqrt{a^2 - b^2}$ (3) $\sqrt{a^2 + b^2}$ (4) $2\sqrt{a^2 + b^2}$

15. Three circles are drawn with the vertices of a triangle as centres such that each circle touches the other two if the sides of the triangle are 2cm, 3cm and 4cm. find the diameter of the smallest circle.

(1) $1cm$ (2) $3cm$ (3) $5cm$ (4) $4cm$

16.The given figure , the value of x is




(1) 2 (2) 8 (3) 4 ( 4) 12

**17.** If in triangles ABC EDF , $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, when

(1)∠B = ∠E (2) ∠A = ∠D (3) ∠B = ∠D (4) ∠A = ∠F

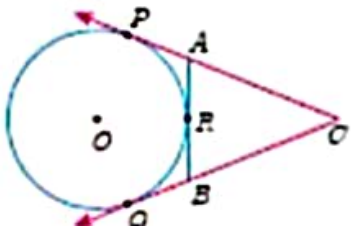
18. A tangent is perpendicular to the radius at the

(1) centre (2) point of contact (3) infinity (4) chord

19. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be

(1) 12 cm (2) 10 cm (3) 13 cm (4) 5 cm

20. In figure CP and CQ are tangents to a circle with centre at O. ARB is another tangent touching the circle at R. If CP=11 cm and BC =7 cm, then the length of BR is




(1) 6 cm (2) 5 cm (3) 8 cm (4) 4 cm

# 5. COORDINATE GEOMETRY

1. Find the ratio in which the line segment joining the points (-3,10) and (6,-8) is internally divided by

   (1) 7:2 (2) 3:4 (3) 2:7 (4) 5:3

2. If the points (0,0) , (a ,0) and (0,b) are collinear then

   (1) a = b (2) a + b = 0 (3) ab = 0 (4)a ≠ b

3. If the mid-point of the line segment joining $A\left(\frac{x}{2}, \frac{y+1}{2}\right)$ and B(x +1, y-3), is C (5 , -2) then find the values of $x$ , $y$

   (1) (6, -1) (2) (-6, 1) (3) (-2, 1) (4)(3, 5)

4. The area of triangle formed by the points (a , b+c) , (b, c+a) and (c , a+b) is

   (1) a +b +c (2) *abc* (3) $(a + b + c)^2$ (4) 0

5. The four vertices of a quadrilateral are (1 ,2 ) ,( -5,6 ) ,(7,-4 ) and (k, -2) taken in order. If the area of quadrilateral is zero then find the value of $k$ .

   (1) -4 (2) -2 (3) 6 (4) 3

6. Find the equation of the line passing through the point (5,3) which is parallel to the $y$ axis is

(1) $y = 5$ (2) $y = 3$ (3) $x = 5$ (4) $x = 3$

7. Find the slope of the line $2y = x + 8$

(1) $\frac{1}{2}$ (2) 1 (3) 8 (4) 2

8. Find the value of $p$, given that the line $\frac{y}{2} = x - p$ passes through the point is

(1) -4 (2) $-6$ (3) 0 (4) 8

9. Find the slope and the $y$-intercept of the line $3y - \sqrt{3}x + 1 = 0$ is

(1) $\frac{1}{\sqrt{3}}, \frac{-1}{3}$ (2) $-\frac{1}{\sqrt{3}}, \frac{-1}{3}$ (3) $\sqrt{3}, 1$ (4) $-\sqrt{3}, 3$

10. Find the value of '$a$' if the lines $7y = ax + 4$ and $2y = 3 - x$ are parallel.

(1) $a = \frac{7}{2}$ (2) $a = -\frac{2}{7}$ (3) $a = \frac{2}{7}$ (4) $a = -\frac{7}{2}$

11. A line passing through the point $(2,2)$ and the axes enclose an area $\alpha$. The intercepts on the axes made by the line are given by the roots of

(1) $x^2 - 2\alpha x + \alpha = 0$ (2) $x^2 + 2\alpha x + 2\alpha = 0$

(3) $x^2 - \alpha x + 2\alpha = 0$ (4) none of these

12. Find the equation of the line passing through the point $(0,4)$ and is parallel to the line $3x + 5y + 15 = 0$ is

(1) $3x + 5y + 15 = 0$ (2) $3x + 5y - 20 = 0$

(3) $2x + 7y - 20 = 0$ (4) $4x + 3y - 15 = 0$

13. In a right angled triangle $ABC$, right angled at $B$, if the side $BC$ is parallel to $x$ axis, then the slope of $AB$ is

(1) $\sqrt{3}$ (2) $\frac{1}{\sqrt{3}}$ (3) 1 (4) not defined

14. The $y$-intercept of the line $3x - 4y + 8 = 0$ is

(1) $-\frac{8}{3}$ (2) $\frac{3}{8}$ (3) 2 (4) $\frac{1}{2}$

15. The lines $y = 5x - 3$, $y = 2x + 9$ intersect at $A$. The coordinates of $A$ are

(1) $(2,7)$ (2) $(2,3)$ (3) $(4,17)$ (4) $(-4,23)$

16. If the points a(6,1) , b(8,2) , c(9,4) , d(p,3) are the vertices of a parallelogram, taken in order of them the value of p is

(1) -7 (2) 7 (3) 6 (4) -6

17. The centroid of the triangle with vertices at (-2,- 5), (-2,12) and (10, - 1) is

(1) (6, 6) (2) (4, 4) (3) (3, 3) (4) (2, 2)

18. If (1, 2), (4, 6), (*x*, 6) and (3, 2) are the vertices of a parallelogram taken in order, then the value of *x* is

(1) 6 (2) 2 (3) 1 (4) 3

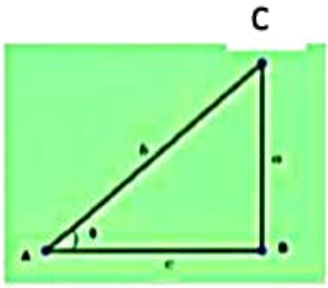
19. Area of the triangle formed by the points (0,0), (2, 0) and (0, 2) is

(1) 1 sq. units (2) 2 sq. units (3) 4 sq. units (4) 8 sq. units

20. Area of the quadrilateral formed by the points (1,1), (0,1), (0, 0) and (1, 0) is

(1) 3 sq. units (2) 2 sq. units (3) 4 sq. units (4) 1 sq. units

# 6.TRIGONOMETRY




1. From the figure, the value of $\operatorname{cosec}\theta+\cot\theta$ is

(1) $\frac{a+b}{c}$ (2) $\frac{c}{a+b}$ (3) $\frac{b+c}{a}$ (4) $\frac{b}{a+c}$

2. $(\sec A+\tan A)(1-\sin A)$ is equal to

(1) $\sec A$ (2) $\sin A$ (3) $\operatorname{cosec} A$ (4) $\cos A$

3. If $x=r\sin\theta\cos\varphi$, $y=r\sin\theta\sin\varphi$ and $z=r\cos\theta$ Then, $x^2+y^2+z^2$ is equal to

(1) $r$ (2) $r^2$ (3) $\frac{r^2}{2}$ (4) $2r^2$

4. If $\cos\theta+\cos^2\theta=1$ then $\sin^2\theta+\sin^4\theta$ is equal to

(1) 1 (2) 0 (3) $-1$ (4) none of these

5. If $\tan\theta+\cot\theta=3$ then $\tan^2\theta+\cot^2\theta$ is equal to

(1) 4 (2) 7 (3) 6 (4) 9

6. If $m\cos\theta+n\sin\theta=a$ and $m\sin\theta-n\cos\theta=b$ then $a^2+b^2$ is equal to (L)

(1) $m^2-n^2$ (2) $m^2+n^2$ (3) $m^2n^2$ (4) $n^2-m^2$

7. $\frac{\tan\theta}{\sec\theta-1}+\frac{\tan\theta}{\sec\theta+1}$ is equal to

(1) $2\tan\theta$ (2) $2\sec\theta$ (3) $2\operatorname{cosec}\theta$ (4) $2\tan\theta\sec\theta$

8. The value of $\left(\frac{3}{\cot^2\theta}-\frac{3}{\cos^2\theta}\right)$ is equal to

(1) $\frac{1}{3}$ (2) 3 (3) 0 (4) $-3$

9. If $\sin(\alpha+\beta)=1$, then $\cos(\alpha-\beta)$ can be reduced to

(1) $\sin\alpha$ (2) $\cos\beta$ (3) $\sin 2\beta$ (4) $\cos 2\beta$

10. If $x=a\sec\theta$ and $y=b\tan\theta$, then $b^2x^2-a^2y^2$ is equal to

(1) $ab$ (2) $a^2-b^2$ (3) $a^2+b^2$ (4) $a^2b^2$

11. The angle of elevation of the top of tree from a point at a distance of 250 $m$ from its base is 60°. The heights of the tree is

(1) 250 $m$ (2) $250\sqrt{3}$ $m$ (3) $\frac{250}{\sqrt{3}}$ $m$ (4) $200\sqrt{3}$ $m$

12. The angle of depression of a boat from a $50\sqrt{3}m$ high bridge is 30°. The horizontal distance of the boat from the bridge is

(1) 150 $m$ (2) $150\sqrt{3}$ $m$ (3) 60 $m$ (4) $60\sqrt{3}$ $m$

13. A Ladder of length 14 $m$ just reaches the top of a wall. If the ladder makes an angle of 60° with the horizontal, then the height of the wall is

(1) $14\sqrt{3}$ $m$ (2) $28\sqrt{3}$ $m$ (3) $7\sqrt{3}$ $m$ (4) $35\sqrt{3}$ $m$

14. The top of two poles of height 18.5 $m$ and 7 $m$ are connected by a wire. If the wire makes an angle of measure 30° with horizontal, then the length of the wire is

(1) 23 $m$ (2) 18 $m$ (3) 28 $m$ (4) 25.5 $m$

15. The banks of a river are parallel. A swimmer starts from a point on one of the banks and swims in a straight line inclined to the bank at 45° and reaches the opposite bank at a point 20 $m$, from the point opposite to the starting point. The breadth of the river is equal to

$(\sqrt{2}=1.414)$

(1) 12.12 $m$ (2) 14.14 $m$ (3) 16.16 $m$ (4) 18.18 $m$

16. $\cos 60^\circ \sin 30^\circ + \cos 30^\circ \sin 60^\circ =$

(1) 90° (2) $\frac{1}{2}$ (3) $\frac{\sqrt{3}}{2}$ (4) 1

17. The angle of elevation and depression are usually measured by a device called

(1) Clinometer (2) Kaleidoscope (3) Periscope (4) Telescope

18. $\frac{\sin(90-\theta)\sin\theta}{\tan\theta}+\frac{\cos(90-\theta)\cos\theta}{\cot\theta}$ =

(1) tanθ (2) 1 (3)-1 (4) sinθ

19. $(1-sin^2\theta)sec^2\theta$ =

(1) 0 (2) 1 (3) $tan^2\theta$ (4) $cos^2\theta$

20. $\sin(90^\circ-\theta)\,cos\theta+\cos(90^\circ-\theta)\,sin\theta$ =

(1) 1 (2) 0 (3) 2 (4) -1

21. *If* $x = asec\theta$, $y = btan\theta$, *then the value of* $\frac{x^2}{a^2}-\frac{y^2}{b^2}$ =

(1) 1 2) -1 (3) $tan^2\theta$ (4) $cosec^2\theta$

22. $\frac{sec\theta}{cot\theta+tan\theta}$ =

(1) Cot θ (2) tan θ (3) sin θ (4) -cotθ

23. $tan\theta cosec^2\theta - tan\theta$ *is equal to*

(1) secθ (2) $cot^2\theta$ (3) sinθ (4) $cot\theta$

24. $(cos^2\theta-1)(cot^2\theta+1)+1$ =

(1) 1 (2) -1 (3) 2 (4) 0

25. $9tan^2\theta-9sec^2\theta$ =

(1) 1 (2) 0 (3) 9 (4) -9

## 7. MENSURATION

1. The curved surface area of a right circular cone of height 15 *cm* and base diameter 16 *cm* is

(1) $60\pi\ cm^2$ (2) $66\pi\ cm^2$ (3) $120\pi\ cm^2$ (4) $136\pi\ cm^2$

2. If $S_1$ denotes the total surface area of a sphere of radius $r$ and $S_2$ denotes the total surface area of a cylinder of base radius $r$ and height $2r$, then

(1) $S_1 = S_2$ (2) $S_1 > S_2$ (3) $S_1 < S_2$ (4) $S_1 = 2S_2$

3. The ratio of the volumes of two spheres is 8:27. If $r$ and $R$ are the radii of spheres respectively, then $(R-r):r$ is

(1) 1:2 (2) 1:3 (3) 2:3 (4) 4:9

4. The radius of a wire is decreased to one-third of the original. If volume remains the same, then the length will be increased _____ of the original.

(1) 3 times (2) 6 times (3) 9 times (4) 27 times

5. The height of a cone is 60 *cm*. A small cone is cut off at the top by a plane parallel to the base and its volume is $\left(\frac{1}{64}\right)^{th}$ the volume the original cone. The height of the smaller cone is

(1) 45 *cm* (2) 30 *cm* (3) 15 *cm* (4) 20 *cm*

6. A solid frustum is of height 8 *cm*. If the radii of its lower and upper ends are 3 *cm* and 9 *cm* respectively, then its slant height is

(1) 15 *cm* (2) 12 *cm* (3) 10 *cm* (4) 17 *cm*

7. A solid is hemispherical at the bottom and conical above. If the curved surface areas of the two parts are equal, then the ratio of its radius and the height of its conical part is

(1) 1:3 (2) $1:\sqrt{3}$ (3) 1:1 (4) $\sqrt{3}:1$

8. The material of a cone is converted into the shape of a cylinder of equal radius. If the height of the cylinder is 5*cm*, then height of the cone is

(1) 10 *cm* (2) 15 *cm* (3) 18 *cm* (4) 24 *cm*

9. The curved surface area of a cylinder is $264\ m^2$ and its volume is $924\ m^3$. The ratio of diameter to its height is

(1) 3:7 (2) 7:3 (3) 6:7 (4) 7:6

10. When Karuna divided surface area of a sphere by the sphere's volume, he got the answer as $\frac{1}{3}$. What is the radius of the sphere?

(1) 24 *cm* (2) 6 *cm* (3) 54 *cm* (4) 4.5 *cm*

11. A spherical steel ball is melted to make 8 new identical balls. Then the radius each new ball is how much times the radius of the original ball?

(1) $\frac{1}{3}$ (2) $\frac{1}{4}$ (3) $\frac{1}{2}$ (4) $\frac{1}{8}$

12. A semicircular thin sheet of a metal of diameter 28 *cm* is bent and an open conical cup is made. What is the capacity of the cup?

(1) $\left(\frac{1000}{3}\right)\sqrt{3}\ cm^3$ (2) $300\sqrt{3}\ cm^3$

(3) $\left(\frac{700}{3}\right)\sqrt{3}\ cm^3$ (4) $\left(\frac{1078}{3}\right)\sqrt{3}\ cm^3$

13. A cone of height 9 *cm* with diameter of its base 18 *cm* is carved out from a wooden solid sphere of radius 9 *c m* . The percentage of wood wasted is
(1) 45% (2) 56% (3) 67% (4) 75%

14. A cylinder having radius 1 *m* and height 5 *m* is completely filled with milk. In how many conical flasks can this milk be filled if the flask radius and height is 50 *cm* each?
(1) 50 (2) 500 (3) 120 (4) 160

15. A floating boat having a length 3 *m* and breadth 2 *m* is floating on a lake. The boat sinks by 1 *cm* . when a man gets into it. The mass of the man is (density of water is 1000 kg/$m^3$ )
(1) 50 *kg* (2) 60 *kg* (3) 70 *kg* (4) 80 *kg*

16. The height of a right circular cone whose radius is 3 cm and slant height is 5cmwill be
(1) 12cm (2) 4cm (3) 13cm (4) 5cm

17. If the volume of sphere is $36\prod cm^3$, then its radius is equal to
(1) 3cm (2) 2cm (3) 5cm (4) 10cm

18. C.S.A of solid sphere is equal to
(1) T.S.A of solid sphere (2) T.S.A. of hemisphere
(3) C.S.A. of hemisphere (4) none of these

19. If the total surface area a solid right circular cylinder is $200\prod cm^2$ and its radius is 5cm, then the sum of its height and radius is
(1)20 m (2) 25 cm (3) 30 cm (4) 15 cm

20. The ratios of the respective heights and the respective radii of two cylinders are 1:2 and 2:1 respectively. Then their respective volumes are in the ratio
(1) 4 : 1 (2) 1 : 4 (3) 2 : 1 (4) 1 : 2

# 8.STATISTICS AND PROBABILITY

1. The range of first 10 prime numbers is

(1) 9 (2) 20 (3) 27 (4) 5

2. If the smallest value and co-efficient of range of a data are 25 and 0.5 respectively. Then the largest value is

(1) 25 (2) 75 (3) 100 (4) 12.5

3. If the observations 1, 2, 3, ... 50 have the variance $V_1$ and the observations 51, 52, 53, . . .100 have the variance $V_2$ then $\frac{V_1}{V_2}$ is

(1) 2 (2) 1 (3) $\frac{1}{2}$ (4) 0

4. If the standard deviation of a variable $x$ is 4 and if $y = \frac{3x+5}{4}$, then the standard deviation of $y$ is

(1) 4 (2) 3.5 (3) 3 (4) 2.5

5. If the data is multiplied by 4, then the corresponding variance is get multiplied by

(1) 4 (2) 16 (3) 2 (4) None

6. If the co-efficient of variation and standard deviation of a data are 35% and 7.7 respectively then the mean is

(1) 20 (2) 30 (3) 25 (4) 22

7. The batsman $A$ is more consistent than batsman $B$ if

(1) C.V of $A$ > C.V of $B$ (2) C.V of $A$ < C.V of $B$

(3) C.V of $A$ = C.V of $B$ (4) C.V of $A \geq$ C.V of $B$

8. The range of first 10 prime numbers is

(1) 9 (2) 20 (3) 27 (4) 5

9. The average of first ' n ' natural number

(1) $\frac{n(n+1)}{2}$ (2) $\frac{n}{2}$ (3) $\frac{n+1}{2}$ (4) $n$

10. The standard deviation of a data is 5. If each value is multiplied by 2, then the new variance is

(1) 3 (2) 100 (3) 10 (4) 225

11. The variance of 10, 10, 10, 10, 10 is

(1) 10 (2) $\sqrt{10}$ (3) 5 (4) 0

12. Mean and standard deviation of a data are 48 and 12 respectively. The coefficient of variation is

(1) 42 (2) 25 (3) 28 (4) 48

13. If an event occurs surely, then its probability is

(1) 1 (2) 0 (3) $\frac{1}{2}$ (4) $\frac{3}{4}$

14. A letter is selected at random from the word 'PROBABILITY'. The probability that it is not a vowel is

(1) $\frac{4}{11}$ (2) $\frac{7}{11}$ (3) $\frac{3}{11}$ (4) $\frac{6}{11}$

15. In a competition containing two events $A$ and $B$, the probability of winning the events $A$ and $B$ are $\frac{1}{3}$ and $\frac{1}{4}$ respectively and the probability of winning both the events is $\frac{1}{12}$. The probability of winning only one event is

(1) $\frac{1}{12}$ (2) $\frac{5}{12}$ (3) $\frac{6}{12}$ (4) $\frac{7}{12}$

16. A number $x$ is chosen at random from $-4, -3, -2, -1, 0, 1, 2, 3, 4$. The probability that $|x| \leq 3$ is

(1) $\frac{3}{9}$ (2) $\frac{4}{9}$ (3) $\frac{2}{9}$ (4) $\frac{7}{9}$

17. If the probability of non-happening of an event is q , then the probability of happening of the event is

(1) 1-q (2) q (3) $\frac{q}{2}$ (4) 2q

18. In one thousand lottery tickets, there are 50 prizes to be given. The probability of Mani winning a prize who bought one ticket is

(1) $\frac{1}{50}$ (2) $\frac{1}{100}$ (3) $\frac{1}{1000}$ (4) $\frac{1}{20}$

19. When three coins are tossed, the probability of getting the same face on all the three coins is

(1) $\frac{1}{8}$ (2) $\frac{1}{4}$ (3) $\frac{3}{8}$ (4) $\frac{1}{3}$

20. A box contains some milk chocolates and some coco - chocolates and there are 60 chocolates in the box. If the probability of taking a milk chocolate is $\frac{2}{3}$ then the number of coco chocolates is

(1)40 (2)50 (3)20 (4)30

21. If $A$ and $B$ are two events such that $P(A) = 0.25$, $P(B) = 0.05$ and $P(A + B) = 0.14$, then $P(A , B) =$

(1) 0.61 (2) 0.16 (3) 0.14 (4) 0.6

22. Probability of getting 3 heads or 3 tails in tossing a coin 3 times is

(1) $\frac{1}{8}$ (2) $\frac{1}{4}$ (3) $\frac{3}{8}$ (4) $\frac{1}{2}$

23. A fair die is thrown once. The probability of getting a prime (or) composite number is

(1) 1 (2) 0 (3) $\frac{5}{6}$ (4) $\frac{1}{6}$

24. A bag contains 5 black balls, 4 white balls and 3 red balls. If a ball is Selected at random, the probability that it is not red is

(1) $\frac{5}{10}$ (2) $\frac{4}{12}$ (3) $\frac{3}{12}$ (4) $\frac{3}{4}$

25. If p is the probability of an event A, then p satisfies

(1) $0 < p < 1$ (2) $0 \leq p \leq 1$ (3) $0 \leq p < 1$ (4) $0 < p \leq 1$