



MODERN PUBLIC SCHOOL, VARDHANA  
PRE-ANNUAL EXAMINATION (2020-21)  
SUBJECT: MATHEMATICS  
CLASS-11<sup>th</sup>

TIME: 3: 00 HRS.

SET-B

General Instructions:

This question paper contains 5 sections A, B, C, D and E.

MARKS

- Section A has 20 questions 1 mark each
- Section B has 5 questions 2 marks each
- Section C has 6 questions 3 marks each
- Section D has 4 questions 5 marks each
- Section E has 3 Case study based questions 4 marks each

SECTION-A

1. The two lines  $ax+by=c$  and  $cx+dy=e$  are perpendicular if  
a)  $ac+bd=0$  b)  $a+c=0$  c)  $a=0$  d)  $d+e=0$
2. If  $n$  elements are common to A and B, then number of elements common in  $A \cup B$  and  $B \cup A$  is  
a)  $n$  b)  $n^2$  c)  $n^3$  d)  $2n$
3. The quadrant in which  $\theta = 1870^\circ$  lies is  
a) I b) II c) III d) IV
4. The range of  $\sin x$  is  
a)  $[0,1]$  b)  $[-1,1]$  c)  $[-1,0]$  d)  $[-1,\infty]$
5. The value of  $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ$  is equal to  
a) 0 b) 1 c)  $\frac{1}{2}$  d) 2
6. The value of  $\tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \tan 89^\circ$  is  
a) 0 b) 1 c)  $\frac{1}{2}$  d) not define
7. The value of  $\cos 40^\circ + \cos 80^\circ + \cos 160^\circ + \cos 240^\circ$  is equal to  
a) 0 b) 1 c)  $\frac{1}{2}$  d)  $\frac{1}{2}$
8. If  $-4 < 3 + 2x \leq 11, x \in R$  then  
a)  $x \in (10, \infty)$  b)  $x \in [10, \infty)$  c)  $x \in (-\infty, 10]$  d)  $x \in [-10, 10]$
9. The point on the x-axis, which is equidistant from the points (7,6) and (3,4) is  
a) (5,0) b)  $(\frac{13}{2}, 0)$  c)  $(\frac{15}{2}, 0)$  d) none of these.
10. The first and last terms of an A.P are 1 and 11. If the sum of its terms is 36, then the number of terms will be  
a) 5 b) 6 c) 7 d) 8
11. If the vertices of a triangle are (-4,6), (2,-2) and (2,5), then its centroid is  
a) (0,3) b) (0,-3) c) (3,0) d) (-3,0)

12. The equation of circle in the first quadrant touching each coordinate axis at a distance of one unit from the origin is:  
 a)  $x^2 + y^2 - 2x - 2y + 1 = 0$  b)  $x^2 + y^2 - 2x - 2y - 1 = 0$  c)  $x^2 + y^2 - 2x - 2y = 0$  d)  $x^2 + y^2 - 2x + 2y - 1 = 0$
13. The length of latus rectum is of the ellipse  $3x^2 + y^2 = 12$  is  
 a) 4 b) 3 c) 8 d)  $\frac{4}{\sqrt{3}}$
14. The area of triangle formed by the lines joining the vertex of the parabola  $x^2 = 12y$  to the ends of its latus rectum is  
 a) 12 sq. units b) 16 sq. units c) 18 sq. units d) 24 sq. units
15. x-axis is the intersection of two planes  
 a) xy and xz b) yz and zx c) xy and yz d) none of these
16. The points (4, -3, 7) lies in the  
 a) First octant b) seventh octant c) Second octant d) Eighth octants
17. The distance of point P(3, 4, 5) from the yz-plane is  
 a) 3 units b) 4 units c) 5 units d) none of these
18. One card is drawn from a pack of 52 cards. The probability that it is the card of a king or spade is  
 a)  $\frac{1}{26}$  b)  $\frac{3}{26}$  c)  $\frac{4}{13}$  d) none of these

**Assertion reasoning questions:**

- a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 c) Assertion (A) is true but Reason (R) is false.  
 d) Assertion (A) is false but Reason (R) is true
19. Assertion: Three numbers  $-1, \frac{1}{4}, \frac{3}{2}$  form an arithmetic Progression. **A**  
 Reason: A sequence in which the difference between every term and the one preceding it is always constant is called an Arithmetic Progression or A.P.
20. Assertion: Slope of the line  $3x - 4y + 10 = 0$  is  $\frac{3}{4}$  **C**  
 Reason: Slope of the line  $ax + by + c = 0$  is  $-\frac{b}{a}$

**SECTION - B (2)**

21. Find the domain and range of the real function  $f(x) = \sqrt{16 - x^2}$ .
22. Differentiate the  $\cos x$  w.r.t.  $x$
23. Find the focus, axis of the parabola, the equation of directrix and the length of the latus rectum of parabola  $y^2 = 12x$
24. Two sets A and B are, such that  $n(A \cup B) = 20$ ,  $n(A) = 9$ ,  $n(B) = 17$ , find  $n(A \cap B)$  and  $n(A - B)$
25. Find the angle between the x-axis and the line joining the points (3, -1) and (4, -2).

### SECTION-C (3)

26. IQ of a person is given by the formula  $IQ = \frac{MA}{CA} \times 100$ , where MA is mental age and CA is chronological age. If  $80 \leq IQ \leq 140$  for a group of 12 years old children, find the range of their mental age.
27. Find the equation of the set of the point P such that its distance from the points A(3,4,-5) and B(-2,1,4) are equal.
28. Prove that  $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\tan x + \tan y}{\tan x - \tan y}$

OR

- Find the lengths of the medians of the triangle with vertices A(0, 0, 6), B(0, 4, 0) and C(6, 0, 0).
29. Find the value of: (i)  $\sin 15^\circ$  (ii)  $\tan 75^\circ$
30. There are 200 individuals with a skin disorder, 120 had been exposed to the chemical C1, 50 to chemical C2 and 30 to both the chemicals C1 and C2. Find the number of individuals exposed to (i) chemical C1 but not chemical C2 (ii) Chemical C2 but not chemical C1 (iii) Chemical C2 or chemical C1.   
 140 90 30
31. Find the values of other five trigonometric functions if  $\sin x = \frac{3}{5}$ , x lies in second quadrant.

### SECTION-D (5)

32. A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag. Calculate the probability that it will be (i) red (ii) yellow (iii) blue (iv) not blue (v) either red and blue.
33. Evaluate:  $\lim_{x \rightarrow 2} \frac{x^3 + 3x^2 - 9x - 2}{x^3 - x - 6}$
34. Differentiate of f(x) from first principle. (i)  $\sin x + \cos x$  (ii)  $x \sin x$

OR

- In an increasing GP, the sum of the first and last terms is 66, the product of the second and the last but one is 128 and the sum of the terms is 126. How many terms are there in this GP?
35. Prove that  $\sin 6^\circ \sin 42^\circ \sin 66^\circ \sin 78^\circ = \frac{1}{16}$

OR

Prove that  $\cos \frac{2\pi}{15} \cdot \cos \frac{4\pi}{15} \cdot \cos \frac{8\pi}{15} \cdot \cos \frac{16\pi}{15} = \frac{1}{16}$

### SECTION-E (4)

**Case Study Based Questions:** Read the following passages and answer the questions that follow:

36. In a library, 25 students are reading books on physics, chemistry, and mathematics. It was found that 15 students were reading mathematics, 12 reading physics and 11 reading chemistry. 5 students reading both mathematics and chemistry, 9 students reading both physics and mathematics, 4 students reading both physics and chemistry, and 3 students reading all three subjects.
- (i) Find the number of students reading only Chemistry.
- (ii) Find the number of students reading only Mathematics.
- (iii) Find the number of students reading at least one of the subjects and also find the number of students reading none of the subjects.

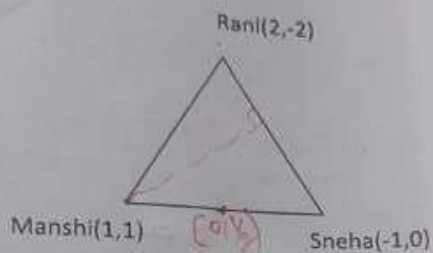


37. The corner points of a square plot are  $(1, 2)$ ,  $(2, 3)$ ,  $(3, 1)$   $(0, -4)$ . Plot is located in an industrial area to build a well known company showroom.

Based on the above information, answer the following questions:

- Find the distance between  $(1, 2)$  and  $(3, 1)$  and also find the slope of  $(1, 2)$  and  $(3, 1)$ .
- Find the distance between  $(2, 3)$  and  $(0, -4)$  and also find the slope of  $(2, 3)$  and  $(0, -4)$ .
- Determine angle B of the triangle with vertices  $A(-2, 1)$ ,  $B(2, 3)$  and  $C(-2, -4)$ .

38. Three girls Rani, Mansi, Sneha are talking to each other while maintaining a social distance due to covid-19. They are standing on vertices of a triangle, whose coordinates are given.



Based on the above information answer the following questions.

(i) The equation of lines formed by Rani and Mansi is:

- $3x - y = 4$
- $3x + y = 4$
- $x - 3y = 4$
- $x + 3y = 4$

(ii) Slope of equation of line formed by Rani and Sneha is:

- $\frac{2}{3}$
- $\frac{-3}{2}$
- $\frac{-2}{3}$
- $\frac{1}{3}$

(iii) The equation of median of lines through Rani is:

- $5x + 4y = 2$
- $5x - 4y = 2$
- $4x - 5y = 1$
- none of these

(iv) ~~none~~ of these altitude through Mansi is:

- $3x - 2y = 1$
- $2x + 3y = 5$
- $x + 2y = 3$
- none of these