

ANGEL'S PUBLIC SCHOOL

SAMPLE PAPER

HALF YEARLY EXAM CLASS – XI CODE – 041 SESSION 2024 – 25

TIME: 3 HRS

SUBJECT : MATHEMATICS

M.M:80

General Instructions:

- This Question paper contains – five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
- Section A has 20 MCQ questions of 1 mark each.
- Section B has 5 Very Short Answer (VSA)–type questions of 2 mark each.
- Section C has 6 Short Answer (SA)–type questions of 3 mark each.
- Section D has 4 Long Answer (LA)–type questions of 5 mark each.
- Section E has 3 source based/case based/passage based/integrated units of assessment of 4 mark each with sub–parts.

SECTION – A

- The LCM of $4!$, $5!$ and $6!$ is ____.
(a) 717 (b) 720 (c) 560 (d) 100
- The coefficient of x^8y^{10} in the expansion $(x+y)^{10}$ is ____.
(a) ${}^{18}C_8$ (b) ${}^{18}C_{10}$ (c) 2^{18} (d) None
- The total number of terms in the expansion $(x+y)^n$ is ____.
(a) $2n$ (b) $2n+1$ (c) $2n-1$ (d) $n+1$
- In how many ways can 5 persons occupy 3 seats?
(a) 60 (b) 30 (c) 20 (d) none
- If $a+ib = c+id$ then ____.
(a) $a+b = c+d$ (b) $a^2+b^2 = c^2+d^2$ (c) $a^2-b^2 = c^2-d^2$ (d) $a+ib = a^2+b^2$
- Find the value of x when $(x-iy)(3+5i)$ is the conjugate of $-6-24i$.
(a) $x = 3$ (b) $x = -3$ (c) $x = 6$ (d) $x = -2$
- If $\cot x = -12/5$ and x lies in 2nd quadrant then $\cos x =$ ____.
(a) $13/12$ (b) $-12/13$ (c) $12/13$ (d) 2
- In a class of 50 students, 10 did not opt for Maths, 13 did not opt for Science and 2 did not opt for either. How many students of class opted for both Maths and Science.
(a) 24 (b) 25 (c) 26 (d) 27
- The multiplicative inverse of $-i$ is ____.
(a) $\frac{1}{i}$ (b) $-i$ (c) 1 (d) i
- How many 3 digits even numbers can be formed from the digits 1,2,3,4,5,6 if the digits cannot be repeated?
(a) 108 (b) 60 (c) 24 (d) 120
- What is the value of x in the inequality $3x-5 < x+7$ when x is a real number?
(a) $\{1,2,3\}$ (b) $x < 6$ (c) $x > 6$ (d) $\{1,2,3,4,5,6\}$
- If ${}^nC_9 = {}^nC_8$, find ${}^nC_{17}$?
(a) 1 (b) 2 (c) -1 (d) -2
- If the arcs of the lengths in two circle subtend angles 65° and 110° at the centre, find the ratio of their radii.

- (a) 22:13 (b) 23:11 (c) 22:11 (d) 11:5
14. The value of $\operatorname{cosec}(315^\circ)$ is ____.
- (a) $\sqrt{2}$ (b) $-\sqrt{2}$ (c) $\sqrt{3}$ (d) $-\sqrt{3}$
15. The value of $(5-3i)^3$ in the form of $a+ib$ is ____.
- (a) $-10-198i$ (b) $10+179i$ (c) $6+13i$ (d) $8+7i$
16. If $x>6$, then
- (a) $-x<-6$ (b) $x<-6$ (c) $x=6$ (d) $x=1/6$
17. How many 4 letter code can be formed using the first 10 letters of the English alphabet if no letter can be repeated?
- (a) 540 (b) 5040 (c) 570 (d) 5050
18. The empty set is a ____ set.
- (a) Finite (b) Infinite (c) Real (d) None of the above
19. The value of $\sqrt{-9} \times \sqrt{-25}$ is ____.
- (a) 15i (b) -15i (c) -15 (d) 15
20. The value of $\cos 1230^\circ$ is ____.
- (a) $-1/2$ (b) $1/2$ (c) 2 (d) $-\sqrt{3}/2$

SECTION - B

21. Solve the linear inequality:
- (a) $3x-7 > 5x-1$ (b) $x/3 > x/2 + 1$

22

Let $z_1 = 2-i$, $z_2 = -2+i$. Find

(i) $\operatorname{Re}\left(\frac{z_1 z_2}{\bar{z}_1}\right)$, (ii) $\operatorname{Im}\left(\frac{1}{z_1 \bar{z}_1}\right)$

23. From a committee of 8 persons, in how many ways can we choose a chairman and a vice chairman assuming one person cannot hold more than one position?

OR

If 45% of the students of a class have offered mathematics and 85% of them biology, then find the percentage of students who offered biology only?

24. Which is larger $(1.01)^{10000}$ or 1000?
25. Prove the following : $\sin 2x + 2\sin 4x + \sin 6x = 4 \cos^2 x \sin 4x$

SECTION - C

26. Find $(a+b)^4 - (a-b)^4$. Hence evaluate $(\sqrt{3}+\sqrt{2})^4 - (\sqrt{3}-\sqrt{2})^4$.

27.

Reduce $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ to the standard form.

28. A man wants to cut three lengths from a single piece of board of length 91 cm. The second length is to be 3 cm longer than the shortest and the third length is to be twice as long as the shortest. What are the possible lengths of the shortest board if the third piece is to be at least 5 cm longer than the second?

29. A box contains 2 white, 3 black and 4 red balls. In how many ways can 3 balls be drawn from the box, if at least 1 black ball is to be included in the draw.

30. Find the value of $\sin 765^\circ$?

OR

Prove the following:

$$\frac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = \frac{-\sin 2x}{\cos 10x}$$

31. How many numbers are there between 99 and 1000 having atleast one of the digits 5?

SECTION – D

32. Using binomial theorem, expand the following:

(2x-7)⁵ (b) (102)

33. Solve the system of inequalities and represent the solutions on the number line.

3x-7 < 5+x

11-5x < 1

34. If sin x = 3/5 and x lies in the second quadrant, find other five trigonometric functions?

35. Find all pairs of consecutive odd natural numbers, both of which are larger than 10, such that their sum is less than 40?

OR

Show that 9ⁿ⁺¹ - 8n - 9 is divisible by 64, whenever n is a positive integer.

SECTION – E

36. Two complex numbers Z₁ = a+ib and Z₂ = c+id are said to be equal if a= c and b= d. On the basis of above information ,give answers to the following questions.

(i) If (3a-6)+ 2ib= -6b+ (6+a)i, then the real values of a and b are _____.

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

(ii) If (2a+2b) + i(b-a)= -4i, then the real values of a and b are _____.

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

(iii) If (x+y) + i(x-y)= 4+6i, then xy= _____.

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

(iv) If $\frac{(1+i)^2}{2-i} = x+iy$ then the value of x+y is _____.

- (a) 1/5 (b) 3/5 (c) 4/5 (d) 2/5

37. There was a prize distribution function in a school. There are 3 prizes and 5 students. In how many ways the prizes can be distributed among 5 students?

(a) No. of students who get come more than one prize are ____.

- (i) 120 (ii) 60 (iii) 40 (iv) 5

(ii) One student may get any number of prizes

- (i) 120 (ii) 125 (iii) 150 (iv) 140

(iii) No. of students who get can all the prizes are ____.

- (i) 120 (ii) 130 (iii) 110 (iv) 150

(iv) 2! + 3! = ____.

- (i) 6 (ii) 8 (iii) 2 (iv) 5

38. A class teacher Mamta of class 11 write three sets A ,B and C such that A= {1,3,5,7,9}, B= {2,4,6,8} and C= {2,3,5,7,11}

Answer the following questions based on above sets.

(i) Find A ∩ B

- (a) { 3,5,7} (b) {1,5,7} (c) {2,5,7} (d) φ

(ii) Find A ∩ C

- (a) { 3,5,7} (b) {3,4,7} (c) φ (d) {1,5,7}

(iii) Which of the following is correct for two sets A and B to be disjoint?

(a) $A \cap B = \varnothing$ (b) $A \cap B \neq \varnothing$ (c) $A \cup B \neq \varnothing$ (d) $A \cup B = \varnothing$

(iv) Which of the following is correct for two sets A and C to be intersecting?

(a) $A \cap C = \varnothing$ (b) $A \cap C \neq \varnothing$ (c) $A \cup C \neq \varnothing$ (d) $A \cup C = \varnothing$