



ANGEL'S PUBLIC SCHOOL

HALF YEARLY EXAMINATION

(SAMPLE PAPER)

SESSION 2026 – 27

SUBJECT : MATHEMATICS

GRADE – XI

TIME : 03 HRS

M.M:80

GENERAL INSTRUCTIONS:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there is some internal choice in some questions.
2. Section A has 18 MCQ's and 02 Assertion Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA) questions of 2 marks each.
4. Section C has 6 Short Answer (SA) questions of 3 marks each.
5. Section D has 4 Long Answer (LA) questions of 5 marks each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub parts.

1. Let $n(A) = m$, $n(B) = n$, then the total number of non empty relations defined from A to B is :
(a) m^n (b) $n^m - 1$ (c) $mn - 1$ (d) $2^{mn} - 1$
2. Range of $f(x) = \frac{1}{1-2\cos x}$ is
(a) $[1/3, 1]$ (b) $[-1/3, 1]$ (c) $[-1, 1/3]$ (d) $(-\infty, -1) \cup [1/3, 1]$

OR

The value of $\tan 75^\circ - \cot 75^\circ$ is

- (a) $2\sqrt{3}$ (b) $2 + \sqrt{3}$ (c) $2 - \sqrt{3}$ (d) None of these
3. 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 defined
4. The value of $\sqrt{-25} \times \sqrt{-9}$ is:
(a) 15 (b) -15 (c) 10 (d) 0

OR

If $\alpha + \beta = \pi/4$, then the value of $(1 + \tan \alpha)(1 + \tan \beta)$ is :

- (a) 1 (b) 2 (c) -2 (d) Not defined
5. If $f(x) = x^{100} + x^{99} + \dots + x + 1$, then $f'(1)$ is equals to _____.
6. If x is a real number and $|x| < 3$, then
(a) $x \geq 3$ (b) $-3 < x < 3$ (c) $x \leq -3$ (d) $-3 \leq x \leq 3$

7. The number of possible outcomes when a coin is tossed 3 times :

- (a) 36 (b) 64 (c) 12 (d) 32

8. $\frac{\sin x}{x-\pi}$ is equals to:

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

9. Which of the following is correct ?

- (a) $\sin 1^\circ > \sin 1$ (b) $\sin 1^\circ < \sin 1$ (c) $\sin 1^\circ = \sin 1$ (d) None of these

OR

Total number of words formed by 2 vowels and 3 consonants taken from 4 vowels and 5 consonants is :

- (a) 60 (b) 120 (c) 7200 (d) 720

10. If $\sin x + \cos x = 1$, then the value of $\sin 2x$ is equals to:

- (a) 1 (b) $\frac{1}{2}$ (c) 0 (d) -1

11. If $|x - 1| > 5$, then

- (a) $X \in (-7, 11)$ (b) $X \in [-11, 7]$
(c) $X \in (-\infty, -7) \cup (11, \infty)$ (d) $X \in (-\infty, -7) \cup [11, \infty)$

12. If $nC_5 = nC_2$, then n is equals to:

- (a) 20 (b) 12 (c) 6 (d) none of these

13. If $y = \frac{\sin x + \cos x}{\sin x - \cos x}$, then $\frac{dy}{dx}$ at $x = 0$:

- (a) -2 (b) 0 (c) 4 (d) does not exist

14. The period of function $\sin 3\theta$ is:

- (a) π (b) 2π (c) 3π (d) None of these

OR

Number of terms in $(x + a)^n$, where n is a positive integer , is:

15. Modulus of complex number $3 + i$ is :

- (a) 10 (b) $\sqrt{10}$ (c) $-\sqrt{10}$ (d) Zero

16. If $f(x) = \cos^2 x + \sec^2 x$, then:

- (a) $f(x) < 1$ (b) $f(x) = 1$ (c) $2 < f(x) < 1$ (d) $f(x) \geq 2$

17. If $\sin \theta = -1/2$ and $\cos \theta = -\sqrt{3}/2$, then θ lies in:

- (a) Ist quadrant (b) IInd quadrant (c) III quadrant (d) IV quadrant

18. If $\left(\frac{1+i}{1-i}\right)^n = 1$, then the smallest value of n is :

- (a) 2 (b) 6 (c) 8 (d) 4

19. Out of $(1.2)^{4000}$ and 800, we have_____.

- (a) $(1.2)^{4000} > 800$ (b) $(1.2)^{4000} < 800$ (c) $(1.2)^{4000} = 800$ (d) None of these

20. If $(n+1)! = 60(n-1)!$, then value of n is :

- (a) 2 (b) 3 (c) 4 (d) None of these

SECTION – B

21. Prove that $2 \cos \frac{\pi}{13} \cos \frac{9\pi}{13} + \cos \frac{3\pi}{13} + \cos \frac{5\pi}{13} = 0$

22. If $x + iy = \frac{a+ib}{a-ib}$, prove that $x^2 + y^2 = 1$

OR

Find the domain and range of $\frac{1}{\sqrt{x-5}}$.

23. In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together?

24. Evaluate : $\lim_{x \rightarrow 0} \left(\frac{\sin x - 2 \sin 3x + \sin 5x}{x} \right)$

25. Expand $\left(x^2 + \frac{3}{x}\right)^4$ using Binomial theorem.

OR

26. Show that $\frac{\cos 18^\circ + \sin 18^\circ}{\cos 18^\circ - \sin 18^\circ} = \cot 27^\circ$

SECTION – C

27. Prove that $\sin^2 6x - \sin^2 4x = \sin 2x \sin 4x$

OR

Prove that $2 \cos x = \sqrt{2 + \sqrt{2 + 2 \cos 4x}}$.

28. In how many ways of distinct permutations of the letters in **MISSISSIPPI** do the four I's not come together.

29. Find the derivative of $f(x) = 2x^2 + 3x - 5$ at $x = -1$. Also Prove that $f'(0) + 3f'(-1) = 0$

OR

Differentiate : $y = \left(\sqrt{x + \sqrt{x^2 + a^2}} \right)^n$ w.r.t x .

30. A group consists of 4 girls and 7 boys . In how many ways can a team of 5 members be selected if the team has

- (a) No girl (b) Atleast one boy and one girl (c) Atleast 3 girls

31. Let $A = \{ 1, 2, 3, 4, 6 \}$. Let R be the relation on set A defined by $R = \{ (a, b) : a, b \in A : b \text{ is exactly divisible by } a \}$. Find the domain and range of R .

32. Find $\lim_{x \rightarrow 0} f(x)$, where function $f(x)$ given below :

$$f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$$

SECTION – D

$$f(x) = \begin{cases} a + bx, & x < 1 \\ 4, & x = 1 \\ b - ax, & x > 1 \end{cases}$$

33. Find the possible values of 'a' and 'b' if $\lim_{x \rightarrow 1} f(x) = f(1)$

OR

An angle α is divided into two parts such that the ratio of the tangents of parts is $k : 1$, if x is the difference of the two parts , prove that

$$\sin x = \frac{k - 1}{k + 1} \tan \alpha .$$

34. Prove that $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$

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

(b) Evaluate : $\lim_{x \rightarrow 0} (\operatorname{cosec} x - \cot x)$.

36) a) Find the domain and range of $\sqrt{25 - x^2}$.

b) Solve the inequality: $\frac{x}{4} \geq \frac{5x - 2}{3} - \frac{7x - 3}{5}$

Or

Prove that $\sin 18^\circ = \frac{\sqrt{5} - 1}{4}$ and hence Also find the value of $\cos 18^\circ$.

CASE STUDY 1

37. 1. Let $z_1 = 2 - i$, $z_2 = -2 + i$

Based on the above information, answer the following questions :

(i) $z_1 z_2$ equals

- (a) $-3 + 4i$ (b) $3 + 4i$ (c) $-3 - 4i$ (d) $-2 + 4i$

(ii) $\frac{z_1 z_2}{\bar{z}_1}$ equals

- (a) $\frac{2}{5} + \frac{11}{5}i$ (b) $-\frac{2}{5} + \frac{11}{5}i$ (c) $-\frac{2}{5} - \frac{11}{5}i$ (d) 0

(iii) $\operatorname{Re}\left(\frac{z_1 z_2}{\bar{z}_1}\right)$ equals

- (a) $\frac{2}{5}$ (b) $-\frac{1}{5}$ (c) $-\frac{2}{5}$ (d) $\frac{1}{5}$

(iv) $z_1 \bar{z}_1$ equals

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

(v) $\operatorname{Im}\left(\frac{1}{z_1 \bar{z}_1}\right)$ equals

- (a) 0 (b) 1 (c) 2 (d) 3

CASE STUDY 2

38. There is a group consisting of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has

Based on the above information, answer the following questions :

(i) In how many ways can a team of 5 members can be selected consisting of 1 girl and 4 boys ?

- (a) 120 (b) 130 (c) 140 (d) 150

(ii) In how many ways can a team of 5 members can be selected 3 boys and 2 girls ?

- (a) 210 (b) 220 (c) 230 (d) 240

(iii) In how many ways can a team of 5 members can be selected consisting of no girl ?

- (a) 18 (b) 19 (c) 20 (d) 21

(iv) In how many ways can a team of 5 members can be selected consisting of at least of 1 boy and 1 girl ?

- (a) 441 (b) 442 (c) 443 (d) 444

(v) In how many ways can a team of 5 members can be selected consisting of at least 3 girls ?

- (a) 90 (b) 91 (c) 92 (d) 93