# APEEJAY SCHOOL, PANCHSHEEL PARK

**Class – X**

**Subject – Mathematics**

**MIDTERM EXAMINATION (2024-25)**

Name of the student: Date:

Time Allowed: 3 hr M.M.:80

General Instructions:

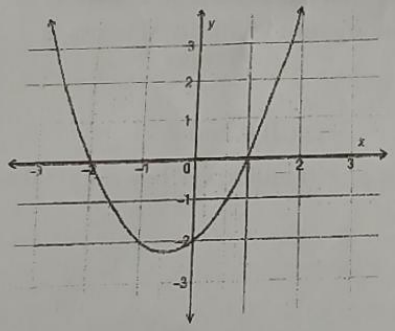
i. This Question Paper has 5 Sections A, B, C, D and E.
ii. Section A has 20 MCQs carrying 1 mark each
iii. Section B has 5 questions carrying 02 marks each.
iv. Section C has 6 questions carrying 03 marks each.
v. Section D has 4 questions carrying 05 marks each.
vi. Section E has 3 case-based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks .
vii. Draw neat figures wherever required.
viii. All questions are compulsory.

## SECTION A

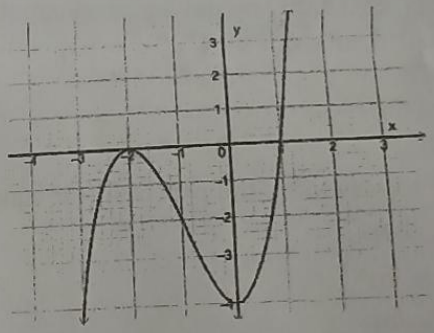
**(1x20=20)**

1. Which of the following could be the graph of the polynomial $(x - 1)^2 (x + 2)$?

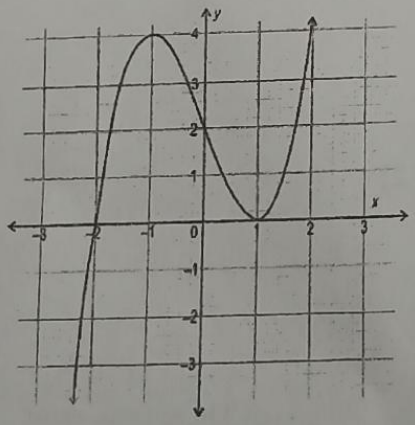
(a)



(b)



(c)



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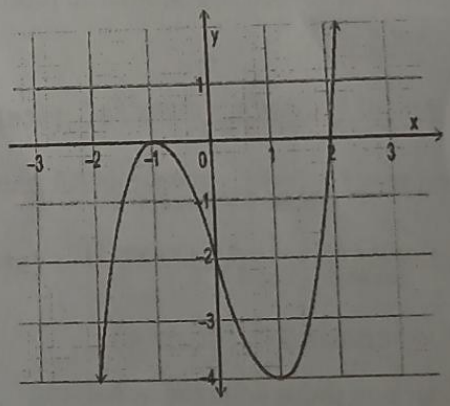


2. Which out of the following is the quadratic polynomial whose sum and the product of zeroes is $\sqrt{2}$ and $\frac{1}{3}$ respectively?

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

(c) $3x^2+3\sqrt{2}x-1$ (d) $3x^2-3\sqrt{2}x-1$

3. For any two positive integers a and b, HCF (a, b) × LCM (a, b) = ?

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

4. The decimal expansion of the rational number $\frac{23}{2^2 \times 5}$ will terminate after

(a) one decimal place (b) two decimal places

(c) three decimal places (d) more than 3 decimal places

5. The pairs of equations $x+2y-5 = 0$ and $-4x-8y+20=0$ have:

(a) Unique solution (b) Exactly two solutions

(c) Infinitely many solutions (d) No solution

6. The value of x, for which 2x, x+ 10, 3x + 2 are three consecutive terms of an AP is

(a) 6 (b) -6 (c) 18 (d) -18

7. If nth term of an AP is given by $a_n = 2n + 3$ then common difference of an AP is

(a) 2 (b) 3 (c) 5 (d) 1

8. Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of ₹1,18,000 by paying every month starting with the first instalment of ₹1000. If he increases the instalment by ₹100 every month , The amount paid by him in 30 instalments is

(a) ₹37000 (b) ₹73500 (c) ₹75300 (d) ₹75000

9. What is/are the roots of $3x^2 = 6x$?

(a) only 2 (b) only 3 (c) 0 and 6 (d) 0 and 2

10. If the lines representing the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are coincident, then

(a) $a_1/a_2 = b_1/b_2$ (b) $a_1/a_2 = b_1/b_2 = c_1/c_2$

(c) $a_1/a_2 \neq b_1/b_2$ (d) $a_1/a_2 = b_1/b_2 \neq c_1/c_2$

11. Shown below is a solved trigonometric problem.

$$\frac{\text{cosec}\,\theta + \cot\theta - 1}{\text{cosec}\,\theta - \cot\theta + 1}$$

$$= \frac{\text{cosec}\,\theta + \cot\theta - (\cot^2\theta - \text{cosec}^2\theta)}{\text{cosec}\,\theta - \cot\theta + 1} \quad \text{(step 1)}$$

$$= \frac{\cot\theta + \text{cosec}\,\theta - (\cot\theta - \text{cosec}\,\theta)(\cot\theta + \text{cosec}\,\theta)}{\text{cosec}\,\theta - \cot\theta + 1} \quad \text{(step 2)}$$

$$= \frac{(\cot\theta + \text{cosec}\,\theta)(1 - \cot\theta + \text{cosec}\,\theta)}{\text{cosec}\,\theta - \cot\theta + 1} \quad \text{(step 3)}$$

$$= \cot\theta + \text{cosec}\,\theta \quad \text{(step 4)}$$

In which step is there an error in solving?

(a) Step 1 (b) Step 2 (c) Step 3 (d) There is no error.

12. $(\sin 30°+\cos 60°) - (\sin 60° + \cos 30°)$ is equal to:

(a) 0 (b) $1+2\sqrt{3}$ (c) $1-\sqrt{3}$ (d) $1+\sqrt{3}$

13. If $\cos x = \frac{2}{3}$ then $\tan x$ is equal to:

(a) 5/2 (b) $\sqrt{(5/2)}$ (c) $\sqrt{5}/2$ (d) $2/\sqrt{5}$

14. If the height of the building and distance from the building foot's to a point is increased by 20%, then the angle of elevation of the top of the building:

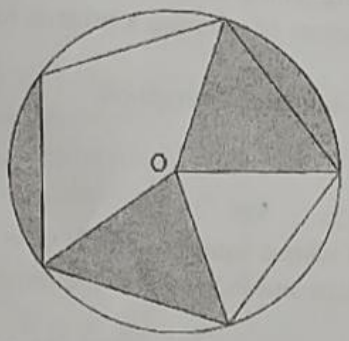
(a) Increases (b) Decreases

(c) Does not change (d) None of the above

15. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is

(a) 2 units (b) $\pi$ units (c) 4 units (d) 7 units

16. A regular pentagon is inscribed in a circle with centre O, of radius 5 cm, as shown below




What is the area of the shaded part of the circle?

(a) $2\pi$ cm$^2$ (b) $4\pi$ cm$^2$ (c) $5\pi$ cm$^2$ (d) $10\pi$ cm$^2$

17. Ginny flipped a fair coin three times and tails came up each time. Ginny wants to flip the coin again. What is the probability of getting heads in the next coin flip?

(a) 0 (b) 0.25 (c) 0.5 (d) 1

18. The probability that a non leap year selected at random will contain 53 Sundays is

(a) 1/7 (b) 2/7 (c) 3/7 (d) 5/7

19. A number q is prime factorised as $3^2 \times 7^2 \times b$, where b is a prime number other than 3 and 7. Based on the above information, two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements (A) and (R).

Assertion (A): q is definitely an odd number.

Reason (R): 32 × 72 is an odd number.

(a) Both (A) and (R) are true and (R) is the correct explanation for (A).

(b) Both (A) and (R) are true but (R) is not the correct explanation for (A).

(c) (A) is true but (R) is false.

(d) (A) is false but (R) is true.

20. Assertion (A): If a box contains 5 white, 2 red and 4 black marbles, then the probability of not drawing a white marble from the box is 5/11

Reason (R): $P(\overline{E}) = 1 - P(E)$, where E is any event.

(a) Both (A) and (R) are true and (R) is the correct explanation for (A).

(b) Both (A) and (R) are true but (R) is not the correct explanation for (A).

(c) (A) is true but (R) is false.

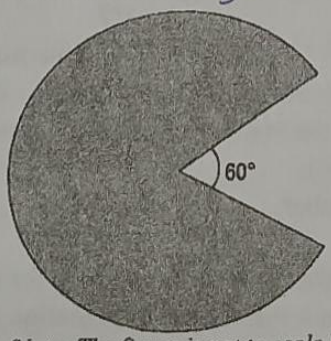
(d) (A) is false but (R) is true.

## SECTION B (2x5=10)

21. $\alpha$ and $\beta$ are the zeroes of the quadratic polynomial $x^2 - 6x + y$. Find the value of 'y' $-\frac{85}{4}$ if $3 + 2\beta = 20$.
22. Prove $\sqrt{6}$ is an irrational number.
23. Find the number of terms in the AP 7, 13, 19,..., 205. 34
24. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other. 3
25. Naima is playing a game and has two identical 6-sided dice. The faces of the dice have 3 even numbers and 3 odd numbers. She has to roll the two dice simultaneously and has two options to choose from before rolling the dice. She wins a prize if:
**Option 1:** the sum of the two numbers appearing on the top of the two dice is odd.
**Option 2:** the product of the two numbers appearing on top of the two dice is odd.
Which option should Naima choose so that her chances of winning a prize is higher?

**SECTION C** **(3x6=18)**

26. Solve the following system of equations using the substitution method.
$x+2y-7=0$ $y=3$, $x=1$
$2x-5y+13=0$
27. Find the sum of first 15 term for the AP:7,11,15,19,..... 525
28. Find two consecutive positive integers, the sum of whose squares is 365. 13, 14
29. In triangle PQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the values of sin P, cos P and tan P. 12/13 5/13 12/5
30. The angle of elevation of the top of a tower from a point on the ground is 30 degrees. When the observer moves 20 meters closer to the tower, the angle of elevation becomes 45 degrees. What is the height of the tower? $10(\sqrt{3}+1)$
31. Wasim made a model of Pac-Man, after playing the famous video game of the same name. The area of the model is $120\pi$ cm$^2$ . Pac-Man's mouth forms an angle of 60° at the centre of the circle. A picture of the model is shown below. $\frac{5}{3}\sqrt{145}\pi$

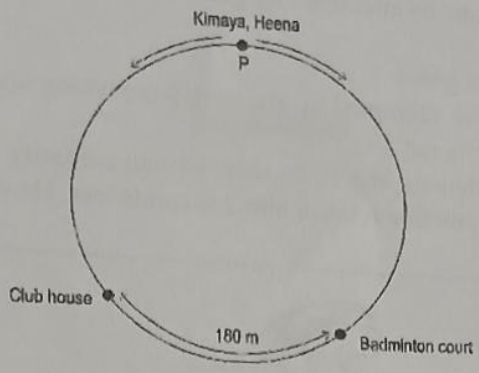



*(Note: The figure is not to scale.)*

Wasim wants to decorate the model by attaching a coloured ribbon to the entire boundary of the shape. What is the minimum length of the ribbon required in terms of $\pi$ ?

**SECTION D** **(5x4=20)**

32. Kimaya and Heena started walking from the point P at the same moment in opposite directions on a 800 m long circular path as shown below. Kimaya walked to the club house at an average speed of 100 m/min and Heena walked to the badminton court at an average speed of 80 m/min. The length of the circular track between the clubhouse and the badminton court is 180m.




(Note: The figure is not to scale.)

If Heena took 1 minute more than Kimaya to reach her destination, find the time taken by Heena to reach the badminton court. 3

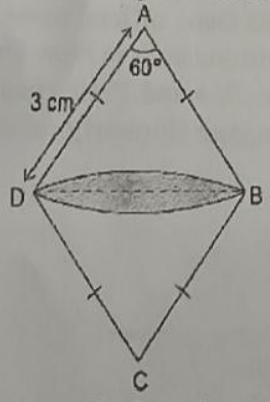
33. The sum of the areas of two squares is 468 $m^2$. If the difference of their perimeters is 24 m, find the sides of the two squares. 18 & 12

34. Show that

$$\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right)=\left(\frac{1-\tan A}{1-\cot A}\right)^2=\tan^2 A$$

35. ABCD is a rhombus with side 3 cm. Two arcs are drawn from points A and C respectively such that the radius of the arcs equals the side of the rhombus. The figure is shown below.

$\frac{63\sqrt{3}-132}{14}$




*(Note: The figure is not to scale.)*

If BD is a line of symmetry for the figure, then find the area of the shaded part of the figure.

## SECTION E

**(4x3=12)**

36. A test consists of 'True' or 'False' questions. One mark is awarded for every correct answer while ¼ mark is deducted for every wrong answer. A student knew answers to some of the questions. Rest of the questions he attempted by guessing. He answered 120 questions and got 90 marks.

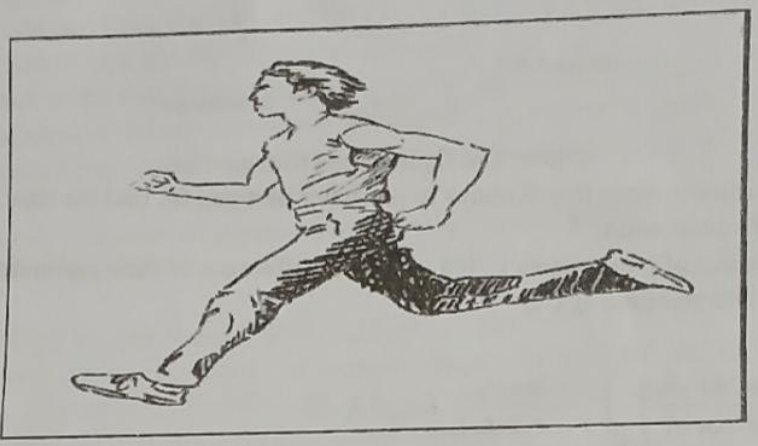
| Type of Question | Marks given for correct answer | Marks deducted for wrong answer |
|---|---|---|
| True/False | 1 | 0.25 |

(a) If answers to all the questions he attempted by guessing were wrong, then how many questions did he answer correctly? 2

(b) How many questions did he guess ? 1

(c) If answers to all questions he attempted by guessing were wrong and he answered 80 correctly, then how many marks did he get ? 1

37. Your friend Veer wants to participate in a 200m race. He can currently run that distance in 51 seconds and with each day of practice it takes him 2 seconds less. He wants to complete the race in 31 seconds .



(a) Form an AP for the given situation. 1

(b) Is 30 a term of the AP of the above given situation? 1

(c) What is the minimum number of days he needs to practice till his goal is achieved 2

38. A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919.The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.

(a) What is the angle of elevation if they are standing at a distance of 42m away from the monument? 1

(b) The angle formed by the line of sight with the horizontal when the object viewed is below the horizontal level is known as angle of _____. 1

(c) They want to see the tower at an angle of 60°. At what distance from the monument should they stand to do so? 2