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BAL BHAVAN INTERNATIONAL SCHOOL
Sec – 12, Dwarka, New Delhi – 75

HALF YEARLY EXAMINATIONS [2025-26]
SET I

Name: _____ **Roll No.:** _____

CLASS X **Time Allowed: 3 Hours**

Subject: MATHEMATICS (041) **M.M. 80**

General Instructions

a. This question paper contains five Sections A, B, C, D and E. Each part is compulsory.
b. Section A has 20 very short answer type (SA1) questions of 1 mark each.
c. Section B has 5 short answer type (SA2) questions of 2 marks each.
d. Section C has 6 long answer type (LA) questions of 3 marks each.
e. Section D has 4 long answer type (LA) questions of 5 marks each.
f. Section E has 3 long answer type (LA) questions of 4 marks each.

SECTION A

Q.1. Two alarm clocks ring their alarms at regular intervals of 50 seconds and 48 seconds. If they first beep together at 12 noon, at what time will they beep again for the first time?

(a) 12.20 pm (b) 12.12 pm (c) 12.11 pm (d) none of these

Q.2. If $p(x) = ax^2 + bx + c$ and $a + b + c = 0$, then one zero is

(a) $\frac{-b}{a}$ (b) $\frac{c}{a}$ (c) $\frac{b}{c}$ (d) none of these

Q.3. If one of the zeroes of a quadratic polynomial of the form $x^2 + ax + b$ is the negative of the other, then it

(a) has no linear term and the constant term is negative.
(b) has no linear term and the constant term is positive.
(c) can have a linear term but the constant term is negative.
(d) can have a linear term but the constant term is positive.

Q.4. If α, β are zeroes of the polynomial $x^2 + 5x + 5$, then polynomial whose zeroes are α + 1 and β + 1 is

(a) $x^2 + 5x—5$ (b) $x^2 + 3x + 5$ (c) $x^2 + 3x + 1$ (d) none of these

Q.5. The system of equations $x + 5 = 0$ and $2x + 1 = 0$ has

(a) No solution (b) Unique solution (c) Two solutions (d) Infinite solutions

Q.6. The equations $ax + by + c = 0$ and $dx + ey + c = 0$ represent the interesting lines if

(a) ad = be (b) ae ≠bd (c) be = ad (d) ad ≠be

Q.7. Find the values of a and b for which the following pair of linear equations has infinitely many solutions:
$2x + 3y = 7$; $(a + b)x + (2a—b)y = 21$

(a) a = 0, b =1 (b) a =5, b=1 (c) a = 2, b= 3 (d) none of these

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Q.8. Which of the following equations has two distinct real roots?

(a) $2x^2 - 3\sqrt{2}x + \frac{9}{4} = 0 = 0$ (b) $x^2 + x - 5 = 0$ (c) $x^2 + 3x + 2\sqrt{2} = 0$ (d) $5x^2 - 3x + 1 = 0$

Q.9. If the equation $x^2 - (2 + m)x + (-m^2 - 4m - 4) = 0$ has coincident roots, then

(b) m =0, m=1 (b) m = 2, m = 2 (c) m= -2, m=-2 (d) m= - 6, m = - 2

Q.10. An AP consists of 31 terms. If its 16th term is m, then sum of all the terms of this AP is

(a) 16 m (b) 47 m (c) 31 m (d) 52m

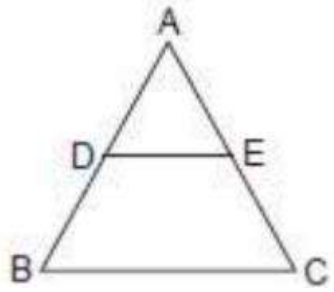
Q.11. The next term of the AP: $\sqrt{18}$, $\sqrt{50}$, $\sqrt{98}$, ...

(a) $\sqrt{146}$ (b) $\sqrt{128}$ (c) $\sqrt{162}$ (d) $\sqrt{200}$

Q.12. If the sum of first n terms of an AP is $An + Bn^2$ where A and B are constants, the common difference of AP will be

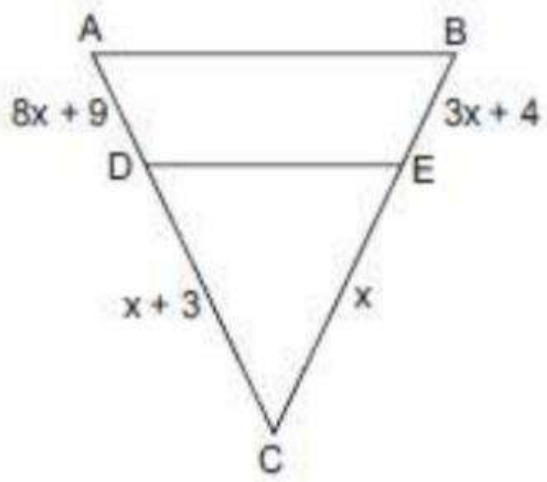
(a) A+B (b)A-B (c) 2A (d) 2B

Q.13. In the given figure, $\frac{AD}{BD} = \frac{AE}{EC}$ and $\angle ADE = 70°$ and ∠BAC = 50°, then angle $\angle BCA =$



(a) 70° (b) 50° (c) 80° (d) 60°

Q.14. What value(s) of x will make DE || AB in the given figure?



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

Q.15. If ΔABC is right angled at C, then the value of cos (A + B) is

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

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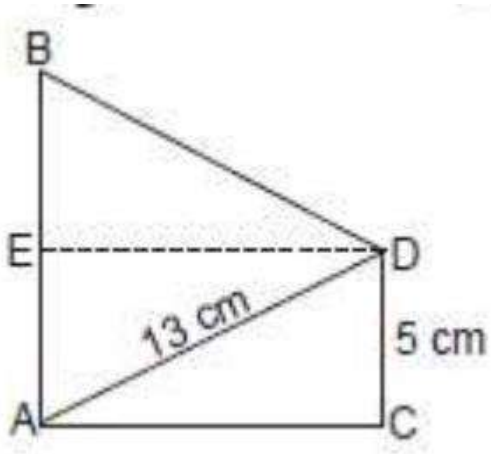
Q.16. In the given figure, if AB = 14 cm, then the value of tan B is:



(a) , $\frac{4}{3}$ (b) $\frac{14}{3}$ (c) $\frac{5}{3}$ (d) $\frac{13}{3}$

Q.17. sinA= ……..

(a) $\frac{cotA}{\sqrt{1-cos^2A}}$ (b) $\frac{tanA}{\sqrt{1-sec^2A}}$ (c) $\frac{tanA}{\sqrt{1+tan^2A}}$ (d) $\frac{1}{\sqrt{1-cos^2A}}$

Q.18. If $\sin\theta$ — $\cos\theta = 0$, then the value of $(\sin^4\theta + \cos^4\theta)$ is

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

DIRECTION FOR Q19 and Q20. In the question number 11 and 12, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice.

1) **Both A and B are true and R is the correct explanation of A.**
2) **Both A and B are true and R is not the correct explanation of A.**
3) **A is true and B is false**
4) **A is false and B is true.**

Q.19. **Assertion (A):** For $0^0 < A < 90^0$, sec A+ tan A and sec A - tan A are reciprocal of each other
Reason : (R) : $\sec^2A - \tan^2A = 1$

Q.20. **Assertion (A):** $3x^2 - 6x + 3 = 0$ has repeated roots.
Reason : (R) The quadratic equation $ax^2 + bx + c = 0$ have repeated roots if discriminant D > 0.

SECTION B

Q.21. The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280, then find the other number.

Q.22. Determine k so that **$4k + 8$, $2k^2 + 3k + 6$ and $3k^2 + 4k + 4$** are three consecutive terms of an AP.

Q.23. If $\boldsymbol{sin(A+B) = cos(A-B) = \frac{\sqrt{3}}{2}}$ *where* $0^0 < A + B < 90^0$ *and* $A > B$, then find the values of A and B**.**

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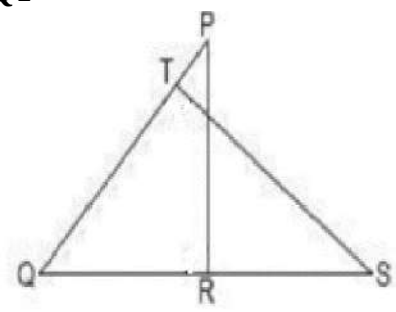
Q.24. Solve for x : $\boldsymbol{x + \frac{1}{x} = \frac{50}{7}}$.

Q.25. In the figure, PQR and QST are two right triangles, right angled at R and T respectively. Prove that **QR x QS = QP x QT**



SECTION C

Q.26. Prove that $\sqrt{3}$ is irrational.

Q.27. If $\boldsymbol{\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1}$ *and* $\boldsymbol{\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1}$, *prove that* $\boldsymbol{\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2}$

OR

Prove that : $\boldsymbol{2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = 0}$

Q.28. Solve for x and y: **152x — 378y = -74 ; - 378x + 152y = - 604.**

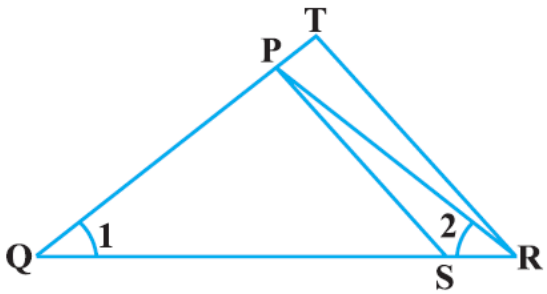
Q.29. If α *and* β are the zeroes of the polynomial, $\boldsymbol{2x^2 - 5x - 8}$ then find the polynomial whose zeroes are $\boldsymbol{\frac{\alpha^2}{\beta}}$ *and* $\boldsymbol{\frac{\beta^2}{\alpha}}$

OR

Find the zeroes of the polynomial: $\boldsymbol{p(x^2 + 1) - x(p^2 + 1)}$ and verify the relationship between the zeroes and the coefficient of the terms.

Q.30. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of triangle PQR). Show that ΔABC ~ ΔPQR.

Q.31. In the given figure, $\boldsymbol{\frac{QR}{QS} = \frac{QT}{PR}}$ and $\boldsymbol{\angle 1 = \angle 2}$, then prove that Δ PQS ~ Δ TQR



SECTION D

Q.32. If a lines is drawn parallel to one side of a triangle, then prove that it divides the other two sides in the same ratio. Now using this theorem, do the following :

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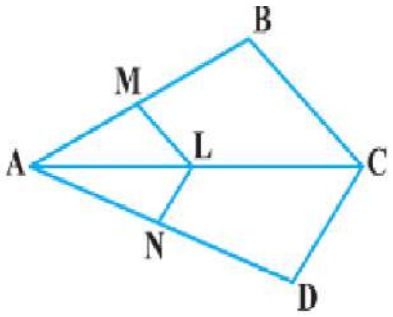
In the given figure, if LM || CB and LN || CD, prove that : $\frac{AM}{AB} = \frac{AN}{AD}$



Q.33. In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100 km/h and time increased by 30 minutes. Find the original duration of the flight.

Q.34. Find the sum of all 3-digit numbers which are not divisible by 12.

.

OR

If the pth, qth, rth terms of an AP be *x*, y, z respectively, show that *x*(q —r) +y(r —p)+z(p—q) = 0.

Q.35. **Prove that :** $\frac{cos^4x - sin^4x}{1 - tanx} = \frac{cotx + 1}{secxcosecx}$

OR

If sec $\theta = x + \frac{1}{4x}$, prove that sec θ + tan $\theta = 2x$ or $\frac{1}{2x}$.

SECTION E

Q.36. Essel World is one of India's largest amusement parks that offers a diverse range of thrilling rides, water attractions and entertainment options for visitors of all ages. The park is known for its iconic "Water Kingdom" section, making it a popular destination for family outings and fun-filled adventure. The ticket charges for the park are 150 per child and 250 per adult. On a day, the cashier of the park found that 300 tickets were sold and an amount of ₹55,000 was collected

.

Based on the above information, answer the following questions:

(i) If the number of children visited is x and the number of adults visited is y, then write the given situation algebraically

(ii) (a) How many children visited the amusement park that day?

OR

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(b) How many adults visited the amusement park that day?

(iii) How much amount will be collected if 250 children and 100 adults visit the amusement park?

Q.37. Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted prize. While playing a treasure hunt game, some clues (numbers) are hidden in various spots collectively forming an AP. If the number on the nth spot is 20 + 4n then answer the following questions to help the players in spotting the clues:

Based on the above information answer the following questions: (1+2+1)

(i) Which number is on first spot?

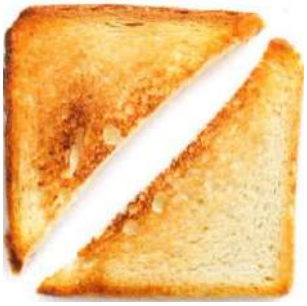
(ii) (a) Which spot is numbered as 1127

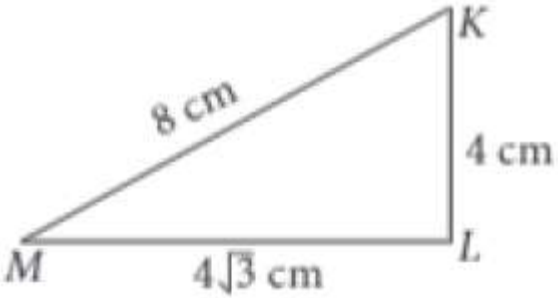
OR

(b) What is the sum of all the numbers on the first 10 spots?

(iii) Which number is on the (n-2)th spot?

Q.38. Ananya is feeling so hungry and so thought to eat something. She looked into the fridge and found a bread pieces. She decided to make a sandwich. She cut the piece of bread diagonally and found it forms a right-angled triangle, with sides 4 cm, $4\sqrt{3}$ cm and 8 cm.





(i) The value of ∠M is

(a). 30° (b) 60° (c) 45° (d)None of these

(ii) The value of ∠K is

(a). 45° (b) 30° (c) 60° (d)None of these

(iii) Find the value of tan*M*.

(a). $\sqrt{3}$ (b) $1/\sqrt{3}$ (c) 1 (d)None of these

(iv) $\sec^2 M - 1 = ?$

(a) tanM (b) $\tan^2 M$ (c) tan2M (d)None of these

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