

K. R. MANGALAM WORLD SCHOOL, GK-II
FIRST TERM EXAMINATION (2025-26)
CLASS X / MATHEMATICS / SET 2

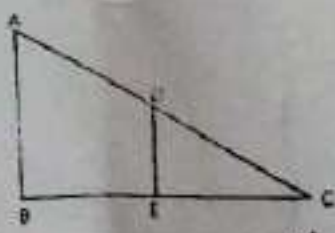
TIME : 3 Hrs.

M.M. - 80

General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.

SECTION - A

Q1.	If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ and LCM $(a, b, c) = 3780$, then x is equal to:	(a) 1	(b) 2	(c) 3	(d) 0	(1)
Q2.	A bag has ₹5 coins and ₹10 coins in the ratio 1:4. A coin is picked at random. Find the probability of getting a ₹10 coin	(a) $\frac{1}{5}$	(b) $\frac{1}{4}$	(c) $\frac{4}{5}$	(d) $\frac{1}{3}$	(1)
Q3.	The shortest distance (in units) of the point (2,3) from y-axis is:	(a) 1	(b) 2	(c) 3	(d) 5	(1)
Q4.	If $\triangle ABC \sim \triangle DEF$, $AB = 6$ cm, $DE = 6$ cm, $EF = 9$ cm and $FD = 12$ cm, then the perimeter of $\triangle ABC$ is:	(a) 28.5 cm	(b) 27 cm	(c) 23 cm	(d) 18 cm	(1)
Q5.	The equation $2x^2 + kx + 5 = 0$ has real roots, if:	(a) $k^2 \leq 40$	(b) $k^2 \geq 40$	(c) $k^2 = 40$	(d) no real roots	(1)
Q6.	If $\sec \theta + \tan \theta = x$, then $\sec \theta - \tan \theta$ will be is equal to:	(a) x^2	(b) $\frac{1}{x}$	(c) x	(d) $\frac{2}{x}$	(1)
Q7.	If mean and mode of given set of observations are 10 and 13 respectively, then the value of median is:	(a) 19	(b) 4	(c) 11	(d) 43	(1)
Q8.	In $\triangle ABC$, $DE \parallel AB$. If $AB = a$, $DE = x$, $BE = b$ and $EC = c$. Then x expressed in terms of a , b and c is:					(1)
		(a) $\frac{ac}{b}$	(b) $\frac{ac}{b+c}$	(c) $\frac{ab}{c}$	(d) $\frac{ab}{b+c}$	
Q9.	In an MCQ test, a student guesses the correct answer x out of y times. If the probability that the student guesses the answer to be wrong is $\frac{2}{3}$, then what is the relation between x and y ?	(a) $y = 3x$	(b) $x = 3y$	(c) $3x = 2y$	(d) $2x = 3y$	
Q10.	If a and b are co-prime numbers, then a^3 and b^3 are:	(a) even	(b) co-prime	(c) odd	(d) not co-prime	
Q11.	The value of ' c ' for which the pair $cx - y = 2$ and $6x - 2y = 3$ will have infinitely many Solutions is:					

- Q12. The mid-point of the line segment joining the points P(4, 5) and Q(4, 6) lies on:
 (a) x-axis (b) y-axis (c) -12 (d) no value of c
 (a) x-axis (b) y-axis (c) origin (d) neither x-axis nor y-axis

- Q13. If α and β are the zeros of the polynomial $2x^2 - 3x + 1$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is:
 (a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) 3

- Q14. If $\tan \theta + \cot \theta = 2$, then the value of $\tan^2 \theta + \cot^2 \theta$ is:
 (a) 0 (b) 2 (c) 4 (d) 6

- Q15. The value of 'a' for which $ax^2 + x + a = 0$ has equal and positive roots is:
 (a) 2 (b) -2 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

- Q16. The mean of the following data is 15. What is the value of x?
- | | | | |
|-----------|----|----|----|
| Value | 10 | 15 | 20 |
| Frequency | 3 | 5 | x |

- Q17. A kite is flying at a height of 150 m from the ground. It is attached to a string inclined at an angle of 30° . The length of the string is:
 (a) $100\sqrt{3}$ m (b) $150\sqrt{2}$ m (c) 300 m (d) $150\sqrt{3}$ m

- Q18. In triangles ABC and DEF, $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$. Then, the two triangles are:
 (a) congruent but not similar (b) congruent as well as similar
 (c) neither congruent nor similar (d) similar but not congruent

DIRECTIONS: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct option:

- (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 and 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.

- Q19. **Statement A (Assertion):** The HCF of two numbers is 6 and their product is 18144, then their LCM is 3024.

Statement R(Reason): $\text{HCF} \times \text{LCM} = \text{Product of two given numbers.}$

- Q20. **Statement A (Assertion):** The point $(-1, 6)$ divides the line segment joining the points $(-3, 10)$ and $(6, -8)$ in the ratio 2:7 internally.

Statement R(Reason): Three points A, B and C are collinear if $AB + BC = AC$

SECTION - B

- Q21. If $x \cos 60^\circ + y \cos 0^\circ + \sin 30^\circ \cot 45^\circ = 5$, then find the value of $x + 2y$.
 OR

Evaluate the following:

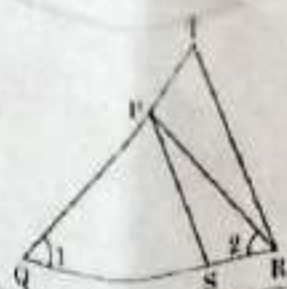
$$\frac{\tan^2 60^\circ}{\sin^2 60^\circ + \cos^2 30^\circ}$$

- Q22. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting:
 (i) a face card or a black card (ii) neither an ace nor a king

- Q23. If $\triangle ABC \sim \triangle PQR$ in which $AB = 6$ cm, $BC = 4$ cm, $AC = 8$ cm and $PR = 6$ cm, then find the length of $(PQ + QR)$.

OR

In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$, show that $\triangle PQS \sim \triangle TQR$.



Q24. Solve the following system of equations algebraically:
 $73x - 37y = 109$ and $37x - 73y = 1$

Q25. The coordinates of the centre of a circle are $(2a, a - 7)$. Find the value(s) of 'a' if the circle passes through the point $(11, -9)$ and has diameter $10\sqrt{2}$ units.

Q26. If the sum of first 7 terms of an A.P. is 49 and that of its first 17 terms is 289, find the sum of first n terms of the A.P.

Q27. Prove that $3 + \sqrt{2}$ is an irrational number.

Q28. A fast train takes one hour less than a slow train for a journey of 200 km. If the speed of the slow train is 10 km/hr less than that of the fast train, find the speed of the two trains.

OR

The product of Ramu's age (in years) five years ago and his age (in years) nine years later is 15. Determine Ramu's present age.

Q29. Prove that:

$$\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} + \frac{\sin \theta - \cos \theta}{\sin \theta + \cos \theta} = \frac{2}{2\sin^2 \theta - 1}$$

Q30. Find the zeroes of polynomial $x^2 + \frac{4}{3}x - \frac{4}{3}$ and verify relation between the zeroes and coefficients of polynomial.

Q31. Two dice are thrown at the same time. What is the probability that the sum of the two numbers appearing on the top of the dice is:

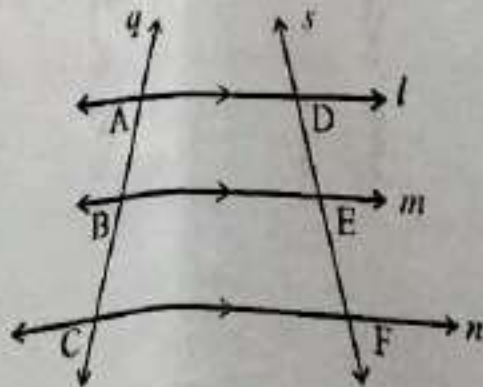
- (i) at least 9? (ii) 7? (iii) less than or equal to 6?

SECTION - D

Q32. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60° . After some time, the angle of elevation reduces to 30° . Find the distance travelled by the balloon during the interval.

Q33. State and prove basic proportionality theorem.

Use it to prove that, if three parallel lines, l, m, n are intersected by transversals q and s as shown in the adjoining figure, then $\frac{AB}{BC} = \frac{DE}{EF}$



OR

If AD and PM are medians of triangles ABC and PQR, respectively where $\triangle ABC \sim \triangle PQR$.
Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$

- Q34. The sum of a two-digit number and the number obtained by reversing the order of its digits is 99. If the digits differ by 3, find the number. (5)

OR

The boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km downstream. Determine the speed of the stream and that of the boat in still water.

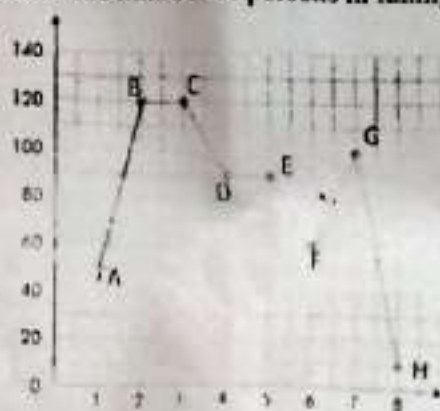
- Q35. The mean of the following data is 42. Find the missing frequencies x and y , if the sum of frequencies is 100. Also, find the median. (5)

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	7	10	x	13	y	10	14	9

(SECTION E)

Section E consists of 3 case study-based questions of 4 marks each.

- Q36. The following graph shows the number of persons in family in a locality. (4)



Observe the graph and answer the following questions:

- Find the midpoint of the line segment joining F(6,60) and G(7,100) (1)
- Find the length of line segment CD. (1)
- Find the point on x-axis which is equidistance from D and E. (2)

OR

- Find the coordinates of the point which divides joining of G and H in the ratio 2:3.

- Q37. Ms. Sheela visited a store near her house and found that the glass jars are arranged one above the other in a specific pattern. On the top layer there are 3 jars. In the next layer there are 6 jars. In the 3rd layer from the top there are 9 jars and so on till the 8th layer. (4)

On the basis of the above situation, answer the following questions.

- Write an A.P. whose terms represent the number of jars in different layers starting from top. Also, find the common difference. (1)
- Is it possible to arrange 34 jars in a layer if this pattern is continued? Justify your answer. (1)
- If there are ' n ' number of rows in a layer then find the expression for finding the total number of jars in terms of n . Hence, find S_n . (2)

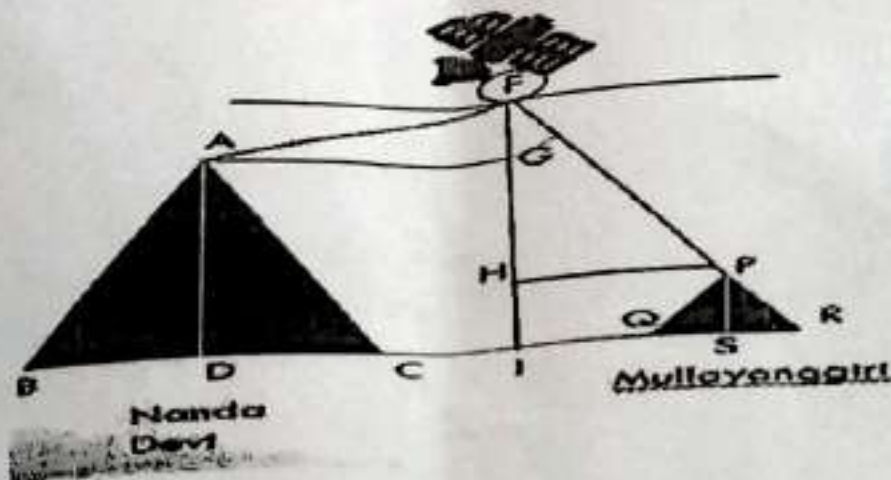
OR

- The shopkeeper added 3 jars in each layer. How many jars are there in the 5th layer from the top?

Q38.

A Satellite flying at height h is watching the top of the two tallest mountains in Uttarakhand and Karnataka, them being Nanda Devi (height 7,816m) and Mullayanagiri (height 1,930 m). The angles of depression from the satellite, to the top of Nanda Devi and Mullayanagiri are 30° and 60° respectively. If the distance between the peaks of the two mountains is 1937 km, and the satellite is vertically above the midpoint of the distance between the two mountains.

(4)



Based on given information, answer the questions:

i. Find the distance of the satellite from the top of Nanda Devi?

(1)

ii. Find the distance of the satellite from the top of Mullayanagiri?

(1)

iii. What is the distance of the satellite from the ground?

(2)

OR

iii. If a mile stone very far away from, makes 45° to the top of Mullanyangiri mountain. So, find the distance of this mile stone from the mountain.