

THE MOTHER'S INTERNATIONAL SCHOOL
HALF YEARLY EXAMINATION (2017-2018)
CLASS - X
SUBJECT: MATHEMATICS

TIME: 3 HOURS

M.M:80

General Instructions

1. All questions are compulsory.
2. Section A contains 6 questions of 1 mark each
3. Section B contains 6 questions of 2 marks each
4. Section C contains 10 questions of 3 marks each
5. Section D contains 8 questions of 4 marks each

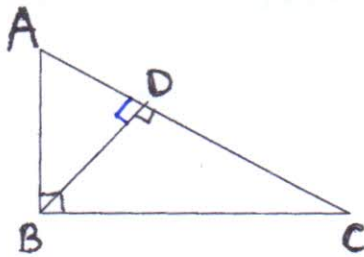
SECTION A (1 Mark each)

- Q1. Without actually performing the long division, state whether the given rational number $\frac{7}{2500}$ has a terminating or a non-terminating decimal expansion. If yes, write down the decimal expansion of it.
- Q2. The median and mode of a data is 28 and 32 respectively. Find its mean using empirical relation.
- Q3. For what value of 'k' the following system of equations will be inconsistent?
- $$\begin{aligned} 3x + y &= 1 \\ (2k - 1)x + (k - 1)y &= 5 \end{aligned}$$
- Q4. Find the zeroes of the polynomial $p(x) = \sqrt{3}x^2 + 10x + 7\sqrt{3}$
- Q5. If $\Delta ABC \sim \Delta DEF$, $BC = 3EF$, ar $(\Delta ABC) = 81\text{cm}^2$, then find ar (ΔDEF)
- Q6. If $\sin\theta + \cos\theta = \sqrt{2}\sin(90 - \theta)$ determine $\tan\theta$

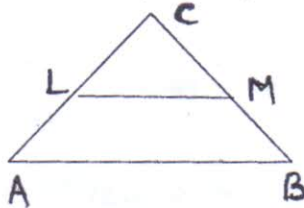
SECTION B (2 Marks each)

- Q7. If α, β are the roots of the polynomial $p(x) = ax^2 + bx + c$, find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$
- Q8. Find the area of the triangle with vertices A (t, t-2), B(t+2, t+2), C(t+3, t).
- Q9. Find the ratio in which the point P (x, 2) divides the line segment joining the points A(12, 5) and B (4, -3). Also, find the value of x.

- Q10. In the given fig $\angle ABC = 90^\circ$, $BD \perp AC$ If $BD = 10\text{cm}$, $AD = 2\text{cm}$, find CD .



- Q11. If the length of the shadow is $\sqrt{3}$ times the length of the pole on the ground then find the angle of elevation of the sun at that time?
- Q12. In the given figure $LM \parallel AB$. If $AL = x-3$, $AC = 2x$, $BC = 2x+3$, $BM = x-2$, find the value of x .



SECTION C (3 Marks each)

- Q13. Prove that square of any positive integer is of the form $4m$ or $4m + 1$ for some integer m .
- Q14. The sum of a two digit number and the number obtained by reversing the order of its digits is 132. If 12 is added to the number, the new number becomes 5 times the sum of the digits. Find the number.
- Q15. Heights of students of class X are given in the following frequency distribution

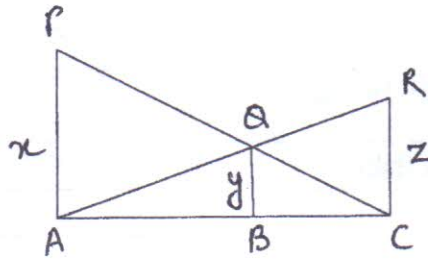
Height (in cm)	150 - 155	155 - 160	160 - 165	165 - 170	170 - 175
No. of students.	15	8	20	12	5

Find the modal height

- Q16. BP and CQ are medians of $\triangle ABC$ right angled at A . Prove that $4 (BP^2 + CQ^2) = 5BC^2$
- Q17. The base QR of an equilateral triangle PQR lies on X -axis. The coordinates of the point Q are $(- 4, 0)$ and origin is the mid-point of the base. Find the coordinates of the point P and R .
- Q18. Prove that $\sqrt{7}$ is irrational.
- Q19. From a point on a bridge across a river, the angles of depression of the banks on opposite sides of a river are 30° and 45° respectively. If the bridge is at a height of 2.5m from the banks, find the width of the river.

Q20. In the given fig PA, QB, RC are each perpendicular to AC,

Prove that $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$



Q21. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the square of corresponding altitudes.

Q22. If the points P(-3,9), Q(a,b) and R(4,-5) are collinear and a+b=1 find the values of a and b.

SECTION D (4 Marks each)

Q23. Evaluate:

$$\frac{\operatorname{Cosec}^2(90 - \theta) - \tan^2 \theta}{4(\operatorname{Cos}^2 48^\circ + \operatorname{Cos}^2 42^\circ)} - \frac{2 \tan^2 30^\circ \sec^2 52^\circ \sin^2 38^\circ}{\tan 13^\circ \tan 37^\circ \tan 60^\circ \tan 53^\circ \tan 77^\circ}$$

Q24. Solve the following pair of equations graphically.

$$4x - 3y + 4 = 0$$

$$4x + 3y - 20 = 0$$

Also, find the area bounded by these lines and X-axis.

Q25. Prove that

$$\frac{(1 + \cot \theta + \tan \theta)(\sin \theta - \cos \theta)}{(\sec^3 \theta - \operatorname{cosec}^3 \theta)} = \sin^2 \theta \cos^2 \theta$$

Q26. From a point 100 m above a lake the angle of elevation of a stationary helicopter is 30° and the angle of depression of the reflection of the helicopter in the lake is 60° . Find the height of the helicopter above the lake.

Q27. Obtain all the zeroes of the polynomial $p(x) = 2x^4 + 7x^3 - 19x^2 - 14x + 30$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

Q28. The following distribution gives the daily income of workers in a factory

Daily Income(Rs.)	100 - 120	120 - 140	140 - 160	160 - 180	180 - 200
No. of workers	12	14	8	6	10

Convert the above distribution to a 'more than type distribution' and draw its Ogive and hence obtain the median value from the graph.

Q29.

During the medical checkup of 35 students of a class, their heights were recorded as follows.

Weight (in kg)	No. of students
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	35

Convert into frequency distribution table and find the mean using assumed mean method.

Q30.

State and prove converse of Pythagoras theorem.
