WBBSE Class 10 Madhyamik Maths Question Paper 2019

2019

Mathematics

Time - Three Hours Fifteen Minutes

(First **fifteen** minutes for reading the question paper only)

Full Marks - 90

(For Regular and Sightless Regular Candidates)

Full Marks - 100

(For External and sightless External Candidates)

Special credits will be given for answers which are brief and to the point.

Marks will be deducted for spelling mistakes, untidiness and bad handwriting

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The answer of the question no, 1, 2, 3 and 4 are to be given at the beginning of the answer script mentioning the question number in the serial order. Necessary calculation and drawing, if any, must be given on the right hand side by drawing margins on the first few pages on the answer - script. Tables and calculator are not allowed. Approximate value of $\pi = \frac{22}{7}$*, if necessary. Graph paper will be supplied if required.*

(Alternative question of 11 is given on page No. 19 for sightless candidates)

[Addition Question number 16 only for external candidates is given on the last page]

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1. Choose the correct option in each case from the following questions : **[1 x 6 = 6]**

(i) In a partnership business, the ratio of share of profit of two friends is $\frac{1}{2} : \frac{1}{3}$, then the ratio of their principal is -

(a) 2 : 3 (b) 3 : 2

(c) 1 : 1 (d) 5 : 3

(ii) If $p + q = \sqrt{13}$ and $p - q = \sqrt{5}$ then the value of pq is -

(a) 2 (b) 18

(c) 9 (d) 8

(iii) O is the centre of a circle and AB a diameter. ABCD is a cyclic quadrilateral. $\angle ABC = 65^\circ, \angle DAC = 40^\circ$, then the measure of $\angle BCD$ is -

(a) 75° (b) 105°

(c) 115° (d) 80°

(iv) If $\tan\alpha + \cot\alpha = 2$, then the value of $\tan^{13}\alpha + \cot^{13}\alpha$ is -

(a) 13 (b) 2

(c) 1 (d) 0

(v) If two cubes of length of each side $2\sqrt{6}$ cm are placed side by side, then the length of the diagonal of the cuboid so produced is -

(a) 10cm (b) 6cm

(c) 2cm (d) 12cm

(vi) The mean of the data $x_1, x_2, x_3, ..., x_{10}$ is 20 then the mean of $x_1 + 4, x_2 + 4, x_3 + 4, ..., x_{10} + 4$ will be —

(a) 20 (b) 24

(c) 40 (d) 10

2. Fill up the blanks (*any five*) : [1 x 5 = 5]

(i) A person deposited Rs. 100 in a bank and gets the amount Rs. 121 after two years. The rate of compound interest is _____ %.

(ii) If the product and sum of two quadratic surds is a rational number,

then surds are _____ surd.

(iii) If the bases of two triangles are situated on same line and the other vertex of the two triangles are common, then the ratio of the areas of two triangles are _____ to the ratio of their bases.

(iv) Number of surfaces of a solid right circular cylinder is _____.

(v) The simplest value of $\frac{\cos 53^\circ}{\sin 37^\circ}$ is _____.

(vi) The variables $x_1, x_2, ..., x_{100}$ are in ascending order of their magnitude, then the median of the variables is _____.

3. Write True or False (*any five*) : **[1 x 5 = 5]**

(i) The difference between the simple interest and the compound interest of Rs. 100 in 1 year at the rate of 10% p.a. is Re. 1.

(ii) The compound ratio of $ab : c^2, bc : a$ and $ca : b^2$ is 1 : 1.

(iii) Only one circle can be drawn through three non-colinear points.

(iv) $\sin 30^\circ + \sin 60^\circ > \sin 90^\circ$.

(v) The ratio of the volume of a right circular cone and a right circular cylinder with same base and height is 1 : 3.

(vi) Value of median of data 2, 3, 9, 10, 9, 3, 9 is 10.

4. Answer the following questions (*any ten*) : **[2 x 10 = 20]**

(i) Find the capital which gives Re. 1 as interest per month at 5% rate of interest per annum.

(ii) In a partnership business the ratio of capitals of three men is 3 : 5 : 8. The share of profit of the first member is Rs. 60 less than that of the third member, then what is the total profit in the business ?

(iii) If $\frac{a}{2}=\frac{b}{3}=\frac{c}{4}=\frac{2a-3b+4c}{p}$, then find p.

(iv) $x \alpha y^2$ and y = 2a when x = a, then show that $y^2 = 4ax$

(v) In a trapezium ABCD, BC||AD and AD = 4 cm. The two diagonals AC and BD intersect at the point O in such a way that $\frac{AO}{OC}=\frac{DO}{OB}=\frac{1}{2}$. Calculate the length of BC.

(vi) Two chords AB and AC of a circle are mutually perpendicular to each other. If AB = 4 cm and AC = 3 cm, find the length of the radius of the circle.

(vii) In $\Delta ABC, \angle ABC = 90^\circ$ and $BD \perp AC$, if AB = 5cm, BC = 12 cm, then find the length of BD.

(viii) Find the value(s) of $\theta\,(0^\circ \le \theta \le 90^\circ)$ for which $2\sin\theta\cos\theta = \cos\theta$.

(ix) If $\sin 10\theta = \cos 8\theta$ and 10θ is a positive acute angle, then find the value of $\tan 9\theta$.

(x) The length, breadth and height of a cuboidal room be *a* unit, *b* unit, and *c* unit respectively and *a* + *b* + *c*=25, *ab* + *bc* + *ca* = 240.5 then find the length of the longest rod to be kept inside the room.

(xi) The area of curved surface of a right circular cone is $\sqrt{5}$ times of that of the base of the cone, find the ratio of the height and the radius of the base of the cone.

(xii) The mid value of first (2n + 1) consecutive natural number is $\frac{n+103}{3}$. Find n.

5. Answer *any one* question : **[5 x 1 = 5]**

(i) If interest is compounded half yearly what will be the compound

interest and amount on Rs. 8,000 at the rate of 10% compound interest per annum for $1\frac{1}{2}$ years ?

(ii) Two friends start a partnership business investing Rs. 40,000 and Rs. 50,000 respectively. There is an agreement between them that 50% of the profit will be divided equally and rest amount of profit will be distributed between them in the ratio of their principal. If the share of profit of 1st friend is Rs. 800 less than that of the 2nd friend, find the share of profit of the 1st friend.

6. Solve *any one* question : **[3 x 1 = 3]**

(i) Determine the equation whose roots are the square of the roots of the equation $x^2+x+1=0$.

(ii) If the price of 1 dozen pen is reduced by Rs 6, then 3 more pens will be got in Rs 30. calculate the price of one dozen pen before the reduction of price.

7. Answer *any one* question : **[3 x 1 = 3]**

(i) Simplify : $\frac{4\sqrt{3}}{2-\sqrt{2}}-\frac{30}{4\sqrt{3}-\sqrt{18}}-\frac{\sqrt{18}}{3-\sqrt{12}}$

(ii) If $\left(\frac{1}{x}-\frac{1}{y}\right)\alpha\frac{1}{x-y}$, then show that $(x^2+y^2)\,\alpha\,xy$.

8. Answer *any one* question : **[3 x 1 = 3]**

(i) If (3x - 2y) : (x + 3y) = 5 : 6, then find the value of (2x + 5y) : (3x + 4y).

(ii) If $\frac{b+c-a}{y+z-x}=\frac{c+a-b}{z+x-y}=\frac{a+b-c}{x+y-z}$, then prove that $\frac{a}{x}=\frac{b}{y}=\frac{c}{z}$.

9. Answer *any one* question : **[5 x 1 = 5]**

(i) Prove that semicircular angle is a right angle.

(ii) If two circles touch each other externally then the point of contact will lie on the line segment joining the two centres - Prove it.

10. Answer *any one* question : **[3 x 1 = 3]**

(i) If a quadrilateral ABCD is circumscribed about a circle with centre O, prove that AB + CD = BC + DA.

(ii) If in $\Delta ABC, \angle A$, is right angle and BP and CQ are two medians, then prove that, $5BC^2 = 4(BP^2 + CQ^2)$.

11. Answer *any one* question : **[5 x 1 = 5]**

(i) Draw a triangle ABC of which BC = 7 cm, AB = 5 cm and AC = 6 cm. Then draw the circumcircle of ΔABC.

(Only traces of construction are required)

(ii) Construct a circle of radius 4 cm and draw two tangents to the circle from an external point at a distance of 6.5 cm from the centre of the circle.

12. Answer *any two* questions : **[3 x 2 = 6]**

(i) In ΔABC, $\angle C = 90°$, if BC = m and AC = n then prove that,

$$m \sin A + n \sin B = \sqrt{m^2 + n^2}.$$

(ii) Find the value of

$$\frac{4}{3}\cot^2 30^\circ + 3\sin^2 60^\circ - 2\cos ec^2 60^\circ - \frac{3}{4}\tan^2 30^\circ$$

(iii) If $\angle P + \angle Q = 90°$ then show that

$$\sqrt{\frac{\sin P}{\cos Q}} - \sin P \cos Q = \cos^2 P$$

13. Answer *any* one question : **[5 x 1 = 5]**

(i) From a quay of a river, 600 metres wide, two boats start in two different directions to reach the opposite side of the river. The first boat moves making an angle of 30° with this bank and the second boat moves making an angle 90° with direction of the first boat. What will be the distance between the two boats when both of them reach the other side ?

(ii) The length of the flag post at the roof of a three storied building is 3.6 metre. The angles of elevation of the top and foot of the post are 50° and 45° respectively from a point on the road. Find the height of the building. [Take tan 50° = 1.2]

14. Answer *any two* questions : **[4 x 2 = 8]**

(i) If 64 buckets of water is withdrawn from a cubical water tank, full of water, then $\frac{1}{3}$ of water in the tank still remains. If the length of the side of the water tank is 1.2 metre then what is the capacity (in litre) of each bucket ? (1 cubic decimeter = 1 litre)

(ii) The diameter of cross-section of a wire is reduced by 50%. If the volume remains constant, what percent of length of the wire should be increased ?

(iii) 77 sq. m tripal is required to make a right circular conical tent. If the slant height of the tent is 7 m, then what is the area of the base of the

tent?

15. Answer *any two* question : **[4 x 2 = 8]**

(i) If the arithmetic mean of the following frequency distribution is 54, then find the value of K :

Class	0 -20	20 - 40	40 - 60	60 - 80	80 -100
Frequency	7	11	K	9	13

(ii) Making frequency distribution table from the given cumulative frequency distribution table, find the mode of the data :

Class	< 10	< 20	< 30	< 40	< 50	< 60	< 70	< 80
frequency	4	16	40	76	96	112	120	125

(iii) Find the mean of 52 students of class X in a school by using direct method and assumed mean method from the table given below :

Class	4	7	10	15	8	5	3
Frequency	30	33	35	40	43	45	48

[Alternative Question For Sightless Candidates]

11. Answer *any one* question : **[5 x 1 = 5]**

(i) Three sides of a triangle are given. Describe the procedure of construction of circumcircle of the triangle.

(ii) Describe the process of drawing two tangents to a circle from an external point.

[Additional Question for External Candidates]

16. (a) Answer *any three* questions: **[2 x 3 = 6]**

(i) p : q = 5 : 7and p + q = - 4 then what is the value of (3p + 2q) ?

(ii) In how many years the interest will be $\frac{3}{5}$th of principal at the rate of 10% simple interest per annum ?

(iii) What is the circular value of an angle formed by the end point of hour hand of a clock in 1 hour rotation ?

(iv) If $x = 2 + \sqrt{5}$ and $xy = -1$, find the value of $x - y$.

(b) Answer any four questions : **[4 x 1 = 4]**

(i) What is the value of *a* if one root of the equation $x^2 + ax + 3 = 0$ is 1 ?

(ii) If the product of three positive continued proportional numbers is 64, what is their mean proportional ?

(iii) Find the value of *k* if the roots of the equation $x^2 - kx + 4 = 0$ are real and equal.

(iv) Find the median of the numbers 1, 2, 3, 5, 8, 6, 9, 11 and 4.

(v) In a partnership business A invests Rs. 600 for 9 months and B invests Rs. 700 for 5 months, find the ratio of their share of profit.