

FINAL TEST – 2022

MATHEMATICS

(ii) Draw a right angled triangle whose greatest side is 12 cm. and another side is 5 cm. Now draw a circumcircle of the triangle.

12. Answer any four of the following :- $4 \times 4 = 16$

(i) The outer radius of a 1cm thick hollow sphere is 6cm. It is melted to make a solid rod of radius 2cm. Find the length of the rod.

(ii) Find the ratio of the volumes of a solid cone, a solid hemisphere and a solid cylinder having the same height and same radius of base.

(iii) If a wooden log with a shape of rectangular parallelepiped with square cross section is made by wasting minimum wood from a right circular wooden log having the diameter of $12\sqrt{2}$ cm and length of 21. Calculate the quantity of remaining wood and wood wasted.

(iv) The height of a right circular cone is twice of its radius. If the height would be six times of its radius the volume would be 539 cubic dm more. Find the height of the cylinder.

(v) A solid sphere of radius 4.2 cm is melted and re-casted in the shape of a right circular rod of radius 2.8 cm. Find the length of the rod.

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by VINAY KUMAR

MADHYAMIK TEST-SERIES 2022

Time : 2 Hrs. 30 mins. MATHEMATICS(X) F.M. : 90

SET - 1

1. Choose the correct answer : $1 \times 6 = 6$

(i) At the rate of 10% p.a. what would be the ratio of SI and CI of ₹100 for 2 years?

(a) 10:11 (b) 11:10 (c) 20:21 (d) 21:20

(ii) If the two roots of the equation $9x^2 - (4 - k)x - 4 = 0$, are equal and opposite in sign, what would be the value of k ?

(a) 4 (b) 0 (c) -4 (d) $\frac{9}{4}$

(iii) A chord of a circle is 6 cm apart from its center. The length of the chord is 16 cm. The radius of the circle is

(a) 10 cm (b) 20 cm (c) 12 cm (d) 24 cm.

(iv) The ratio of the volume of two cubes is 8:125, find the ratio of their surface area.

(a) 4:9 (b) 9:4 (c) 4:25 (d) 2:5

(v) The circumcenter of $\triangle ABC$ is O. If $\angle OAB = 50^\circ$ then find $\angle ACB$

(a) 25° (b) 50° (c) 100° (d) 160°

(vi) In how many years a sum of money will become thrice at the rate of $6\frac{1}{4}\%$ per annum.

(a) 16 (b) $16\frac{2}{3}$ (c) 20 (d) 32

2. Answer the following questions as directed : -

Fill in the blanks (Any five) : $1 \times 5 = 5$

(i) The present population of a village is p. If the population increases at the rate of 2r% per year, the population after n years would be _____.

(ii) The roots of the equation $ax^2 + bx + c = 0$ would be unequal when _____.

(iii) If x be the mean proportional of (x - 2) and (x - 3) then the value of x will be _____.

(iv) The number of tangents drawn from an outer point to a circle is/are _____.

(v) If the area of a hemisphere and sphere are equal, the ratio of their radii is _____.

(vi) ABCD is a cyclic quadrilateral. If $AB = AD$ and $\angle ABD = 30^\circ$, then find $\angle BCD =$ _____.

3. Write true or false (Any five) : $1 \times 5 = 5$

(i) At the same rate of interest, for the same time period, the Compound Interest of a sum of money is always greater than its Simple interest.

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(ii) $\sqrt{75}$ and $\sqrt{147}$ are similar surds.

(iii) Two similar triangles are always congruent.

(iv) In a partnership business there should be minimum 3 partners.

(v) If two circles touch each other externally, then three simple common tangents can be drawn.

(vi) Roots of the equation $x^2 + x + 1 = 0$ are real.

4. Answer any ten questions : 2×10=20

(i) At the rate of 10% p.a. the difference of SI and CI of a sum of money is ₹60. Find the sum of money.

(ii) In a partnership business Vinay invests ₹1200 for certain time and Akash invests ₹1500 for 4 months. If the share of profit of the two partners is same, for how many months Vinay invested the money?

(iii) One root of the equation $ax^2 + bx + c = 0$ is twice of the other, show that $2b^2 = 9ac$.

(iv) $\frac{x}{y} \alpha (x + y)$ and $\frac{x}{y} \alpha (x - y)$, show that $(x^2 - y^2) = \text{constant}$.

(v) The radii of two circles are 8 cm and 3cm and the distance between their centres is 13 cm, find the length of their simple common tangent.

(vi) Bipin, Shivam and Sandeep invested in ECC Limited in the ratio $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$. If the total profit be Rs. 260000 then what will be the profit share of Sandeep?

(vii) At a certain rate of compound interest a sum of money becomes twice in n years. In how many years will it become 4 times?

(viii) AB is the diameter of a circle with centre at O. P is a point on the circle. If $\angle PAB = 45^\circ$, then find $\angle POB = ?$

(ix) If α and β are the roots of the quadratic equation $x^2 - 22x + 105 = 0$ then find $(\alpha - \beta)$.

(x) A solid right circular cone is melted to form a right circular solid cylinder. The radii of their bases are equal. If the height of the cone is 15 cm, find the height of the cylinder.

(xi) The curved surface area of a sphere is S and volume is V, find the value of $\frac{S^3}{V^2}$.

(xii) The numerical value of volume and curved surface area of a right circular cone are equal. If the height and radius be h and r unit, then what will be the value of $\frac{1}{h^2} + \frac{1}{r^2}$?

5. Answer any two of the following :- 5x2=10

(i) At the rate of 8% p.a. compound interest, in how many years ₹40000 will be amounted to ₹46656 ?

by VINAY KUMAR

(ii) Anjali, Kirti and Ayushka invested ₹6500, ₹5200 and ₹9100 in a partnership business. At the end of the year they got a profit of ₹14400. $\frac{2}{3}$ of the profit they divided equally and rest in the ratio of their capita. Find the profit share of each.

(iii) Kalloo took a loan of Rs. 30,000 for 3 years in such a way that the rates of compound interest in the first, second and third years are 4%, 5% and 6% respectively. What amount including interest will have to be paid back after 3 years by Kalloo?

6. Answer any two of the following :- 3x2=6

(i) Solve : $\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} + \frac{1}{(x-3)(x-4)} = \frac{1}{6}$

(ii) Shivam and Vivek work in a factory. Shivam takes 5 minutes less than Vivek to make an object. On 6 hours Shivam makes 6 objects more than Vivek. How many objects will Vivek make in that time?

(iii) Solve : $\frac{x+1}{2} + \frac{2}{x+1} = \frac{x+1}{3} + \frac{3}{x+1} - \frac{5}{6}$

7. Answer any two of the following :- 3x2=6

(i) If $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$, show that $\frac{x^2+y^2}{x^2-y^2} = \frac{7\sqrt{3}}{12}$.

(ii) y is equal to the sum of two variables. One is directly proportional to x and the other is inversely proportional to x. If $x=1$ then $y= -1$ and when $x=3$ then $y=5$. Find the relationship between x and y.

(iii) $a \propto b$ and $b \propto c$, show that $(ab)^3 + (bc)^3 + (ca)^3 \propto abc(a^3 + b^3 + c^3)$

8. Answer any one of the following :- 3

(i) If $a : b = b : c$, show that $a^2b^2c^2 \left(\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3} \right) = a^3 + b^3 + c^3$

(ii) If $\frac{x^2-yz}{a} = \frac{y^2-xz}{b} = \frac{z^2-xy}{c}$, show that $(a + b + c)(x + y + z) = (ax + by + cz)$

9. Answer any one of the following :- 5

(i) Prove that, in a right angled triangle if a perpendicular is drawn from right angular point on hypotenuse then the two triangles on both sides of this perpendicular are similar and each of them is similar to original triangle.

(ii) Prove that, opposite angles of a cyclic quadrilateral are supplementary.

10. Answer any one of the following :- 3

(i) ABCD is a cyclic quadrilateral. The extended sides of AB and CD meet at a point P. Prove that $PA \cdot PB = PC \cdot PD$.

(ii) Prove that cyclic parallelogram is a rectangle.

11. Answer any one of the following :- 5

(i) Draw a circle of radius 2.8 cm. Now draw two tangents of the circle from a point 7.5 cm apart from the centre.