Symbol No..... RE - 109'D'

SEE 2078(2022) PROVIENCE 4

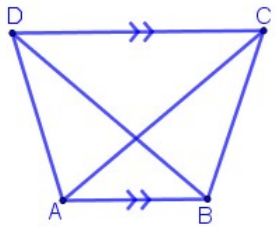
Subject: Compulsory Mathematics

Time: 3: 00 hrs **F.M.:** 100

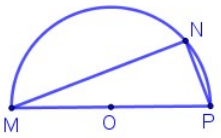
Attempt all the questions. All the working must be shown.

Group"A" $[3 \times (1+1) = 6]$

1. (a) If the initial price of an article is Rs. X and annual rate of compound depreciation is $R\%$, then what will be the price of the article after T years? Write it.
   (b) If one side of an equilateral triangle is y cm, then what is its area? Write it.
2. (a) What does b represent in the surd $\sqrt[b]{a}$? Write it.
   (b) Write the formula for finding the the third quartile (Q_3) of a continuous series.
3. (a) From the given figure, write the relation between the areas of ΔABC and ΔABD.

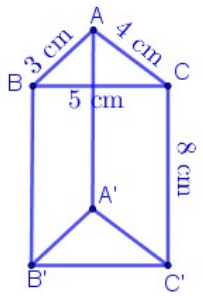


   (b) In the adjoining figure, O is the centre of the semi-circle. What is the value of $\angle MNP$? Write it.

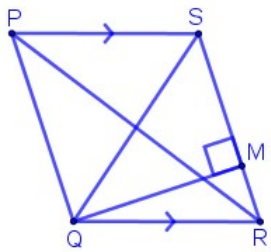


Group "B" $[17 \times 2 = 34]$

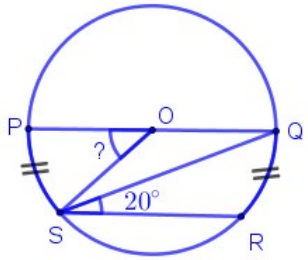
4. (a) A person needs \$4500 to visit foreign countries. If \$1= NRs. 120.92 and the bank charges 2% as commission, how much Nepali rupees does the person require to exchange \$4500? Find it.
   (b) The present population of a town is 35000. If the population increases by 4% every year, after how many years the population of the town will be 37856? Find it.
5. (a) Find the area of a triangle having length of sides 9 cm, 11 cm and 13 cm.
   (b) Find the radius of a sphere whose volume is 972π cu.cm.
   (c) Find the area of rectangular surfaces of the given prism whrere AB = 3 cm, AC = 4 cm, BC = 5 cm and CC' = 8 cm.



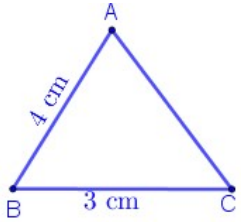
6. (a) Find the H.C.F. of : y^3+1 and y^2-y+1
   (b) Simplify : $8\sqrt[3]{24} - 2\sqrt[3]{81} + 4\sqrt[3]{192}$
7. (a) Solve: $7^{y^2-1} = 1$
   (b) If one-third of the square of a positive number is 12, find the number.
   (c) Find the L.C.M. of: $c^2 - 2cd + d^2$ and $c - d$
8. (a) In the given figure, if $PS//QR, QM \perp SR, QM = 8$ cm and $SR = 6$ cm, find the area of ΔPQR.



   (b) In the given figure, O is the centre of the circle. If $\widehat{PS} = \widehat{QR}$ and $\angle QSR = 20°$, then find the value of $\angle POS$.



   (c) Find the length of a tangent up to the point of contact drawn from a point 10 cm far from the centre of a circle with radius 6 cm.
9. (a) In the given figure, area of ΔABC is $3\sqrt{2}$ sq.cm. If AB = 4 cm and BC = 3 cm, then find the value of $\angle ABC$.



(b) If mean $(\bar{x}) = 8, \Sigma fm = 10p + 6$ and $N = 2p - 3$ of a continuous series, find the value of p.

10. (a) A card is drawn randomly from the number cards numbered from 9 to 29. Find the probability of getting number which is divisible by 5 or 6.

(b) A bag contains 5 black and 8 red balls of same shape and size. Two balls are drawn randomly one after another without replacement from the bag. Show the probability of possible outcomes in a tree diagram.

Group "C" $[10 \times 4 = 40]$

11. In a survey of 75 students, it was found that 49 students liked cricket game only and 14 students liked both cricket and volleyball games. The number of students who liked cricket game is three times the number of students who liked volleyball game. By using a venn-diagram find the number of students who liked volleyball game only and who didn't like any of both games.

12. An artilce is sold for Rs. 3051 after allowing 10% discount on the marked price and adding 13% value added tax. What is the discount amount ? Find.

13. Find the total surface area of a square based solid pyramid whose area of the base and vertical height are 100 sq.cm. and 12 cm respectively.

14. Simplify : $\frac{1}{k+1} - \frac{k}{k^2-1} - \frac{k^2}{1-k^4}$

15. Simplify: $\sqrt[p-q]{x^{\frac{1}{p-r}}} \times \sqrt[q-r]{x^{\frac{1}{q-p}}} \times \sqrt[r-p]{x^{\frac{1}{r-q}}}$

16. Prove the relationship between the central angle and circumference angle standing on the same arc of a circle with centre R theoritically.

17. Construct a quadrilateral WXYZ with WX = 4.5 cm, WY = 6 cm, YZ = 4 cm, WZ = 6.6 cm and $\angle$ WXY = 75° Also construct a triangle AXY whose area is equal to the area of the quadrilateral WXYZ.

18. Verify experimentally that the sum of the opposite angles WXY and WZY of a cyclic quadrilateral WXYZ is two right angles. (Two circles having radii at least 3 cm are necessary.)

19. The top of a tree broken by the wind made an angle of 30° with the ground. If the distance of the point where the top touched the ground from the foot of the tree is $10\sqrt{3}$ ft, find the height of the tree before it was broken.

20. Calculate the upper quartile of the data given below.

Class interval	0 - 20	20 - 40	40 - 60	60 -80	80 - 100
Frequency	2	5	4	6	3

Group "D" $[4 \times 5 = 20]$

21. A person took a loan of Rs. 250000 for two years at the rate of 10% annual compound interest. To reduce interest and the loan partly he/she paid Rs. 125000 at the end of first year.

(a) Now, how much rupees should he/she has to pay at the end of second year to clear his/her debt? Find it.

(b) Find the total interest paid by him/her in two years.

(c) If he/she had paid the loan only at the end of second year, how much less or more interest should have to be paid? Find it.

22. A solid object is made with the combination of a cylinder and a cone having same radii. The height of the cylinder and the slant height of the cone are 20 cm and 10 cm respectively. If the total cost of painting the total surface of the solid object at the rate of Rs. 150 per 100 sq.cm is Rs. 1584, find the of the cone.

23. The total cost of 3 kg orange and 5 kg apple is Rs. 1300. If the rate of orange increases by 10% and the rate of apple decreases by 20%, the total cost of 2 kg orange and 3 kg apple will be Rs. 700. By what percent the cost of 1 kg orange is more or less than cost of 1 kg apple? Find it.

24. In a trapezium MNOP, MP//NO and A is the mid-point of PO, then prove that: Area of $\Delta MAN = \frac{1}{2}$ area of trapezium $MNOP$.

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