Sainik School Examination Board
PRE-SEE 2078 [Set - A]

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) Ramhari has just come from abroad. He wants to exchange his dollars from a bank. Which rate does the bank use, buying rate or selling rate?

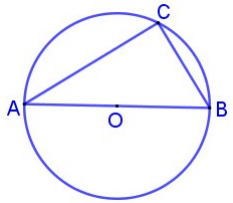
   (b) If s, a, b and c have their own meanings, write the formula to calculate the area of scalene triangle?

2. (a) What is the order of the surd $\sqrt[x]{p}$?

   (b) What is the formula for third quartile in grouped data ?

3. (a) Write the relation between the areas of rectangle and rhombus standing on the same base and lying between the same parallels.

   (b) In the adjoining figure O is the center of a circle. Write the measurement of $\measuredangle ACB$.



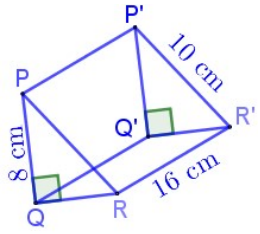
Group "B" $[17 \times 2 = 34]$

4. (a) On a certain day \$5 = Rs.615, £10 = Rs.1,620. How many US dollars(\$) be exchanged for £41?

   (b) The population of a town is 1,00,000. What will be the population of the town after 2 years at the growth rate of 2% per annum?

5. (a) An umbrella was made by stitching six isosceles triangular pieces of cloth of sides 25 cm, 25 cm and 14 cm. What is the area of the total cloth?

   (b) Find the LSA of the given triangular based prism.



   (c) If the area of the greatest circle of the sphere is 154 cm^2, find its Total Surface Area.

6. (a) Simplify: $\dfrac{100x^2}{10x-9y} + \dfrac{81y^2}{9y-10x}$

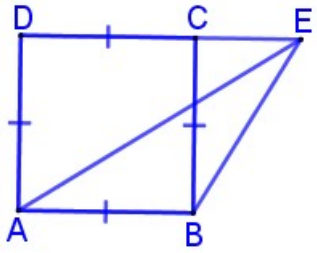
   (b) Simplify: $\dfrac{x}{x-y} - \dfrac{x}{x+y} + \dfrac{2xy}{x^2+y^2}$

7. (a) If $a^x = b, b^y = c, c^z = a$, prove that: $xyz = 1$.

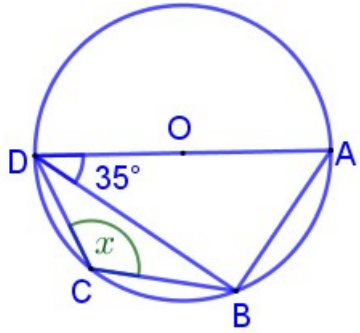
   (b) Solve: $\dfrac{x-81}{\sqrt{x}+9} = 1$

   (c) Simplify: $4\sqrt{72} + 7\sqrt{128} - 10\sqrt{32}$

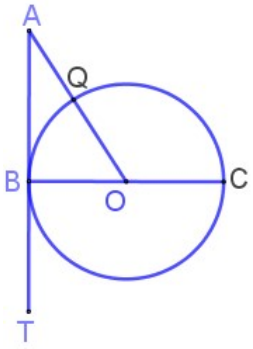
8. (a) In the adjoining figure ABCD is a square with perimeter 40 cm. Find the area of ΔABE.



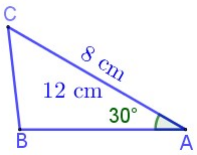
   (b) In the figure alongside O is the centre of a circle, $\measuredangle ADB = 35°$, find the value of x.



   (c) In the figure, O is centre of circle, ABT is a tangent to the circle, B is point of contact and Q is the point in the circle. If BC = 16 cm, AB = 6 cm, find the length of AQ.



9. (a) In the given $\Delta ABC, AC = 8cm, BC = 12cm$ and $\measuredangle ACB = 30°$, find the area of ΔABC.



   (b) In the grouped data, if $\Sigma fm = 1345 + 26p, N = 55 + p$ and $\bar{x} = 25$, find the value of p.

10. (a) What is the probability of getting a multiple of 5 or a multiple of 7 when a card is drawn randomly from the number cards numbered from 6 to 26 ?

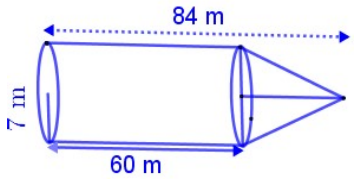
    (b) Two balls are drawn from a bag with 7 red and 5 yellow balls one after another without replacement. Show all the possible outcomes by drawing a tree diagram.

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

11. In the second terminal examination, out of 390 students, 150 obtained A^+ in Maths only, 120 students obtained A^+ in Nepali only and 20 students didn't obtain A^+ in both subjects.
    (a) Show the information in Venn-diagram.
    (b) Find the number of students who obtained A^+ in both subjects.
    (c) Find the number of students who obtained A^+ in at least one subject.

12. After allowing 25% discount and then levying 13% value added tax (VAT), the value of a laptop will be Rs.84,750. Calculate the marked price and the discount amount.

13. Find the cost for colouring the given solid at the rate of Rs. 35 per m^2.



14. Find the H.C.F. of :

$$x^3 + y^3, x^4 + x^2y^2 + y^4 \text{ and } x^3y - x^2y^2 + xy^3$$

15. Simplify:

$$\left(x^a \times \frac{1}{x^b}\right)^{a^2+ab+b^2} \times \left(x^b \times \frac{1}{x^c}\right)^{b^2+bc+c^2} \times \left(x^c \times \frac{1}{x^a}\right)^{c^2+ca+a^2}$$

16. A parallelogram PQMN and a parallelogram PQRS are constructed on the same base PQ and lying between the same parallel lines. Prove that the area of parallelogram PQMN = area of parallelogram PQRS.

17. Construct a quadrilateral PQRS in which PQ=5cm, PS = 4 cm, QR = 4.4 cm, RS = 5.6 cm and $\angle P = 60°$. Then construct a triangle PSG equal area to the quadrilateral PQRS.

18. Experimentally verify that the opposite angles of cyclic quadrilateral PQRS are supplementary. (Note: two circles having radii not less than 3 cm are required).

19. A 2 m tall man observes a bird sitting on the top of the tree in front of him and finds the angle of elevation to be 60°. The distance between the man and the tree is 52 m. Find the height of the tree.

20. If the first quartile of the following data is 25, find the value of 'm',

Class interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	9	11	m	20	30	16

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

21. The following are the schemes of CITIZENS BANK LTD for the fixed deposit.

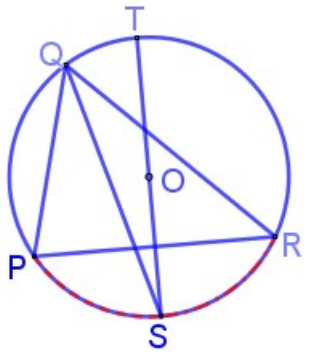
Normal saving	**Super Saving**
Interest Rate: 12% p.a.	Interest Rate: 10% p.a.
Compounded annually	Compounded semi - annually

A person wants to deposit Rs.2,00,000 for 2 years. Which of the above schemes is profitable for him/her and by how much?

22. A metallic water tank of square based pyramid shaped, equal base with cemented pillar is fixed at the top of the pillar of $240cm \times 240cm$ and height 4m. IF the total cost to paint the whole pillar and outer surface of the tank at the rate of Rs. 0.25 per cm^2 is Rs. 114000. How many liters of water can the tank hold ?

23. Ravi said to Kavi "I was twice as old as you were when I was as old as you are". If the sum of their present age is 35 years, find their present age.

24. In the given figure alongside, ST is a diameter. If $\widehat{PS} = \widehat{SR}$ Prove that $\angle QST = \frac{1}{2}(\angle QPR - \angle QRP)$



Ambik