National PABSON
SEE PRE BOARD EXAM - 2078

Subject.: Compulsory Mathematics (PC 109)

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

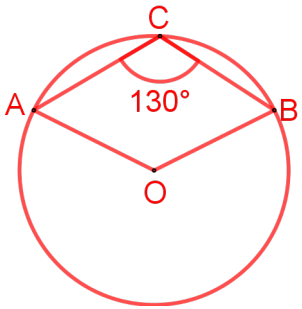
Candidates are required to write their answers according to the instructions given.
Attempt all questions

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

1. (a) If the initial price of an article is V and annual rate of depreciation is R%, write the formula to find the price V_A after T years.
   (b) What is the area of a right angled triangle whose sides containing the right angle are p and q ?

2. (a) Write the definition of HCF.
   (b) Find the number of terms N of continuous series in which mean $(\bar{X}) = 40$ and $\Sigma fm = 1200$.

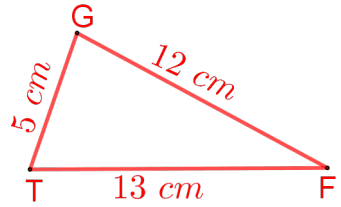
3. (a) Find the relation between the areas of a rhombus and a triangle standing on the same base and between the same parallel lines.
   (b) In the given figure, O is the center of the circle and $\angle ACB = 130°$. Find the value of reflex angle AOB.



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

4. (a) At present 1 US dollar can be exchanged with Nepali Rupees 120. If Nepali currency is devaluated by 10%, how much Nepali currency is needed to exchange 450 US dollar?
   (b) At the beginning of 2076 B.S., the population of a village was 50,000. If the annual population growth rate is 10%, what will be the population of the village at the end of 2078 B.S. ?

5. (a) Find the area of triangle ABC given in the figure.

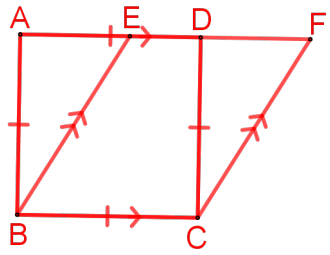


   (b) Find the diameter of the base of a cylinder whose volume is 448π cu.cm and the height is 7 cm.
   (c) The height of an equilateral triangular based prism is 30 cm. If the area of one base of the rism is $16\sqrt{3}$ cm^2, find the area of the rectangular surfaces of the prism.

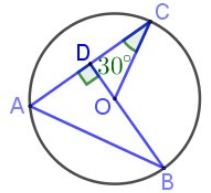
6. (a) Find the LCM of : $y^3 + 8$ and $y^3 - 2y^2 + 4y$.
   (b) Simplify: $\sqrt[4]{2m^1 0n^9} \div \sqrt[4]{512m^6 n^{-3}}$

7. (a) Simplify: $\dfrac{1}{y(x-y)} + \dfrac{1}{xy - x^2}$
   (b) Solve: $\sqrt{x^2+3} + x = 3$
   (c) Think a number and multiply it by 3. Substract 10 from the product and divide the remainder by 7. If the final result is 2, what is the number ?

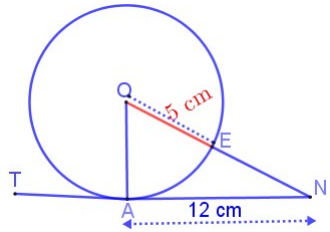
8. (a) In the given figure, square ABCD and parallelogram EBCF are on the same base BC and between the same parallel lines AF and BC. If $BD = 6\sqrt{2}$ cm, find the area of the parallelogram EBCF.



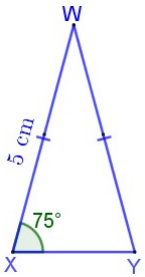
   (b) In the given figure, O is the center of the circle and PQRS is a cyclic quadrilateral. If $\angle SRT = 96°$ and $PQ = RS$, find the value of $\angle PSQ$.



   (c) In the given figure, O is the center of the circle and ABC is a tanget in which B is the point of contact. If $\angle OCB = 30°$, find the value of x and y.



9. (a) In the given figure, if the area of ΔABC is 15 cm^2, find the value of AC.



(b) In a continuous series of 80 terms, the median lies in the class (20 - 30). If the median is 24 and the cumulative frequency preceding the median class is 30, find the frequency of the median class.

10. (a) What is the probability of getting a prime number on the dice and tail on the coin when a cubical dice is rolled and a coin is tossed simultaneously.

(b) Two cards are drawn randomly in a succession without replacement from a well shuffled pack of 52 cards. Find the probability of getting both cards non faced by drawing a tree diagram.

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

11. In an examination, 80 students passed in Mathematics, 70 failed in Mathematics, 90 failed in Science and 20 failed in both.

(a) Illustrate the given information in a Venn diagram.

(b) How many students passed in Science ?

(c) How many students passed in both Mathematics and Science?

12. The marked price of a Laptop is Rs. 75,000. After allowing a certain percent of discount and levying 15% VAT, the laptop is sold at Rs. 73,312.50. Calculate the discount percent and VAT amount.

13. The given figure is a solid object made up of a cylinder and a cone. The radius of the base of the object is 7 cm, length of the cylinderical part is 35 cm and total length is 59 cm. Find the volume of the solid object.

14. A number of two digits is three times the sum of the digits. If the number is multiplied by 3, the product is equal to the square of the sum of the digits. Find the number.

15. Simplify: $\frac{1}{a-x} - \frac{2x}{a^2+x^2} - \frac{4x^3}{a^4+x^4} - \frac{8x^7}{a^8-x^8}$

16. In the given figure, ST//VU, SX//TU and WT//XU. Prove that the parallelograms STUV and WTUX are equal in area.

17. Draw a quadrilateral ABCD in which AB=BC = 4.5 cm, CD=DA=5.5cm and $\angle BAD = 75°$. Also construct a triangle whose area is equal to the area of the quadrilateral ABCD.

18. Verify experimentally that central angle of a circle is twice the inscribed angle standing on the same arc. (Two circles of radii more that 3 cm are necessary.)

19. A man observes the top of a pillar of height 51.5 m standing in front of him and finds the angle of elevation to be 30°. If the distance between the man and the pillar is 86 m, find the height of the man.

20. Compute the third quartile of the data given below.

Class interval	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Frequency	5	7	7	5	4

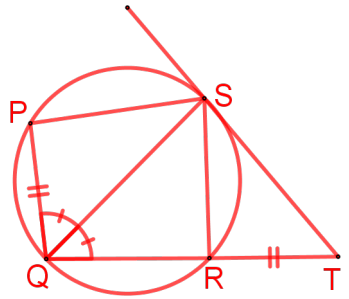
Group "D" $[4 \times 5 = 20]$

21. According to yearly compound interest, the compound interest on a sum of money for two successive years are Rs. 225 and Rs. 240 respectively. Find the rate of interest and the compound interest for the next year.

22. A solid is made up of the combination of a pyramid and a square based prism with the height of 24 cm. The height of the prism is 12 cm and length of the base is 10 cm. How much money is needed to paint the total surface area of the solid at the rate of Rs. 1.50 per cm^2 ?

23. Solve: $5^{x+1} = 126 - 5^{2-x}$

24. In the given figure, PQRS is a cyclic quadrilateral. Side QR is produced to T such that PQ = RT. If QS is the bisector of ∠PQR, prove that SQT is an isosceles tringle.



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