SIDDHARTHA VANASTHALI INSTITUTE
PRE - SECONDARY EDUCATION EXAMINATION - 2078

Subject: Compulsory Mathematics

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

Candidates are required to give their answers in their own words as far as practicable. Credit will be given to original answers, not to memory work. Diagrams and rough must compulsorily be shown wherever necessary.

Attempt all the questions.

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

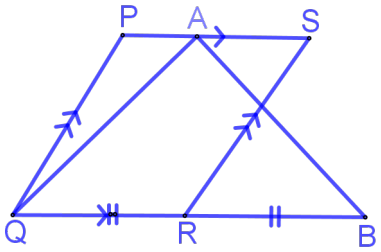
1. (a) If the population growth rate of a certain place for first three years be $R_1\%, R_2\%$ and $R_3\%$ respectively then write the formula to calculate the population after 3 years.

   (b) The area of an equilateral triangle is $729\sqrt{3}$ cm^2. Find its length of side.

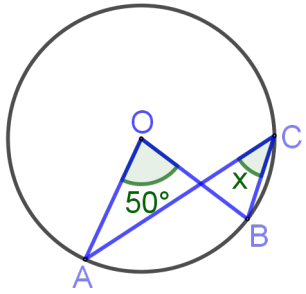
2. (a) Write the rationalizing factor of $3+\sqrt{3}$

   (b) Write the formula to find the position of upper quartile in continuous data.

3. (a) Write the relation between parallelogram PQRS and ΔAQB in the given figure.



   (b) In the given figure, O is the centre of the circle then what is the value of x.



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

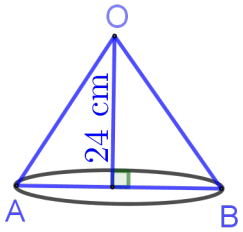
4. (a) A customer purchased a furniture for Rs. 3390 with 13% VAT. Find the cost of the furniture without VAT

   (b) A cupboard costing Rs 16,800 is depreciated at the rate of 15% per year. What will be its cost after 2 years?

5. (a) A triangular base prism is 30 cm long. If the length of the sides of its triangular base are 3 cm 4 cm and 5 cm, find its volume.

   (b) The surface area of a sphere is π sq. cm. If its radius is doubled, by how much does its surface area increase?

   (c) If the volume of the given right circular cone is 1232 cm^3 and its vertical height is 24 cm, find its slant height.



6. (a) Find the L.C.M. of : $6x^2 - x - 1$ and $54x^4 + 2x$

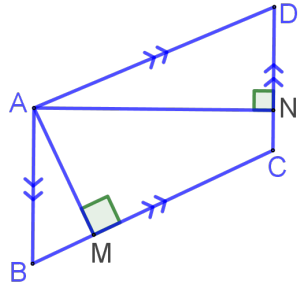
   (b) Solve: $\dfrac{3x-1}{\sqrt{3x}+1} = 1$

7. (a) Simplify: $\dfrac{11^{2x+1} - 6 \times 121^x}{5 \times 121^x}$

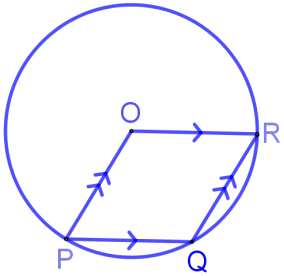
   (b) Simplify: $\dfrac{x}{x^2+2xy+y^2} + \dfrac{y}{x^2-y^2}$

   (c) If the sum of two consecutive odd numbers is 40, find them.

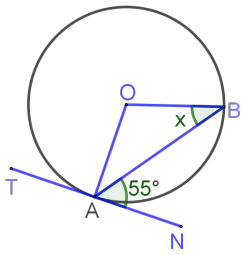
8. (a) In a parallelogram $ABCD$, if $AM \perp BC, AN \perp CD, BC = 5.4\ cm, CD = 6.8\ cm$ and $AM = 3.4\ cm$, find AN.



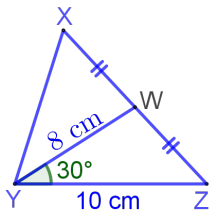
   (b) In the given figure O is the centre of the circle and $OPQR$ is a parallelogram. Find the value of $\angle OPQ$



(c) In the given figure, O is the centre of the circle. TN is a tangent to the circle at A, if BAN is 55°, find the value of x.



9. (a) Find the area of ΔXYZ, if YZ = 10 cm, WY=8 cm, WYZ=30° and W is the mid-point of XZ.



(b) Find the value of a if $\bar{x} = 20, N = 10 + a$ and $\Sigma fm = 25a + 150$.

10. (a) From the number cards numbered from 2 to 30, a card is drawn at random. Find the probabilities of the number is either divisble by 5 or by 6

(b) A bag contains 5 green and 6 black balls of the same shape and size. Two balls are drawn at random one after the other without replacement. Draw a tree diagram showing all the probabilities and also find the probability of getting both balls of the same colour.

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

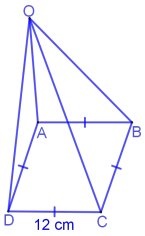
11. In a survey of some students. It was found that 60% of them studied Commerce and 40% studied Science. If 40 students studied both the subjects and 10% didn't study any of the subjects by drawing a Venn-diagram,

(a) find the total number of students

(b) find the number of students who studied Science only

12. The cost price of a mobile is Rs. 4,000. A businessman marked its price 25% above its cost price. If 13% VAT is charged after allowing 12% discount, how much does a customer pay for it.

13. In the given figure, if the length of a side of the base of the pyramid having square base is 12 cm and the volume of the pyramid is 384 cm^3, find the total surface area of the pyramid.



14. Simplify:

$$\frac{x+y}{x^2+xy+y^2} + \frac{x-y}{x^2-xy+y^2} + \frac{2y^3}{x^4+x^2y^2+y^4}$$

15. A two digit number is such that the product of its digits is 8. When 18 is added to the number the digits interchange their places. Find the number.

16. Prove that the angle at the centre of a circle is twice the angle at its circumference standing on the same arc.

17. Construct a parallelogram $ABCD$ in which $AB = 6\ cm, BC = 4cm$ and $\angle BAD = 60°$ Also construct ΔAEF whose area is equal to the area of parallelogram $ABCD$ such that AE = 7.5 cm.

18. Verify experimentally that the exterior angle of a cyclic quadrilateral is equal to the opposite interior angle. (Two circles having radii at least 3 cm are necessary)

19. The top of a tree which is broken by the wind makes an angle of 60° with the ground at a distance $3\sqrt{3}$ m from the foot of the tree. Find the height of the tree before its was broken. Find the median from the data given below:

20. Find the median from the data given below:

Class interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	4	8	5	7	6

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

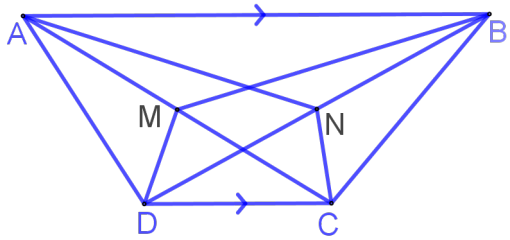
21. Ram lend altogether Rs. 10,000 to Hari and Laxmi for 2 years. Hari agrees to pay simple interest at 12% p.a. and Laxmi agrees to pay compound interest at the rate of 9% pa. If Laxmi paid Rs. 596.70 more than Hari as the interest, find how much did he lend to each.

22. The circumference of the circular base of a cylindrical pillar is 33 ft and its height is 10 ft. The top of the pillar has a combined cone of height 7 ft. Find the cost of painting the combined structure of the pillar at the rate of Rs. 40 per sq. ft.

23. If $a + b + c = 0$ show that

$$\frac{1}{1+x^a+x^{-b}} + \frac{1}{1+x^b+x^{-c}} + \frac{1}{1+x^c+x^{-a}} = 1$$

24. In the given figure, $ABCD$ is trapezium in which M and N are the mid-points of AC and BD respectively and $AB||DC$. Prove that $\Delta BMD = \Delta ANC$.



Good Luck