Dr. Virendra Swarup Education Centre, Avadhpuri, Kanpur
Winter Holidays Assignment (2024–25)
Class 9 (Mathematics)

Q1) If 2A is an acute angle and $2\cos 2A = \sqrt{3}$, then evaluate:

$\sin^2(75^0 - A) + \cos^2(45^0 + A)$.

Q2) If $x = \frac{1}{4-x}$, find the value of:

a) $x + \frac{1}{x}$ 　　　　 b) $x^2 + \frac{1}{x^2}$

Q3) If $x + \frac{1}{x} = 3$, find the values of $x^6 + \frac{1}{x^6}$

Q4) Solve for x:

log (x+3) + log (x-3) = log 27

Q5) The following frequency distribution as follows:

Class Interval	0-5	5-10	10-15	15-20	20-25	25-30
Frequency	5	8	12	9	4	3

   a) Construct a frequency polygon for the above data on a graph sheet.
   b) State the class mark of the class 15-20.

Q6) Factorise:　　 $a^4 + 4b^4 - 5a^2b^2$

Q7) In the parallelogram ABCD, CP and DP are the bisectors of angle C and D. Prove that $\angle DPC = 90^0$ and AP=PB.
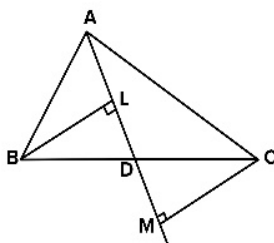
Q8) On what sum of money will the difference between the compound interest and simple interest for 2 years at 10% p.a. be equal to Rs. 120

Q9) Solve: 19x+15y=83; 15x+19y=87

Q10) If a point A (7, -8) and a point B is on the x- axis, find the co-ordinate of B, if AB=10 units.

Q11) Find 'x' if $2^{2x+3} - 9 \times 2^x + 1 = 0$

Q12) AD is the median of $\triangle$ABC, BL and CM are perpendiculars to AD and AD produced. Prove that BL=CM

Q13) In an equilateral $\triangle$ABC D, E and F are the mid-points of sides BC, CA and AB respectively. Show that $\triangle$DEF is also an equilateral triangle.

Q14) If a+b=8 and ab=12, find the value of a^3+b^3.

Q15) If A=60^0 and B=30^0, verify that sin(A-B) = sin A cosB- cosA sinB.

Q16) In $\triangle ABC$, $\angle B=90^0$ and D is the mid-point of BC. Prove that: $AC^2=AD^2+3CD^2$.

Q17) ABCD is a square and ABE is an equilateral triangle outside the square, prove that $\angle ACE = \frac{1}{2}\angle ABE$.

Q18) Evaluate the following: $\log 2 + 16 \log \frac{16}{15} + 12 \log \frac{25}{24} + 7 \log \frac{81}{80}$

Q19) Prove that: $\frac{2^{m+1}\times 3^{2m-n}\times 5^{m+n}\times 6^n}{6^m\times 10^{n+2}\times 15^m} = \frac{1}{50}$

Q20) Chords AB and CD of a circle are parallel to each other and lie on the opposite sides of the centre of the circle. If AB=24cm, CD=32cm and the perpendicular distance between AB and CD is 28cm, find the radius of the circle.

Q21) Construct a parallelogram ABCD in which AC=6cm, BD=4.6cm and $\angle 60^0$ in between of the diagonals.

Q22) In a three-digit number, the digits at the hundred's place are three times the digit at the one's place and sum of the digits is 15. If the digits are reversed, the number is reduced by 396. Find the number.

Q23) 1) **Assertion**: Sides opposite to equal angles of a triangle are equal.

  Reason: Angles opposite to equal sides of a triangle are not equal.

  2) **Assertion**: If two arcs subtend equal angles at the centre, then they are equal.

  Reason: Equal arcs subtend equal angles at the centre.

   (a) Both Assertion and Reason are true and Reason is a correct explanation of Assertion.

   (b) Both Assertion and Reason are true and Reason is not a correct explanation of Assertion.

   (c) Assertion is true, and Reason is false.

   (d) Assertion is false, and Reason is true.

Q24) Three consecutive vertices of a parallelogram ABCD are A (1,2), B (1,0) and C (4,0). Find the fourth vertex D. (While using distance formula)

Q25) If sin A = $\frac{\sqrt{3}}{2}$ = cos B, then find tan (A-B)

Q26) In QR , PQ=PR=y and QR=10 cm and the area of $\triangle PQR$ is 60 cm^2. Find y.

Q27) Show that the quadrilateral formed by joining the mid-points of the adjacent sides of a square is also a square,

Q28) 2 men and 5 women can do a piece of work in 4 days, while one man and one woman finishes it in 12 days. How long would it take 1 man to do the work?

Q29) Factorize: a) $4a^2 + 4ab + b^2-9c^2$ b) $x^4 + x^2y^2 + y^4$

Q30) If a sum of money becomes $\frac{256}{81}$ times of itself in 4 years compounded annually, find the rate of interest.