HERITAGE INTERNATIONAL SCHOOL, ALIGARH
HOLIDAY HOMEWORK SESSION 2023-24
SUBJECT: MATHEMATICS
CLASS: X

1. What is algorithm and lemma?
2. What is a composite number?
3. Express 429 as the product of its prime factors.
4. If HCF (336 , 54) = 6, find LCM(336 , 54).
5. If the product of two numbers is 1080 and their HCF is 30, find their LCM.
6. If p and q are two prime numbers, then what is their HCF?
7. If p and q are two prime numbers, then what is their LCM?
8. What is the total number of factors of a prime number?
9. Two positive integers a and b can e written as $a = x^3y^2$ and $b= xy^3$, where x , y are prime numbers. Find LCM (a , b).
10. Express the following positive integers as the product of its prime factors:
    a. 140 b. 156 c. 5005 d. 7429
11. Two numbers are in the ratio 21:17. If their HCF is 5, the numbers are …… and ……..
12. For what value of k, is 3 a zero of the polynomial $2x^2 + x + k$?
13. Find the LCM and HCF of the following pair of integers and verify: LCM × HCF = product of integers
    a. 336 and 54 b. 404 and 96 c. 90 and 144
14. For what value of k, -4 is a zero of the polynomial $x^2 – x – (2k+2)$?
15. Find the zeroes of the following polynomials P(x) and verify the relationship between zeroes and its coefficients:
    a. $X^2 + 7x + 12$
    b. $6x^2 – 3$
    c. $7y^2 - \frac{11}{3}y - \frac{2}{3}$
    d. $abx^2 + (b^2 – ac)x – bc$
16. find a quadratic polynomial whose sum and product of zeroes are as follow:
    a. $\sqrt{2}, \frac{-3}{2}$
    b. $\frac{-8}{3}, \frac{4}{3}$
17. If α *and* β are the zeroes of the polynomial $2y^2 + 7y + 5$, write the value of $\alpha + \beta + \alpha\beta$.

18. If $\alpha \; and \; \beta$ are the zeroes of the quadratic polynomial P(x) = x^2 – 5x + 4, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$

19. If $\alpha \; and \; \beta$ are the zeroes of the quadratic polynomial P(x) = x^2 – 1, find a quadratic polynomial whose zeroes are $\frac{2\,\alpha}{\beta} \; and \; \frac{2\,\beta}{\alpha}$.

20. If $\alpha \; and \; \beta$ are the zeros of the polynomial P(x) = x^2 – x – 2, find a polynomial whose zeroes are $2\alpha + 1 \; and \; 2\,\beta + 1$.

21. If $\alpha \; and \; \beta$ are the zeroes of the quadratic polynomial P(x) = x^2 + x – 2, find the value of $\frac{1}{\alpha} - \frac{1}{\beta}$.

22. If $\alpha \; and \; \beta$ are the zeros of the polynomial P(x) = $2x^2$ –5 x + 7, find a polynomial whose zeroes are $2\alpha + 3\beta \; and \; 3\alpha + 2\beta$.

23. If $\alpha \; and \; \beta$ are the zeroes of the quadratic polynomial P(x) = $4x^2$ – 5x – 1, find the value of $\alpha^2\beta + \alpha\beta^2$

24. If $\alpha \; and \; \beta$ are the zeroes of the quadratic polynomial P(x) = $6x^2$ + x – 2, find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

25. If sum of the squares of zeros of the quadratic polynomial P(x) = x^2 – 8x + k is 40, find the value of k.

26. If $\alpha \; and \; \beta$ are the zeroes of the quadratic polynomial P(x) = x^2 – p (x+1) – c, show that $(\alpha + 1)(\beta + 1) = 1 - c$

27. If $\alpha \; and \; \beta$ are the zeroes of the quadratic polynomial such that $\alpha + \beta = 24 \; and \; \alpha - \beta = 8$, find a quadratic polynomial having $\alpha \; and \; \beta$ as its zeroes.

28. Find a quadratic polynomial whose zeroes are negative of the zeroes of the polynomial px^2 + q x + r.

29. Show that following numbers are irrational:

a. $\frac{1}{\sqrt{2}}$ b. $3 + \sqrt{2}$ c. $2\sqrt{3} - 1$ d. $2 - 3\sqrt{5}$

30. If $\alpha \; and \; \beta$ are the zeros of the quadratic polynomial P(x) = ax^2 + bx + c, then evaluate:

i. $\alpha^2 + \beta^2$ ii. $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ iii. $\alpha^3 + \beta^3$ iv. $\frac{1}{\alpha^3} + \frac{1}{\beta^3}$

v. $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ vi. $\alpha^4 + \beta^4$ vii. $\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2}$