



Attempt questions first; check the separate key afterward. Show steps and draw labelled diagrams where asked.

A. Very short answers - 1 mark each

1. Define a prime number.
2. Write the prime factorisation of 84.
3. Find HCF of 18 and 24.
4. Find LCM of 12 and 15.
5. Is $\sqrt{7}$ rational?
6. Can the HCF of two positive integers exceed either integer?
7. State the fundamental theorem of arithmetic.
8. Find HCF of consecutive positive integers.

B. Short answers / practice - 2 marks each

9. Find HCF and LCM of 72 and 120.
10. Find the least number divisible by 8, 12 and 18.
11. Two numbers have product 216 and HCF 6. Find their LCM.
12. Can 6^n end in zero for positive integer n ? Justify.
13. Find the greatest length that exactly measures ropes 84 m and 126 m long.
14. Find the smallest perfect square divisible by 12 and 18.
15. Prove that $\sqrt{2}$ is irrational.
16. Prove that $\sqrt{3}$ is irrational.
17. Prove that $5+\sqrt{2}$ is irrational.
18. Find HCF of $2^3 \times 3^2 \times 5$ and $2^2 \times 3 \times 7$.
19. Find LCM of $2^3 \times 3^2 \times 5$ and $2^2 \times 3 \times 7$.
20. Two bells ring every 18 and 24 minutes. When will they next ring together?

C. Application / reasoning - 3 marks each

21. Find the least integer greater than 15 which leaves remainder 3 on division by 8, 12 and 15.

22. A school groups 96 boys and 120 girls into identical groups without mixing genders. Find maximum group size.

23. Prove that $\sqrt{5}$ is irrational.

24. Explain why $7 \times 11 \times 13 + 13$ is composite.

25. Does an integer divisor exist that leaves remainder 7 when dividing both 187 and 272? Justify.

26. Can the sum of two irrational numbers be rational? Give an example.

27. Find HCF and LCM of 135 and 225.

28. Prove that $7+3\sqrt{2}$ is irrational.

29. Find the least positive number divisible by 14, 21 and 30.

30. Two positive numbers have HCF 15 and LCM 180. If one is 45, find the other.

31. Can two positive integers have HCF 18 and LCM 75? Explain.

D. Extended practice - 5 marks each

32. Find HCF and LCM of 144, 180 and 192 using prime factorisation.

33. Prove that $3-2\sqrt{5}$ is irrational.

34. Two positive integers have HCF 12 and LCM 180. Give all unordered possible pairs.

35. Prove that $\sqrt{2}+\sqrt{3}$ is irrational by squaring a supposed rational sum.

ANSWER KEY - Numerical / closed questions

2) $2^2 \times 3 \times 7$. 3) 6. 4) 60. 5) No. 6) No. 8) 1. 9) 24; 360. 10) 72. 11) 36. 12) No; no factor 5. 13) 42 m. 14) 36. 18) 12. 19) 2520. 20) After 72 min. 21) 123. 22) 24. 24) 13×78 . 25) No; it must divide $\gcd(180, 265)=5$ but exceed 7. 26) Yes; $\sqrt{2}+(-\sqrt{2})=0$. 27) 45; 675. 29) 210. 30) 60. 31) No; HCF must divide LCM. 32) 12; 2880. 34) (12, 180), (36, 60).