



Attempt questions first; check the separate key afterward. Show all working. Draw accurate figures where required.

A. Very short answers - 1 mark each

1. Define an algorithm.
2. Why must its instructions be unambiguous?
3. Find HCF of 48 and 18 by Euclid's algorithm.
4. Find HCF of 252 and 105 similarly.
5. Divide 157 by 12 and state quotient and remainder.
6. Verify $\text{dividend} = \text{divisor} \times \text{quotient} + \text{remainder}$.
7. List steps to test whether an integer is even.
8. Apply them to 1003.

B. Short answers / practice - 2 marks each

9. Use repeated addition to compute 7×6 .
10. Explain one efficiency advantage of ordinary multiplication.
11. Write an algorithm to find the largest of three numbers.
12. Trace it on 12, -4, 19.
13. Apply Euclid's algorithm to consecutive integers 35 and 36.
14. Explain why consecutive integers are always coprime.
15. Sort 8, 3, 6, 1 using successive adjacent swaps; show stages.
16. How can you check that sorting preserved all data?
17. Write an algorithm to find the sum $1+2+\dots+n$.
18. Evaluate it for $n=20$.
19. Use trial division to test 97 for primality.
20. Why need only prime divisors not exceeding $\sqrt{97}$ be checked?

C. Application / reasoning - 3 marks each

21. Convert decimal 19 to binary using repeated division by 2.
22. Trace the same algorithm for 26.
23. Use the subtraction method to find HCF of 28 and 20.
24. Compare it with the division method in this example.
25. Starting from 5, repeatedly double and add 1 three times. Find final value.
26. Write a formula for one step.
27. Use Euclid's algorithm to find HCF of 391 and 299.
28. Write an algorithm to count multiples of 3 from 1 to a positive integer n .
29. Trace repeated division by 2 to convert 37 into binary.
30. A rule starts at 2 and repeats "multiply by 3, then subtract 1". Find the next three values.
31. Design an algorithm to reverse the digits of a positive two-digit integer; test it on 47.

D. Extended practice - 5 marks per pair

32. Explain inputs, outputs and stopping conditions with an example.
33. Why is "keep adding 1 forever" unsuitable for a terminating computation?
34. Design an algorithm to find LCM using HCF.
35. Apply it to 72 and 90, showing Euclid's steps.

ANSWER KEY - Numerical / closed questions

- 3) 6. 4) 21. 5) 13; 1. 6) $157 = 12 \times 13 + 1$. 8) Odd.
9) 42. 12) 19. 13) HCF 1. 15) 1, 3, 6, 8. 18) 210. 19) Prime. 21) 10011. 22) 11010. 23) 4.
25) 47. 26) $\text{Next} = 2 \times \text{current} + 1$. 27) 23. 29) 100101. 30) 5, 14, 41. 31) Reversed number 74.
34) $\text{LCM} = ab/\text{HCF}$ for positive integers. 35) HCF 18; LCM 360.