Fibonacci Day maths for CBSE Class 10: Class 11: answers

CBSE Math Revision · CBSE Class 11 (no calculator) · 23 November · Teacher answers and notes

No calculator. Every answer works out exactly.

Teacher notes

- For CBSE Class 11. No calculator: every answer works out exactly, as in board exams.

Starter

1. ***x* = (1 + √5)/2 or (1 – √5)/2**
   - Quadratic formula: $x = (1 \pm \sqrt{5})/2$
2. **55**
   - 1, 1, 2, 3, 5, 8, 13, 21, 34, 55
3. **1023**
   - 10 terms of a GP: $2^{10} - 1 = 1023$
4. **24**
   - 4! = 24

Task A: The golden ratio

a. **(3 + √5)/2**

- $\varphi^2 = (1 + 2\sqrt{5} + 5)/4 = (6 + 2\sqrt{5})/4 = (3 + \sqrt{5})/2$
- $\varphi + 1 = (1 + \sqrt{5})/2 + 2/2 = (3 + \sqrt{5})/2$

b. **(√5 – 1)/2**

- Divide $\varphi^2 = \varphi + 1$ by φ: $\varphi = 1 + 1/\varphi$.
- $1/\varphi = \varphi - 1 = (\sqrt{5} - 1)/2$

c. **2 + √5**

- $\varphi^3 = \varphi \times \varphi^2 = \varphi(\varphi + 1) = \varphi^2 + \varphi = 2\varphi + 1$
- $= 1 + \sqrt{5} + 1 = 2 + \sqrt{5}$

Task B: Climbing the stairs

a. **5**

- 1+1+1+1, 2+1+1, 1+2+1, 1+1+2, 2+2

b. **34**

- The counts are 1, 2, 3, 5, 8, 13, 21, 34 for 1 to 8 steps.

c. **15**

- Two 2-steps and four 1-steps: 6 moves.
- Choose where the 2-steps go: ${}^6C_2 = 15$

Extension

1. **143**
   - 1 + 1 + 2 + 3 + 5 + 8 + 13 + 21 + 34 + 55 = 143
   - The 12th Fibonacci number is 144.

Every question is original and every answer was checked before publishing.