

Fibonacci Day maths activities for IGCSE and GCSE

IGCSE Math Revision · IGCSE and GCSE (Higher and Extended) · 23 November · Student sheet

Name _____

Class _____

Date _____

The starter is non-calculator. A calculator is allowed in the main activity.

Starter (5 minutes)

1. Write down the next three terms: 1, 1, 2, 3, 5, 8, ...
2. Write down the next two terms of the Fibonacci-type sequence 3, 4, 7, 11, ...
3. Expand and simplify $(1 + \sqrt{5})^2$.
4. Write $8 : 5$ as a decimal, in the form $n : 1$.

Main activity (35 minutes)

Task A: Fibonacci-type sequences

Each term is the sum of the two terms before it.

- a. The first two terms are 2 and 5. Find the 6th term.
- b. The first two terms are a and b . Show that the 5th term is $2a + 3b$. If the 5th term is 41 and $a = 4$, find b .
- c. A Fibonacci-type sequence has 3rd term 10 and 6th term 42. Find the first two terms.

Task B: The golden ratio

Divide each Fibonacci number by the one before it.

- a. Work out $13 \div 8$, $21 \div 13$ and $34 \div 21$, each to 3 decimal places. What do you notice?
- b. The ratios get closer to the golden ratio ϕ , the positive solution of $x^2 = x + 1$. Use the quadratic formula to find ϕ to 3 decimal places.
- c. A golden rectangle has length ϕ times its width. A golden rectangle is 20 cm wide. Find its length to 1 decimal place.

Task C: Fibonacci squares and the spiral

Squares with sides 1, 1, 2, 3, 5 and 8 cm fit together to make a rectangle.

- a. What are the length and width of the rectangle?
- b. Show that the total area of the squares equals the area of the rectangle.
- c. A quarter circle is drawn in each square, with radius equal to the side. Find the total length of the spiral, to 3 significant figures.

Extension

1. $\phi = (1 + \sqrt{5})/2$. Show that $\phi^2 = \phi + 1$ by working out both sides.
2. Every third Fibonacci number is even. How many of the first 60 Fibonacci numbers are even? Explain why the pattern works.