ACCURATE CONSTRUCTION: THE GOLDEN SPIRAL

Use squared paper for this construction. You may find it helps to sketch it first, so that you understand what the instructions are asking you to do.

Start by writing down a list of Fibonacci numbers:

1, 1, 2, 3, ...

1. In the centre of the paper, draw a square of side length 1 unit (0.5 or 1cm). Draw a quarter circle, centred at the top left vertex, and with radius 1 unit.

2. On the left side of this square, draw another square of side length 1 unit. Draw a quarter circle inside the second square, centred on the top right vertex, and radius 1 unit.

3. On top of the rectangle now formed, draw a square of side length 2 units. Draw a quarter circle inside this square, centred on the bottom right vertex, and radius 2 units.

4. On the right side of the rectangle now formed, draw a square of side length 3 units. Draw a quarter circle inside this square, centred on the bottom left vertex, and radius 3 units.

5. Continue drawing squares on the side of the rectangle you have just formed, and putting quarter circles into them, until you run out of room on the paper. You need to continue moving round the diagram in a clockwise direction so that the arcs form a continuous spiral.

Questions to answer (do not substitute a numerical value for π in these):

1. What is the sequence of the side lengths of the rectangles? Why?

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2. What is the length of the first and second quarter circle?

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3. What is the length of the third quarter circle?

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4. Write down the sequence of the lengths of the first ten quarter circles.

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5. Predict the length of the 15th quarter circle.

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6. Write down a formula for the length of the *n*th quarter circle (use F_n for the *n*th Fibonacci number).

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