The number φ	Season	02
	Episode	10
	Time frame	2 periods

Prerequisites : Sequences, arithmetic and geometric sequences

Objectives :
- Work on listening skills.
- Cultural introduction to the Golden Ratio.

Materials :
- *Audio recording of the program "Five numbers" by Simon Singh.*
- *Structure of the radio program (for the teacher)*
- *Questions : on separated papers and on one global answer sheet.*
- *Beamer with the answers illustrated. Elements of correction of the test or added.*

1 – Listening to a radio program — 30 mins

Students listen to a radio program three times. First, the teacher introduces the people appearing in the program :
- Simon Singh, author who has specialised in writing about mathematical and scientific topics in an accessible manner.
- Ian Stewart, professor of mathematics at the University of Warwick, England, and a widely known popular-science writer.
- Robin Wilson, Math historian at the Open University
- Adam Spencer, Australian radio DJ with a penchant for pure mathematics.
- Ron Knott, University of Surey, specialist of the Fibonacci numbers.

First time : They listen to the program, with some small breaks, without knowing what questions are going to be asked. They may take notes.

Second time : A list of four or three questions is given to each student, to focus on for the second time. They are given time to write down their answers precisely.

Third time : The complete list of questions is given to the students before the last time they listen to the program. But they're not allowed to write anything down during this last part.

The number φ	Season	02
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	Document	Answer sheet

1. What does Ian Stewart call the Platonist concept of the ideal world ?

2. How did the Ancient Greek define the number π ?

3. What was the preferred way of the Ancient Greek to talk about "strange" numbers such as π or φ ?

4. What is an irrational number ?

5. What approximate value to 6DP of φ is given by Ian Stewart ?

6. What are the other names of the Golden Ratio ?

7. What did the Ancient Greek regard as the perfect rectangle ?

8. Why was the rectangle built using the Golden Ratio considered perfect ?

9. Where did Leonardo Da Vinci see the Golden Ratio ?

10. Which modern painter used repeatedly the Golden Ratio ?

11. What famous Greek building is referred to in this program ? Why ?

12. What is the danger of looking for the Golden Ratio everywhere ?

13. Which famous modern architect used the Golden Ratio extensively ?

14. Why can we hear a heartbeat in the program ?

15. How is the DNA spiral involving the Golden Ratio ?

16. What figure is created by the rectangles introduced by Adam Spencer ?

17. Where is this figure appearing in nature ?

18. What do you get if you square the Golden Ratio ? What if you take its reciprocal ?

19. Why does the Golden Ratio have this property ?

20. What process described by Ron Knott ends up with the Golden Ratio ?

21. Who was Fibonacci ?

22. How is the Fibonacci sequence built ?

23. Initially, what phenomenon were the Fibonacci numbers modelled on ?

24. Why are the Fibonacci numbers so important in mathematics ?

25. What is the link between Fibonacci numbers and car-parks ?

26. What is the link between Fibonacci numbers and sunflowers ?

27. What is the link between Fibonacci numbers and pineapples ?

28. What is the relation between Fibonacci numbers and the Golden Ratio ?

Document 1 Groups of four questions

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1. What does Ian Stewart call the Platonist concept of the ideal world ?
2. What approximate value to 6DP of φ is given by Ian Stewart ?
3. Where did Leonardo Da Vinci see the Golden Ratio ?
4. Which famous modern architect used the Golden Ratio extensively ?

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1. What are the other names of the Golden Ratio ?
2. Which modern painter used repeatedly the Golden Ratio ?
3. Why can we hear a heartbeat in the program ?
4. What do you get if you square the Golden Ratio ?
   What if you take its reciprocal ?

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1. How is the Fibonacci sequence built ?
2. What is the link between Fibonacci numbers and sunflowers ?
3. What was the preferred way of the Ancient Greek to talk about "strange" numbers such as π or φ ?
4. What did the Ancient Greek regard as the perfect rectangle ?

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1. What famous Greek building is referred to in this program ? Why ?
2. How is the DNA spiral involving the Golden Ratio ?
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1. What is the link between Fibonacci numbers and pineapples ?
2. What is an irrational number ?
3. Why was the rectangle built using the Golden Ratio considered perfect ?
4. What is the danger of looking for the Golden Ratio everywhere ?

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1. What figure is created by the rectangles introduced by Adam Spencer ?
2. What process described by Ron Knott ends up with the Golden Ratio ?
3. Why are the Fibonacci numbers so important in mathematics ?
4. What is the relation between Fibonacci numbers and the Golden Ratio ?

Document 2 Plan of the radio program

Part I – The Golden Ratio (Simon Singh, author who has specialised in writing about mathematical and scientific topics in an accessible manner, Ian Stewart, professor of mathematics at the University of Warwick, England, and a widely known popular-science and science-fiction writer. Robin Wilson, Math historian at the Open University)

Part II – Places where the Golden Ratio can be found (Simon Singh, Ian Stewart, Adam Spencer, Australian radio DJ with a penchant for pure mathematics).

Part III – Properties of the number (Simon Singh, Robin Wilson, Ron Knott, University of Surey, specialist about the Fibonacci numbers).

Part IV – The Fibonacci numbers (Adam Spencer)

Part V –ă Fibonacci numbers in parking meters (Simon Singh and Ron Knott)
Fibonacci numbers in sunflowers (Ian Stewart)
Fibonacci numbers in pineaples (Simon Singh)

Part VI – Fibonacci numbers and the Golden Ratio (Simon Singh)