

Reading Guide for *The Golden Ratio: The Story of Φ*

Chapter 1. Prelude to a Number

1. What is the Golden Ratio?
2. Define incommensurability, and relate to the Golden Ratio.
3. Relate ϕ , the chambered nautilus, and Dali's *Sacrament of the Last Supper* to the Golden Ratio.

Chapter 2. The Pitch and the Pentagon

4. How large a number can you recognize at a glance without counting?
5. Discuss at least four different base systems, their possible origins, and where they are utilized today.
6. Define numerology, and discuss its reliability.
7. Highlight some of the main ideas associated with Pythagoras and the Pythagoreans.
8. Relate the pentagram, the pentagon, and ϕ .
9. What is the mathematical significance of the Egyptian Horus eye?

Chapter 3. Under a Star-y-Pointing Pyramid?

10. Where in ancient remains is ϕ purported to figure?
11. Is there convincing evidence that π and ϕ were both known to and used by the ancient Egyptians?

Chapter 4. The Second Treasure

12. How does mathematics fit into the philosophy of Plato?
13. What are the Platonic solids?
14. The Parthenon is on our itinerary. Where is it, and when will we be there?
15. Relate the Parthenon to the story of ϕ .
16. What makes a triangle a golden triangle? What is the connection with the pentagon?
17. Describe a golden rectangle and its "daughter" rectangles in terms of ϕ .

Chapter 5. Son of Good Nature

18. Who was Leonardo of Pisa? Note the things he is remembered for.
19. Who was Fibonacci, and what is a Fibonacci sequence?
20. Explain the link between Fibonacci numbers and ϕ .
21. Define phyllotaxis, and give examples illustrating its connection to ϕ .

22. How is the golden angle utilized in nature?
23. Relate the Spira Mirabilis to ϕ .
24. Draw pictures incorporating the logarithmic spiral with a golden rectangle and a golden triangle.
25. Use a web search engine to find a picture of the Vatican staircase. Relate to this discussion.

Chapter 6. The Divine Proportion

26. Describe the use of perspective by Piero della Francesca. Find works by him illustrating the technique.
27. Note the connection among Luca Pacioli, Leonardo da Vinci, ϕ , and the divine proportion.
28. According to Pacioli, why is ϕ divine?
29. Discuss the philosophy of form behind Leonardo da Vinci's *Vitruvian Man*.
30. Who was Albrecht Dürer?
31. Use a web search engine to find several magic squares. What is their mathematical significance?
32. Summarize Kepler's view of the universe.
33. To what use does Kepler put the five Platonic solids?
34. What are Kepler's three laws of planetary motion?

Chapter 7. Painters and Poets have Equal License

35. Where might we see a work by Giotto on our trip? How about Leonardo's *Madonna of the Rocks*?
36. Do you think Seurat uses golden rectangles in his works? If so, in which ones?
37. Distinguish among the artistic styles known as pointillism, cubism, and futurism.
38. Summarize Le Corbusier's use of the Modulor. Was this a successful system of proportions?
39. What psychological traits were studied by Fechner and Godkewitsch?
40. Is there an innate golden-ratio aesthetic in humans, do you think?

Chapter 8. From the Tiles to the Heavens

41. Draw the tiles used in a Penrose tiling, and explain their relation to ϕ .
42. Is there a real-world application of Penrose tiling?
43. In your own words, describe what a fractal is.
44. How plausible is it that ϕ plays a role on Wall Street?

Chapter 9. Is God a Mathematician?

45. Views on the nature of mathematics can be roughly placed into two categories, the (modified) Platonic view and the inventionist view. Explore your own experience with mathematics. Do you prefer one view over another? Add your thoughts to your math journal.