Fibonacci sequence

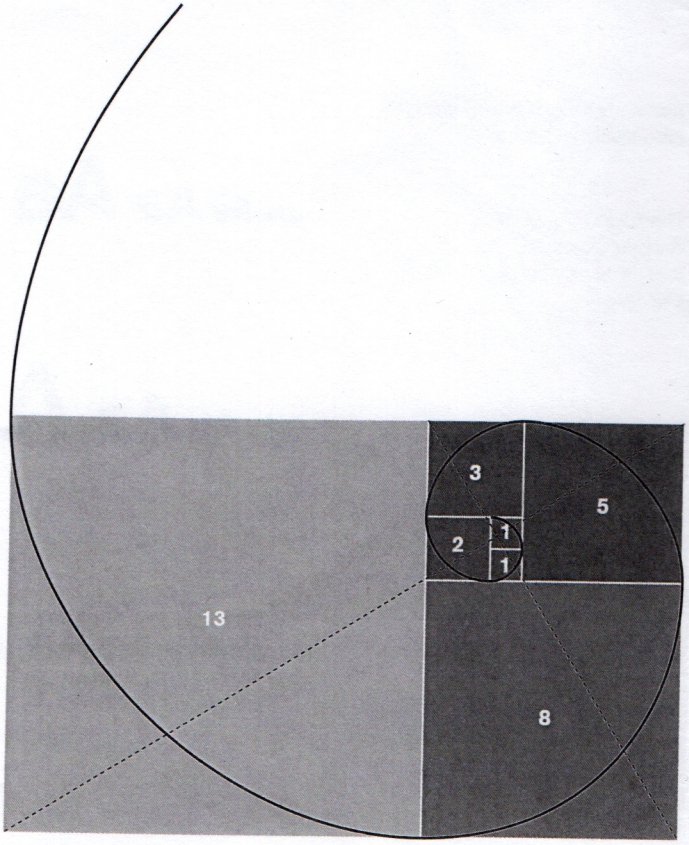
Another useful model when considering proportions is the Fibonacci sequence. Named for Italian mathematician Leonardo Fibonacci (c.1170–1240), a Fibonacci sequence describes a sequence in which each number is the sum of the two preceding numbers:

0
1
1 [1+0]
2 [1+1]
3 [1+2]
5 [2+3]
8 [3+5]
13 [5+8]
21 [8+13]
34 [13+21]
...

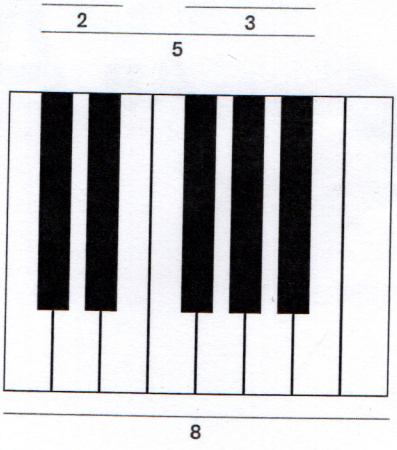
As the numbers in a Fibonacci sequence increase, the proportion between any two numbers very closely approximates the proportion in a golden section (1:1.618). For example, 21:34 approximately equals 1:1.618. Nature is full of examples of the Fibonacci sequence and the golden section, from the intervals of branches on a tree to the shell of a chambered nautilus.

Fibonacci's sequence always began with 1 but the proportion between any two numbers remains constant when the sequence is multiplied:

0	**0**	**0**
2	**3**	**4**
2	**3**	**4**
4	**6**	**8**
6	**9**	**12**
10	**15**	**20**
16	**24**	**32**
26	**39**	**52**
42	**63**	**84**
68	**102**	**136**
...	...	...



Above, a spiral describing a Fibonacci series (and the growth of a chambered nautilus). The red rectangle on the upper right approximates a golden section. As each square in the sequence is added, the orientation of the golden section changes from vertical to horizontal.



Left, one of the many examples of a Fibonacci sequence is the musical octave as seen on a piano—eight white keys and five black keys (separated into a group of two and a group of three).