

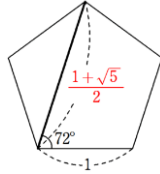
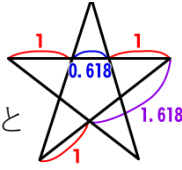
黄金比はなぜ美しいのか

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【導入】

黄金比は1:1.618になる比率のこと
美しい比率の代表的なもの
古代から人類の発展とともに歩んできた
ものであり、建造物や自然界にたくさん見られる

Ex) パルテノン神殿、
サグラダファミリア、
富嶽三十六景、モナ・リザ etc



●グスタフ・フェヒナーの統計的な実験

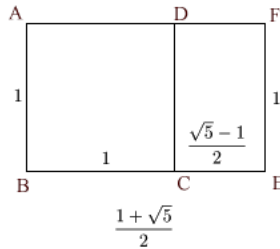
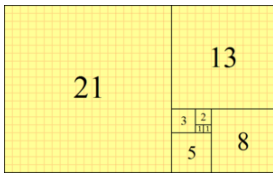
ドイツの学者のフェヒナーは
心理学の立場から証明した
多数の被験者に様々な長方形をみせたとき、
最も美しいと思うものを選択してもらった結果
黄金比の長方形が一番選ばれた
そのため、黄金比が一番美しいと示された

黄金比が最も美しいという 数学的な証明はない

黄金比を発見したのは古代数学者ユークリッド
初めて使用したのは古代彫刻家である
ペイディアスと言われている

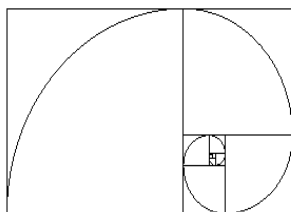
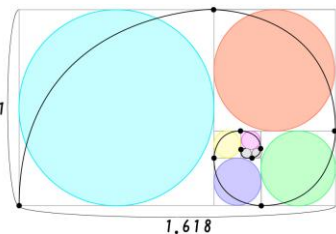
黄金長方形

縦横比が黄金比になる長方形
特徴；正方形区切ると再び黄金長方形が
作られ無限に生まれる



黄金螺旋

黄金長方形の対角線上に円を描き螺旋を描いたもの
黄金長方形と同じように黄金螺旋も無限に生まれる



【フィボナッチ数列、黄金比、 自然界の関係性】

●自然界に潜むフィボナッチ数列

ウサギのつがい、木の枝分かれ、葉の付き方など
自然界に密接に関わっている数列となっている

●フィボナッチ数列とは

0_1_1_2_3のように始まる数列であり、
次の数は2つの数を足し合わせて成り立っている
自然界にも多く見られ、ひまわりや松ぼっくり、
日常にはApple社やGoogle社のロゴなど
隣り合う2つの数を分数にして並べると
以下の通りとなる

| | | | | | | | | | |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1 ÷ 1 = 1 | 2 ÷ 1 = 2 | 3 ÷ 2 = 1.5 | 4 ÷ 3 = 1.333... | 5 ÷ 4 = 1.25 | 6 ÷ 5 = 1.2 | 7 ÷ 6 = 1.166... | 8 ÷ 7 = 1.142... | 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... |
| 2 ÷ 1 = 2 | 3 ÷ 2 = 1.5 | 4 ÷ 3 = 1.333... | 5 ÷ 4 = 1.25 | 6 ÷ 5 = 1.2 | 7 ÷ 6 = 1.166... | 8 ÷ 7 = 1.142... | 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 |
| 3 ÷ 2 = 1.5 | 4 ÷ 3 = 1.333... | 5 ÷ 4 = 1.25 | 6 ÷ 5 = 1.2 | 7 ÷ 6 = 1.166... | 8 ÷ 7 = 1.142... | 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... |
| 4 ÷ 3 = 1.333... | 5 ÷ 4 = 1.25 | 6 ÷ 5 = 1.2 | 7 ÷ 6 = 1.166... | 8 ÷ 7 = 1.142... | 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... |
| 5 ÷ 4 = 1.25 | 6 ÷ 5 = 1.2 | 7 ÷ 6 = 1.166... | 8 ÷ 7 = 1.142... | 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... |
| 6 ÷ 5 = 1.2 | 7 ÷ 6 = 1.166... | 8 ÷ 7 = 1.142... | 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... |
| 7 ÷ 6 = 1.166... | 8 ÷ 7 = 1.142... | 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... |
| 8 ÷ 7 = 1.142... | 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... |
| 9 ÷ 8 = 1.125 | 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... |
| 10 ÷ 9 = 1.111... | 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... |
| 11 ÷ 10 = 1.1 | 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... |
| 12 ÷ 11 = 1.0909... | 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 |
| 13 ÷ 12 = 1.0833... | 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... |
| 14 ÷ 13 = 1.0769... | 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... |
| 15 ÷ 14 = 1.0714... | 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... |
| 16 ÷ 15 = 1.0667... | 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... |
| 17 ÷ 16 = 1.0625... | 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 |
| 18 ÷ 17 = 1.0588... | 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 | 27 ÷ 26 = 1.0385... |
| 19 ÷ 18 = 1.0556... | 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 | 27 ÷ 26 = 1.0385... | 28 ÷ 27 = 1.037... |
| 20 ÷ 19 = 1.0526... | 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 | 27 ÷ 26 = 1.0385... | 28 ÷ 27 = 1.037... | 29 ÷ 28 = 1.0357... |
| 21 ÷ 20 = 1.05 | 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 | 27 ÷ 26 = 1.0385... | 28 ÷ 27 = 1.037... | 29 ÷ 28 = 1.0357... | 30 ÷ 29 = 1.0345... |
| 22 ÷ 21 = 1.0476... | 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 | 27 ÷ 26 = 1.0385... | 28 ÷ 27 = 1.037... | 29 ÷ 28 = 1.0357... | 30 ÷ 29 = 1.0345... | 31 ÷ 30 = 1.0333... |
| 23 ÷ 22 = 1.0455... | 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 | 27 ÷ 26 = 1.0385... | 28 ÷ 27 = 1.037... | 29 ÷ 28 = 1.0357... | 30 ÷ 29 = 1.0345... | 31 ÷ 30 = 1.0333... | 32 ÷ 31 = 1.0323... |
| 24 ÷ 23 = 1.0435... | 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 | 27 ÷ 26 = 1.0385... | 28 ÷ 27 = 1.037... | 29 ÷ 28 = 1.0357... | 30 ÷ 29 = 1.0345... | 31 ÷ 30 = 1.0333... | 32 ÷ 31 = 1.0323... | 33 ÷ 32 = 1.0313... |
| 25 ÷ 24 = 1.0417... | 26 ÷ 25 = 1.04 | 27 ÷ 26 = 1.0385... | 28 ÷ 27 = 1.037... | 29 ÷ 28 = 1.0357... | 30 ÷ 29 = 1.0345... | 31 ÷ 30 = 1.0333... | 32 ÷ 31 = 1.0323... | 33 ÷ 32 = 1.0313... | 34 ÷ 33 = 1.0303... |
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| 28 ÷ 27 = 1.037... | 29 ÷ 28 = 1.0357... | 30 ÷ 29 = 1.0345... | 31 ÷ 30 = 1.0333... | 32 ÷ 31 = 1.0323... | 33 ÷ 32 = 1.0313... | 34 ÷ 33 = 1.0303... | 35 ÷ 34 = 1.0294... | 36 ÷ 35 = 1.0286... | 37 ÷ 36 = 1.0278... |
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| 47 ÷ 46 = 1.0217... | 48 ÷ 47 = 1.0213... | 49 ÷ 48 = 1.0208... | 50 ÷ 49 = 1.0204... | 51 ÷ 50 = 1.02 | 52 ÷ 51 = 1.0196... | 53 ÷ 52 = 1.0192... | 54 ÷ 53 = 1.0189... | 55 ÷ 54 = 1.0185... | 56 ÷ 55 = 1.0182... |
| 48 ÷ 47 = 1.0213... | 49 ÷ 48 = 1.0208... | 50 ÷ 49 = 1.0204... | 51 ÷ 50 = 1.02 | 52 ÷ 51 = 1.0196... | 53 ÷ 52 = 1.0192... | 54 ÷ 53 = 1.0189... | 55 ÷ 54 = 1.0185... | 56 ÷ 55 = 1.0182... | 57 ÷ 56 = 1.0179... |
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