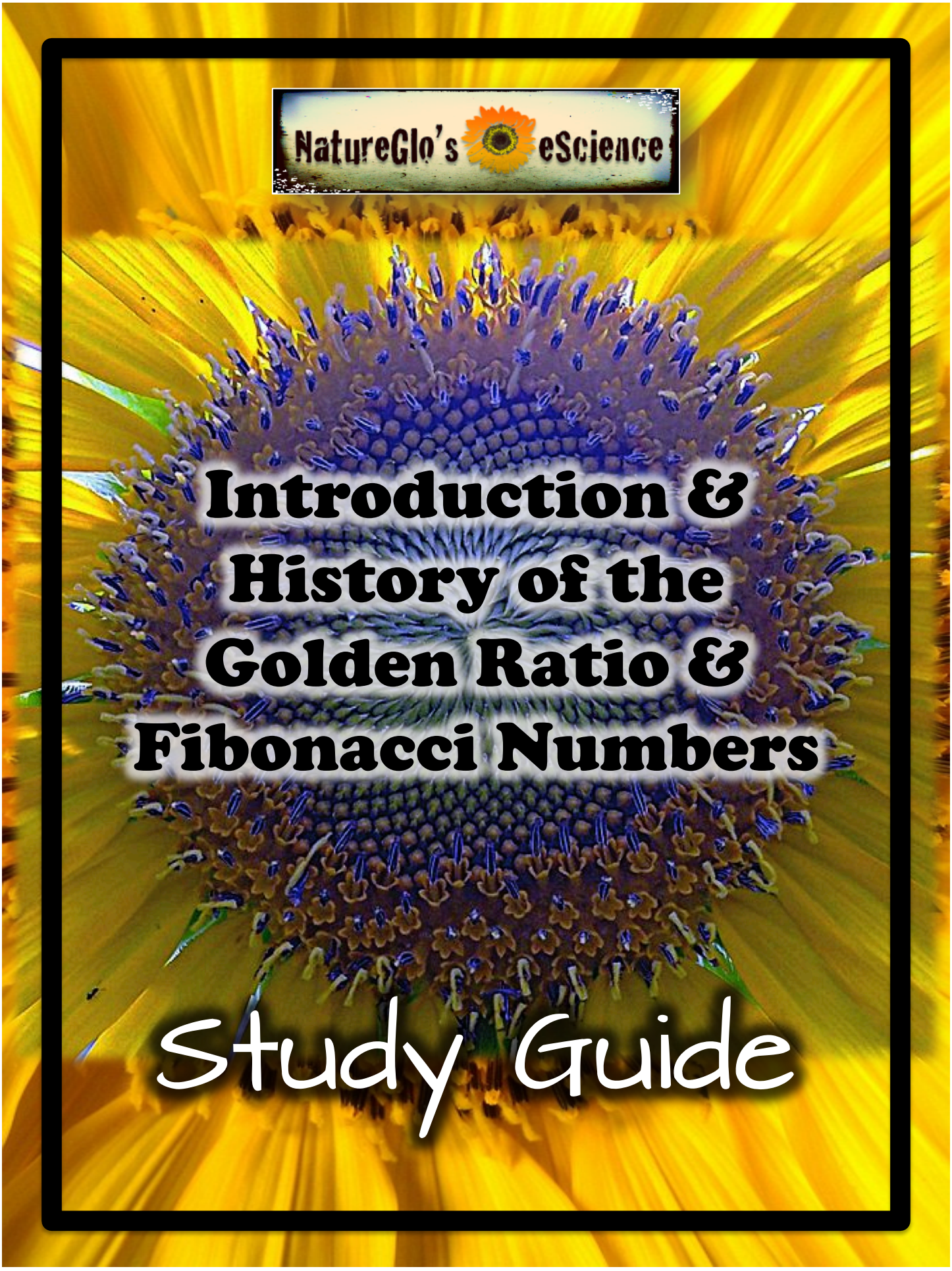
NatureGlo's eScience
Introduction & History of the Golden Ratio & Fibonacci Numbers
Study Guide

NatureGlo's eScience
Introduction & History of the
Golden Ratio & Fibonacci Numbers
Revised 12/16/16

Cover photography – Sunflower with purple seed head by James M. Henfre. Background sunflower image by Pixabay and in the public domain.

Table of Contents

PowerPoint Interaction – Golden Ratio & Fibonacci Intro

Slide #3 The Golden Number

1. Write out the golden number below to 3 decimal places.

_____

2. What kind of number is the golden number? Circle all that apply.

   Rational irrational infinite finite

Slide #5 History of the Golden Ratio & Fibonacci Numbers (2574 – 1200 AD).

3. In 1200 A.D., the _____ _____ series was written about by Leonardo of Pisa aka Fibonacci & popularized in west. Fill in the blank.

Slide #10 Euclid of Alexandria, "the Father of Geometry" - 325–265 BC

4. During 300 BC, in Euclid's book, Elements, he first recorded the golden ratio _____. Fill in the blank.

   Definition rabbits photographs

Slide #14 - Different Names of the Golden Number

List two different names for the golden ratio.

5. _____

6. _____

PowerPoint Interaction – Golden Ratio & Fibonacci Intro

Slide #15 Fibonacci Numbers History – 6th century to 19th Century

7. Who is credited with inventing the Fibonacci numbers and the Hindu-Arabic numbers (0, 1 – 9) we use today? Multiple choice.

_____

a. Ancient Europeans b. Ancient Greeks c. Ancient Indians

Slide #15 Fibonacci Numbers History – 6th century to 19th Century

8. 1202 AD – Leonardo of Pisano (aka Fibonacci) introduced India's number series to west in book "Liber Abaci" (page right) or Book of the Abacus, with the famous _____. Multiple choice.

a. Rabbit sequence b. Sunflower sequence c. Indian Sequence

Slide #16 The Fibonacci Number Series History Overview

9. Write out the first 10 Fibonacci numbers in order below. **Hint**: Remember to add the first two subsequent numbers (numbers next to each other) to get the sum of the next number.

_____

_____

PowerPoint Interaction –
Golden Ratio & Fibonacci Intro

Slide #19 Golden Number & Fibonacci Numbers History Timeline: Bonnet & Ohm

10. Charles Bonnet pointed out _____ spiral phyllotaxis going clockwise and counter-clockwise were frequently two successive Fibonacci numbers. Multiple choice.

    a. nautilus b. Parthenon c. plant

Journal Entry

Name: _____ Date:_____

Directions: Select a topic from the PowerPoint lesson or web resources. Complete the information about it below.

Sketch

1). **General Description**

_____
_____
_____
_____

2). **Size**

_____
_____
_____

3). **Color(s)**

_____
_____

4). **Other interesting facts**

_____
_____
_____
_____
_____
_____

Mathematician/MathArtist Journal Entry

Your Name: _____ Date: _____

Mathematician/MathArtist:_____

<u>Directions</u>: Select a mathematician or a "MathArtist" (one who used or uses mathematics in their artwork). Follow the guidelines below.

Sketch or Photos

Details

Life work:
1)._____
_____
_____
_____

Numbers & Geometric shapes used in work:
_____
_____
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_____

Additional Interesting facts:
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Natureglo's eScience Student Project Rubric:

Usage: PowerPoints, posters & other written research projects

Category	Criteria				Points
	4 Exemplary	**3 Accomplished**	**2 Developing**	**1 Beginner**	
Accurate Research/ Inform-ation Gathering & Citation	All taken from several sources & cited in work	Most taken from sources & cited	Some taken from sources and cited	Little or none taken from sources and or not cited	
Content	Great number of interesting facts around topic	Many interesting or too many facts	Some important facts	Few or no facts	
Graphics/ Sound/ Animation	High quality; enhance understandin g on every page. All borrowed graphics with source cited.	Many enhance understanding on most pages; most borrowed graphics cited.	Some enhance understandi ng; some cited	Zero, unrelated, very few or poor quality graphics and/or none cited	
Organiz-ation & Attractive-ness	Well organized and very attractive; demonstrates creative & logical sequencing and sentence structure	Mostly well organized and attractive; demonstrates logical sequencing and sentence structure	Somewhat organized and attractive, but some illogical sequencing and sentence structure	Unattractive and or weakly organized or disorganized	
Grammar and Mechanics	All correct	1 – 5 errors	5 – 10 errors	Frequent errors	
Divide total points from 20 for grade.			**Total Points/Grade:**		

Introduction & History of the Golden Ratio & Fibonacci Numbers

Quiz

Golden Ratio
& Fibonacci Intro – Quiz

1. Write out the golden number below to 3 decimal places.

_____

2. What kind of number is the golden number? Circle all that apply.

   Rational irrational infinite finite

3. In 1200 A.D., the _____ _____ series was written about by Leonardo of Pisa aka Fibonacci & popularized in west. Fill in the blank. Fill in the blank.

4. During 300 BC, in Euclid's book, Elements, he first recorded the golden ratio _____. Fill in the blank with multiple choice.

   Definition rabbits photographs

List two different names for the golden ratio.

5. _____

6. _____

Golden Ratio
& Fibonacci Intro – Quiz

7. Who is credited with inventing the Fibonacci numbers and the Hindu-Arabic numbers (0, 1 – 9) we use today? Multiple choice.

_____

a. Ancient Europeans b. Ancient Greeks c. Ancient Indians

8. 1202 AD – Leonardo of Pisano (aka Fibonacci) introduced India's number series to west in book "Liber Abaci" (page right) or Book of the Abacus, with the famous _____. Multiple choice.

a. Rabbit sequence b. Sunflower sequence c. Indian Sequence

9. Write out the first 10 Fibonacci numbers in order below. **Hint**: Remember to add the first two subsequent numbers (numbers next to each other) to get the sum of the next number.

_____

_____

Golden Ratio
& Fibonacci Intro – Quiz

10. Charles Bonnet pointed out _____ spiral phyllotaxis going clockwise and counter-clockwise were frequently two successive Fibonacci numbers. Multiple choice.

    a. nautilus b. Parthenon c. plant

PowerPoint Interaction & Quiz Answer Key

PowerPoint Interaction – Golden Ratio & Fibonacci Intro

Slide #3 The Golden Number

1. Write out the golden number below to 3 decimal places. 1.618

2. What kind of number is the golden number? Circle all that apply.

   Rational irrational infinite finite

Slide #5 History of the Golden Ratio & Fibonacci Numbers (2574 – 1200 AD).

3. In 1200 A.D., the Fibonacci number series was written about by Leonardo of Pisa aka Fibonacci & popularized in west. Fill in the blank.

Slide #10 Euclid of Alexandria, "the Father of Geometry" - 325–265 BC

4. During 300 BC, in Euclid's book, Elements, he first recorded the golden ratio a. definition Multiple choice.

   a. Definition b. rabbits c. photographs

Slide #14 - Different Names of the Golden Number

List two different names for the golden ratio.

Student answers will vary but can include any two of the following choices:

Golden mean, Golden section, Golden number, Golden ratio (most popular), Golden proportion, Golden cut, Extreme mean & ratio, Mean of Phidias, Divine section, Medial section, Divine proportion, Phi (also very popular)

PowerPoint Interaction – Golden Ratio & Fibonacci Intro

Slide #15 Fibonacci Numbers History – 6th century to 19th Century

7. Who is credited with inventing the Fibonacci numbers and the Hindu-Arabic numbers (0, 1 – 9) we use today? Circle one.

a. Ancient Europeans b. Ancient Greeks c. Ancient Indians

Slide #15 Fibonacci Numbers History – 6th century to 19th Century

8. 1202 AD – Leonardo of Pisano (aka Fibonacci) introduced India's number series to west in book "Liber Abaci" (page right) or Book of the Abacus, with the famous a. Rabbit sequence.

a. Rabbit sequence b. Sunflower sequence c. Indian Sequence

Slide #16 The Fibonacci Number Series History Overview

9. Write out the first 10 Fibonacci numbers in order below. **Hint**: Remember to add the first two subsequent numbers (numbers next to each other) to get the sum of the next number.

   0, 1, 1, 2, 3, 5, 8, 13, 21, 34

PowerPoint Interaction – Golden Ratio & Fibonacci Intro

Slide #19 Golden Number & Fibonacci Numbers History Timeline: Bonnet & Ohm

10. Charles Bonnet pointed out **c. plant** spiral phyllotaxis going clockwise and counter-clockwise were frequently two successive Fibonacci numbers. Multiple choice.

    a. nautilus b. Parthenon **c. plant**