**Exploring the World of Math**

Name: _____ Date: _____

**Test 1d– Fibonacci Sequences and the Golden Ratio**

1. Write a Fibonacci sequence starting with 1

| $F_1$ | $F_2$ | $F_3$ | $F_4$ | $F_5$ | $F_6$ | $F_7$ | $F_8$ | $F_9$ | $F_{10}$ | $F_{11}$ | $F_{12}$ | $F_{13}$ | $F_{14}$ | $F_{15}$ | $F_{16}$ | $F_{17}$ | $F_{18}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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2. Compute the following using data provided:

| $F_{24}$ | $F_{25}$ | $F_{26}$ | $F_{27}$ | $F_{28}$ |
|---|---|---|---|---|
| | 75025 | 121393 | | |

   a. Calculate the value of $F_{24}$

   b. Calculate the value of $F_{27}$

   c. Calculate the value of $F_{28}$

3. Compute the following:
   a. $F_{12} \times 3$
   b. $F_{2+7+9}$
   c. $F_{49/7}$
   d. $F_{16}+F_8+ F_4$
   e. $F_{15} \div F_6$
   f. $F_{10} \times F_5$

4. Compute the following:
   a. $\varphi$
   b. $\Phi^{-1}$
   c. $\Phi^{7}$
   d. $\Phi^{9} / \sqrt{5}$
   e. $\Phi^{10} / \sqrt{5}$
   f. $\Phi^{19} / \sqrt{5}$

5. What can we observe about the answers to 4d, 4e and 4f from comparing your answer to the Fibonacci series in question 1?

6. Using Binet's formula, what is the Fibonacci number $F_{625}$?

7. Nokia has a sequence that starts with 1, then 4, then 5, and so on. We call the sequence N. Complete the sequence.

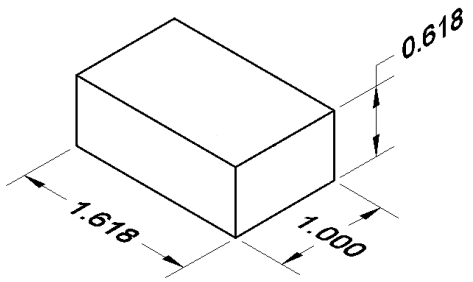
| $N_1$ | $N_2$ | $N_3$ | $N_4$ | $N_5$ | $N_6$ | $N_7$ | $N_8$ | $N_9$ | $N_{10}$ | $N_{11}$ | $N_{12}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

8. Divide $N_{12}$ by $N_{11}$. What value is this close to?

9. To achieve a perfect layout of leaves on a stem each subsequent leaf is added every 137.5°. How is this number computed. Show your work.

10. Minerva is working on a box design and decides to use the golden ratio as a guide. If the length (long side) is 3.5 meters, what should the width be? Show your work.

11. Ophelia wants to use a box that has 100% golden measurements. In the diagram, we see the proportions. If the long side is 6 feet, what is the width and the height?




12. Draw a rectangle that has the proportion of the Golden Ratio with the long side of 10.

13. Name five parts of the human body that display the Fibonacci sequence or the Golden Ratio. Be specific from what from part to what part.

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14. Name three manmade objects or buildings that display the Fibonacci sequence or the Golden Ratio.

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15. Draw a Fibonacci spiral 1, 1, 2 ,3, 5, 8