The Fibonacci Sequence

NAME: ....

CLASS: ....

DATE: ....

Basic

1) A sequence is an ordered set of numbers, shapes or objects arranged according to a rule. For example, starting with the number 2, adding 5 to the previous number gives the sequence 2, 7, 12, 17…

Using the rule provided, give the first five numbers in the following sequences:
a) Start with 3 and add 4 to the previous number.

b) Start with 1 and double the previous number.

c) Start with 2 and multiply the previous number by 3 then subtract 1.

2) Give the rule for the following sequences of numbers:
a) 2, 9, 16, 23, 30…

b) 2, 8, 32, 128, 512…

c) 5, 7, 11, 19, 35 …

3) The Fibonacci Sequence starts with 1, 1, 2, 3, 5, 8, 13…
a) Give the next five terms in the sequence.

b) Consider the first four numbers of the sequence (1, 1, 2, 3). Multiply the first and fourth numbers then multiply the second and third numbers. Calculate the difference.

c) Repeat procedure (b) for any four consecutive numbers in the Fibonacci Sequence. What do you notice?

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Core

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a) Start with 3 and add 4 to the previous number.

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2) Give the rule for the following sequences of numbers:
a) 2, 9, 16, 23, 30…

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c) 5, 7, 11, 19, 35 …

3) Similar sequences to the Fibonacci Sequence can be generated. For each of the following sequences, give the next five terms and write the rule for the sequence.
a) 2, 2, 4, 6, 10, 16…

b) 2, 7, 9, 16, 25, 41…

c) 5, 10, 15, 25, 40…

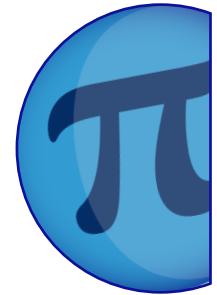d) 1, 1, 1, 3, 5, 9, 17…

Generate your own Fibonacci type sequences.

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1) Similar sequences to the Fibonacci Sequence can be generated. For each of the following sequences, give the next five terms and write the rule for the sequence.

a) 2, 2, 4, 6, 10, 16…

b) 2, 7, 9, 16, 25, 41…

c) 5, 10, 15, 25, 40…

d) 1, 1, 1, 3, 5, 9, 17…

Generate your own Fibonacci type sequences.

2) a) Discover an algebraic rule for the Fibonacci Sequence. Represent the first and second terms in the Fibonacci sequence with x and y. The first few terms would be expressed as follows:

First term = x
Second term = y
Third term = $(x + y)$
Fourth term = $(x + y) + y = 1x + 2y$
Fifth term = $(x + 2y) + (x + y) = 2x + 3y$

Give an expression for the next five terms.
Sixth term =
Seventh term =
Eighth term =
Ninth term =
Tenth term =

b) Is there anything familiar about the coefficients of the x and y terms.

The Fibonacci Sequence

ANSWERS

Basic

1a) 3, 7, 11, 15, 19   b) 1, 2, 4, 8, 16   c) 2, 5, 14, 41, 122

2a) Start with 2 and add 7 to the previous term.   b) Start with 2 and multiply the previous term by 4.
c) Start with 5 and multiply the previous term by 2 then subtract 3.

3a) 21, 34, 55, 89, 144   b) 1 x 3 = 3; 1 x 2 = 2; difference = 1.   c) The difference is always 1.

Core

1a) 3, 7, 11, 15, 19   b) 1, 2, 4, 8, 16   c) 2, 5, 14, 41, 122

2a) Start with 2 and add 7 to the previous term.   b) Start with 2 and multiply the previous term by 4.
c) Start with 5 and multiply the previous term by 2 then subtract 3.

3a) 26, 42, 68, 110, 178. Start with 2 then 2 and then add previous 2 terms.
b) 66, 107, 173, 280, 453. Start with 2 then 7 and then add previous 2 terms.
c) 65, 105, 170, 275, 445. Start with 5 then 10 and then add previous 2 terms.
d) 31, 57, 105, 193, 355. Start with 1, 1, 1 then add previous 3 terms.

Advanced

1a) 26, 42, 68, 110, 178. Start with 2 then 2 and then add previous 2 terms.
b) 66, 107, 173, 280, 453. Start with 2 then 7 and then add previous 2 terms.
c) 65, 105, 170, 275, 445. Start with 5 then 10 and then add previous 2 terms.
d) 31, 57, 105, 193, 355. Start with 1, 1, 1 then add previous 3 terms.

2a)
Sixth term = $(2x + 3y) + (x + 2y) = 3x + 5y$
Seventh term = $(3x + 5y) + (2x + 3y) = 5x + 8y$
Eighth term = $(5x + 8y) + (3x + 5y) = 8x + 13y$
Ninth term = $(8x + 13y) + (5x + 8y) = 13x + 21y$
Tenth term = $(13x + 21y) + (8x + 13y) = 21x + 34y$

2b) They're numbers in the Fibonacci sequence.