

Is It Happy? Worksheet 1

A number which, when replaced by the sum of the digits squared, and repeated infinitely will equal in a series of '1' is a Happy number.

Example 1

313 Is a Happy number, Proof;

$$3^2+1^2+3^2=19$$

$$1^2+9^2=82$$

$$8^2+2^2=68$$

$$6^2+8^2=100$$

$$1^2=1$$

The sequence end in 1 therefore 313 is Happy.

Example 2

71 Is not a Happy number, Proof;

$$7^2+1^2=50$$

$$5^2=25$$

$$2^2+5^2=29$$

$$2^2+9^2=85$$

$$8^2+5^2=89$$

The sequence has entered the infinite unhappy loop (4,16,37,58,89...) so is not Happy.

Exercise:

1-Are the following numbers Happy?

a) 998

b) 54

c) 314

d) 101

e) 649

f) 709

g) 2

h) 821

2-Find the complete infinite unhappy loop

3-Happy primes are prime numbers that are also Happy, what are all the Happy primes below 25?

Teacher Copy

Answers:

1

- | | | | |
|-----------------|--------------------|---------------------|---------------------|
| a) 998 is Happy | b) 54 is not Happy | c) 314 is not Happy | d) 101 is not Happy |
| e) 649 is Happy | f) 709 is Happy | g) 2 is not Happy | h) 821 is not Happy |

2

4,14,16,37,58,89,145,42,20

3

7,13,19,23