

1991 - The Year of the Palindromes

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A palindrome is a word or number in which its letters or digits are the same backwards and forwards. BOB and 1991 are both examples of palindromes.

In this activity we will focus on numerical palindromes.

Any number (see editor's comment at end) can eventually become a palindrome by applying a simple function. If a number is not a palindrome, add the reverse of the number to the number itself. Repeat this process until the sum of the two numbers becomes a palindrome.

157 is not a palindrome, so

$$\begin{array}{r} 157 \\ +751 \\ \hline 908 \end{array}$$

908 is not a palindrome, so repeat the process....

$$\begin{array}{r} 908 \\ +809 \\ \hline 1717 \end{array}$$

1717 is not a palindrome, so repeat the process....

$$\begin{array}{r} 7171 \\ +1717 \\ \hline 8888 \end{array}$$

8888 is a palindrome!!!!

It took three generations to convert the number, 157, into a palindrome. All numbers will eventually become a palindrome, but some take longer than others. What kinds of numbers are more likely to take several iterations to become palindromes? Do odd number take longer? Do prime numbers take longer than composite numbers?

Test your hypothesis and collect data using the following procedures.

The procedures

The first procedure we need is a simple recursive operation for reporting the reverse of a word (or number).

```
to reverse :word
if empty? :word [output :word]
output word last :word reverse bl
:word
end
```

The first set of palindrome procedures work as a command - printing the number of generations it takes for a number to become a palindrome.

```
to palindrome :number
print (sentence :number [is a ]
find.palindrome :number 1 [generation
palindrome])
end
```

```
to find.palindrome :number :counter
if :number = reverse :number [print
:number output :counter]
print :number
output find.palindrome (:number + re-
verse :number) :counter + 1
end
```

PRINT PALINDROME 157

157 is a 3 generation palindrome.

```
to try.numbers :start :finish
if :start > :finish [stop]
palindrome :start
try.numbers :start + 1 :finish
end
```

Type PRINT TRY.NUMBERS 150 160 to print out palindrome information for the numbers 150 to 160.

See *Palindrome...page 12*