

Here are four 'think of a number' challenges:

Challenge 1

Think of a number  
Double it  
Add 4  
Take away 6  
Halve it  
Add 1

Challenge 2

Think of a number  
Add 10  
Double it  
Add 2  
Halve it  
Subtract 11

Challenge 3

Think of a number  
Multiply it by 4  
Add 16  
Take away 20  
Add 8  
Divide it by 4  
Subtract 1

Challenge 4

Think of a number  
Multiply it by 4  
Add 200  
Halve it  
Add 1  
Take away double the  
number you first thought  
of  
Multiply it by 2  
Multiply it by 10

- What do you notice?
- Which challenge is the odd one out? Why?
- Does changing the number you start with matter?
- What happens if you change the number?
- Would it be the same with a decimal number?
- Would it be the same with a negative number?

You should have discovered that Challenges 1,2 and 3 give you the same number you started with.

Here is why:

Challenge 1

Think of a number  
Double it  
Add 4  
Take away 6  
Have it  
Add 1

Call the number you choose  $x$   
 $x$  just represents any number but helps us see what has happened

Think of a number	$x$
Double it	$2x$
Add 4	$2x + 4$
Take away 6	$2x - 2$
Halve it	$x - 1$
Add 1	$x$

As we get  $x$  back, this proves that this 'think of a number' challenge will work for any number that you choose, even if it is a decimal, or negative, or even  $\pi$ !

- a) Use  $x$  as the number you start with in Challenges 2 and 3. If you get back to  $x$  you will prove it works for any value of  $x$ .
- b) Can you make your own? Try it out on your family and friends to see if it works!