

1

			3	
x			1	6
		1	8	6
		3	1	0
		4	9	6

2

			2	3
x			4	
			6	9
		9	2	0
		9	8	9

3

			6	2
x				5
		3	1	0
	1	8	6	0
	2	1	7	0

4

			2	
x				4
			8	4
		8	4	0
		9	2	4

5

			6	
x				2
		1	3	0
	3	2	5	0
	3	3	8	0

6

			1	
x				6
		1	0	8
		1	8	0
		2	8	8

7

				4
x			2	
			7	2
		4	8	0
		5	5	2

8

				5
x			4	
		1	7	5
	1	4	0	0
	1	5	7	5

9

				8
x			6	
			5	4
	1	0	8	0
	1	1	3	4

10

			6	
x			3	
		1	2	2
	1	8	3	0
	1	9	5	2

11

			3	
x			5	
		1	0	8
	1	8	0	0
	1	9	0	8

12

			1	
x				
			4	2
		2	8	0
		3	2	2

Goldbach's conjecture

A conjecture is a mathematical statement which seems likely to be true but has not been proven to be true. It is usually based on some evidence which is not complete.

A famous mathematical conjecture is by Goldbach who claimed:

'every even number greater than two can be written as the sum of two primes'

Can you prove Goldbach's conjecture up to 100? The first few have been done for you.

4	$2 + 2$	6	$3 + 3$
8	$3 + 5$	10	
12		14	
16		18	
20		22	
24		26	
28		30	
32		34	
36		38	
40		42	
44		46	
48		50	
52		54	
56		58	
60		62	
64		66	
68		70	
72		74	
76		78	
80		82	
84		86	
88		90	
92		94	
96		98	
100			

1. A little monkey had 60 peaches...

On the first day he kept $\frac{3}{4}$ of his peaches and gave the rest away.
Then he ate one.

On the second day, he kept $\frac{7}{11}$ of his peaches and gave the rest away. Then he ate one.

On the third day, he kept $\frac{5}{9}$ peaches and gave the rest away. Then he ate one.

On the fourth day, he kept $\frac{2}{7}$ of his peaches and gave the rest away. Then he ate one.

On the fifth day, he kept $\frac{2}{3}$ of his peaches and gave the rest away. Then he ate one.

How many peaches did he have in the end?



2. A little monkey had some peaches...

On the first day, he decided to keep $\frac{1}{2}$ of his peaches. He gave the rest away. Then he ate one.

On the second day, he decided to keep $\frac{1}{2}$ of his peaches. He gave the rest away. Then he ate one.

On the third day, he decided to keep $\frac{1}{2}$ of his peaches. He gave the rest away. Then he ate one.

On the fourth day, he found that he only had one peach left.

How many peaches did he have at the start?



Superduper tricky challenge investigation



A little monkey started off with 75 peaches.

Every day, he kept a fraction of the peaches, gave the rest away and then ate some. These are the fractions he decided to keep:

$\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{3}{5}$, $\frac{5}{6}$, $\frac{11}{15}$

In which order did he use the fractions so that he was left with just one peach at the end?

Whenever the monkey has peaches, he always keeps a fraction of them each day, gives the rest away and then eats one.

I wonder how long he could make his peaches last for?
Here are his rules:

- Each fraction must be in its simplest form and must be less than one.
- The denominator is never the same as the number of peaches left (for example, if there were 45 peaches left, he would not be able to keep $\frac{44}{45}$ of them).

What is the longest you can make the peaches last, starting with fewer than 100 peaches?