

# Do Prime Numbers Have Primary Importance?



A PRIME NUMBER IS

- 1) Is 1 a prime number?
- 2) Are there more composite or prime numbers between 1-10?
- 3) what about 1- 100? Will your answer be different if the max number gets bigger?
- 4) Is there a pattern among the prime numbers?
- 5) Interesting facts about primes?
  - Ex: Between a number and its double there is always a prime number!
- 6) List the methods to find primes. Do you have a favorite method?
- 7) Search about Goldbach Conjecture. Explain it by giving examples.

Here is a Goldbach Calculator: <https://www.goldbach.cloud/#/>

- 8) What are the other famous conjectures and theorems about prime numbers?
  
  
  
  
  
  
  
  
  
  
- 9) Visit <https://www.mersenne.org> to join internet's biggest Mersenne Prime Search.
  
  
  
  
  
  
  
  
  
  
- 10) What is the largest known prime? Who, when and how was it found?
  
  
  
  
  
  
  
  
  
  
- 11) Watch the videos of @Standupmaths videos by Matt Parker about prime numbers on YouTube. Write three things that you are surprised!
  
  
  
  
  
  
  
  
  
  
- 12) Where do we use prime numbers in our daily life? Why are they so important? Are the humans the only creatures to know about the primes? Can animals know about the prime numbers?

Postscript:

## The Cicadas 17-year Life Cycle

<http://www.murderousmaths.co.uk/cicadas.htm>

In May 1987 billions and billions of Cicadas bugs swarmed all over North America. During a 5-6 week period they chirped, fed and most importantly bred, then they disappeared underground again.

In May 2004 they're at it again! And 2021 is loading

The amazing thing is that the 17-year gap is no accident. The cicadas are using a prime number to avoid predators.

17 is a prime number. This means it doesn't divide by any numbers apart from 17 or 1.



Suppose you have a predator desperate to catch cicadas when they're out of the ground. Suppose the predator had a life cycle of e.g. 3 years, and the first year depended on eating cicadas. If the cicadas appeared e.g. every 6 years, then every 2nd generation of predators would be able to rely on eating them. Good news for the predators, but bad news for the cicadas.

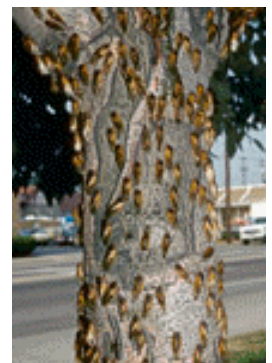
If the cicadas cycle was another number such as 14 years, then a predator with either a 2 year or 7 year life cycle could come to rely upon them within a reasonable number of generations. Therefore the cicadas rather cleverly decided to pick quite a large prime number of years between appearances.

- If a predator had a 5 year life cycle, it would be  $5 \times 17 = 85$  years before it could come to rely on the cicadas arriving again.
- If a predator had a life cycle of 11 years, it would be  $11 \times 17 = 187$  years before the cicadas would arrive.

Unless a predator adopted a life cycle of 17 years (or a multiple of 17 such as 34 or 51), then it will always be 17 generations before it can expect cicadas arriving.

Not surprisingly predators can't be bothered to wait. Incidentally, there are also some 13-year cycle cicadas.

How do they know when 17 years are up when they are underground in the dark?



**\*\*** Apparently they nibble on plant roots, and they can tell by the health of the roots what time of year it is and how many years have passed.