

Problem of the Week: Week 1 (Summer 2): Year 8: Number: Primes, LCM and HCF

- Use prime numbers, factors, multiples, common factors and multiples, highest common factor and lowest common multiple to solve problems
- Select and use appropriate calculation strategies to solve increasingly complex problems.

Prime order

How many of the three-digit numbers that can be made from all of the digits 1, 3 and 5 (used only once each) are prime?

Solution

- 135, 315 are not prime as they are divisible by 5 (multiples of 5)
- 513, 531, 351, 153 are not prime as when you add the digits the totals are all divisible by 3.
This means the numbers are multiples of 3.

So, none of the numbers that can be made from 1, 3 and 5 are prime.

<https://nrich.maths.org/4947>

What's on the back?

Four cards each have a number written on one side and a phrase written on the other. The four numbers are 2, 5, 7 and 12.

The four phrases are

Divisible by 7

Odd

Prime

Greater than 100

On each card, the number written **does not** have the property written on the other side of the card. What are the four number-property pairs?

Solution

12 is the only number that is not prime so it must have PRIME on one side

2 is the only number left that is even, so it must have ODD on one side

5 is the only number left that is not a multiple of 7, so it must have DIVISIBLE BY 7 on the other side

So, 7 must have GREATER THAN 100 on the other side

<https://nrich.maths.org/11708>

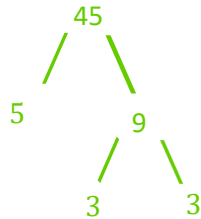
Factor trio

Which of the following numbers is the product of exactly 3 distinct prime numbers?

45, 60, 91, 105, 330

Solution (use factor trees to help)

$$45 = 3^2 \times 5$$



$$60 = 2^2 \times 3 \times 5$$

$$91 = 7 \times 13$$

$$105 = 3 \times 5 \times 7$$

$$330 = 2 \times 3 \times 5 \times 11$$

The answer is 105, 330 has 4 rather than 3 distinct prime factors so cannot be the answer.

<https://nrich.maths.org/2916>

One million

If you have been alive for a million seconds, how many birthdays have you had? What if you have been alive for a million minutes?

Solution

One million seconds is.....

$$\begin{aligned} \text{Minutes} &= 1000\ 000 \div 60 \\ &= 16\ 666\frac{2}{3} \end{aligned}$$

$$\begin{aligned} \text{Hours} &= 16\ 666\frac{2}{3} \div 60 \\ &= 277\frac{7}{9} \end{aligned}$$

$$\begin{aligned} \text{Days} &= 277\frac{7}{9} \div 24 \\ &= 11\frac{31}{54} \text{ days} \end{aligned}$$

This shows that you haven't yet had a birthday to celebrate being one year old

One million minutes is.....

$$\begin{aligned} \text{Hours} &= 1000\ 000 \div 60 \\ &= 16\ 666\frac{2}{3} \end{aligned}$$

$$\begin{aligned} \text{Days} &= 16\ 666\frac{2}{3} \div 24 \\ &= 694\frac{4}{9} \text{ days} \end{aligned}$$

$$\begin{aligned} \text{Years} &= 694\frac{4}{9} \div 365 \\ &= 1\frac{593}{657} \text{ years} \end{aligned}$$

This shows that you are nearly two years old, so have celebrated one birthday

