Tricks

Number magic

Puzzles are great for developing mathematical logic skills, as well as training us to be resilient if a solution proves tricky to find…!

Digital roots

To find the digital root of a number, add its digits until you get a 1-digit answer.

Example 1

To find the digital root of 324, find 3 + 2 + 4.

The digital root of 324 is 9.

Example 2

To find the digital root of 281, find 2 + 8 + 1.

The total (11) is a 2-digit number, so add the digits again. The digital root of 281 is 1 + 1 or 2.

Practise by finding the digital roots of these numbers, before trying the 'tricks' on the next page…

1. 521
2. 1066
3. 358
4. The year you were born.
5. Your mother/carer's age.

Answers

1. 8 2. 4 3. 7 4 and 5 will vary.

Here are three tricks

A. The lost digit trick

1. Tell your friend to write a **4-digit number.**
2. They calculate the **digital root** (you have to explain how to do this).
3. They tell you the **digital root.**
4. They look at their original **4-digit number** and cross out **one digit.**
5. They use the remaining 3 digits in order as a 3-digit number.
6. They subtract their digital root (answer in step 3) from the 3-digit number.
7. They tell you their answer.
8. YOU now silently work out the digital root of their answer.
9. Subtract this from 9. Your answer is the number they crossed out!

Example

Your friend starts with 4751.
The digital root is 8 (since 4 + 7 + 5 + 1 = 17 and 1 + 7 = 8).

*They cross out the **7** and subtract 8 from 451, leaving **443**.*

You find the digital root of 443, which is 2 (since 4 + 4 + 3 = 11 and 1 + 1 = 2).

*Subtract 2 from 9 gives **7**, the number they crossed out!*

B. Digital roots and times tables

Some of our times tables give some interesting patterns in digital roots!

Let's try with the 6s.

1. Write out the multiples of 6: 6, 12, 18, 24, 30 ..... up to 72.
2. Find the digital roots of all of the answers.
3. What did you find? What if you continued counting in 6s up to 100?
4. Now try the 3s and 9s.
5. You can also try 2s and 5s, they are quite easy to learn because of their patterns but what about their digital roots?

C. Using digital roots to guess a person's age.

Instructions

1. Ask someone to write a 3-digit number and then re-arrange the digits to make a second 3-digt number.
2. They should subtract the smaller from the larger number and add their age. They tell you that answer.
3. You find the digital root of that answer and keep adding 9s until you get to the number closest to their age.

Example

Grandad is 57.

He chooses 426 as his 3-digit number and re-arranges the digits to 264.

He finds 426 – 264 (162), then adds his age (57) making 219.

You find the digital root of 219 to be 3 (since 2 + 1 + 9 = 12 and 1 + 2 = 3).

Now keep adding 9s to 3…

3 + 9 = 12, 12 + 9 = 21, 12 + 9 = 30. Could Grandad be 12, 21 or 30?

Keep adding 9s.

30 + 9 = 39

39 + 9 = 48 still too young.

48 + 9 = 57.

57 + 9 = 66, that's too old! Grandad must be 57.