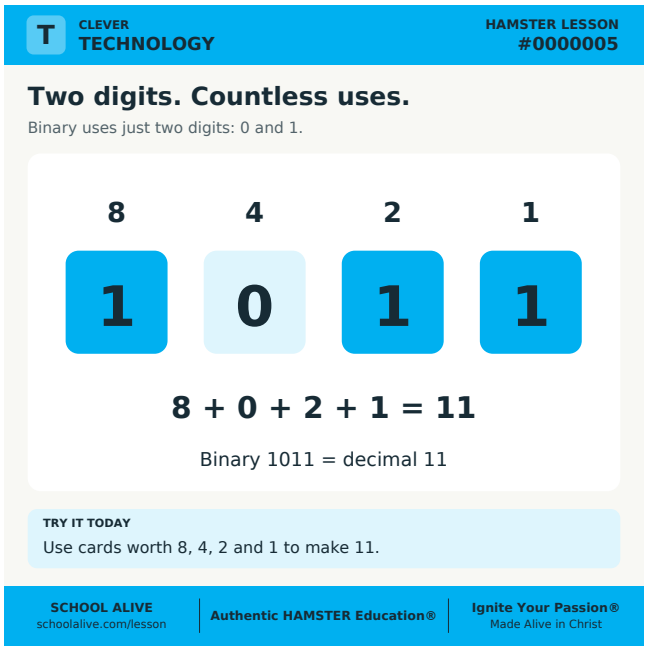

1. ❓ How can a computer work with information using only zeros and ones?
2. 🙋 Binary is a number system with two digits: 0 and 1. A bit is a binary digit. Combinations of bits can represent numbers and, through agreed-upon codes, text, pictures, and sounds.
3. ⏳ In 1703, Gottfried Wilhelm Leibniz wrote an explanation of binary arithmetic. The mathematics came long before the electronic computers that would put it to widespread use.
4. 💡 Our familiar place values grow by tens: 1, 10, 100. Binary place values grow by twos: 1, 2, 4, 8. In the binary number 1011, the 1s select 8, 2, and 1. Add them to get eleven.
5. 🔍 A zero still matters. It holds a place and tells us that its value is not included. In 1011, the zero means we do not add the 4.
6. 🌎 Understanding bits helps us see that digital technology follows rules we can investigate. The tools may be complex, but their foundations can be learned one step at a time.
7. 🎯 Label four cards 8, 4, 2, and 1 from left to right. Use a 1 for each selected value and a 0 for each unused value. Make eleven, then six and nine. Check after trying: six = 0110; nine = 1001. Explain one zero.

References · MIT Press: Leibniz on Binary · IBM: Bits and binary
Twemoji © Twitter, Inc. and contributors · CC BY 4.0

School Alive
Authentic HAMSTER Education®
Ignite Your Passion® · Made Alive in Christ
schoolalive.com/lesson/0000005/