

Mastering Binary Math

Cisco certification candidates, from the [CCNA](#) to the CCIE, must master binary math. This includes basic conversions, such as binary-to-decimal and decimal-to-binary, as well as more advanced scenarios involving subnetting and VLSM. There's another conversion that might rear its ugly head on your Cisco exam, though, and that involves hexadecimal numbering. Newcomers to hexadecimal numbering are often confused as to how a letter of the alphabet can possibly represent a number. Worse, they may be intimidated ? after all, there must be some incredibly complicated formula involved with representing the decimal 11 with the letter ?b?, right? Wrong. The numbering system we use every day, decimal, concerns itself with units of ten. Although we rarely stop to think of it this way, if you read a decimal number from right to left, the number indicates how many units of one, ten, and one hundred we have. That is, the number ?15? is five units of one and one unit of ten. The number ?289? is nine units of one, eight units of ten, and two units of one hundred. Simple enough!

	Units Of 100	Units Of 10	Units Of 1
The decimal "15"	0	1	5
The decimal "289"	2	8	9

Hex numbers are read much the same way, except the units here are units of 16. The number ?15? in hex is read as having five units of one and one unit of sixteen. The number ?289? in hex is nine units of one, eight units of sixteen, and two units of 256 (16 x 16).

	Units Of 256	Units Of 16	Units Of 1
The hex numeral "15"	0	1	5
The hex numeral "289"	2	8	9

Since hex uses units of sixteen, how can we possibly represent a value of 10, 11, 12, 13, 14, or 15? We do so with letters. The decimal ?10? is represented in hex with the letter ?a?; the decimal 11 with ?b?; the decimal ?12? with ?c?, ?13? with ?d?, ?14? with ?e?, and finally, ?15? with ?f?. (Remember that a MAC address of ?ffff.ffff.ffff? is a Layer 2 broadcast.) Practice Your Conversions for Exam Success Now that you know where the letters fall into place in the hexadecimal numbering world, you'll have little trouble converting hex to decimal and decimal to hex ? if you practice. How would you convert the decimal 27 to hex? You can see that there is one unit of 16 in this decimal; that leaves 11 units of one. This is represented in hex with ?1b? ? one unit of sixteen, 11 units of one. Work From Left To Right To Perform Decimal ? Hexadecimal Conversions.

	Units of 256	Units of 16	Units of 1	Hexa
Decimal Number "27"	0	1	B (11)	1b

	Units of 256	Units of 16	Units of 1	Hexadecimal Value
Decimal Number "322"	1	4	2	142

Hex-to-decimal conversions are even simpler. Given the hex number 144, what is the decimal equivalent? We have one unit of 256, four units of 16, and four units of 4. This gives us the decimal figure 324.

	Units of 256	Units of 16	Units of 1	Decimal Value
Hexadecimal Number "144"	1	4	4	256 + 64 + 16

[CCNA exams](#). Binary math questions come in many different forms; make sure you have practiced all of them before exam day. The number one reason CCNA candidates fail their exam is that they're not prepared for the different types of binary math questions they're going to be asked, and that they aren't ready for hexadecimal questions at all. As you can see, hexadecimal conversions are actually simple. You have to practice them, though! You don't have time to learn how to do in on exam day. You've got to be ready before you go into the exam room, and the only way to be ready is a lot of practice. Finally, make sure you read the question carefully. You've got hex, decimal, and binary numbers to concern yourself with on your [CCNA](#) and [CCNP](#) exams. Make sure you give Cisco the answer in the format they're looking for. I have written 20 practice questions that will help you practice your hexadecimal conversion skills. Once you practice with these questions, and know exactly how each answer was arrived at, you'll have no problem with hexadecimal conversions on your Cisco exams. Best of luck! To your success, Chris Bryant, CCIE? #12933 20 Practice questions in .Pdf; Download