

00:00:07.130 --> 00:00:09.490  
Alright, this video is on.

00:00:09.490 --> 00:00:12.540  
Square roots, cube roots and beyond.

00:00:12.540 --> 00:00:17.730  
Sort of an NTH roots. And.

00:00:17.730 --> 00:00:18.678  
Let's remember what it

00:00:18.678 --> 00:00:19.863  
means to square a number.

00:00:19.870 --> 00:00:22.621  
So if you're going to square a

00:00:22.621 --> 00:00:27.310  
number 2 squared is just  $2 * 2$ .

00:00:30.000 --> 00:00:32.220  
Right, which is 4 and it's

00:00:32.220 --> 00:00:33.700  
called squaring because it's.

00:00:36.200 --> 00:00:39.070  
It's the area of a square whose

00:00:39.070 --> 00:00:42.028  
side length is. Is 2 right?

00:00:42.028 --> 00:00:46.098  
And cubing is like  $2^3$  is going to be?

00:00:46.100 --> 00:00:51.390  
 $2 * 2 * 2$  and this is the volume of a

00:00:51.390 --> 00:00:54.319  
cube whose side lengths are all two.

00:00:54.320 --> 00:00:55.200  
It's going to be 8.

00:00:57.280 --> 00:01:01.020  
And. We can ask to go backwards,

00:01:01.020 --> 00:01:02.538  
and that's what square roots and

00:01:02.538 --> 00:01:04.250  
cube roots are really about, so.

00:01:07.500 --> 00:01:10.400  
So sqrt 4.

00:01:13.850 --> 00:01:17.231  
Is saying OK? I have a square

00:01:17.231 --> 00:01:20.788  
whose area is 4 and I want the side

00:01:20.788 --> 00:01:22.408  
length that corresponds to that,

00:01:22.410 --> 00:01:24.139  
so it's like the origin of four

00:01:24.139 --> 00:01:26.010  
from the point of view of a square,

00:01:26.010 --> 00:01:27.960  
so it's going to be.

00:01:27.960 --> 00:01:30.606  
Two, it's a number where this

00:01:30.606 --> 00:01:32.630  
number times itself is 4,

00:01:32.630 --> 00:01:34.730  
and then if I want cube root.

00:01:36.940 --> 00:01:39.838  
Cube root of 8 is saying OK,

00:01:39.840 --> 00:01:42.944  
so give me a number where this number.

00:01:42.950 --> 00:01:44.054  
Times itself three times,

00:01:44.054 --> 00:01:45.710  
so this this number to the

00:01:45.767 --> 00:01:48.630  
third power is 8, so that's.

00:01:48.630 --> 00:01:52.025  
That's true, and then let's just do.

00:01:52.030 --> 00:01:53.135  
Let's just do another couple

00:01:53.135 --> 00:01:54.240  
of examples over here so.

00:01:58.450 --> 00:02:01.267  
Let's think about what will be the 4th root.

00:02:04.940 --> 00:02:11.008  
Of. 81 so I need a number where

00:02:11.008 --> 00:02:14.099  
this number to the 4th power is 81,

00:02:14.100 --> 00:02:15.430  
so you could pause the

00:02:15.430 --> 00:02:16.760  
video and think about that.

00:02:16.760 --> 00:02:18.209  
And that number is going to be.

00:02:20.690 --> 00:02:23.528  
Three right because?

00:02:23.530 --> 00:02:29.649  
3 to the four. Is 81. Or let's do.

00:02:32.760 --> 00:02:33.770  
Let's do the cube root.

00:02:37.570 --> 00:02:41.020  
Of negative 27.

00:02:44.510 --> 00:02:47.534  
So pause the video and think about that.

00:02:47.540 --> 00:02:48.836  
And cube root of negative 27.

00:02:48.840 --> 00:02:50.226  
This is a number where the

00:02:50.226 --> 00:02:51.172  
number to the third power.

00:02:51.172 --> 00:02:52.740  
So you take 3 copies in the number,

00:02:52.740 --> 00:02:54.380  
you multiply them all together

00:02:54.380 --> 00:02:56.020  
and you get negative 27.

00:02:56.020 --> 00:02:58.941  
It's going to be negative 3.

00:02:58.941 --> 00:03:01.046  
So that's the essential idea,

00:03:01.050 --> 00:03:02.538  
and we're going to work with

00:03:02.540 --> 00:03:04.550  
with this idea with variables.

00:03:04.550 --> 00:03:08.134  
One thing to notice here is that.

00:03:08.140 --> 00:03:10.816  
Cube roots can take negative inputs,

00:03:10.820 --> 00:03:13.337  
and they'll give you negative outputs, right?

00:03:13.337 --> 00:03:15.128  
So for example.

00:03:15.130 --> 00:03:16.418  
That's going to be true for all

00:03:16.418 --> 00:03:17.742  
the odd roots because odd powers

00:03:17.742 --> 00:03:18.947  
are going to preserve signs,

00:03:18.950 --> 00:03:20.050  
so what's the 5th root?

00:03:23.040 --> 00:03:25.560  
Of negative one, it's going to be

00:03:25.560 --> 00:03:27.462  
negative one because negative one times

00:03:27.462 --> 00:03:29.620  
negative one is 1 times negative,

00:03:29.620 --> 00:03:31.124  
one is negative one.

00:03:31.124 --> 00:03:33.004  
Write times negative one is

00:03:33.004 --> 00:03:34.504  
1 times negative one again,

00:03:34.504 --> 00:03:36.190  
so 5 copies of negative one,

00:03:36.190 --> 00:03:37.174  
all multiplied together

00:03:37.174 --> 00:03:38.814  
gives us a negative one,

00:03:38.820 --> 00:03:41.167  
but the 6th root of negative one or

00:03:41.167 --> 00:03:42.949  
the square root of negative one.

00:03:42.950 --> 00:03:44.735  
At the moment we're going to leave

00:03:44.735 --> 00:03:47.490  
those things just undefined, so.

00:03:47.490 --> 00:03:50.450  
Odd roots we can operate on negative numbers.

00:03:50.450 --> 00:03:52.088  
They're going to give us negative numbers,

00:03:52.090 --> 00:03:52.710  
even roots.

00:03:52.710 --> 00:03:55.190  
We're only going to put in positive numbers.

00:03:55.190 --> 00:03:55.658  
And that's it.