

00:00:07.160 --> 00:00:09.385
So we're going to keep

00:00:09.385 --> 00:00:10.720
talking about exponents,

00:00:10.720 --> 00:00:11.980
and we're going to talk about

00:00:11.980 --> 00:00:13.460
one of the rules of exponents,

00:00:13.460 --> 00:00:16.729
and that is the product of powers.

00:00:16.730 --> 00:00:21.010
So the product. Of powers.

00:00:23.060 --> 00:00:23.470
Roll.

00:00:25.520 --> 00:00:26.580
So when we're talking about

00:00:26.580 --> 00:00:27.428
the product of powers,

00:00:27.430 --> 00:00:28.670
we're talking about things that

00:00:28.670 --> 00:00:35.030
look like this, say $X^2 * X^3$.

00:00:35.030 --> 00:00:37.112
And there's a rule that will

00:00:37.112 --> 00:00:38.870
help us figure this out,

00:00:38.870 --> 00:00:41.310
but I'm not a big fan of just

00:00:41.310 --> 00:00:42.370
blindly memorizing rules,

00:00:42.370 --> 00:00:44.296
so I like to understand what's

00:00:44.296 --> 00:00:45.953
happening behind the rule and

00:00:45.953 --> 00:00:47.528
when it's time for exponents,

00:00:47.530 --> 00:00:49.255
you actually can write out

00:00:49.255 --> 00:00:50.290
exactly what's happening.

00:00:50.290 --> 00:00:52.330
So if you forget the rule,

00:00:52.330 --> 00:00:56.138
you can still figure out the problem so.

00:00:56.140 --> 00:00:58.024
We're going to try to multiply

00:00:58.024 --> 00:00:59.280
these two things together,

00:00:59.280 --> 00:01:01.045
even though there's not a

00:01:01.045 --> 00:01:02.457
multiplication in between these.

00:01:02.460 --> 00:01:03.516
Remember that when there's

00:01:03.516 --> 00:01:05.446
not a sign and you have the

00:01:05.446 --> 00:01:06.896
variables next to each other,

00:01:06.900 --> 00:01:08.436
it is implying multiplication.

00:01:08.436 --> 00:01:11.938
So really what I have here is $X^2 * X^3$,

00:01:11.938 --> 00:01:14.010
and So what I'm going to do is

00:01:14.084 --> 00:01:16.788
I'm going to use what I know about

00:01:16.788 --> 00:01:19.656
exponents to rewrite this so X^2 squared.

00:01:19.656 --> 00:01:25.130
If I just think about $X^2 X^2$ means.

00:01:25.130 --> 00:01:30.639
 $X * X$ So this X^2 .

00:01:30.640 --> 00:01:32.390
All that saying is it's

00:01:32.390 --> 00:01:36.060
shorthand notation for $X * X$.

00:01:36.060 --> 00:01:38.470
And then.

00:01:38.470 --> 00:01:43.300
 X^3 so if you want to

00:01:43.300 --> 00:01:44.950
remember what X^3 means,

00:01:44.950 --> 00:01:50.535
 X^3 is just $X * X * X$ so the X^3

00:01:50.535 --> 00:01:55.842
is shortcut notation for $X * X * X$.

00:01:55.842 --> 00:02:00.600
So this. Goes with this.

00:02:00.600 --> 00:02:03.036
And so all I've done is use

00:02:03.036 --> 00:02:04.919
what the meaning of exponents

00:02:04.919 --> 00:02:07.175
is to break this down.

00:02:07.180 --> 00:02:09.160
And now I actually can put

00:02:09.160 --> 00:02:10.480
it all back together.

00:02:10.480 --> 00:02:11.894
All I have to do is count

00:02:11.894 --> 00:02:13.119
how many X is I have.

00:02:13.120 --> 00:02:13.528
So I have

00:02:16.680 --> 00:02:20.411
 $12345 X$ is so I could rewrite

00:02:20.411 --> 00:02:23.658
this as X to the 5th.

00:02:23.660 --> 00:02:26.719
So if you look here I could

00:02:26.719 --> 00:02:29.356
have I had $X^2 * X^3$.

00:02:29.356 --> 00:02:31.846
I broke it down and then I put it

00:02:31.846 --> 00:02:33.934
all back together as X surface.

00:02:33.940 --> 00:02:35.844
Now one of the things I could have

00:02:35.844 --> 00:02:37.741
done is I could have jumped from

00:02:37.741 --> 00:02:39.788
this first part to this part and

00:02:39.788 --> 00:02:42.574
if you look at what happened here

00:02:42.574 --> 00:02:46.070
I had the two and the three right.

00:02:46.070 --> 00:02:48.686
So we had a two and a 3.

00:02:48.690 --> 00:02:52.186
And what happens with the two and the

00:02:52.186 --> 00:02:55.629
three to get 5 is I add them right?

00:02:55.630 --> 00:02:59.726
So $2 + 3$ would give me 5.

00:02:59.730 --> 00:03:02.138
So here where I had X^2 rewrote

00:03:02.138 --> 00:03:04.011
the X^2 as $X * X$.

00:03:04.011 --> 00:03:07.204
I rewrote the X^3 as $X * X * X$.

00:03:07.204 --> 00:03:10.580
I counted up how many I had and I got five,

00:03:10.580 --> 00:03:12.316
but a shortcut way to do that would

00:03:12.316 --> 00:03:14.057
have been like to look here and say,

00:03:14.060 --> 00:03:17.485
oh, I have two X is and I have $3X$ is

00:03:17.485 --> 00:03:20.966
and $2 + 3$ gives me 5 and so that is

00:03:20.966 --> 00:03:24.890
our general rule so the the rule right?

00:03:24.890 --> 00:03:27.248
If you're someone who likes to

00:03:27.248 --> 00:03:29.769
memorize rules then the rule says X .

00:03:29.770 --> 00:03:35.430
To the a power Times X to the B power

00:03:35.430 --> 00:03:37.726
all we would do is add them together.

00:03:37.730 --> 00:03:43.050
It's going to become X to the $A+B$ power.

00:03:43.050 --> 00:03:45.310
And that helps us out if we want to do,

00:03:45.310 --> 00:03:45.547
say,

00:03:45.547 --> 00:03:46.969
like bigger examples that you don't

00:03:46.969 --> 00:03:48.468
want to write all of these out.

00:03:48.470 --> 00:03:50.123
So for instance.

00:03:50.123 --> 00:03:53.429
Suppose I wanted to multiply X

00:03:53.430 --> 00:03:57.659
to the 15th times X to the 32nd.

00:03:57.659 --> 00:04:01.112
So those are big powers and I don't

00:04:01.112 --> 00:04:04.362

want to write out here $15X$ is and then

00:04:04.362 --> 00:04:06.948
32 X is and then have to count them up.

00:04:06.950 --> 00:04:09.554
So instead I can use my rule

00:04:09.554 --> 00:04:12.864
which says X to the $15 + 32$,

00:04:12.864 --> 00:04:16.865
which would give me access to the 47th.

00:04:16.865 --> 00:04:19.490
But the important thing to remember is

00:04:19.490 --> 00:04:21.711
that really all that's happening is

00:04:21.711 --> 00:04:24.773
it's saying I have $15X$ is multiplied

00:04:24.773 --> 00:04:27.432
together multiplied by another 32.

00:04:27.432 --> 00:04:28.788
 X is altogether,

00:04:28.788 --> 00:04:31.152
so altogether I have 47.

00:04:31.152 --> 00:04:34.047
 X is multiplied together and that's all

00:04:34.047 --> 00:04:35.940
there is to the product of powers rule.