Sums. The're Math Magic

8 – Sum Indices

Please go through each slide stopping until you have understood the concept described

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Define 2 to the power of 3 = 2^3

Here we call 3 the exponent which indicates the number of times the expression 2 is used as a factor

Try 2 multiplied by itself three times

2 X 2 is 2 multiplied by itself once

So $2^3 = 2 \times 2 \times 2 \times 2 = 16$ is two multiplied by itself three times.

Whoops – this is wrong. We know that $2^3 = 8$

Try 2^0 = two not multiplied by itself which must be 2 and this is also wrong.

So what is the real definition?

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Define 2 to the power of 3 = 2^3

Lets try 2 multiplied (3-1) times by 2

This works.

So the rule might be Y^X = Y multiplied (X-1) times by Y

Now try 2^0

So this would be 2 multiplied (0-1) times by 2

How do I multiply -1 times? I do not know!

So the above rule must be wrong.

So what is the real definition?

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Define 2 to the power of 3

The clue is $2^0 = 1$

In 2^3 we have 2 as the multiplier and 3 as the number of times we must multiply.

We know that $2^3 = 8$

So the question is "What do we have to multiply by 2 three times to get 8?

The answer is 1.

So 2^3 is 1 multiplied three times by 2.

And the general rule is X to the power of Y = X^Y is

X^Y = 1 multiplied Y times by X

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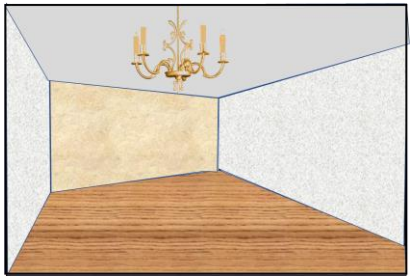
Does the rule work for 2^0

So 2^0 is 1 multiplied no times by 2

If I do not multiply 1 by anything it stays as 1

Yes – the rule works for 2^0



How do you keep warm in a square room?

You go into the corner, where it is always

90 degrees.

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What is $2^2 \times 2^3$

The rule is to add the indices.

$2^2 \times 2^3 = 4 \times 8 = 32 = 2^5 = 2^{(2+3)}$

Does this work for all indices $X^Y \times X^Z$?

X^Y = 1 multiplied Y times by X
and
X^Z= 1 multiplied Z times by X

So $X^Y \times X^Z$ = 1 multiplied Y times by X and then multiplied Z times by X

Logic says that multiplying Y times by X and multiplying Z times by X is the same as multiplying Y+Z times by X

So when multiplying indices you add them.

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Please go to the next lesson.

Handy Multiplication

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