MATHEMATICS · GRADES 7-9

Zero exponents

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you handle a power with an exponent of zero, like knowing that any number raised to zero is one, so you can finish such powers instantly. A zero exponent looks strange, because you are not multiplying the number by itself at all. The rule is simple and always the same, any number raised to zero is one, so there is nothing to work out. Knowing that means a power with a zero exponent never slows you down, in a calculation or on a test.



Rule

Zero exponents: $a^0 = 1$ for any non-zero a.

A power with a zero exponent is always 1, whatever the base.

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Worked examples

EXAMPLE 1

Q What is 5^0?

SOLUTION

This is a zero exponent question, so the one rule to remember is: any nonzero number to the power of zero is 1. The pattern is the proof: keep dividing by 5 and the next step is 1.

The powers of 5 are $5^3 = 125$, $5^2 = 25$, $5^1 = 5$, and each step divides by 5.

One more step down gives $5 \div 5 = 1$, so $5^0 = 1$.

EXAMPLE 2

Q What is $(-4)^0$? What is $(2y)^0$?

SOLUTION

This is the same question type for a negative base and a base with a letter: the rule does not care what the base is, as long as it is not zero.

-4 is a nonzero number, so $(-4)^0 = 1$, and $2y$ is a nonzero base, so $(2y)^0 = 1$.

Both are 1, because the base does not change the answer.

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Practice questions

1 What is 6^0?

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2 What is $5^0 + 5^0$?

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3 What is $(-2)^0$?

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4 What is $9^0 \times 9^1$?

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5 If x is not zero, what number is x^0 equal to?

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6 Work out $(-5)^0 \times (5)^0$

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7 What is $(7y)^0$?

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8 Julie says $8^0 = 0$ and Mike says $8^0 = 1$. Who is right?

A Julie

B Mike

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9

What is 0^0?

A 0

B 1

C Undefined

D Infinity

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10

What is $3^0 \times 4^2$?

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ANSWER KEY

1. 1

2. 2

3. 1

4. 9

5. 1

6. 1

7. 1

8. Mike

9. Undefined

10. 16

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