

Curriculum Outcome

(N1) Demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by: representing repeated multiplication using powers; using patterns to show that a power with an exponent of zero is equal to one; solving problems involving powers.

(N2) Demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole number exponents.

Student Friendly:

"Powers of tens and the ZERO exponent"



Warm Up
Grade 9



Write the following as a repeated multiple and evaluate

1) $-(-7)^5$ 2) (-3^5) 3) -2^6 4) $-(-4)^2(6)^3$

Write as a power then evaluate

1) $(-4)(-4)(4)(4)(-5)(-5)$ 2) $-(3)(3)(-7)(-7)(-7)$

Write as a base of 3

a) 2187



Warm Up
Grade 9



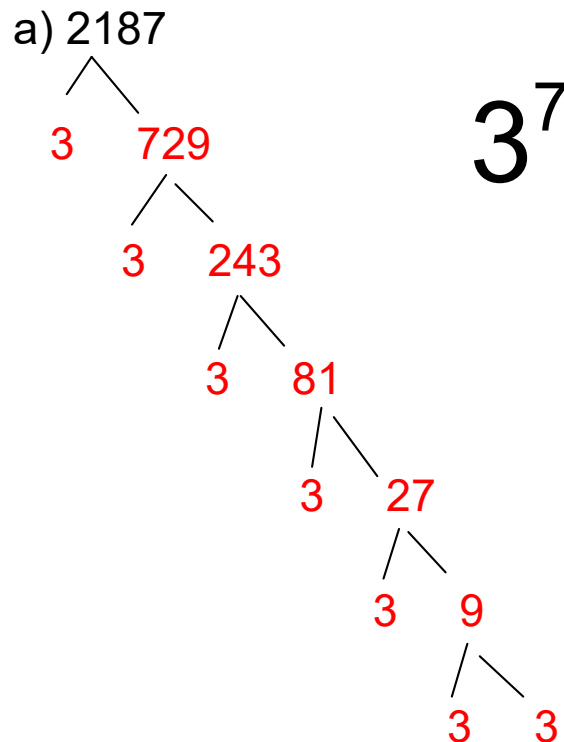
Write the following as a repeated multiple and evaluate


1) $-(-7)^5$ $-(-7)(-7)(-7)(-7)(-7)$ $-(-16807)$ 16807	2) -3^5 $-(3)(3)(3)(3)(3)$ -243	3) -2^6 $-(2)(2)(2)(2)(2)(2)$ -64	4) $-(-4)^2(6)^3$ $-(-4)(-4)(6)(6)(6)$ $-(16)(216)$ -3456
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Write as a power then evaluate

1) $(-4)(-4)(4)(4)(-5)(-5)$ $(-4)^2(4)^2(-5)^2$ $(16)(16)(25)$ 6400	2) $-(3)(3)(-7)(-7)(-7)$ $-(3)^2(-7)^3$ $-(9)(-343)$ $-(-3087)$ 3087
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Write as a base of 3





Section 2.2

Powers of Ten and the Zero Exponent



Avogadro's number = 6.0221415×10^{23}

*

The speed of light = $2.99\ 792\ 458 \times 10^8$ m / s

*

Temperature of the Sun's Core = 1.5×10^7 °C

*

since 15000000 kelvin = 14999726.85 degree Celsius

Light years = 4.96×10^{12} km

Distance related to Powers of 10

<http://vimeo.com/819138>

*

Any number (except 0) with an exponent 0 will equal 1

$$2^0 = 1$$

$$13^0 = 1$$

$$199^0 = 1$$

$$(-6)^0 = 1$$

Why???



Zero Exponent LAW

A power with a base not equal to zero, and an exponent of 0 is equal to 1



Any number raised to the exponent of ZERO is equal to 1

$$x^0 = 1$$

$$2^0 = 1$$

$$-2^0 = -1$$

$$(-2)^0 = 1$$

$$-(-2)^0 = -1$$

Read this number to me

426 .

Four hundred
Twenty
Six

In elementary school you may have expressed it in this form

$$400 + 20 + 6$$

$$4(100) + 2(10) + 6(1)$$
$$(4 \times 10^2) + (2 \times 10^1) + (6 \times 10^0)$$

[Powers of 10]

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Number in Words	Standard Form	Power
One billion	1 000 000 000	10^9
One hundred million	100 000 000	10^8
Ten million	10 000 000	10^7
One million	1 000 000	10^6
One hundred thousand	100 000	10^5
Ten thousand	10 000	10^4
One thousand	1 000	10^3
One hundred	100	10^2
Ten	10	10^1
One	1 =	10^0

[*Image taken from "Math Makes Sense 9",
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Writing Numbers Using Powers of Ten

Standard form

Write 96 713 as a power of 10

10^4 10^3 10^2 10^1 10^0

Expanded form:

$$(9 \times 10000) + (6 \times 1000) + (7 \times 100) + (1 \times 10) + (3 \times 1)$$

Powers of ten form:

$$(9 \times 10^4) + (6 \times 10^3) + (7 \times 10^2) + (1 \times 10^1) + (3 \times 10^0)$$

• **7 605 404** Standard form

$\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow$
 $10^6 \quad 10^5 \quad 10^3 \quad 10^2 \quad 10^1 \quad 10^0$

Write in powers of ten form:

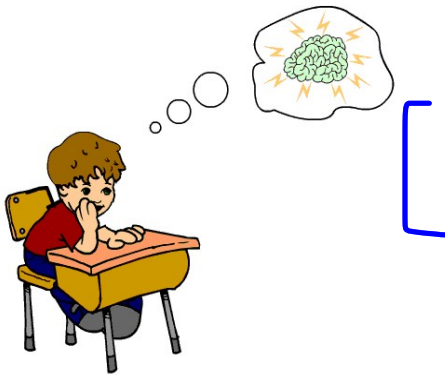
$$(7 \times 10^6) + (6 \times 10^5) + (5 \times 10^3) + (4 \times 10^2) + (4 \times 10^0)$$

$$(5 \times 10^4) + (3 \times 10^2) + (4 \times 10^0)$$

Write in standard form:

$$\begin{array}{cccccc} 10^4 & 10^3 & 10^2 & 10^1 & 10^0 & \\ \underline{5} & \underline{0} & \underline{3} & \underline{0} & \underline{4} & \end{array}$$

PRACTICE TIME



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15,16,17ac,18,20de,21a