



ÁREA DE MATEMÁTICA



Nombre: _____

Fecha: _____

Grado: _____

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POTENCIACIÓN EN Z



CONCEPTO: Es una operación en la que dada una base entera (número entero) y un exponente natural, hallamos un tercero llamado POTENCIA "P".

Así:



El exponente natural "n" indica la cantidad de veces que se repite la base entera "a" como factor, así tenemos:

$$a^n = \underbrace{a \times a \times \dots \times a}_{\text{"n" veces}}$$

Ejemplos:

Efectuar:

- $(+3)^2 = \underbrace{(+3)(+3)}_{2 \text{ veces}} = +9$
- $(+3)^3 = \underbrace{(+3)(+3)(+3)}_{3 \text{ veces}} = +27$
- $(-3)^2 = \underbrace{(-3)(-3)}_{2 \text{ veces}} = +9$
- $(-3)^3 = \underbrace{(-3)(-3)(-3)}_{3 \text{ veces}} = -27$



SIGNOS DE POTENCIACIÓN EN Z

➤ $(+a)^{\text{Par o Impar}} = +P$

- $(+3)^2 = +9$
- $(+2)^3 = +8$

➤ $(-a)^{\text{Par}} = +P$

- $(-3)^2 = +9$
- $(-2)^4 = +16$

➤ $(-a)^{\text{Impar}} = -P$

- $(-3)^3 = -27$
- $(-5)^3 = -125$



¡Ahora Práctica tú!

- | | |
|-------------------------------------|--|
| $(+2)^5 = \underline{\hspace{2cm}}$ | $(-2)^5 = \underline{\hspace{2cm}}$ |
| $(+7)^3 = \underline{\hspace{2cm}}$ | $(-3)^5 = \underline{\hspace{2cm}}$ |
| $(-6)^2 = \underline{\hspace{2cm}}$ | $(-7)^2 = \underline{\hspace{2cm}}$ |
| $(-3)^4 = \underline{\hspace{2cm}}$ | $(-2)^8 = \underline{\hspace{2cm}}$ |
| $(+3)^3 = \underline{\hspace{2cm}}$ | $(-1)^{10} = \underline{\hspace{2cm}}$ |



PRODUCTO DE POTENCIAS DE BASES IGUALES

Observa:

$$a^m \cdot a^n = a^{m+n}$$

- $(+3)^2 (+3)^3 = (+3)^{2+3} = (+3)^5$
- $(-5)^4 (-5)^2 = (-5)^{4+2} = (-5)^6$

Ahora:

- $(-2)^2 (-2)^6 = (-2) = \underline{\hspace{2cm}}$
- $(-6)^2 (-6)^2 = (-6) = \underline{\hspace{2cm}}$
- $(+4)^2 (+4)^3 = (+4) = \underline{\hspace{2cm}}$
- $(-1)^7 (-1)^8 = (-1) = \underline{\hspace{2cm}}$
- $(+2)^4 (+2)^3 = (+2) = \underline{\hspace{2cm}}$
- $(+3)^2 (+3)^2 = (+3) = \underline{\hspace{2cm}}$
- $(-5)^2 (-5)^4 = (-5) = \underline{\hspace{2cm}}$
- $(-7)^2 (-7)^1 = (-7) = \underline{\hspace{2cm}}$
- $(-2)^5 (-2)^3 = (-2) = \underline{\hspace{2cm}}$
- $(+9)^2 (+9)^1 = (+9) = \underline{\hspace{2cm}}$

**COCIENTE DE POTENCIAS DE BASES IGUALES**

Observa:

$$\frac{a^m}{a^n} = a^{m-n}$$

$$\bullet \frac{(-5)^6}{(-5)^2} = (-5)^{6-2} = (-5)^4 = 625$$

Ahora:

$$\bullet \frac{(-3)^5}{(-3)^3} = (-3) = \underline{\hspace{2cm}} \quad \bullet \frac{(-5)^7}{(-5)^5} = (-5) = \underline{\hspace{2cm}}$$

$$\bullet \frac{(+2)^8}{(+2)^7} = (+2) = \underline{\hspace{2cm}} \quad \bullet \frac{(+7)^9}{(+7)^8} = (+7) = \underline{\hspace{2cm}}$$

$$\bullet \frac{(-2)^8}{(-2)^6} = (-2) = \underline{\hspace{2cm}} \quad \bullet \frac{(-15)^6}{(-15)^3} = (-15) = \underline{\hspace{2cm}}$$

$$\bullet \frac{(-30)^8}{(-30)^7} = (-30) = \underline{\hspace{2cm}} \quad \bullet \frac{(+7)^{19}}{(+7)^{17}} = (+7) = \underline{\hspace{2cm}}$$

$$\bullet \frac{(-3)^{20}}{(-3)^{17}} = (-3) = \underline{\hspace{2cm}} \quad \bullet \frac{(-5)^{17}}{(-5)^{14}} = (-5) = \underline{\hspace{2cm}}$$

OBSERVACIÓN:

$$a^m \div a^m = \frac{a^m}{a^m} = a^{m-m} = a^0$$

$$\text{Pero: } \frac{a^m}{a^m} = 1$$

$$\Rightarrow \boxed{a^0 = 1} \quad \text{Potencia de exponente cero.}$$

**POTENCIA DE POTENCIA**

Observa:

$$(a^n)^m = a^{nm} = (a^m)^n$$

$$\bullet [(-5)^3]^2 = (-5)^{3 \cdot 2} = (-5)^6$$

Ahora:

$$1. [(5)^3]^8 = (\quad) = (\quad)$$

$$2. [(11)^7]^9 = (\quad) = (\quad)$$

$$3. [(-3)^{10}]^5 = (\quad) = (\quad)$$

$$4. [(-13)^9]^2 = (\quad) = (\quad)$$

$$5. [(23)^4]^3 = (\quad) = (\quad)$$

$$6. [(3)^4]^5 = (\quad) = (\quad)$$

$$7. [(-2)^3]^6 = (\quad) = (\quad)$$

$$8. [(-7)^5]^3 = (\quad) = (\quad)$$

$$9. [(-7)^3]^3 = (\quad) = (\quad)$$

$$10. [(-5)^2]^4 = (\quad) = (\quad)$$

**POTENCIA DE UN PRODUCTO**

Observa:

$$(a \times c)^n = a^n \times c^n$$

$$\bullet (3 \times 7)^2 = (3)^2 \times (7)^2$$

$$\bullet [(-3)(+5)]^3 = (-3)^3 \times (+5)^3$$

Ahora:

$$1. (-21)^3 = (-3) \times (7)$$

$$2. (-15)^6 = (-3) \times (5)$$

$$3. (-26)^3 = (-2) \times (13)$$

$$4. (39)^{11} = (-3) \times (13)$$

$$5. (-35)^7 = (-5) \times (7)$$

$$6. (30)^6 = (2) \times (3) \times (\quad)$$

$$7. (-33)^3 = (-3) \times (11)$$

$$8. (70)^{11} = (2) \times (\quad) \times (7)$$

$$9. (-42)^3 = (-2) \times (\quad) \times (7)$$

$$10. (-30)^{11} = (-2) \times (\quad) \times (5)$$