

Fractions and Exponents

Why Do We Use Exponents?

- ▶ Mathematically, it's a simpler notation for expressing multiplication.
- ▶ Exponents appear frequently in economics and business!
- ▶ Examples include: compound interest, modeling, and forecasting.

1) Adding and Subtracting Exponents

2) Multiplying Exponents

3) Understanding Negative Exponents

4) The Zero Exponent: a^0

Where a is any real number

Solve the following

Assume a is a real number while b, c are positive integers.

$$5^3 \left(\frac{1}{5}\right)^3$$

$$a^{2b} / a^c =$$

Exponents In Practice

If you save \$1,000 at an interest rate of 12%,
how much would you have in one year?

Exponents In Practice

If you save \$1,000 at an interest rate of 12%,
How much would you have in three years?

Exponents In Practice

You saved some money 8 years ago at an interest rate of 4 percent. Today, it is worth \$50,000. How much savings did you start with?

Exponents In Practice

A blouse is regularly priced at 89.99. The store is offering it a discount of 20%. It is also a long weekend where all store items receive an additional 33% off. The sales tax is 13%. How much does the blouse actually cost?

Some Important Algebra Rules

Let a, b, c be real numbers and let d be a positive integer, then

1. The order of addition does not matter:

$$a + b + c = c + b + a$$

2. The order of multiplication does not matter:

$$ab = ba$$

3. Any real number multiplied by zero is zero:

$$0^d = 0$$

Let a, b, c be real numbers and let d be a positive integer, then

4. Any real number divided by zero is *undefined*:

5. $(a)(b + c) = ab + ac$ Rule 5 has important implications:

A bedsheet has a width of $a + 3$ and a length of $b + 3$. What is the area of the bedsheet?

Write down an algebraic expression that captures the following information and expand it: a sales person covers a region 30 km^2 (kilometers squared) in size. The region is $(3+a)$ km east-to-west and the distance north-to-south is $(8+b)$ km.

east-to-west and north-to-south distances.

Algebraic Expressions

Quadratic Identities

A quadratic expression has no variable with a power higher than 2.

1. $(a + b)^2 =$

2. $(a - b)^2 =$

3. $(a + b)(a - b) =$

Negative Parentheses

$$-(4 - 3 + 5 - 2) =$$

More than 2 Parentheses

$$(2 + 3)(4 + 5)(6 + 7) =$$

$$(a + b)^3 =$$

Factoring

Factor the Following Expressions

$$\frac{108}{12}$$

$$\frac{3^2}{81}$$

Factor the Following Expressions

$$(1 + d)Z + (1 + d)Zd$$

$$2x^{-2} + 4dx^{-3}$$

Factor Using the Identities

$$36a^2 - 1$$

$$4x^2 + 8xy + 4y^2$$

A sales person covers a region 30 km^2 (kilometers squared) in size. The region is $(3+a)$ km east-to-west and the distance north-to-south is $(8-a)$ km. Find the east-to-west and north-to-south distances.

Fractions

Fractions and Exponents: the Foundation to Your Success

Factoring Using with Identities

$$36a^2 - 1$$

$$4x^2 + 8xy + 4y^2$$

Factoring Harder Cases

$$x^2 - 3x - 40$$

$$2x^2 + 2x - 24$$

Fractions

Let a, b, c, d be positive integers (whole numbers).

$$\frac{a}{b}$$

Fractions

Let a, b, c, d be positive integers (whole numbers).

$$\frac{a}{b} \quad \begin{array}{l} \leftarrow \text{numerator} \\ \hline \leftarrow \text{denominator} \end{array}$$

Fractions: Common Denominators

$$\frac{1}{2} + \frac{1}{3} + \frac{1}{6}$$

$$\frac{1}{3} + \frac{1}{4} + \frac{1}{5}$$

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c}$$

Simplifying Fractions

$$\frac{5a^2b^3}{15ab^2c}$$

$$\frac{2a^2 + 2ab}{a^2 - b^2}$$

Word Problem with Fractions

You invest $\frac{1}{4}$ of your wealth in Fund A which contains $\frac{1}{3}$ ESG (Environmental, Social, and Governance) approved assets. The remaining wealth you invest in Fund B which contains $\frac{3}{5}$ ESG approved assets. How much of your wealth is invested in ESG approved assets?

