**Important Factorization Formulas**

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**Introduction**

Hey guys, today I’m going to help you out by introducing a few key factorization formulas. Factorization is the base of algebra, but it can be quite complicated. It is the operation of resolving a quantity into factors, and there are many math problems that require us to factorize a polynomial, which may look similar to this: . In order to factorize these polynomials efficiently and conveniently, it’s necessary to apply specific formulas. But before we talk about the formulas, let’s first start with the definition of these terms.

**Definition of terms**

1. **Polynomial**

A polynomial is an expression consisting of two or more algebraic terms. It usually contains variables, constants, coefficients, exponents, and operation symbols.

1. **Terms**

A term is either a single number, a single variable, or the product of several numbers and variables. Different terms in a polynomial are connected by the four operation symbols.

1. **Exponent**

An exponent is an operation where a number (called the base) is multiplied by itself a certain number of times. For example,  means that the base  is multiplied by itself  times. This is read as “n to the power of m”. Exponents help express repeated multiplication in a concise form.

1. **GCF (Greatest Common Factor)**

GCF is the largest number that can evenly divide two or more numbers. It is often used in the first step of factorization to simplify expressions, making it easier to continue factorizing.

**Formulas**

After learning these basic terms, I’m sure that you are one step closer to understanding factorization. Now, let’s learn the following formulas and steps of factorization:

**Perfect squares:**

**Difference of squares:**

**Perfect cubes:**

**Sum and difference of cubes:**

**Steps of Factorization**

1. Combine like terms.
2. Find the GCF and simplify the terms.
3. Group the terms to make the question ready for factorizing.
4. Apply the appropriate factorization formula to each group.
5. Write the answer in the simplest way.

**Example**

Factorize .

First, we combine the like terms, simplifying the expression to .

Next, we find the GCF, which is 16, giving us .

Then, we apply the difference of squares formula (always be aware of square numbers):

).

We continue using the difference of squares: .

Finally, we apply the difference of squares one more time, checking if any other formulas can be used. The final factorization is .

**Practice Problems to Test Yourself**

（The answers will be revealed in the next article, so please subscribe to our account!）

1. Factorize.
2. Factorize .
3. Factorize .

**Last Article’s Answer**

1) There are 9 letters in total with 2” M” s repeating, so the answer is ways.

2) We first need to choose three people from the 25 people, so it is . Then, we need to choose one person from these three people to be the president and the other two will become the vice-presidents. Thus, the final answer is ways.

3) We first need to choose 3 English books, giving us . Next, we need to choose 4 Math books, giving us . The final answer is then ways.

4) We can list the equation:. Next, we expand it into:

The only possible solution of *n* here is 20.

**重要的因式分解公式**

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**背景介绍**

今天我们将向大家介绍一些重要且关键的因式分解公式。因式分解是代数的基础，但它可能相当复杂。它是将一个总量分解成多个因子的操作，有很多数学问题需要我们分解一个多项式。它或许看起来像这样： 。为了方便地进行因式分解，我们常常使用一些特定的公式。但在讨论公式之前，我们需要先从这些项的定义开始进行了解。

**定义**

1. **多项式**

多项式是由两个或多个代数表达式组成的表达式。它通常包含变量、常数、系数、指数和运算符号。

1. **项**

一个项要么是一个数字，一个变量，或者是数字和变量的乘积。多项式中的不同项由运算符号连接。

1. **指数**

指数是一个数(称为基数)与自身相乘一定次数的运算。例如， 代表了底数n乘以了m次自己。读作“n的m次方”。指数有助于以简洁的形式表达重复的乘法。

1. **GCF (最大公约数)**

最大公约数是能平均除两个及以上的数中的最大数。它通常用于因式分解的第一步，以简化表达式，使其更容易继续分解。

**公式**

在学习了这些基本术语之后，我相信你离理解因式分解又近了一步。接下来我们来学习分解的公式和步骤:

**完全平方公式:**

**平方差公式:**

**完全立方公式:**

**立方和&立方差公式:**

**因式分解的步骤**

1. 合并同类项。
2. 寻找最大公约数 (GCF) 并简化各项。
3. 对各项进行分组，为因式分解做好最后的准备。
4. 对每一组应用合适的因式分解公式。
5. 将答案用最简方式表达出来。

**范例**

因式分解 。

首先，我们合并同类项并简化得到： 。

然后，我们找出最大公约数，也就是16，并得到原式 = 。

接着，我们应用平方差公式 (一定要随时留意平方数):

)。

我们再使用一次平方差公式，得到: 。

最后，我们再应用一次平方差公式，然后检查我们是否可以继续分解。最终分解完的结果就是： 。

**考验自己的小练习：**

（答案将在下一篇文章中公布，所以请关注我们的公众号!）

1. 因式分解。
2. 因式分解 。
3. 因式分解 。

**上期答案**

1) 一共有9个字母，其中有两个“M”, 所以答案是 种方法。

2) 首先，我们需要从25个人中选择三个，所以是 。接下来，我们需要从这三个人中选一位去当主席，而剩下的人则当副主席。因此，答案是 种方法。

3) 我们首先需要选三本英语书，所以我们得到 接下来，我们需要选择四本数学书，得到 。最终的答案就是 种方法。

4) 我们可以列一个方程:，我们需要把它展开为：

我们会发现，n在这里的唯一可能值就是20。