Factorisation Method

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http://waponpoint.com/how-to-use-factorisation-method/

Hello candidates, how are you doing, it's been a while since we've solve any calculations, so I decided we should solve some today, our topic for today on mathematics is how to use factorisation method to solve an expression or let me just say factors.

Factorisation Or Factors

First I will need you to master this simple factors.

{a} ab + ac = a(b+c)
{b} a^2 ? b^2 = (a ? b)(a + b)
{c} a^2 ? 2ab + b^2 = (a ? b)(a ? b)
{d} a^2 + 2ab + b^2 = (a + b)(a + b)
{e} a^2 + b^2 = no factors
{f} a^3 + b^3 = (a + b)(a^2 ? 2ab + b^2)
{g} a^3 ? b^3 = (a ? b)(a^2 + 2ab + b^2)Ok now, let dive into the ocean...

Common Factor

If two terms have the same factor, this is called a **common factor**, that there is a factor common to them.

For example:
{I} ab + ac = a(b +c), that is, **a is common to both of them**. If you open that bracket, you will still get the same thing.

See this one also;
{ii} ax^2 ? a^2x = ax(x ? a)
Open that bracket you will still get the same thing.

Let take one more;

{iii} ab^2c^3 ? a^2bc^2 = abc^2(bc ? a)
And that is how to factorise or let me say how to use factorisation method, look simple right? Lol keep looking, you are not going anywhere right?

We can also use common factors to simplify fractions. And please notice that we have to divide the numerator and the denominator by the common factor.

For example:

{I}

ab ? ac2a + 3a²
The fraction above is the same thing as:

a(b ? c)a(2 + 3a)

(b ? c)(2 + 3a){ii}

2a² + 6ab9ab² + 8a²
The fraction above is also the same thing as:

2a(a + 3b)a(9b² ? 8a)

2(a + 3b)(9b² + 8a)Now let take more examples on this one before we move to difference of two squares.

Examples In Factorisation

Exp 1 : Factorise 4a + 6ab ? 8ab²

Solution

4a + 6ab ? 8ab²

First ask yourself, what are the common factor in this equation?

You can see that we have 3 coefficients (4, 6, 8) which they are all divisible by 2, and we also have **a** common to all the three coefficients, that is, **common factor**
If you agree, then:

4a + 6ab ? 8ab² = 2(2a + 3ab ? 4ab²)
And
2(a + 3ab ? 4ab²) = 2a(2 + 3b ? 4b²)

And that is how to use factorisation method to solve an expression.

Exp 2 : factorise 5h² + 10gh ? 20g²h

Solution

Yes, you have already know the question,
what are the common factor in this equation?

You can see that we have 3 coefficients (5, 10, 20) which they are all divisible by 5, and we also have **h** common to all the three coefficients, that is, **common factor**
If you agree, then:

$5h^2 + 10gh ? 20g^2h = 5(h^2 + 2gh ? 4g^2h)$
And $5(h^2 + 2gh ? 4g^2h) = 5h(h + 2g ? 4g^2)$

Exp 3 : factorise $2c^2d ? 4cd^2$

Solution

What do you do? Yes look for the common factor
The common factor here is **2, c,** & **d**.

$2c^2d ? 4cd^2 = 2(c^2d ? 2cd^2)$
$2(c^2d ? 2cd^2) = 2cd(c ? 2d)$

Now let take the fraction ones:

Exp 4 :

Simplify 4a ? 8b 6a + 18b

Solution

I hope you can still remember how will simplify in fraction,

4a ? 8b6a + 18bAgree that:
4a ? 8b = 2(2a ? 4b) ..... numerator

6a + 18b = 2(3a + 9b) ..... denominator

then,

4a ? 8b6a + 18b=

2(2a ? 4b)2(3a + 9b)I believe you agree the **2** above will cancel the **2** below, then

4a ? 8b6a + 18b=

2a ? 4b3a + 9bThen that is the answer right? **NO!!!!!!**
Why? If you look at the answer, you will see that, it is not a simple factor yet, that is, it can still be simplify.

Note : when factorising or simplifying, **please always make sure that you simplify till the equation**

has no factor anymore that is, cannot be further simplify or factorise.
Meaning that, factorisation and simplification is based on principle of making a complex expression simpler to its lowest or last factor.

Do you know that:

2a ? 4b3a + 9b=

2(a ? 2b)3(a + 3b)Now that is the answer.

Let solve one more on fraction simplification.

Exp 5 :

Simplifyax ? aba² ? ax

Solution

Agree that,
ax ? ab = a(x ? b) ..... numerator
a² ? ax = a(a ? x) ..... denominator

Then the **a** above will cancel the **a** below, then

x ? ba ? xExp 6 :

Simplify ax a² ? ax

Solution

Agree that:
a² ? ax = a(a ? x) ..... denominator

then,

ax a² ? ax= ax a(a ? x)
then the answer becomes

x a ? xExp 7: Factorise ax + ay +az

Solution

ax + ay +az = a(x + y + z)
So simple.

Exp 8: Factorise ab^2c ? abc^2 ?b^2c^2

Solution

ab^2c ? abc^2 ?b^2c^2 = $bc(ab$? ac ? $bc)$

Exp 9: Factorise $4a^2x^2 + 8a^3x^3$

Solution

$4a^2x^2 + 8a^3x^3 = 4a^2x^2(1 + 2ax)$

Let take one more example and then we quickly explain difference of two squares.

Exp 10: Factorise a^2x ? $4ax + 3ax^2$

Solution

a^2x ? $4ax + 3ax^2 = ax(a$? $4 + 3x)$

Now let talk about difference of two squares, what do you know about difference of two squares.

Difference Of Two Squares

The fundamental identity of difference of two squares is:

A^2 ? B^2 = (A + B)(A ? B).

Note : $A^2 + B^2$ = has no rational factors (as I have mention before)

Let take first example on difference of two squares:

Exp 1: Factorise $9a^2$? $16x^2$

Solution

Before I say anything, do you notice or realise that,
$9a^2$? $16x^2$ is in the same pattern as A^2 ? B^2 and A^2 ? B^2 = (A + B)(A ? B)
Meaning that $9a^2$ represents A^2 and $16x^2$ represents B^2.
But there is one thing you should know, that it is all A that is squared and only variable of **9** is squared.
Meaning that, you have to make everything the same, how?

Agree that:
$9a^2 = (3a)^2$ and $16x^2 = (4x)^2$

If you are confused about the expression above just open the bracket.

So our expression $9a^2 ? 16x^2$
Can be written as $(3a)^2 ? (4x^2)$

Now we can now relate it with $A^2 ? B^2$
$A^2 ? B^2 = (3a)^2 ? (4x^2)$
And $A^2 ? B^2 = (A + B)(A ? B)$
just put 3a into where A is, and 4x into where B is, and that's it.

$9a^2 ? 16x^2 = (3a)^2 ? (4x^2) = (3a + 4x)(3a ? 4x)$

If you open that bracket, you will get back the expression. Should we open it? .... No, try and do it yourself, to confirm.

Exp 2: Factorise $(a ? b)^2 ? c^2$

Solution

If you look at that expression, you will see that it is still in the pattern as $A^2 ? B^2$
And $A^2 ? B^2$ is what? Yes $(A + B)(A ? B)$
Please make sure you know that expression very well and the rest?.

So $(a ? b)^2$ represents A and c^2 represents B
You can see that, this one is very simple because we are only dealing with variables no coefficient

As you already know that,
$A^2 ? B^2 = (A + B)(A ? B)$, then,
$(a ? b)^2 ? c^2 = (a ? b + c)(a ? b ? c)$
And that how that goes.

Note : Please don't be deceived by the sign in front of the variables or coefficient, because it is negligible. For example:
$(a ? b)^2 ? c^2$, don't say because there is a minus sign before c^2 so you use the minus sign, don't use it, it is only the variables or the coefficient that you'll deal with.

Exp 3: Factorise $16(a ? b)^2 ? 25(x ? y)^2$

Solution

What can you see comparing the expression $A^2 ? B^2$, you can see that, the expression are not well represented, so,

$16(a ? b)^2 ? 25(x ? y)^2 = [4(a ? b)]^2 ? [5(x ? y)]^2$
Now they are well represented.

$4(a ? b) = A$
$5(x ? y) = B$

And $A^2 ? B^2 = (A + B)(A ? B)$
then
$[4(a ? b)]^2 ? [5(x ? y)]^2 = [4(a ? b) + 5(x ? y)][4(a ? b) ? 5(x ? y).$

Exp 4: Factorise $9 ? 36x^2$

Solution

Looking at the expression above, you see that the expression is factor of 9.

You can write the expression as:
$9 ? 36x^2 = 9(1 ? 4x^2)$
That means we will only need to factorise $(1? 4x^2)$
To make it look like $A^2 ? B^2$
We can say:
$1? 4x^2 = (1)^2 ? (2x)^2$
Now we can now apply the formula
$(1)^2 ? (2x)^2 = (1 + 2x)(1 ? 2x)$

Remember that, we have $9(1 ? 4x^2)$
then our answer becomes:
$9(1 ? 4x^2) = 9[(1)^2 ? (2x)^2] = 9(1 + 2x)(1 ? 2x)$

Exp 5: Factorise $4 ? 25a^2$

Solution

We will do it the same way we did the one above
First we will need to re-write the expression, agree that:
$4 ? 25a^2 = 4(1 ? 5a^2)$
Now we factorise what's inside the bracket.
Here is the deal, what are the factors of $(1 ? 5a^2)$, you will see that apparently, **None**
The point here is that, whenever you see an expression, yes the best method is to first make the expression simpler before factorising, but ones you see that, if you make the expression simpler there won't be any factor please don't, so that you won't end up saying, this expression cannot be factorise.

So what do we do now? We return the expression back to the way it was.
$4(1 ? 5a^2) = 4 ? 25a^2$
Now we have two factors which are 2 and 5
Agree that:
$4 ? 25a^2 = (2)^2 ? (5a)^2$
Now, we relate,

$A^2 ? B^2 = (A + B)(A ? B)$
$(2)^2 ? (5a)^2 = (2 + 5a)(2 ? 5a)$

Exp 6: Factorise $9a^2 ? 4(b ? c)^2$

Solution

$9a^2 ? 4(b ? c)^2 = (3a)^2 ? [2(b ? c)]^2$
$A^2 ? B^2 = (A + B)(A ? B)$
$(3a)^2 ? [2(b ? c)]^2 = [3a + 2(b ? c)][3a ? 2(b ? c)]$
$[3a + 2(b ? c)][3a ? 2(b ? c)] = (3a + 2b ? 2c)(3a ? 2b ? 2c)$.

Let take one more example,

Exp 7: Factorise $108 ? 3x^2$

Solution

Agree that;
$108 ? 3x^2 = 3(36 ? x^2)$
Now we can factorise $(36 ? x^2)$
$(36 ? x^2) = (6)^2 ? (x)^2$
$A^2 ? B^2 = (A + B)(A ? B)$
$(6)^2 ? (x)^2 = (6 + x)(6 ? x)$
$3(36 ? x^2) = 3(6 + x)(6 ? x)$.

Let stop here for today, I think those examples should be enough.

OF COURSE !!!!! am giving you assignment, and trust me I have plenty of them.
So sit back and factorise these expression:

Assignment On Factorisation

1} Factorise $(x + y)^2 ? (xy + 1)^2$

2) Factorise $(R ? 2r)^2 ? r^2$

3) Factorise $49 ? 4x^2$

4) Factorise $a^2 ? 64b^2$

5) Factorise $(a ? b)^2 ? 9(c ? d)^2$

6) Factorise $p^2 ? 49(r ? s)^2$

7) Factorise $1 ? (a ? b)^2$

8) Factorise $16(3a + 2b)^2 ? 25(p + 2q)^2$

9) Factorise $(2a ? b)^2 ? 9(3c ? d)^2$

10) Factorise $7 ? 63x^2$

Submit your answer through the comment box{you have to register before you can write a comment}.
It won't cost you anything to try and solve all those questions in fact it will help you to know where you need improvement.
See you comment gladdens our tutors more than anything, thanks. Don't forget to hit the share button and subscribe to our mailing listing, thank you ones again.
