**Why Learn to Factor?**

Date: 07/08/2002 at 04:20:43

From: Michelle Kelly

Subject: Factoring, special products!

Hello!

I am currently in Algebra 2. The thing is, factoring expressions and

special products are killing my brain cells...

I want to be a fashion designer someday... Will I be needing

factoring?

Date: 07/09/2002 at 16:30:12

From: Doctor Ian

Subject: Re: Factoring, special products!

Hi Michelle,

For fun, you might want to conduct a random survey of adults that

you run into, and ask how many of them ended up doing what they

thought they'd be doing at your age. :^D

If you suspect that you'll probably never have to factor an

equation once you're out of school, you're right. But you're not

being taught factoring so you can use it on a daily basis.

You're being taught factoring - and a lot of other mathematical

techniques - so that you can develop certain habits of thought,

which will make you better at \_anything\_ you might end up doing,

whether it's fashion design, rocket science, or managing the

local McDonald's.

Which habits of thought? The most important one, I think, is the

habit of looking for ways to turn difficult tasks into easy ones

by changing descriptions. That's all that's going on with

factoring, really.

For example, if I give you an equation like

 f(x) = x^2 - 8x + 15

and ask you to draw a graph of the function, you could start

plugging in values of x, and plotting the resulting points on a

graph. How many points would you have to plot? Maybe a few (if

you get lucky in choosing your values of x), maybe a lot (if

you're not so lucky). In any case, it's very straightforward, but

also very tedious and time-consuming.

On the other hand, if you factor the equation to get

 f(x) = (x - 3)(x - 5)

then you can see immediately where the graph crosses the x-axis

(at x=3 and x=5), so you can draw two points with no effort at

all; and if you recognize that this must be the equation of a

parabola, and if you remember that a parabola is symmetric, then

you know that the highest or lowest point must be halfway between

the two points you just drew. So with very little effort, you

can sketch the graph.

Now, how often are you going to do this? Probably if you

\_needed\_ to graph an equation like this, you'd just run a

computer program to do it for you. (However, this doesn't always work.)

But look at it this way. When you were very young, you spent

hours and hours playing with all kinds of toys, e.g., blocks that

you would pound through holes with the same shapes. Were you

preparing to pound blocks through holes on a daily basis as an

adult? Or were you developing a fairly general set of

problem-solving skills that you would someday use on problems

that you couldn't even begin to imagine at that age?

Same thing with math.

- Doctor Ian, The Math Forum

 <http://mathforum.org/dr.math/>

Date: 07/12/2002 at 05:36:01

From: Michelle Kelly

Subject: Factoring, special products!

Hello again!

Another question:

You explained about how factoring affects our life. But that is just

factoring in general.

But our teacher even asked ask to study about all the rules of

factoring. Specifically Rule # 1, which is Common Monomial Factoring

which is what we should check first in an equation.

Let me get to my point: How does Common Monomial Factoring affect or

how is it connected to our real life?

The hardest type of factoring for me is Perfect Square Trinomial

Factoring. How does that affect or get used in our real life?

You did tell me that some techniques in math our teacher taught to us

so that we can develop certain habits. Why do we need to develop

these habits? The computer can do the thinking for us too!

Well... Thanks for the reply!

-Michelle

Date: 07/12/2002 at 10:03:15

From: Doctor Ian

Subject: Re: Factoring, special products!

Hi Michelle,

Suppose you're running a factory. There are a number of workers

who do certain tasks, many of them requiring a particular tool

(e.g., a certain kind of file). Each guy, when he needs a tool,

leaves what he's doing and walks over to the place where they

keep the tools, checks out the tool, walks back to where he's

working, uses the tool, walks back to the place where they keep

the tools, and checks it back in. This can happen several times

a day.

If you're familiar with factoring common monomials, you might

think about this: Is it easier to compute

 3\*19 + 12\*19 + 2\*19 + 5\*19

or

 (3 + 12 + 2 + 5)\*19 ?

It's obvious that it's easier to compute the latter, because it

requires fewer steps. So you might consider, can the underlying

idea be applied to what's happening in the factory? In fact, it

can: You could have each worker check out the tools that he

needs one time, at the beginning of the shift, and check them

back in one time, at the end of the shift.

It's really the same kind of reasoning, except one deals with

mathematical expressions, and the other deals with manufacturing

processes.

Do you \_need\_ to have studied monomial factoring in order to come

up with this solution? Not necessarily. But if you've spent

several years in math classes, learning to look for ways to

eliminate wasted operations, you're much, much more likely to

think to look for a solution in the first place, which is the

first step to finding one.

>The hardest type of factoring for me is Perfect Square Trinomial

>Factoring, How does that affect or used in our real life?

It's really just another variation on the same idea.

>You did tell me that some techniques in math our teacher

>taught to us so that we can develop certain habits. Why do

>we need to develop these habits? The computer can do the

>thinking for us too!

I've spent a large part of my career working in artificial

intelligence, and I can tell you that if you think computers are

going to be able to do your thinking for you anytime soon, you

need to reconsider that notion.

But let me ask you this: If computers \_can\_ do your thinking for

you, why shouldn't someone who's thinking of hiring you for a job

just buy a computer instead?

Michelle, there is no question that you can live a 'real' life

without ever using any of the information that you're learning in

your math classes. You can grow up, get a job that bores you

(because all the thinking that it requires is being done by other

people, leaving you to simply carry out their increasingly

detailed orders), use the money from the job to pay for food,

shelter, and clothing, and spend what's left (if anything \_is\_ left)

on diversions (alcohol, video games, movies, clubs) to help you

forget how much you hate your boring job... Millions of people

do this, and if you want to join them, you're free to do that.

(Or, you might be perfectly happy with a job that never requires

you to think in order to deal with a situation that wasn't

covered during your training. Millions of people do that, too.)

But before you make that decision, you should take the time to

talk to some people who have jobs that require creative thought:

scientists, engineers, architects, designers, computer

programmers, and so on. If you do, what you'll find is that many

of these people \_love\_ what they do, and would probably do it for

free (that is, if they weren't already being paid high salaries).

As the guy in the commercial says, having a job that you love is

like being on vacation every day, and getting paid for it.

For the most part, the more math you learn, the more options you

have, and the greater control you can exercise over your own

life. If that's not important to you, then feel free to dismiss

your math courses as irrelevant and act accordingly. But please

write a letter to yourself now reminding yourself not to complain

later, when you finally realize what a huge mistake that turned

out to be.

- Doctor Ian, The Math Forum

 <http://mathforum.org/dr.math/>