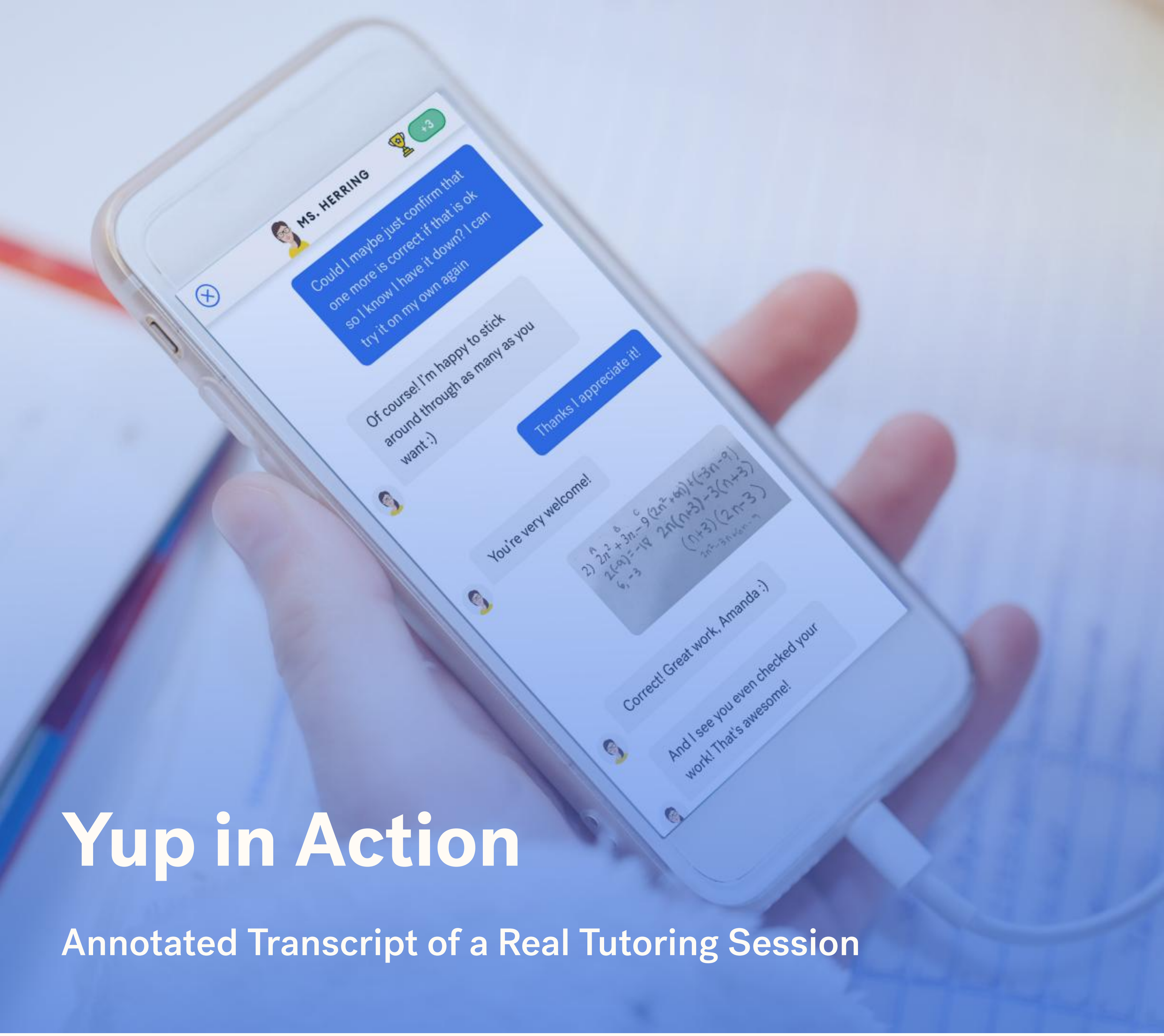


Yup in Action

Annotated Transcript of a Real Tutoring Session

OVERVIEW

Yup tutors help students learn through employing a transferable framework for problem-solving so that they can apply their math skills beyond the coursework at hand. Tutors accomplish this by instilling a UPSCR (Understand, Plan, Solve, Check, and Reflect) routine in students. These steps make sure that students take the time to understand their problem, identify strategies to plan to tackle it, solve it, utilize various methods to check for accuracy, and then reflect on what they've learned.

UNDERSTAND

Student understands what the problem is asking for, important information given, and key concepts necessary for solving.

Awesome! Do you have any ideas for getting started, or not really?

Not really...

No problem! If I asked you to factor something like x^2 - x - 6, would you know how?

I think I have done something similar before but can't quite remember how

No problem! In that case, I won't use the comparison as an example :)

In your problem, do you know how to find the coefficient of the squared term?

Is it 3?

You got it!

How about the coefficient of the term with a variable, that's not squared? That is, the middle term

2?

UNDERSTAND

Tutor starts with broad questions to see what the student already knows.

UNDERSTAND

Tutor asks more narrowly focused questions to dive into more specific topics to determine where the student might have misconceptions.

UNDERSTAND

Tutor asks a more narrow question to see what else the student might have misconceptions on.

PLAN

After identifying an appropriate strategy or concept.

That's correct! Nice work, Amanda :)

Thank you!

Do you have any questions about how we solved this? Do you think you can quickly summarize the main strategies we used?

PLAN
Tutor asks the student to identify the strategy used.

You're doing great, Amanda!

We used the AC method to find numbers that added to -2 and multiplied to -15. We also found the greatest common factor.

PLAN
Student identifies the strategy used in the problem they completed.

Yay, exactly!

SOLVE

Student first completes all steps with tutor support and then independently to demonstrate mastery.

I don't think so. Could I maybe just confirm that one more is correct if that is ok so I know I have it down? I can try it on my own again

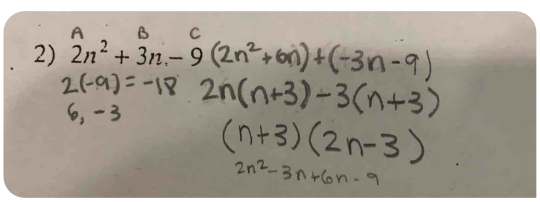
Of course!

Thank u!

I'm happy to stick around through as many as you want :)

Thanks I appreciate it!

You're very welcome!



Checking this now!

Correct! Great work, Amanda :)

SOLVE

Student has reached independent mastery, including proactively checking their answer through an alternative method.

CHECK

Student confirms that their answer fully addresses the problem and uses an alternative method to check the accuracy or reasonableness of their answer.

Ohhh

$(3p-5)(p+1)$

That's spot on, yay! Do you have any ideas for how we can check your great work?

CHECK
Tutor asks the student to use another method to ensure that the answer is correct.

Yay thx! Solve this factored equation to see if it gives us the original?

"Solve" isn't quite the right word here. What operation are we doing?

Multiply?

Terrific! What do we get when we do that?

$3p^2+3p-5p-5$ which then becomes $3p^2-2p-5$!

CHECK
Student verifies that their answer is correct.

That's correct! Nice work, Amanda :)

Thank you!

REFLECT

Student makes connections to other learning.

3n^2-8n+4!

Nice! And was there anything you had to do differently from the last problem? Can you please summarize whatever differences you saw?

REFLECT
Tutor has the student reflect upon connections to other learning.

Instead of just factoring out the variable, there was actually a number as well that was a greatest common factor of the two numbers so I factored out those numbers as well

REFLECT
Student is thinking more flexibly by explaining how the procedure changes when the problem changes.

Excellent! Do you have any questions about any of that?

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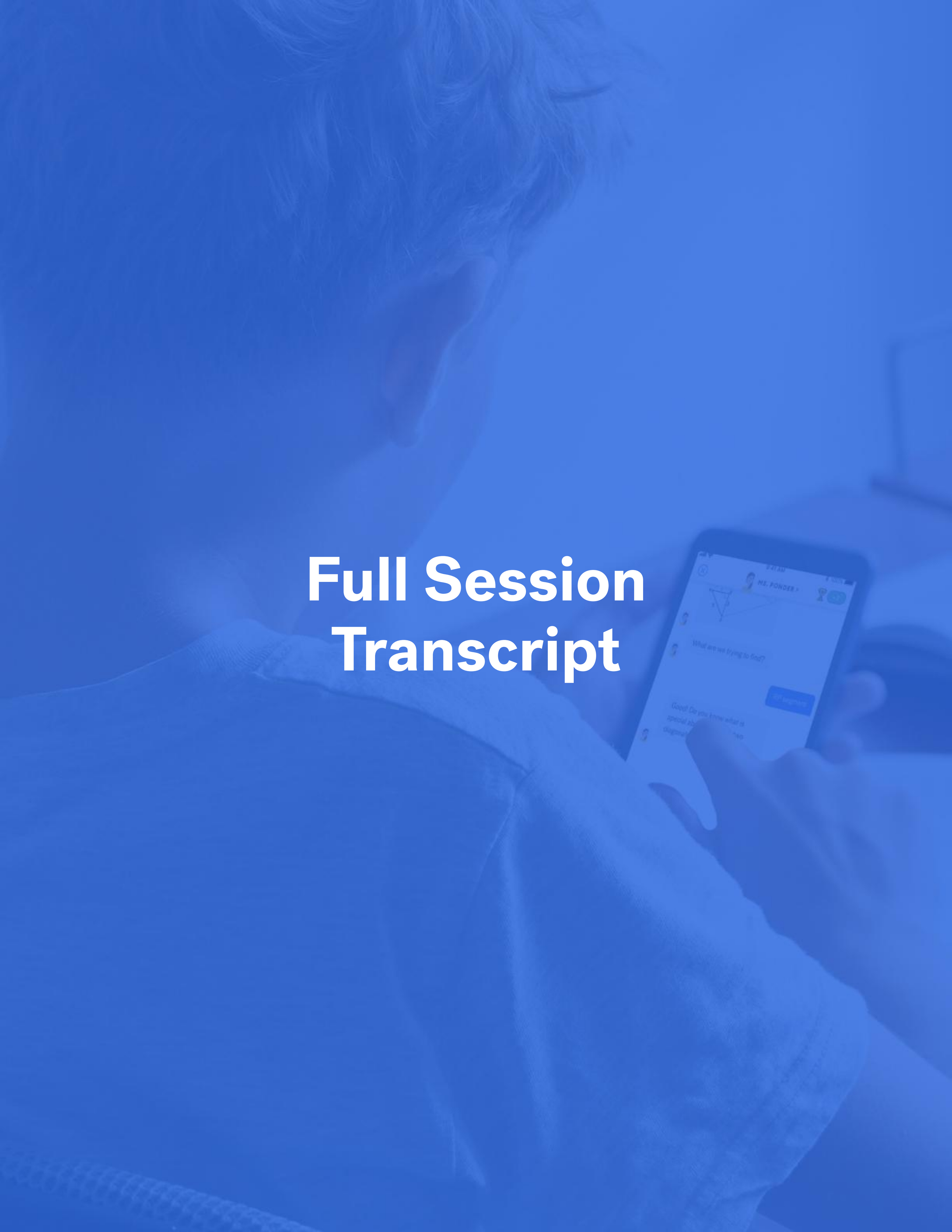
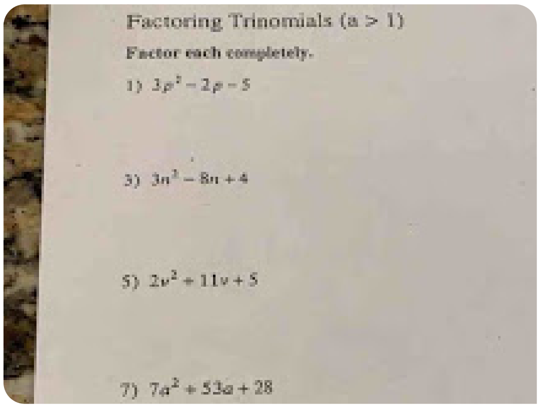


Full Session Transcript


Factoring Trinomials (a > 1)

Factor each completely.

1) $3p^2 - 2p - 5$

3) $3n^2 - 8n + 4$

5) $2v^2 + 11v + 5$

7) $7a^2 + 53a + 28$

Hi Amanda, welcome to Yup! I'm Ms. Herring and I'll be your tutor for this session. How are you today?

Hi! I'm good, how are you?

Quite well, thanks for asking!

Which of these would you like to work on together?

Maybe just a couple of the first numbers until I can get the concept down?

Sounds great! Would you like to start with 1?

Sure!

Awesome! Do you have any ideas for getting started, or not really?

UNDERSTAND

Tutor starts with broad questions to see what the student already knows.

Not really...

No problem! If I asked you to factor something like x^2 - x - 6, would you know how?

UNDERSTAND

Tutor asks more narrowly focused questions to dive into more specific topics to determine where the student might have misconceptions.

I think I have done something similar before but can’t quite remember how

No problem! In that case, I won't use the comparison as an example :)

In your problem, do you know how to find the coefficient of the squared term?

UNDERSTAND

Tutor asks a more narrow question to see what else the student might have misconceptions on.

Is it 3?

You got it!

How about the coefficient of the term with a variable that's not squared? That is, the middle term

2?

Is that positive or negative?

-2 sorry

No problem! How about the term without a variable?

-5?

Exactly!

In problems like this, the 3 is known as A, the -2 is known as B, and the -5 is known as C

UNDERSTAND

Tutor clarifies concepts when necessary. Tutor helps the student connect new knowledge to the problem.

Ok!

This is called the AC method, because we need to multiply A and C together! What is A times C?

-15?

It is! And we'll do that no matter what A and C are

Now we want to find two numbers that add up to B and multiply to the same thing as A*C

Can you think of two numbers that add to -2 and multiply to -15?

-5 and 3?

Those will do for sure!

We'll use those to split up the B term

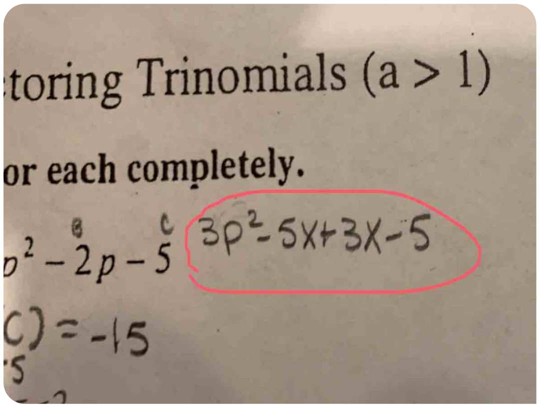
Say if we had x^2 - x - 6, we could split it into x^2 - 3x + 2x - 6

Would you please try splitting the middle term of this problem the same way?

UNDERSTAND
After clarifying a concept, tutor uses a check for understanding to ensure that the student can apply their revised thinking.

Ya!

Super!



UNDERSTAND

Student applies their revised understanding.

That looks great!

-15?

Do you have any ideas for what to do next, or not really?

UNDERSTAND

Tutor cycles back to broad questions in case the student is able to push forward independently. The process of broad, narrow, and CFU (check for understanding) questions repeats throughout the problem.

Not quite

No problem! Have you ever factored anything with 4 terms before?

I don’t think so

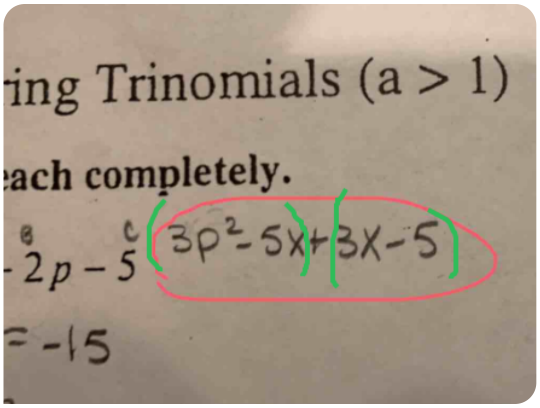
Then just so you know, this trick will work for lots of those problems too!

Ok cool!

What we're about to do now is called factoring by grouping

We'll split these terms up into two groups, and try to pull the greatest common factor out of each group!

Do you know what the greatest common factor is?



Is it -15?

Not quite, so I'll explain!

Oh, I just noticed one quick error! It looks like you accidentally split -2p into -5x + 3x. What should that be instead of x?

Oh whoops! -5p and -3p

-3p?

*3p

You got it!

And it sounds like you caught your own error - that's amazing!

Thx!

UNDERSTAND

Tutor again asks narrow questions to uncover a misconception.

The greatest common factor is the biggest thing that we can pull out of both terms in a group. So if we had 3x^2 + 6x, we could pull out 3x from both terms!

UNDERSTAND

Tutor clarifies another concept.

What if we had 7y^2 + 49y?

UNDERSTAND

Tutor checks for understanding.

7?

Just 7, or can we pull out a variable too?

7y?

You got it!

Finding the greatest common factors (GCF) of each group here will be a little harder, but I know you can do it!

What is the greatest common factor of 3p^2 and -5p?

Is it 15?

Ooh, I think you're thinking of the least common multiple, actually

The smallest number that's divisible by both 3 and -5?

Ohhh

Does that clarify things a bit?

The good news here is that you apparently know how to find the least common multiple, which is excellent!

I think so? Would the greatest common factor be a whole number?

Is there a number that we can factor out of both 3p^2 and -5p? Or maybe a variable?

P is common variable

But I’m not sure about a number

Great! Would you please factor p out of both?

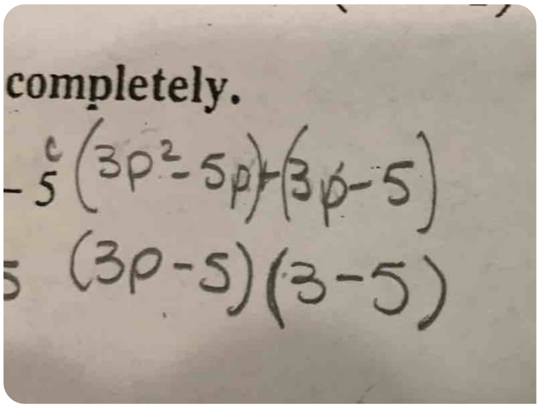
Sure!

And actually, 3 and -5 are both prime, so we can't factor anything out besides p

We could say 1p instead of p (that might be useful information later)

Ohh ok that makes sense :)

Awesome!



Oh! It looks like you factored it out of 3p^2 - 5p, but also out of 3p too

Oh do I only do it on the left where it is squared?

Not where it's squared, but we're looking at each group separately right now

Oh ok👍

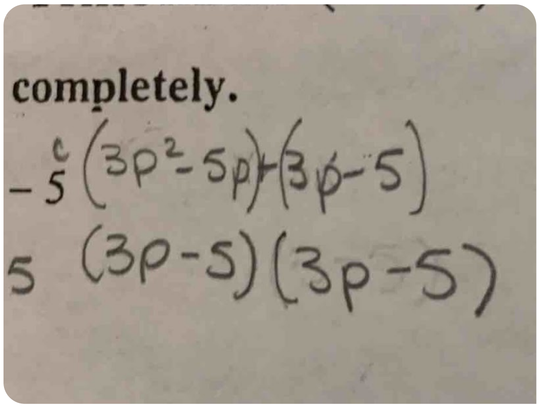
That may seem weird for the moment, but I expect it to make sense why shortly!

If it doesn't make sense by the end of the problem, would you please let me know so I can explain more?

Yes for sure!

Thank you!

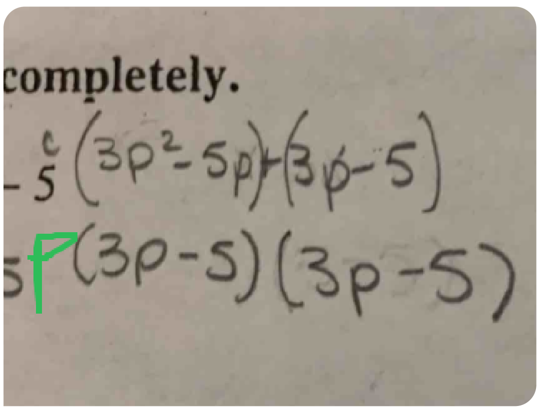
Please let me know when you've factored p out of just the first pair of terms :)



UNDERSTAND

Student applies their revised understanding of the concept to the problem.

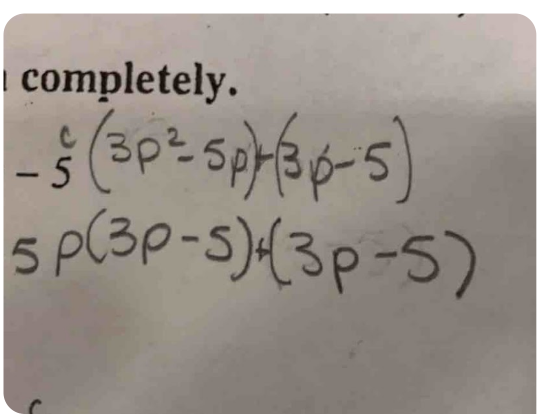
Nice! So that spare p that we just factored out, we'll write beside it



And would you please keep the plus sign between the groups?

Ya!

Thank you!



That looks great!

Is there any greatest common factor we can pull out of the second group, or should we just pull out a factor of 1?

Just 1?

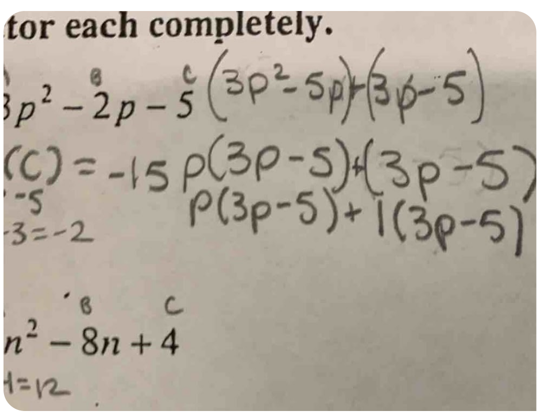
Yes!

Would you please write that out front of that group, like you did the p?

Ya!

Excellent!

Any ideas what to do next, or not really? We're on the home stretch!



UNDERSTAND

Student understands key concepts necessary for solving.

That's looking great!

Do I multiply the parentheses and then add?

Actually, that would undo all the hard work you just did!

Oh I see!

That said, maybe keep that in mind for later, when I ask you about checking your work

Do we have the same thing in each set of parentheses?

Ya

Yay, that's a good clue we did it right!

The thing that's in both sets of parentheses will be one of our factors. What is it?

Yay!

P?

Actually, the whole thing in the parentheses!

Ohhh (3p-5)

By the way, if you ever do a problem like this and have the parentheses not match, it's time to go back and check what you did earlier

(3p-5) it is!

What's left over after we take both copies of that away?

P and 1?

P+1

Wonderful! Care to hazard a guess as to what our second factor is?

(P+1)

Excellent! What is the factored form of the entire original problem?

(3p-5)+(p+1)

Hmm, why are we adding them together?

Ohhh

(3p-5)(p+1)

SOLVE
Student has completed all steps to solve the problem.

That's spot on, yay! Do you have any ideas for how we can check your great work?

CHECK
Tutor asks the student to use another method to ensure that the answer is correct.

Yay thx! Solve this factored equation to see if it gives us the original?

"Solve" isn't quite the right word here. What operation are we doing?

Multiply?

Terrific! What do we get when we do that?

3p^2+3p-5p-5 which then becomes
3p^2-2p-5!

CHECK
Student verifies that their answer is correct.

That's correct! Nice work, Amanda :)

Thank you!

Do you have any questions about how we solved this? Do you think you can quickly summarize the main strategies we used?

PLAN
Tutor asks the student to summarize the strategies.

You're doing great, Amanda!

We used the AC method to find numbers that added to -2 and multiplied to -15. We also found the greatest common factor.

PLAN
Student identifies the strategies used.

Which part would you say was most confusing to you and how did you overcome it?

REFLECT
Tutor asks the student to reflect on the most important thing she learned.

I think I just didn't know how to factor before, but now, I can use the AC method to figure out how to split the middle term and then finish factoring by the GCF.

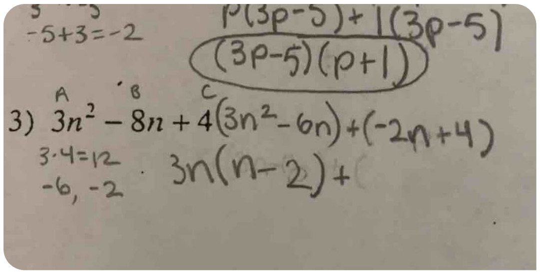
REFLECT
Student reflects on the main things she learned in the session.

Awesome summary! Want to try another one to make sure you got it down?

SOLVE
Tutor asks the student to try another problem to promote independent mastery.

I will start #3 now!

I'm so glad you're trying it on your own - that's great!



I got this far...does it look right so far? And then would a greatest common factor of the right be 2?

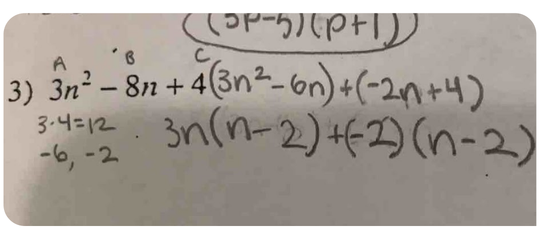
It's looking great so far!

For the greatest common factor, when the first term in the group has a negative sign, we usually want to try to factor out a negative number

Would you please try pulling out -2 instead?

Ya!

Awesome!



Like this?

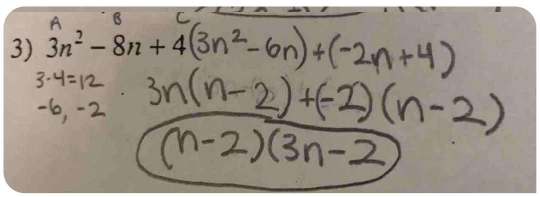
Exactly like that!

Ok thx!

We could write the + (-2) as -2, but there's absolutely no need to do that

Ohh ok

It'll work out either way!



How does this look?

That's looking amazing! How would you check your work?

Thx! Multiply?

Yes!

3n^2-8n+4!

Nice! And was there anything you had to do differently from the last problem? Can you please summarize whatever differences you saw?

REFLECT

Tutor has the student reflect upon connections to other learning.

Instead of just factoring out the variable, there was actually a number as well that was a greatest common factor of the two numbers so I factored out those numbers as well

REFLECT

Student is thinking more flexibly by explaining how the procedure changes when the problem changes.

Excellent! Do you have any questions about any of that?

I don’t think so. Could I maybe just confirm that one more is correct if that is ok so I know I have it down? I can try it on my own again

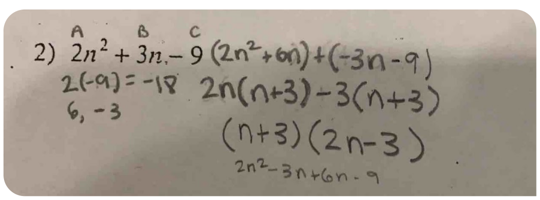
Of course!

Thank u!

I'm happy to stick around through as many as you want :)

Thanks I appreciate it!

You're very welcome!



SOLVE

Student has reached independent mastery, including proactively checking their answer through an alternative method.

Checking this now!

Correct! Great work, Amanda :)

And I see you even checked your work! That's awesome!

Thank you!

Was anything different about this one?

I had to factor out numbers and variables so it was very similar to #3!

Cool! And anything you weren't sure about?

I think I got it now!

That's wonderful! Your hard work paid off!

Thanks!

Absolutely! Are there any others you'd like to try with me here?

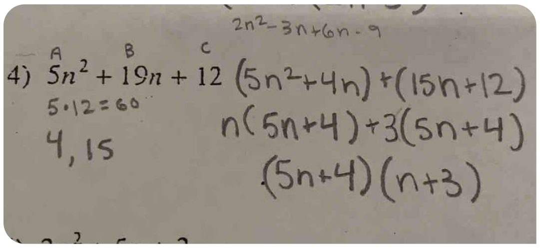
Maybe just one more that I've already started on? Just to check?

Sounds good!

Thx!

Sure! You're doing great, Amanda!

Thx!



Checking this now!

Yay, that looks awesome!

Yet another correct one :)

Ok thx!

Sure! Seems like you're on a roll!

Ya thank you for your help! I think I am ready to continue on my own!

That's wonderful! In that case, feel free to stop by again whenever you're stuck on something, and for now I hope you have a wonderful day!

Ok thank you so much! You too :)