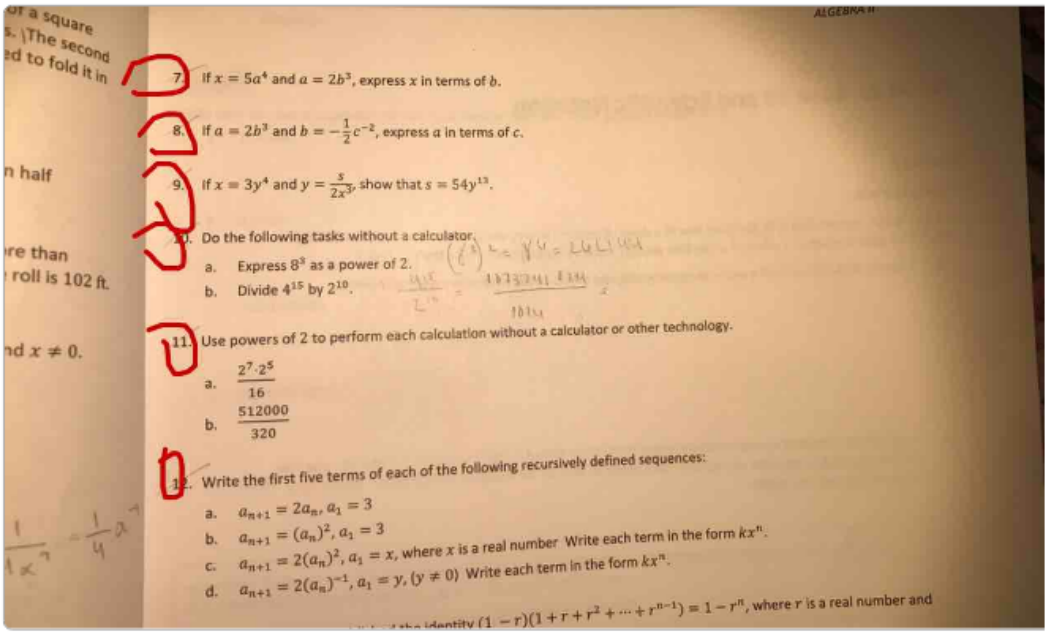


ALGEBRA II

7. If $x = 5a^4$ and $a = 2b^3$, express x in terms of b.

8. If $a = 2b^3$ and $b = -\frac{1}{2}c^{-2}$, express a in terms of c.

9. If $x = 3y^4$ and $y = \frac{s}{2x^3}$, show that $s = 54y^{13}$.

10. Do the following tasks without a calculator.
   a. Express 8^3 as a power of 2.
   b. Divide 4^{15} by 2^{10}.

11. Use powers of 2 to perform each calculation without a calculator or other technology.
   a. $\frac{2^7 \cdot 2^5}{16}$
   b. $\frac{512000}{320}$

12. Write the first five terms of each of the following recursively defined sequences:
   a. $a_{n+1} = 2a_n, a_1 = 3$
   b. $a_{n+1} = (a_n)^2, a_1 = 3$
   c. $a_{n+1} = 2(a_n)^2, a_1 = x$, where x is a real number Write each term in the form kx^n.
   d. $a_{n+1} = 2(a_n)^{-1}, a_1 = y, (y \neq 0)$ Write each term in the form kx^n.

May 11th 4:38:49 am

Hi natalia, welcome to Yup 😃. I'm finding you a tutor now.

May 11th 4:38:51 am

I'm here to help you prepare for your tutoring session. You can talk to me by tapping the orange button that appears at the bottom 👇

May 11th 4:38:53 am

TUTOR FOUND, NOW REVIEWING PROBLEM AT NO CHARGE

May 11th 4:38:53 am

SESSION STARTED AT 11:39 PM

May 11th 4:39:16 am

Hi Natalia. It's great to see you here once again!

May 11th 4:39:28 am ✓ ***Introduction: Builds rapport with warm greeting***

How are you?

May 11th 4:39:31 am

Hey! Im good!

May 11th 4:39:39 am

Great!

May 11th 4:39:44 am

Which of these problems would you like us to go through first?

May 11th 4:39:53 am ✓ ***A1: Confirms student's problem***

#7

May 11th 4:40:02 am

Ok. Can you show me what you have tried with it?

May 11th 4:40:14 am ✓ ***A1: Determine the student's progress***

I know we have to substitute I think but im not sure where. All the variables are confusing

May 11th 4:41:11 am

That is true. But you are right about substitution.

May 11th 4:41:29 am ✓ ***C1: Tutor is attentive to student's message***

Let me help you figure it out.

May 11th 4:41:36 am ✓ ***C2: Reassuring language***

Okay

May 11th 4:41:48 am

Which variable is common in both equations?

May 11th 4:41:55 am ✓ ***C3: Guiding question***

A

May 11th 4:42:05 am

Right. And we want to get x and b together, right?

May 11th 4:42:12 am ✓ ***C3: Guiding question***

Yeah

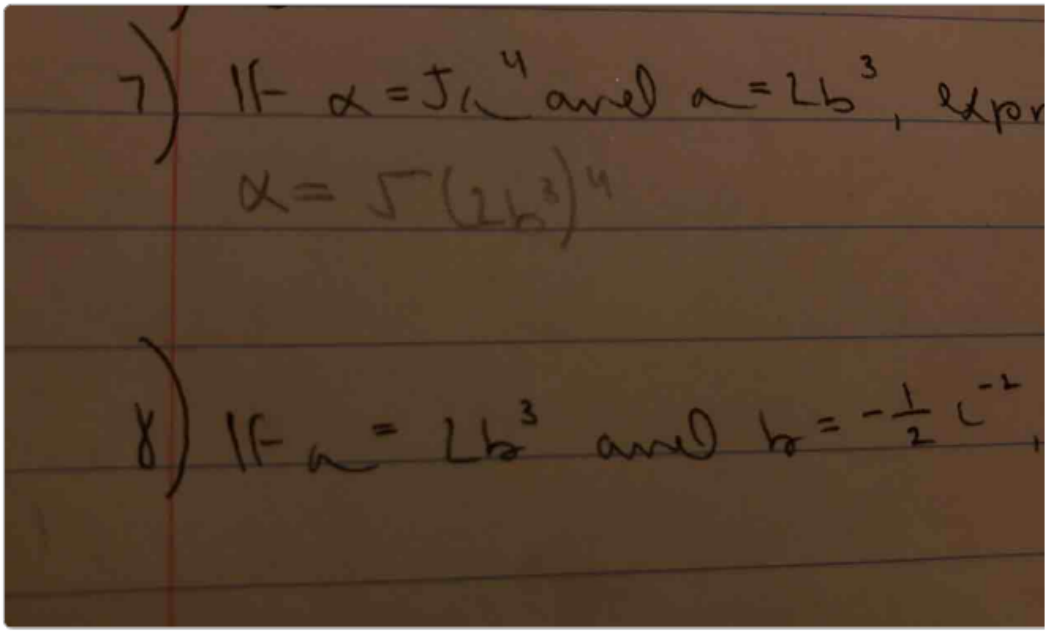
May 11th 4:42:22 am

Well, if we want x and b together and we don't need a, which do you think we should substitute?

May 11th 4:42:45 am ✓ ***C3: Invite student input***

Think about which one can be gotten rid of.

May 11th 4:43:11 am ✓ ***B2: Guides their thinking, but without giving to much away***



✓ *C2: Motivates student with encouraging language* May 11th 4:43:58 am

That was absolutely awesome!

May 11th 4:44:18 am

I always love working with you!

May 11th 4:44:23 am

You are a good thinker. :)

May 11th 4:44:32 am

Thanks :)

May 11th 4:44:37 am

You are welcome.

May 11th 4:44:40 am

So, all you have left to do is simplify that as much as possible.

May 11th 4:44:59 am ✓ *B2: Explain rationale behind step*

Be careful with the exponents.

May 11th 4:45:23 am

If you aren't sure you can multiply 4 times or something similar.

May 11th 4:45:38 am

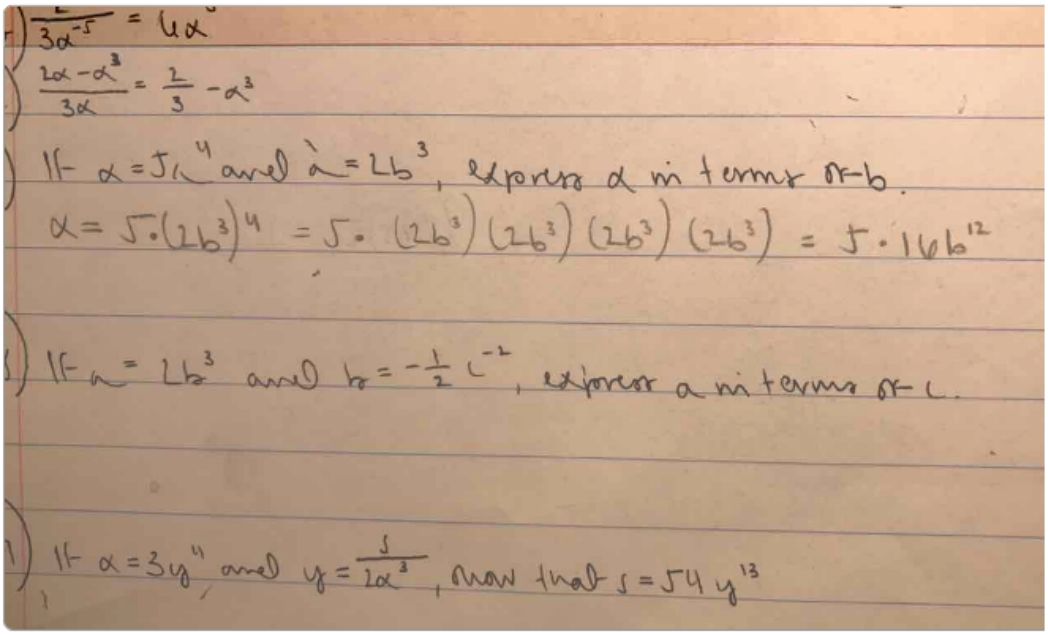
✓ *B2: Clarifies step further*

Oh i get what you mean

May 11th 4:46:12 am

:)

May 11th 4:46:16 am



May 11th 4:47:27 am

Looking great so far!!

May 11th 4:47:46 am ✓ *C2: Encouraging language*

Cool!

May 11th 4:48:00 am

So, what is our final answer?

May 11th 4:48:09 am ✓ *C3: Invite student to solve independently*

80b^12?

May 11th 4:48:32 am

You got it!!!

May 11th 4:48:38 am ✓ *C2: Positive language*

Nice work!!

May 11th 4:48:40 am

Do you see the other way you could have used to get b^12?

May 11th 4:48:54 am ✓ *C3: Invites student to reflect on the underlying concept*

Yeah I couldve applied the exponent to the exponent and the base in the parentheses.

May 11th 4:50:16 am

May 11th 4:50:16 am

Correct!

May 11th 4:50:24 am

Just multiplying exponents

May 11th 4:50:35 am ✓ *B2: Clarifies underlying concept*

Yeah

May 11th 4:50:40 am

Law	Example
$x^0 = 1$	$3^0 = 1$
$x^1 = x$	$9^1 = 9$
$x^a x^b = x^{a+b}$	$x^3 x^5 = x^8$
$x^a / x^b = x^{a-b}$	$x^{11} / x^4 = x^7$
$(x^a)^b = x^{ab}$	$(x^5)^3 = x^{15}$
$(xy)^a = x^a y^a$	$(xy)^4 = x^4 y^4$
$(x/y)^a = x^a / y^a$	$(x/y)^6 = x^6 / y^6$
$x^{-1} = 1/x$	$3^{-1} = 1/3$
$x^{-a} = 1/x^a$	$9^{-2} = 1/81$
$x^{1/n} = \sqrt[n]{x}$	$x^{1/3} = \sqrt[3]{x}$
$x^{m/n} = \sqrt[n]{x^m} = (\sqrt[n]{x})^m$	$x^{9/2} = \sqrt{x^9} = (\sqrt{x})^9$

May 11th 4:50:41 am ✓ *B2: Uploads helpful information to supplement explanation*

Like the fifth rule in that table.

May 11th 4:50:58 am

Makes sense?

May 11th 4:51:18 am ✓ *C1: Check with the student to ensure understanding*

Yeah!

May 11th 4:51:24 am

Wonderful!

May 11th 4:51:30 am ✓ *C2: Positive language*

Are you ready for number 8?

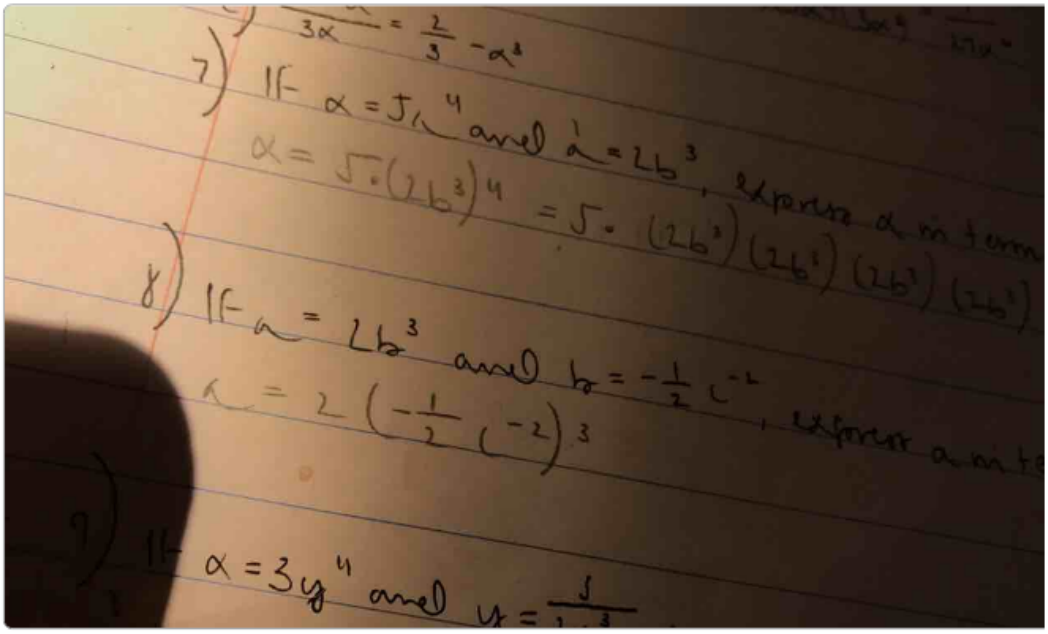
May 11th 4:51:34 am ✓ *C1: Confirms student is ready to move on*

yeah im ready

May 11th 4:52:01 am

Great! Any ideas about what to do here?

May 11th 4:52:11 am ✓ *A1: Determine student's level of understanding*



May 11th 4:52:55 am

Excellent start! You got the first step done correctly!

May 11th 4:53:18 am ✓ *C2: Reassuring language*

Then I apply the exponent, yeah?

May 11th 4:54:05 am

Correct!

May 11th 4:54:11 am

And remember it applies to the number as well. (-1/2)

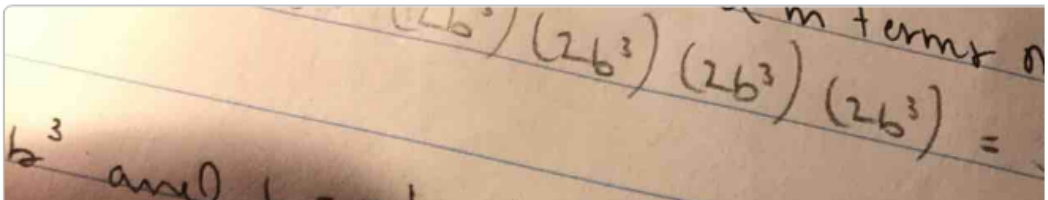
May 11th 4:54:23 am ✓ *B2: Tutor builds on student's thoughts*

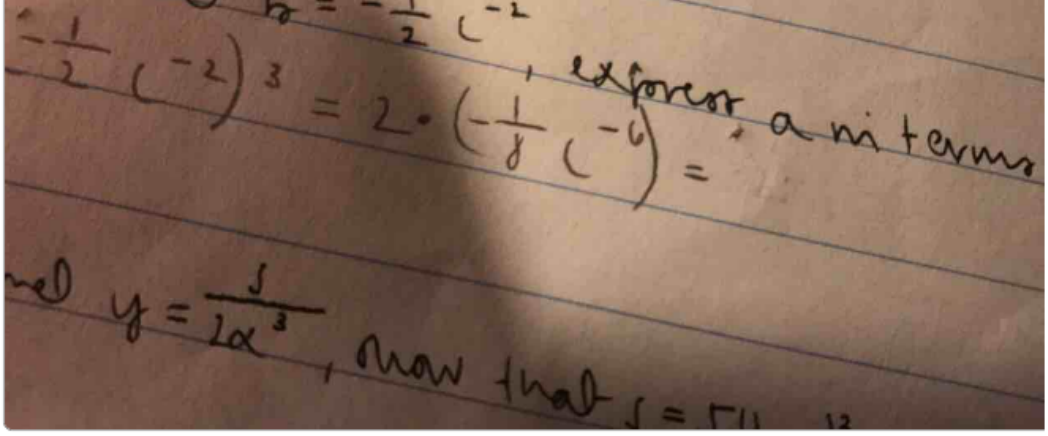
yeah

May 11th 4:54:48 am

Ok. Go ahead and try it.

May 11th 4:54:54 am ✓ *C3: Invite student to proceed independently*





May 11th 4:55:31 am

Oh my! You are doing so well!!

May 11th 4:55:54 am ✓ *C2: Positive language*

Did you simplify it all the way?

May 11th 4:56:58 am ✓ *C3: Guiding question*

Also this has a negative exponent so its going to be a fraction. Im not sure how thats supposed to look like with this

May 11th 4:57:27 am

Ok. So, you would like to apply the rule for the negative exponent?

May 11th 4:57:52 am ✓ *C3: Encourages student to continue solving independently*

Yeah but im not sure how itd look like for this term

May 11th 4:58:21 am

In the rules I sent you, have a look at the third one from the bottom.

May 11th 4:58:31 am

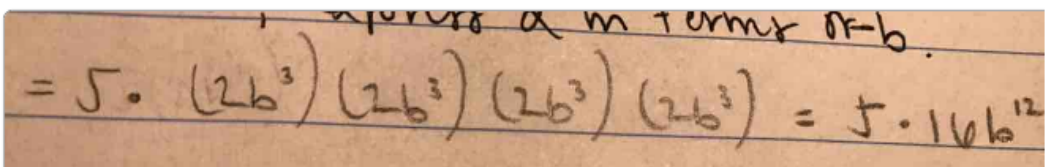
Note: Ideally the tutor would have shared the image again here.

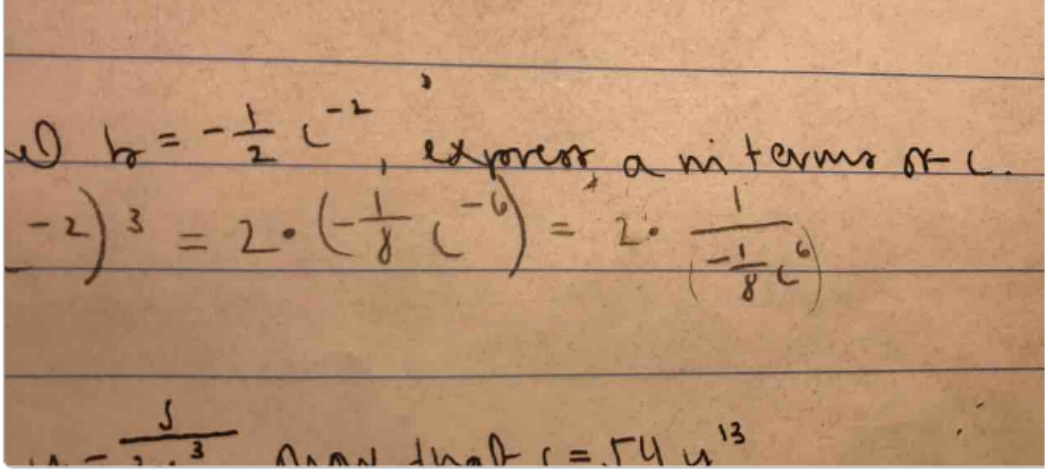
Okay

May 11th 4:58:53 am

You can let me know if you understand it.

May 11th 4:59:01 am ✓ *C1: Checks with the student to ensure understanding*





May 11th 5:00:14 am

Oops. Not quite, but that was a good attempt.

May 11th 5:00:33 am ✓ ***C2: Acknowledge student's mistake without causing stress***

I'll show you an example that can help.

May 11th 5:00:43 am ✓ ***C1: Adapts explanation to student's confusion***

Since we know that x^-a means 1 over x^a, have a look at this:

May 11th 5:01:04 am ✓ ***B2: Tutor uses example to to clarify concept***

$$\frac{1}{4}y^{-3}$$

$$= \frac{1}{4} \cdot \frac{1}{y^3}$$

May 11th 5:01:09 am

Do you notice I moved y to the denominator and changed the sign for the exponent?

May 11th 5:01:52 am ✓ ***B2: Clarifies example***

Yeah

May 11th 5:02:04 am

$$\frac{1}{4}y^{-3}$$

$$= \frac{1}{4} \cdot \frac{1}{y^3}$$

$$= \frac{1}{4y^3}$$

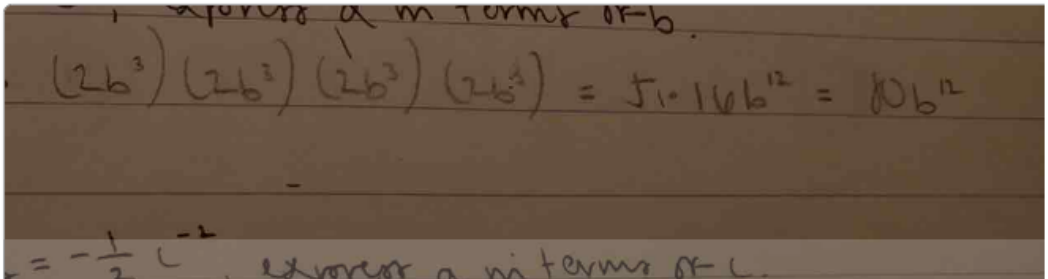
May 11th 5:02:07 am

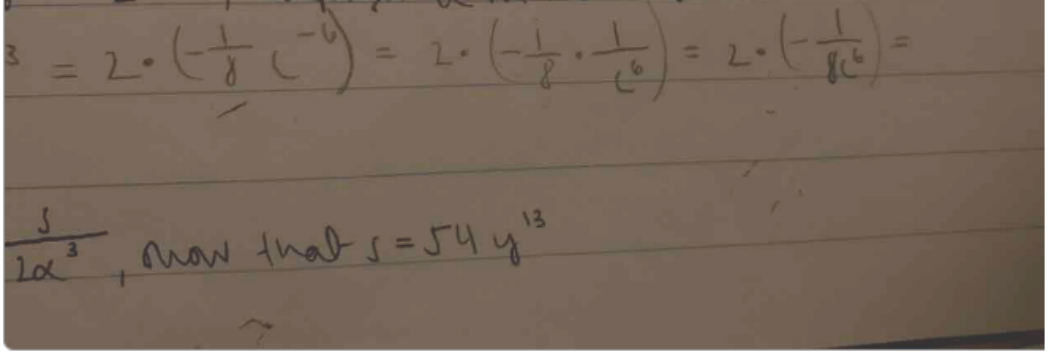
That is how the rule can be applied.

May 11th 5:02:18 am

Change the sign of the exponent and move the variable up or down depending on where it is.

May 11th 5:02:37 am ✓ ***B2/C1: Tutor clarifies key information to ensure they are on the same page***





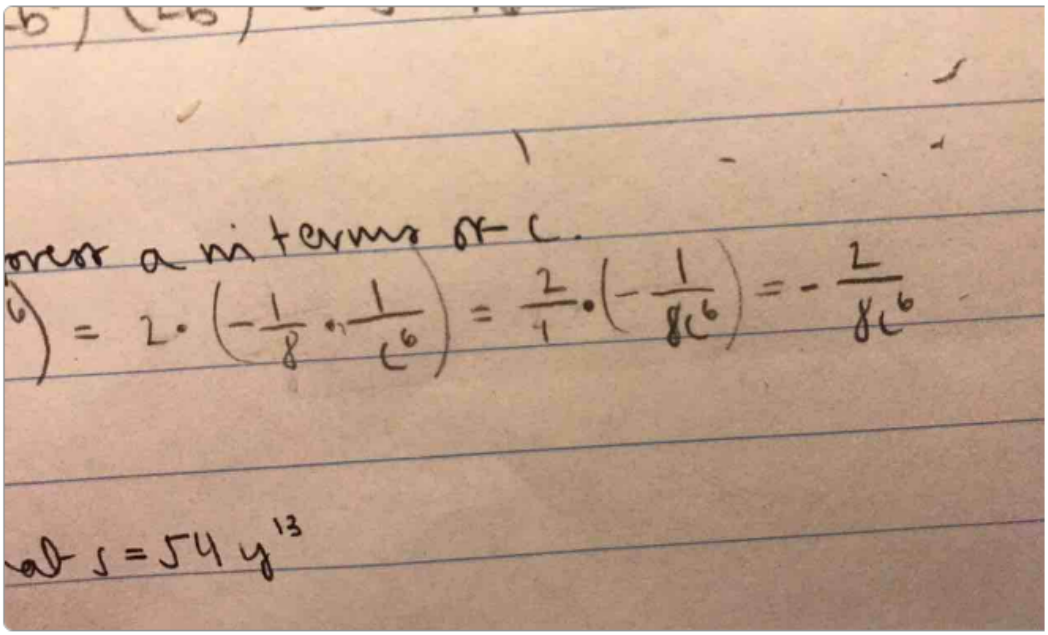
May 11th 5:03:08 am

There you go!!

May 11th 5:03:25 am ✓ *C2: Positive language*

Now you can just multiply to finish it.

May 11th 5:03:41 am ✓ *B2: Guides student towards next step*



May 11th 5:04:12 am

I can reduce this to ¼, yeah?

May 11th 5:04:28 am

Correct!

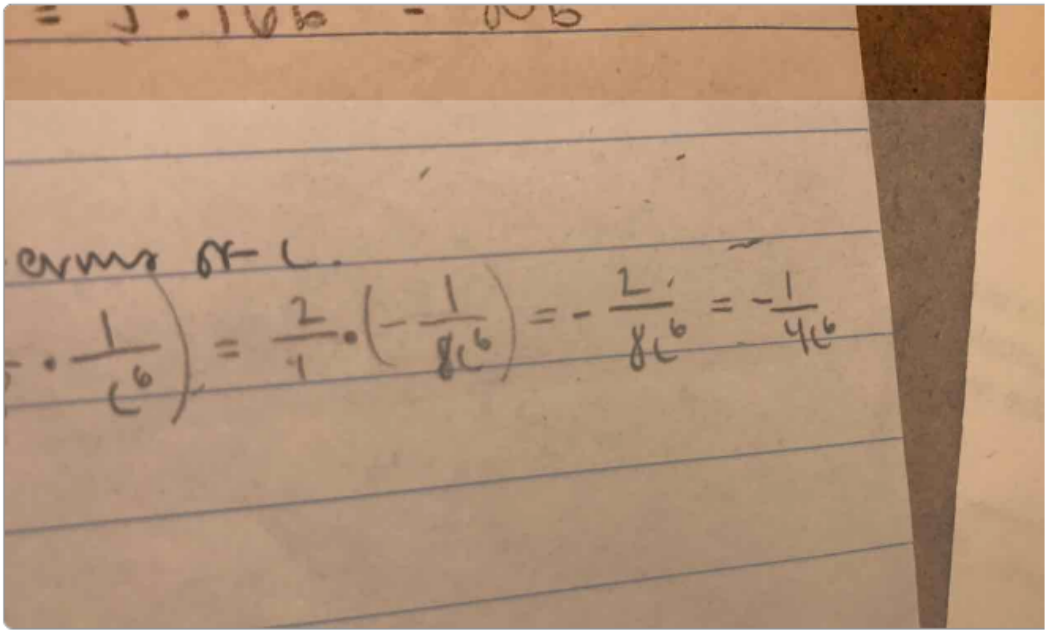
May 11th 5:04:30 am

Great!

May 11th 5:05:27 am

So, what is your final result?

May 11th 5:05:35 am ✓ *C3: Invites student to finish solving independently*



May 11th 5:05:51 am

Brilliant!!

May 11th 5:06:01 am ✓ *C2: Positive language / punctuation*

I'm so sorry Natalia. But would you mind starting a new session for your next problem? It's past the end of my tutoring shift and I need to leave now, but another tutor would be more than happy to help you further.

May 11th 5:06:25 am ✓ *Tutor waits until the end of the solution to end shift*

Ah its okay. Thank you for helping me!

May 11th 5:06:58 am

Please keep up the great work!
I wish you had come earlier. :)

May 11th 5:07:00 am ✓ *C2: Praises student for their work*

You are welcome. :)

May 11th 5:07:04 am

Did you understand all we did?

May 11th 5:07:59 am ✓ ***Tutor checks to make sure the session was clear***

Next time :) hope to come across you again soon!

May 11th 5:07:59 am

And yeah i do

May 11th 5:08:06 am

I sure hope so too!! Always a pleasure working with you.

May 11th 5:08:14 am ✓ ***Conclusion: Warm send off***

Student ended session

May 11th 5:08:20 am