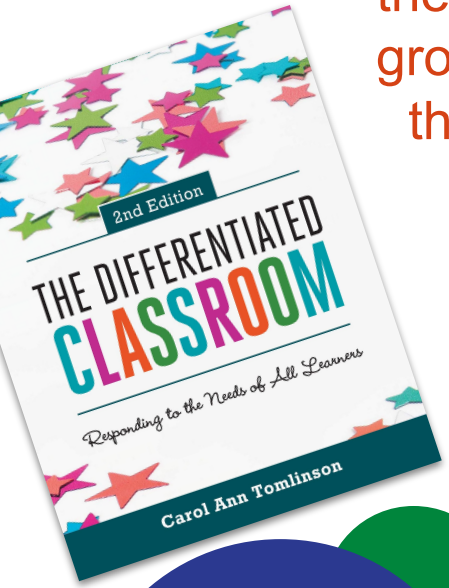
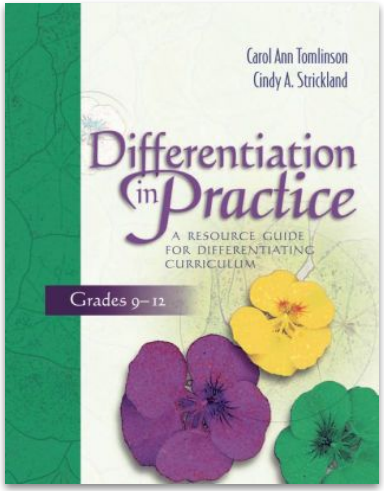
Differentiating Calculator Activities for ALL Learners

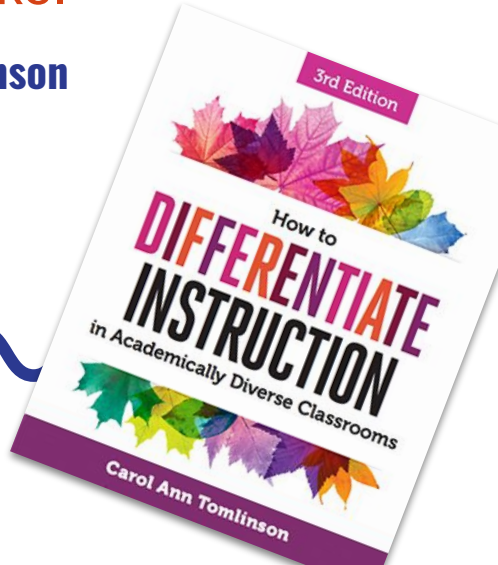
Julie Frizzell

“**Differentiation** is simply a teacher attending to the learning needs of a particular student or small group of students, rather than teaching a class as though all individuals in it were basically alike.”

— Carol Ann Tomlinson







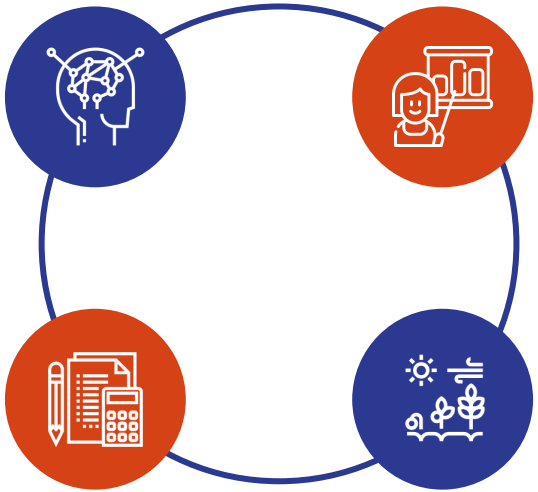
Differentiation

Process

How students acquire information

Product

How students demonstrate learning



Content

What is to be learned

Environment

Where and with whom students learn

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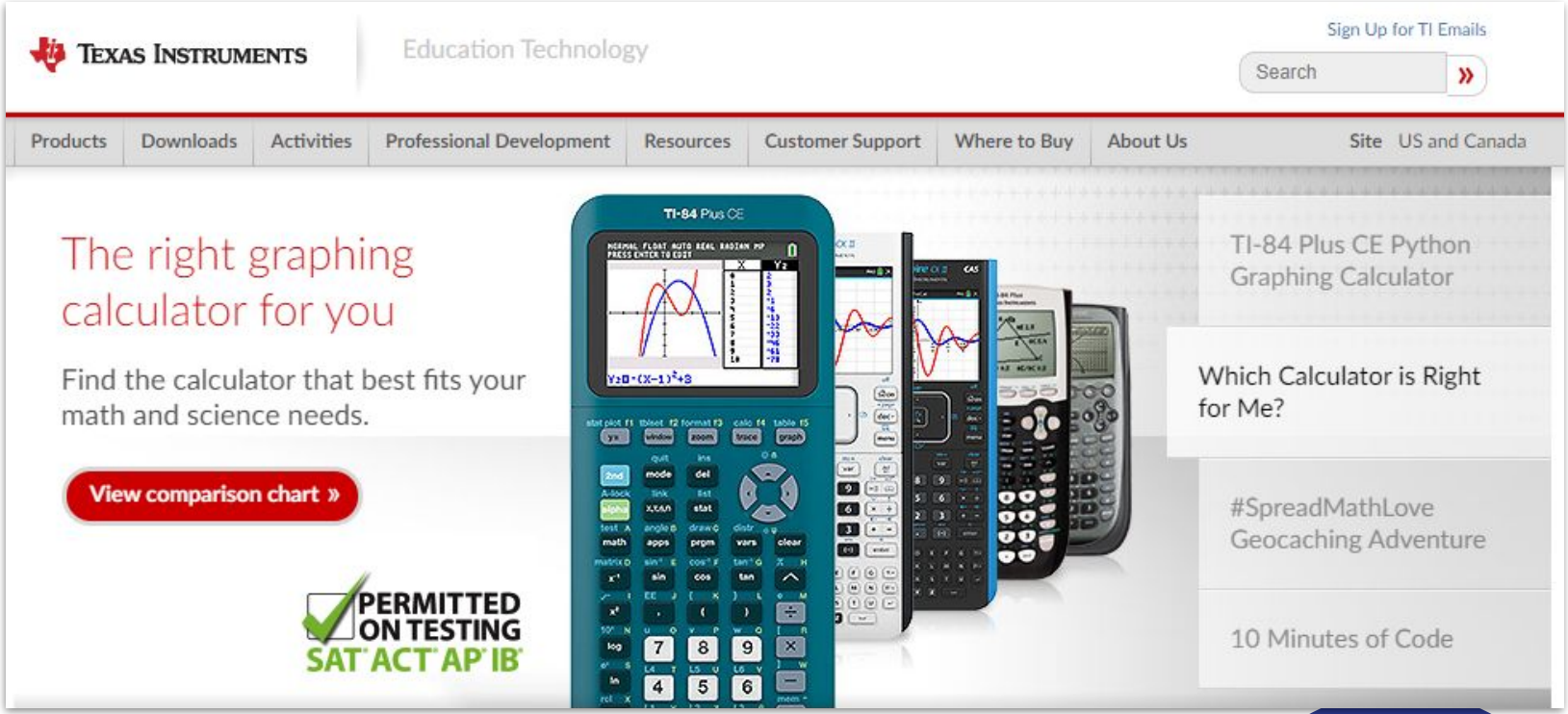

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- TI-Nspire™ CX CAS/CX II CAS
- TI-Nspire™ CX II
- TI-Nspire™ CX II CAS

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Classroom Activities	Author	Level	Technology		
Ingenuity Takes Flight Students learn about and explore physics concepts and calculations regarding *Ingenuity*, NASA's tiny helicopter.	Karlheinz Haas	9-12	TI-Nspire™ CX CAS/CX II CAS TI-Nspire™ CX/CX II	55	35
Voronoi Diagrams In this TI-84 family activity, students will create Voronoi Diagrams and apply them to real world scenarios.	Texas Instruments	9-12	TI-84 Plus C Silver Edition TI-84 Plus CE	77	3
Sampling Techniques	Texas	9-12	TI-84 Plus		

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transformations

Classroom Activities > transformations

Advanced

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Devices
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- TI-Nspire™ CX II
- TI-Nspire™ CX II CAS

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Classroom Activities	Author	Level	Technology		
STAAR / EOC: Transformations on the Coordinate Plane Students will use graphing technology to investigate all types of transformations on points in a coordinate plane. Alignment : Standards Textbook	Rick Sanchez	9-12	TI-83 Plus Family TI-84 Plus TI-84 Plus Silver Edition TI-Navigator™	4799	7
STAAR / EOC: Function Translations Review Students will use graphing technology to review transformations of functions.	Rick Sanchez	9-12	TI-83 Plus Family TI-84 Plus TI-84 Plus Silver Edition	4787	5

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transformations

Classroom Activities > transformations

Advanced

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- TI-Nspire™ CX/CX II
- TI-Nspire™ CX CAS/CX II CAS
- TI-Nspire™ CX II
- TI-Nspire™ CX II CAS
- TI-84 Plus CE

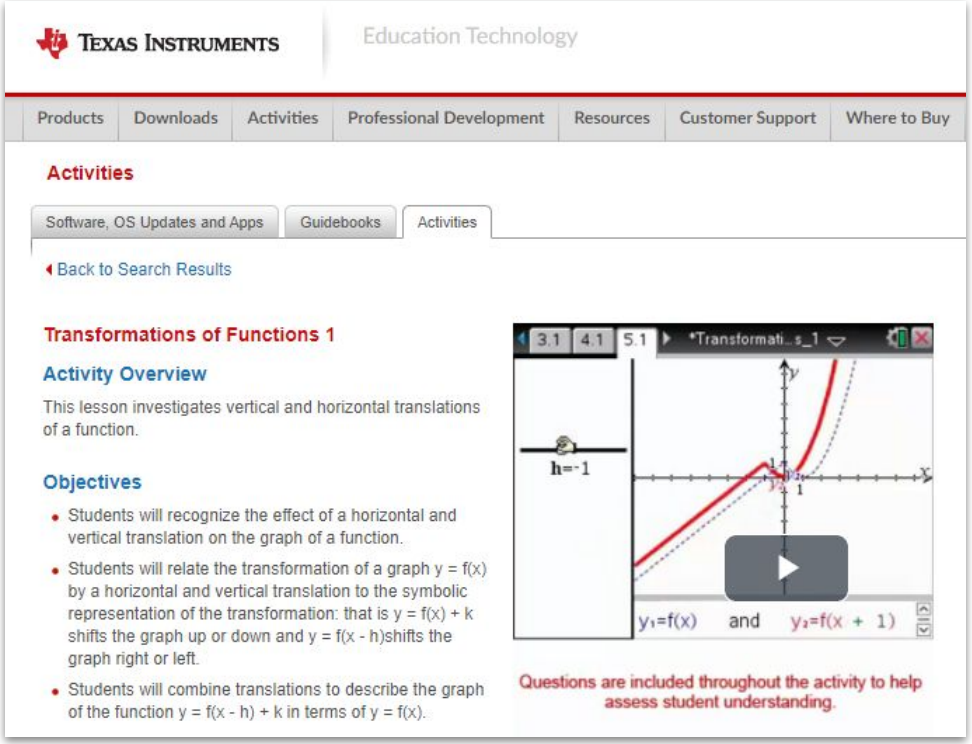
Displaying: TI-Nspire™ TI-84 Plus

Viewing 1 - 15 of 90 results Page: 1 2 3 > 6 Most Recent 15 | Page

Classroom Activities	Author	Level	Technology		
STAAR / EOC: Transformations on the Coordinate Plane Students will use graphing technology to investigate all types of transformations on points in a coordinate plane. Alignment : Standards Textbook	Rick Sanchez	9-12	TI-83 Plus Family TI-84 Plus TI-84 Plus Silver Edition TI-Navigator™	4799	7
STAAR / EOC: Function Translations Review Students will use graphing technology to	Rick Sanchez	9-12	TI-83 Plus Family TI-84 Plus TI-84 Plus	4787	5

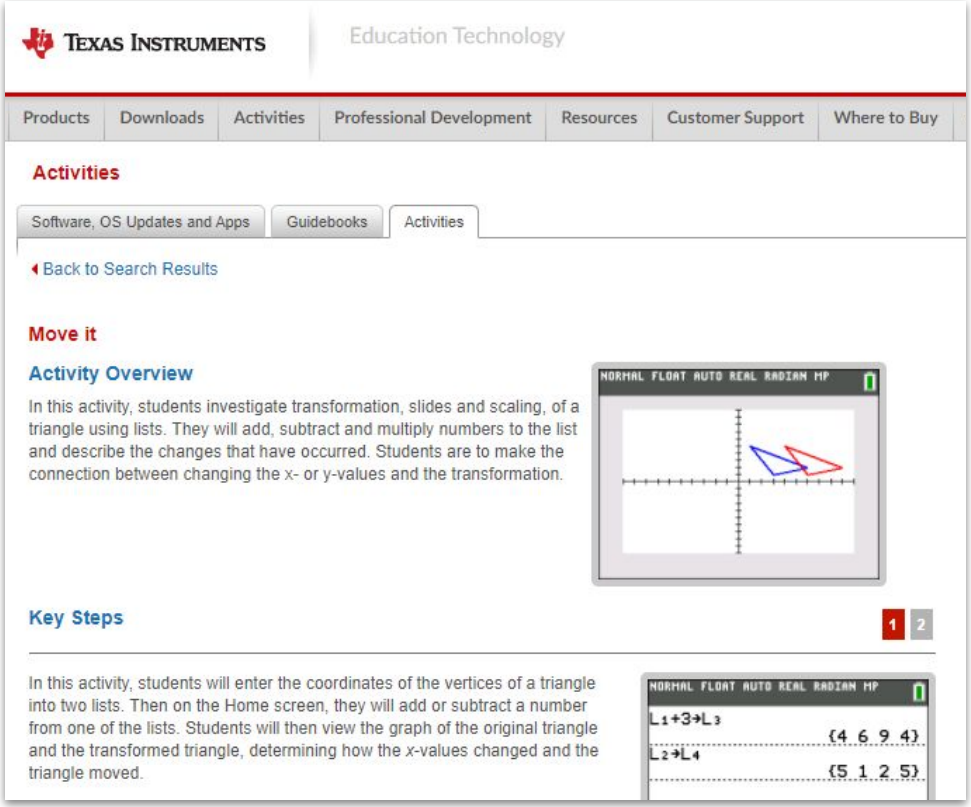
Transformation of Functions 1

bit.ly/TransFuncNspire



Move It!

bit.ly/MoveIt84



Transformations of Functions 1

Student Activity

Name _____

Class _____

Open the TI-Nspire document *Transformations_of_Functions_1.tns*.

This activity investigates some transformations of functions. The graph of a function $y = f(x)$ will be *translated*. You will be able to compare the new graph with the original to determine the impact of changes to the function on the graph.

Move to page 1.2.

Part One: $y = f(x) + k$.

1. Drag the point to change the value of k.
   a. What happens to the graph of $y_2 = f(x)+k$ as the value of k changes?
      As k increases, the graph _____.
      As k decreases, the graph _____.
   b. Move the point so that $k > 0$. Where is the graph of $y_2 = f(x)+k$ compared to $y_1 = f(x)$?
      For $k > 0$, the graph of $y_2 = f(x)+k$ is _____ *the graph of $y_1 = f(x)$.*
   c. Move the point so that $k < 0$. Where is the graph of $y_2 = f(x)+k$ compared to $y_1 = f(x)$?
      For $k < 0$, *the graph of $y_2 = f(x)+k$ is* _____ *the graph of $y_1 = f(x)$.*
   d. Move the point so that $k = 0$. Where is the graph of $y_2 = f(x)+k$ compared to $y_1 = f(x)$?
      For $k < 0$, *the graph of $y_2 = f(x)+k$ is* _____ *the graph of $y_1 = f(x)$.*

2. For each of the following statements, indicate if it is True or False, and explain wh
   a. When k is negative, the graph of $y_2 = f(x)+k$ is below the graph of $y_1 = f(x$
   b. When k is positive, the graph of $y_2 = f(x)+k$ is below the graph of $y_1 = f(x)$
   c. There is a value of k that will make part of the graph of $y_2 = f(x)+k$ above th
   an

3. The gr
   graph a

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Transformations of Functions 1

Student Activity

Move to page 2.1.

Part Two: $y = f(x - h)$

4. Drag the point to change the value of h.
   a. What happens to the graph of $y_2 = f(x-h)$ as the value of h changes?
      As h increases, the graph _____.
      As h decreases, the graph _____.
   b. Move the point so that $h > 0$. Where is the graph of $y_2 = f(x-h)$ compare
      For $h > 0$, the graph of $y_2 = f(x-h)$ is _____
   c. Move the point so that $h < 0$. Where is the graph of $y_2 = f(x-h)$ compare
      For $h < 0$, the graph of $y_2 = f(x-h)$ is _____
   d. Move the point so that $h = 0$. Where is the graph of $y_2 = f(x-h)$ compare
      For $h = 0$, the graph of $y_2 = f(x-h)$ is _____ *the grap*

5. The graph of $y_2 = f(x-h)$, when $h = 0$, is a *horizontal shift* of the graph of y_1
   horizontally?

Vocabulary Spotlight

- A vertical shift is also known as a vertical translatio
- A horizontal shift is also known as a horizontal trans

tions on pages 1.2 through 3.1 were of the absolute value type.
s, $y_1 = |x|$ and $y_2 = |x-h|+k$. How does the graph of
compare to the graph of $y_1 = |x|$?

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Transformations of Functions 1

Student Activity

Name _____

Class _____

(Use page 3.1 of the tns document on your handheld to help determine the transformations.)

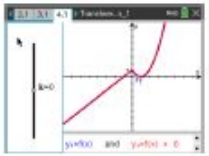
7. The vertex of the absolute value graph function is where the graph turns back up or goes back down. What is the vertex of $y_2 = |x-2|-1$?

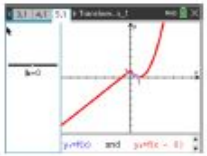
8. What is the vertex of $y_2 = |x+3|+4$? What is the vertex of $y_2 = |x-h|+k$?

Tech Tip

To see the coordinates of the vertex of a graph, tap the vertex. From the pop-up options that appear, select "Coordinates."

9. Pages 4.1 and 5.1 use a different type of function. For each transformation in a, b and c, describe the changes in the graph of $y_1 = f(x)$ shown. Then sketch the graph of y_2. Use pages 4.1 and 5.1 to check answers.

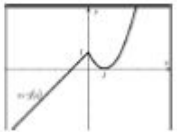


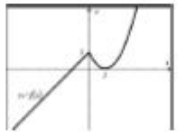


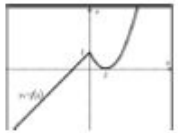
a. $y_2 = f(x-1)$

b. $y_2 = f(x)+2$

c. $y_2 = f(x-1)+2$







Wrap-Up

- The transformation $y = f(x)+k$ on a function $y = f(x)$ will result in a _____ shift; it will shift ____ when k is positive and _____ when k is negative.
- The transformation $y = f(x-h)$ on a function $y = f(x)$ will result in a _____ shift; the shift will be to the _____ when h is positive and to the _____ when h is negative.

https://bit.ly/3A1QIsB

Move It!
Student Activity

Name
Class

TI-84 For this activity, you should already be familiar with entering data in lists. need a reminder, check out these free tutorials at https://learnit.hoonuit.c https://learnit.hoonuit.com/2760/learnit/97479.

Part 0 – Setting Things Up

Press [STAT] and select **1:Edit...**

Enter the numbers shown at the right.

List L1 represents the *x*-values; List L2 represents the *y*-values.

TI-84 If there is already data in the lists, arrow up to the top of the lists and press [clear] [enter] in each list. Use the arrow keys to move from one list to another.

Press [2nd] [STAT PLOT] and select **1:Plot1...**

Match the settings shown at the right.

TI-84 Notice that the Type is set to ⌐. Instead of ⌐. This will connect the points to form the figure. To enter the names of the lists (L1, L2, L3, L4), press [2nd] [list] and select the appropriate name.

Press [ZOOM] and select **6:ZStandard** to view the graph

Press [2nd] [STAT PLOT] again and select **Plot2**. Use the same settings as Plot1, but for **Xlist** select L3 and for **Ylist** select L4 and leave the Color in **Plot2** RED..

STOP CHECK IN HERE

https://bit.ly/2VtenDz

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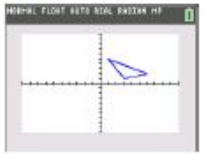
Move It!
Student Activity

Part 1 – Move Those *x*'s & *y*'s

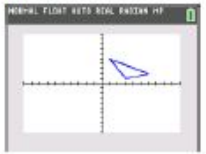
Press [2nd] [QUIT] to return to the home screen. On this screen, you will transform the

For Exercises 1 and 2, enter both expressions and then press [GRAPH]. (To enter the graph.

1. L1 + 3 → L3
   L2 → L4

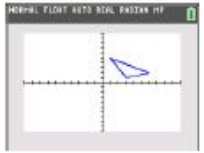


2. L1 – 3 → L3
   L2 → L4

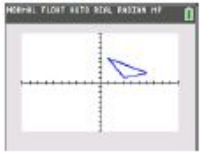


Return to the home screen. For Exercises 4 and 5, enter both expressions and the

4. L1 → L3
   L2 + 5 → L4



5. L1 → L3
   L2 – 5 → L4



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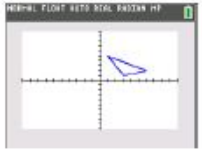
Move It!
Student Activity

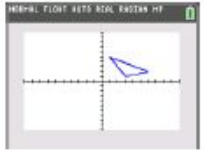
Part 2 – Change That Shape

Return to the home screen. For Exercises 7 and 8, enter both expressions and then press [GRAPH]. Sketch the graph.

7. $\frac{1}{2} * L1 \rightarrow L3$
   $\frac{1}{2} * L2 \rightarrow L4$



8. $2 * L1 \rightarrow L3$
   $2 * L2 \rightarrow L4$



9. In general, what happens when a number between 0 and 1 or a number greater than 1 is multiplied by both the *x*- and *y*-values of a figure?

STOP CHECK IN HERE

Part 3 – Explore on your own

Choose one of the following activities to explore further.

A. Create your own graph picture and transform it using the transformation(s) in this lesson. Have someone else try to figure out what transformation(s) you used.

B. Symbolically, when we transform a function, $f(x)$, we write it as:

- $f(x-h)$ translates the function horizontally "*h*" units
- $f(x)+k$ translates the function vertically "*k*" units
- $a \cdot f(x)$ dilates the function by a factor of "*a*"

Explain what transformations take place when $f(x)$ becomes $3 \cdot f(x-2)+4$.

What would the function $f(x)$ look like if we translated it 5 units to the right and 2 units left?

C. Research how transformations, specifically translations and dilations as we explored in this lesson, are used in real life. Share what you learn with a classmate or your teacher.

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Differentiation Strategies

Tiered Assignments

Highlight Vocabulary

Alone or in Groups

Access to Resources

Checks for Understanding

Choice / Extensions

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Resources from this
webinar can be found here.

THANKS!

DO YOU HAVE ANY QUESTIONS?

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@MzFrizzMath

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