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Texas Instruments

Bee mine – teacher notes

In this differentiated activity, students will use their knowledge of functions and limited domains to do one of the following:

» Write equations to create the given design.

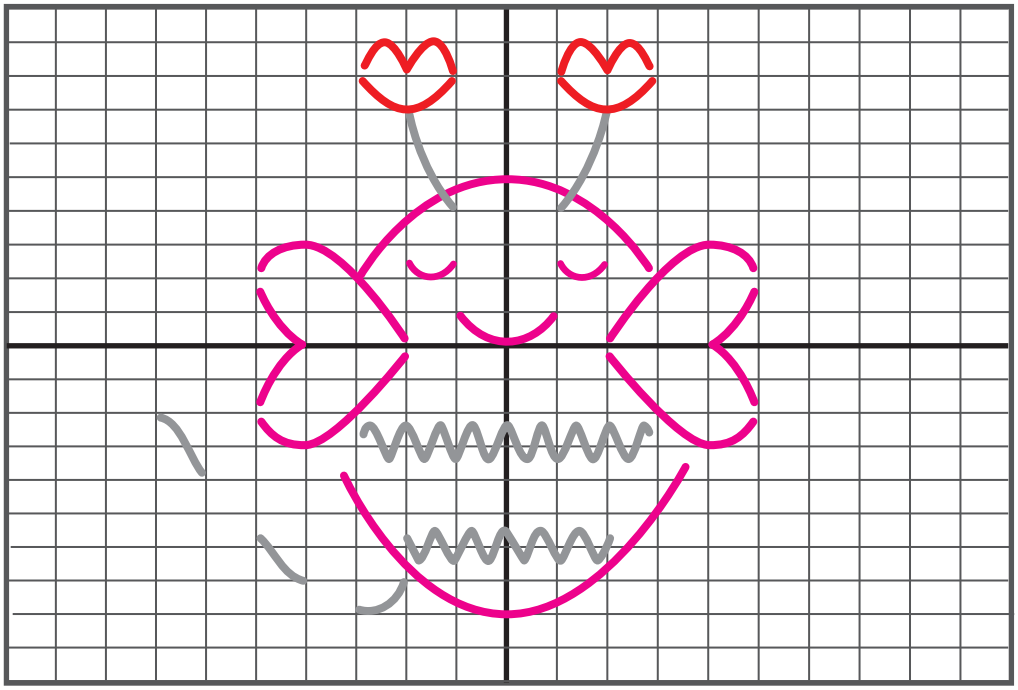
» Use their knowledge of transformations to produce the rest of the design.

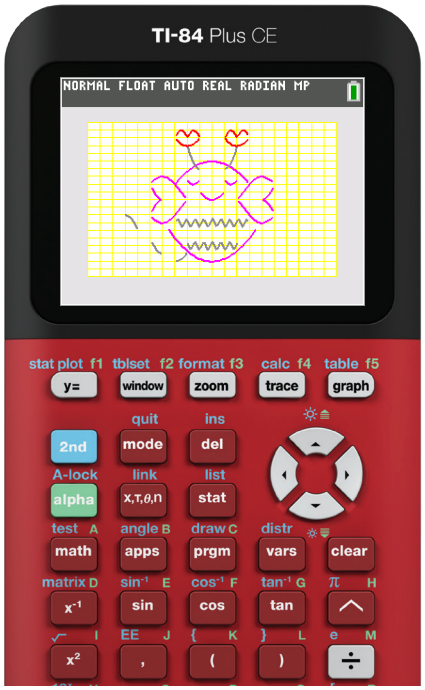
» Make their own design and write the corresponding equations.

Common Core Standards:

» CCSS.HSF.BF.B.3

» CCSS.HSF.IF.C





ACTIVITIES AND THEIR OBJECTIVES

Buzzing over functions

At the end of this activity, students should be able to:

» Write equations from a graph.

» Identify the domain of each equation (identify the domains of each piecewise function).

Love bee true - transformations

At the end of this activity, students should be able to:

» Use properties of function transformations to write the equations for the missing parts of the design.

For this activity, use personal discretion on whether to share some, all, or none of the equations to students.

You hive my love

At the end of this activity, students should be able to:

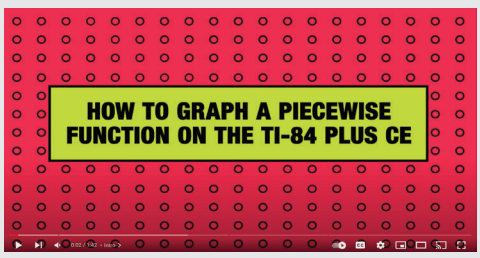
» Use their extensive knowledge of functions to write equations to create a unique graph of a design.

» Identify the domain of each equation (identify the domains of each piecewise function).

Introduction to piecewise functions

For these activities, students will need to know how to enter piecewise functions into their calculators.

You can play this quick how-to video for your class: **https://bit.ly/3SCT1fq**



Bee mine – teacher notes

Highlighted equations are the missing parts or altered domains for the transformations activity.

$$f(x) = \begin{cases} -(x+4)^2 + 3;\ -5 < x < -3 \\ -2x - 4;\ -3 < x < -2 \\ x^2;\ -1 < x < 1 \\ 2x - 4;\ 2 < x < 3 \\ -(x-4)^2 + 3;\ 3 < x < 5 \end{cases}$$

Top of wings and smile: (pink)

$$f(x) = \begin{cases} 2(x+4)^2;\ -5 < x < -4 \\ -\frac{3}{9}x^2 + 5;\ -3 < x < 3 \\ 2(x-4)^2;\ 4 < x < 5 \end{cases}$$

Top of interior wings and top of bee body: (pink)

$$f(x) = \begin{cases} -2(x+4)^2;\ -5 < x < -4 \\ 2(x+\frac{3}{2})^2 + 2;\ -2 < x < -1 \\ 2(x-\frac{3}{2})^2 + 2;\ 1 < x < 2 \\ -2(x-4)^2;\ 4 < x < 5 \end{cases}$$

Bottom of interior wings and eyes: (pink)

$$f(x) = \begin{cases} (x+4)^2 - 3;\ -5 < x < -3 \\ 2x + 4;\ -3 < x < -2 \\ -2x + 4;\ 2 < x < 3 \\ (x-4)^2 - 3;\ 3 < x < 5 \end{cases}$$

Bottom of wings: (pink)

$$f(x) = \begin{cases} \frac{3}{9}x^2 - 8;\ -3.5 < x < 3.5 \end{cases}$$

Bottom of body: (pink)

Bee mine – teacher notes (cont.)

Highlighted equations are the missing parts or altered domains for the transformations activity.

$$f(x) = \{\ .5\cos(9x) - 3;\ -3 \le x \le 3\ \}$$

Stripes 1: (gray)

$$f(x) = \{\ .5\cos(9x) - 6;\ -2 <= x <= 2\ \}$$

Stripes 2: (gray)

$$f(x) = \begin{cases} -2(x+7)^2 - 2;\ -7 < x < -6 \\ 2(x+4)^2 - 7;\ -5 < x < -4 \\ (x+3)^2 - 8;\ -3 < x < -2 \\ 3(x+1)^2 + 4;\ -2 < x < -1 \\ 3(x-1)^2 + 4;\ 1 < x < 2 \end{cases}$$

Antennae and trail: (black)

$$f(x) = \begin{cases} (x+2)^2 + 7;\ -3 < x < -1 \\ (x-2)^2 + 7;\ 1 < x < 3 \end{cases}$$

Bottom of hearts on Antennae: (red)

$$f(x) = \begin{cases} -4\left(x + \frac{5}{2}\right)^2 + 9;\ -3 < x < -2 \\ -4\left(x + \frac{3}{2}\right)^2 + 9;\ -2 < x < -1 \\ -4\left(x - \frac{3}{2}\right)^2 + 9;\ 1 < x < 2 \\ -4\left(x - \frac{5}{2}\right)^2 + 9;\ 2 < x < 3 \end{cases}$$

Top of hearts on Antennae: (red)

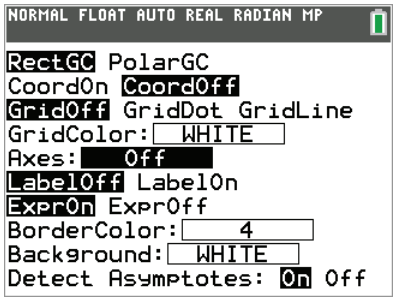
Graphing tips

To prep/modify your graph screen:

format

2nd zoom f3

You can customize colors and visibility of various graph labeling and style choices. Toggle to selections. Press enter to activate your desired setting. Experiment and discover how to customize your display.



If working with Inequalities, turn on the Inequalities Application: angle B apps Select: 5: Inequalz

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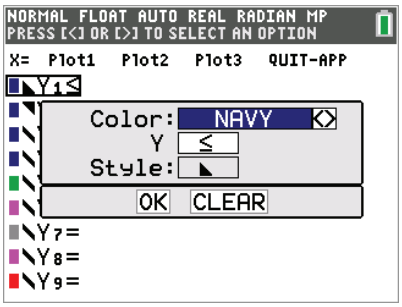
Enter equations into the stat plot f1 y= screen

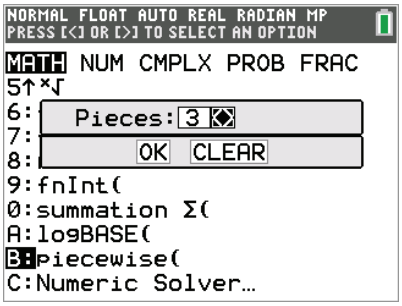
To change colors and inequality symbols: Arrow left until the desired Yx = line is outlined with a box. Press enter. Hint: pay attention to the inequality symbols.

Use the dialogue box to select settings.



To enter multiple functions in a Yx = row, use the piecewise template: test A math Select: B: piecewise(

Use dialogue box to select quantity of pieces per Yx = line.



For **x=** go to the top left corner of the functions menu and select **x=** to toggle between the functions

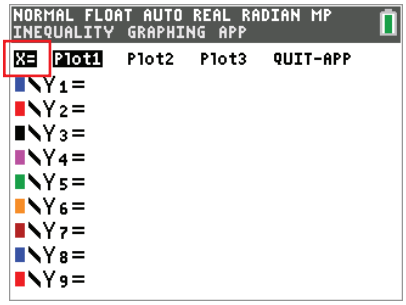


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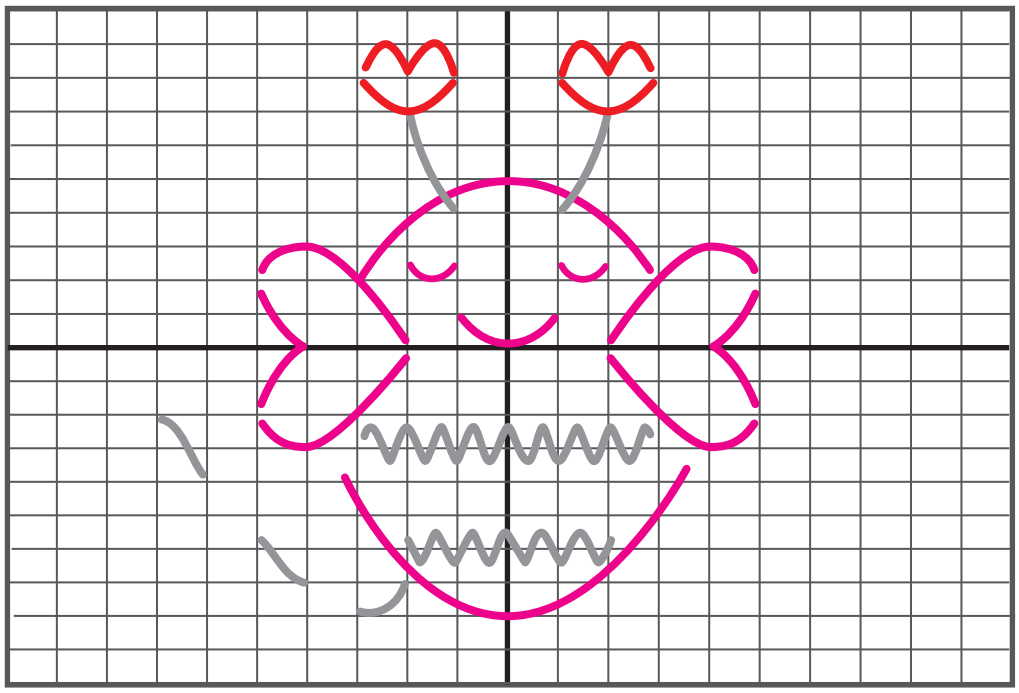
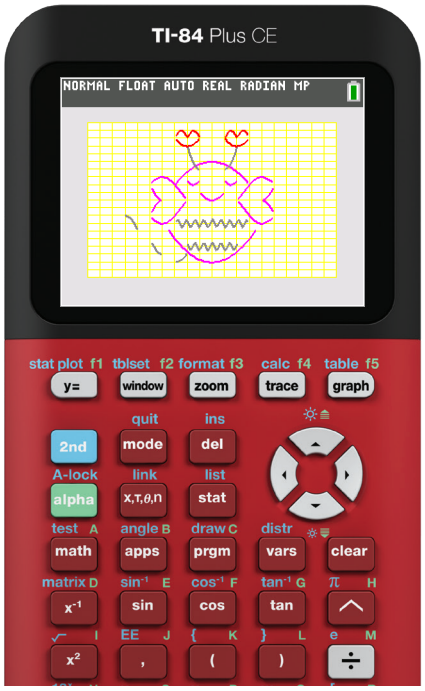
table f5 graph your work when all math is entered. Double check your equations.

Name: _____ Date: _____

Buzzing over functions

Let's draw a bee-dazzling design! First, determine the equations used to make this image. Try breaking down the image into the parts below. Hint: The number of functions used is indicted in the parentheses. Next, enter the equations into your calculator to visualize them all together!





Top of wings and smile (5):

Top of interior wings and top of bee body (3):

Bottom of interior wings and eyes: (4):

Bottom of wings (4):

Top of hearts on Antennae (4):

Bottom of body (1):

Antennae and trail (5):

Bottom of hearts on Antennae (2):

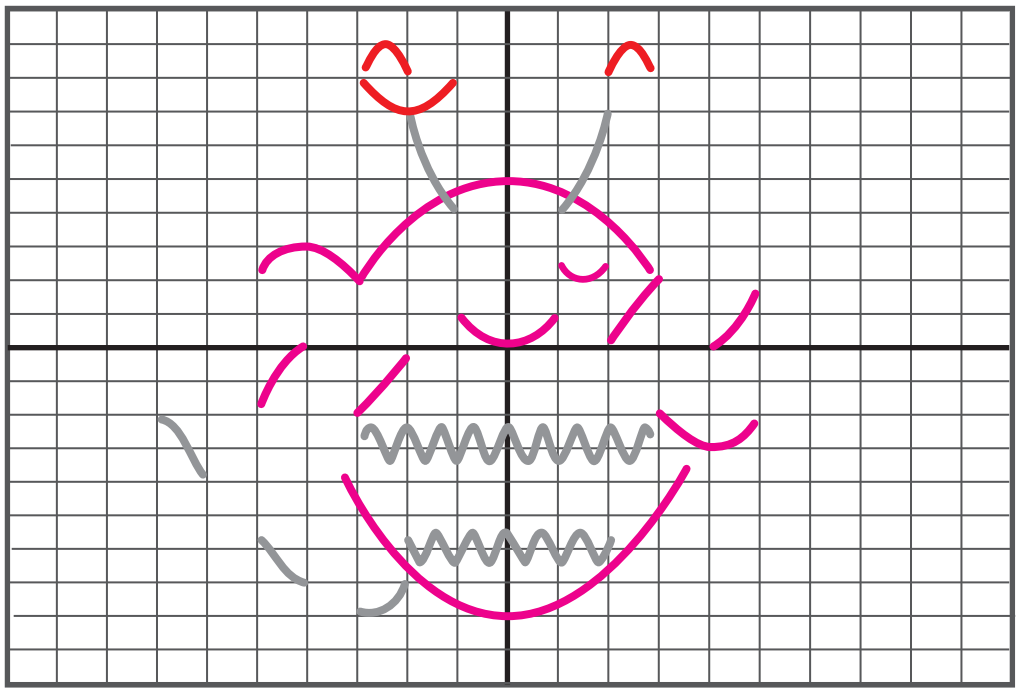
Stripe 1 (1):

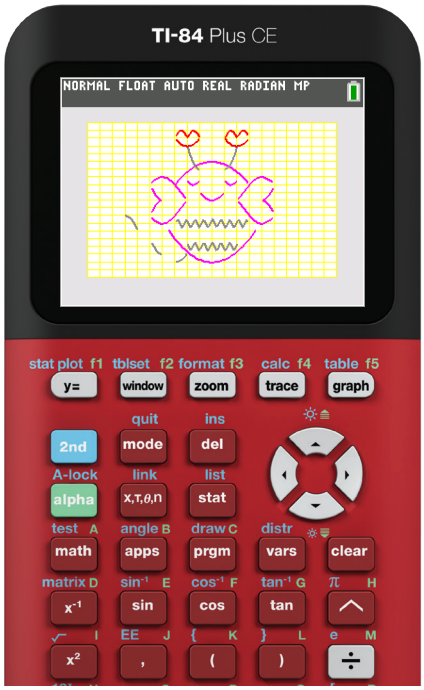
Stripe 2 (1):

Name: _____ Date: _____

Love bee true – transformations

This bee is missing sum of its parts! Determine the equations needed to finish the picture.
Next, enter the equations into your calculator to finish the transformation.





Top of wings and smile (5):

_____

_____

_____

_____

_____

Top of interior wings and top of bee body (3):

_____

_____

_____

Bottom of interior wings and eyes: (4):

_____

_____

_____

_____

Bottom of wings (4):

_____

_____

_____

_____

Top of hearts on Antennae (4):

_____

_____

_____

_____

Bottom of body (1):

_____

Antennae and trail (5):

_____

_____

_____

_____

_____

Bottom of hearts on Antennae (2):

_____

_____

Stripe 1 (1):

_____

Stripe 2 (1):

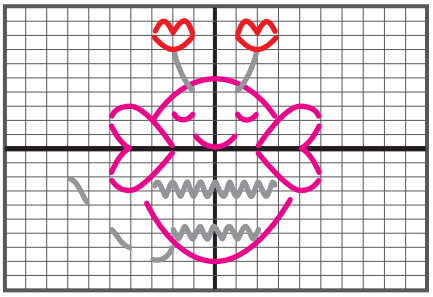
_____

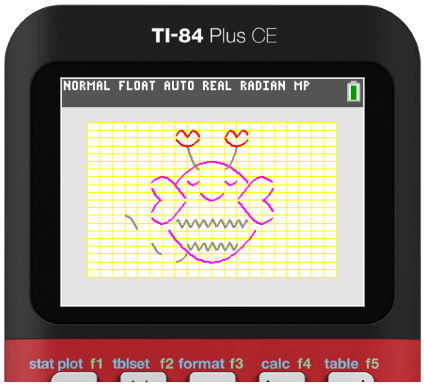
Name: _____ Date: _____

You hive my love

Use your knowledge of functions to make a buzz-worthy bee design of your own! Use the provided image as inspiration. Draw your own design, then try breaking it down into parts. Next, enter the equations into your calculator to visualize them all together!

Example:





Draw your own design.

Determine your functions below. Graph them on your calculator to check your work.