# Merry and bright – 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 image.

» Make their own inspired design and write the corresponding equations.

Common Core Standards:

» CCSS.HSF.BF.B.3

» CCSS.HSF.IF.C
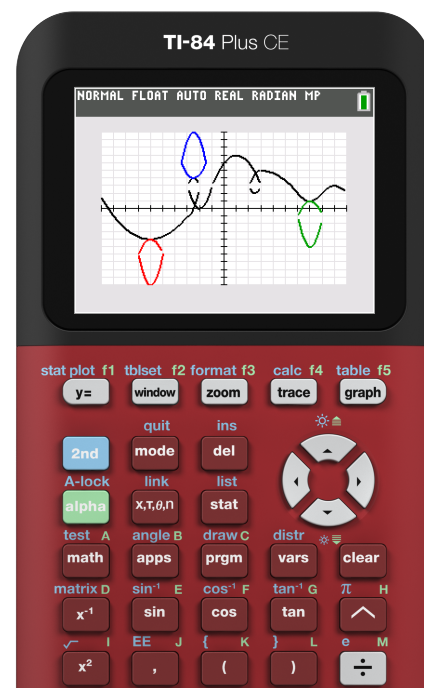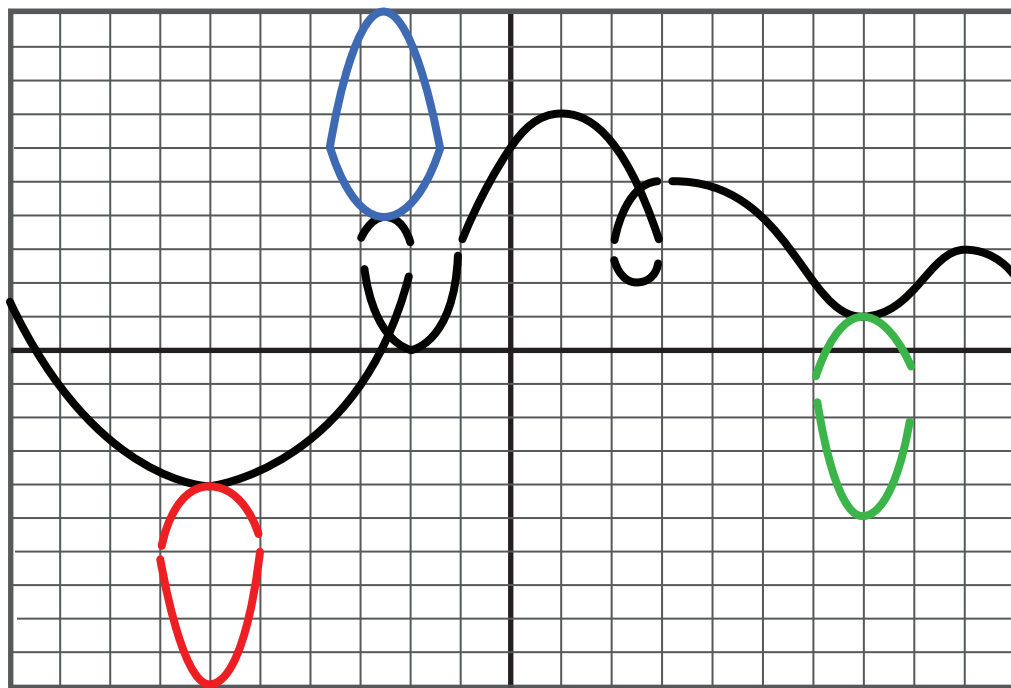
## ACTIVITIES AND THEIR OBJECTIVES

### Lit 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 in each piecewise function).

### Watt's up? – transformations

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

» Use properties of function transformations to write the equations for the missing pieces of the image.

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

### Ready, set, glow!

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 their own.

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

### Introduction into piecewise function

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**

HOW TO GRAPH A PIECEWISE FUNCTION ON THE TI-84 PLUS CE
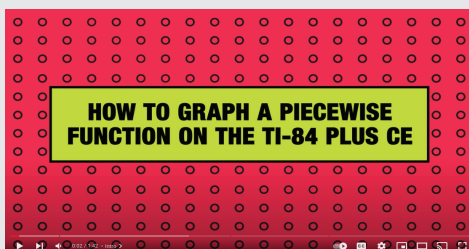
# *Lit functions*

Let's decorate with some bright lights! 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 indicated in the parentheses. Next, enter the equations into your calculator to visualize the equations all together!
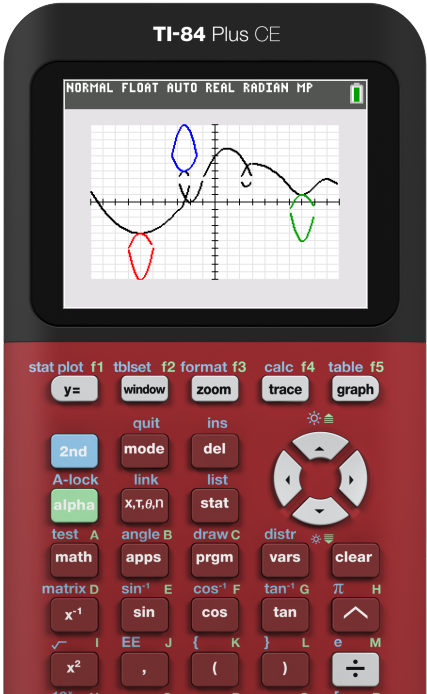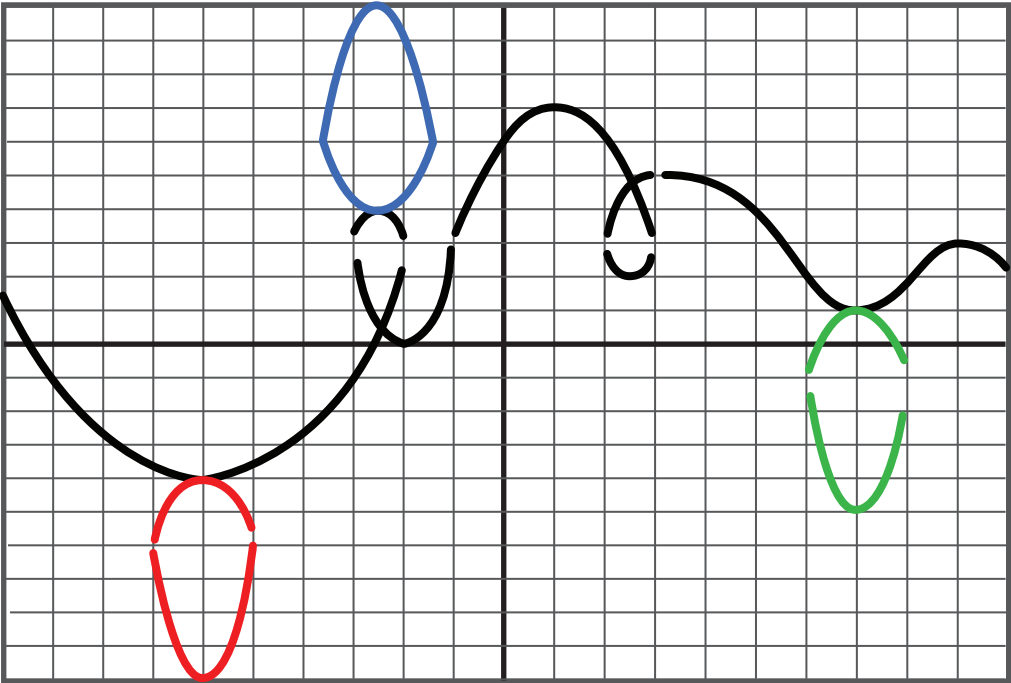


**Wire(3)**

_____

_____

_____

**Wire(4)**

_____

_____

_____

_____

**Wire(2)**

_____

_____

**Wire(1)**

_____

**Red bulb top (1)**

_____

**Red bulb bottom (1)**

_____

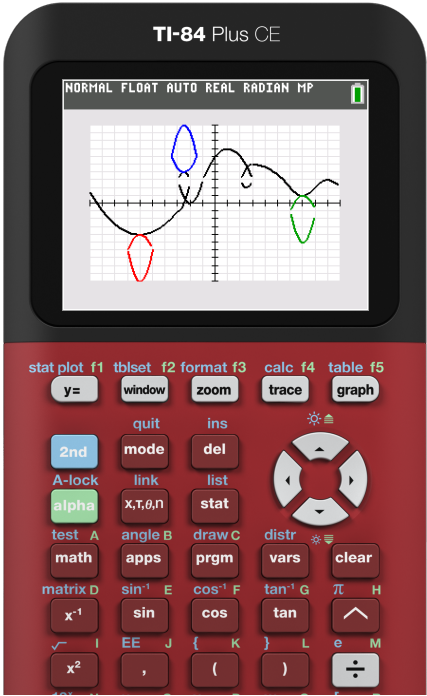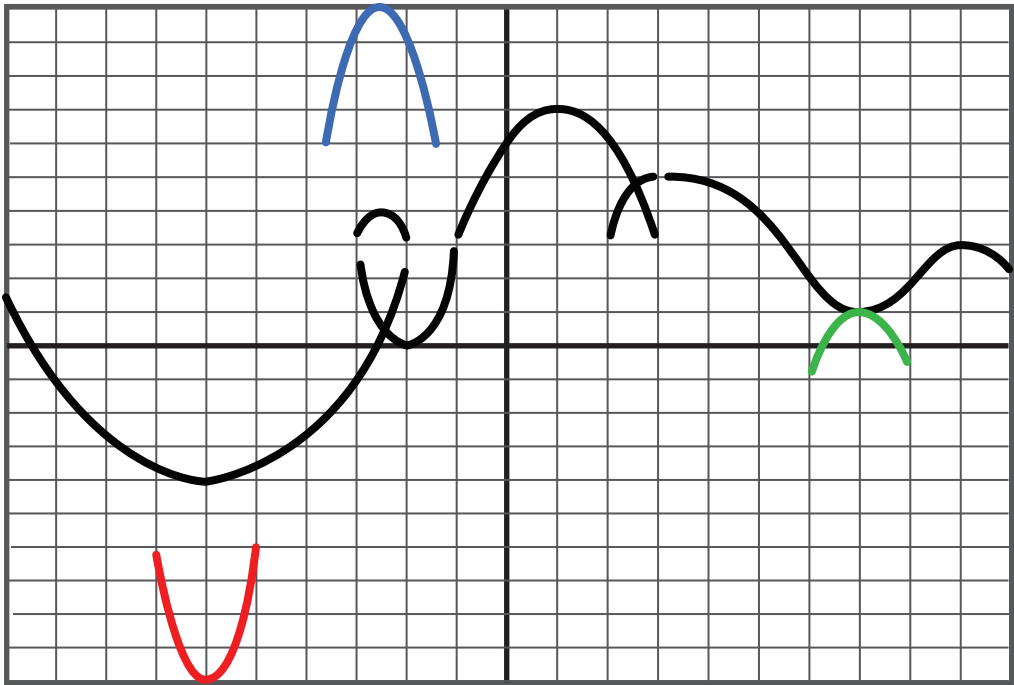**Blue bulb top (1)**

_____

**Blue bulb bottom (1)**

_____

**Green bulb top (1)**

_____

**Green bulb bottom(1)**

_____

# Watt's up? – transformations

Uh oh! These lights got busted. Help fix the strand and light up the row! Determine the equations needed to finish the picture. Next, enter the equations into your calculator to finish the transformation.

**Wire(3)**

_____

_____

_____

**Wire(4)**

_____

_____

_____

**Wire(2)**

_____

_____

**Wire(1)**

_____

**Red bulb top (1)**

_____

**Red bulb bottom (1)**

_____

**Blue bulb top (1)**

_____

**Blue bulb bottom (1)**

_____

**Green bulb top (1)**

_____

**Green bulb bottom(1)**
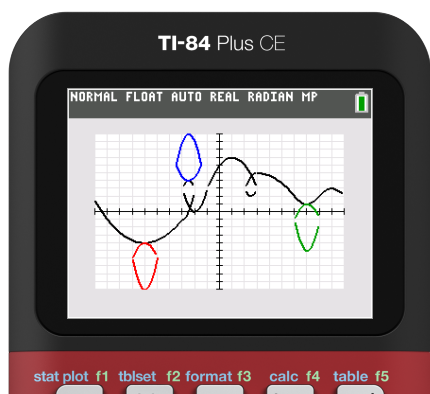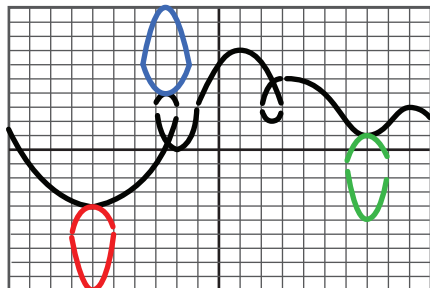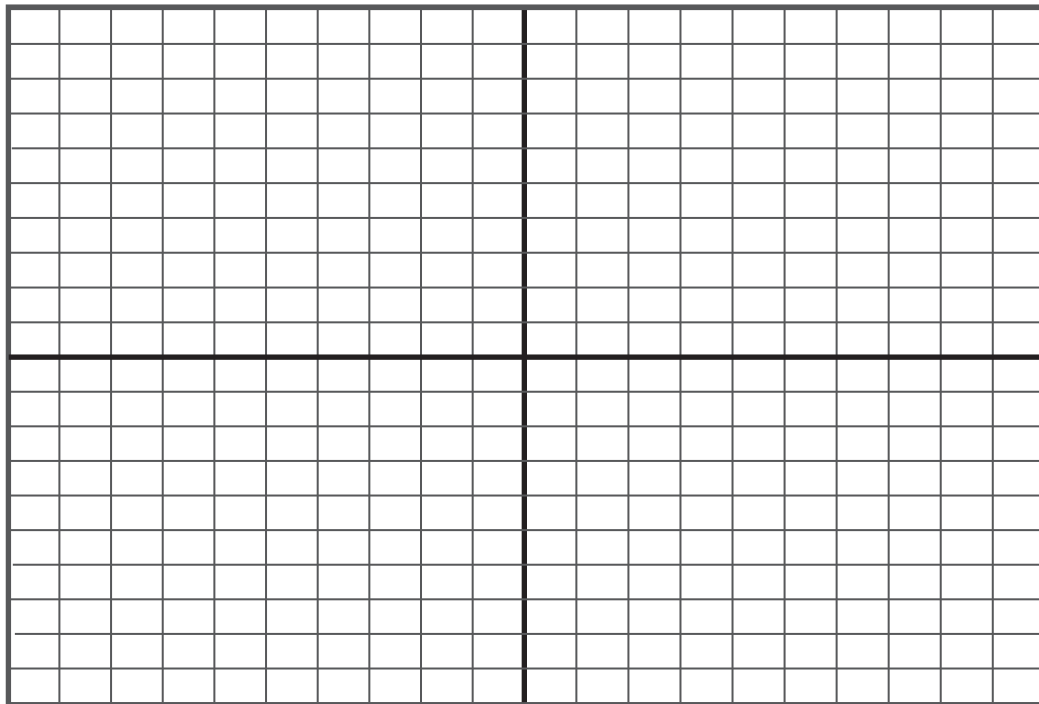
_____

# Ready, set, glow!

Make your own lit design! Use the provided image as inspiration to make your own merry and bright deisgn. Draw your design, then try breaking it down into parts. Next, enter the equations into your calculator to visualize the equations all together!

**Example**

**Draw your own festive light display**

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

# *Merry and bright – teacher notes*

$$f(x) = \begin{cases} \frac{1}{3}(x+6)^2 - 4; & -10 \le x < -3 \\ 4(x+3)^2 - 1; & -3 \le x < -2 \\ -(x-1)^2 + 7; & -1 \le x < 3 \end{cases}$$

$$f(x) = \begin{cases} 3(x+2)^2; & -3 \le x < -1 \\ -\frac{1}{3}(x-3)^2 + 5; & 3 \le x < 6 \\ (x-7)^2 + 1; & 6 \le x < 8 \\ -(x-9)^2 + 3; & 8 \le x < 10 \end{cases}$$

Wire (black)

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

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

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

$$f(x) = \begin{cases} 4(x+6)^2 - 10; & -7 < x \le -5 \end{cases}$$

Red bulb: (red)

$$f(x) = \begin{cases} 2(x+\frac{5}{2})^2 + 4; & -\frac{7}{2} \le x \le -\frac{3}{2} \end{cases}$$

$$f(x) = \begin{cases} -4(x+\frac{5}{2})^2 + 10; & -\frac{7}{2} \le x \le -\frac{3}{2} \end{cases}$$

Blue bulb: (blue)

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

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

Green bulb: (green)