

Graphing Bingo – Instructor Instructions

Setup (Before Class)

- Graphing Bingo uses 14 functions – 4 even, 4 odd, and 6 neither. These functions are plotted on the master list for your reference. Use the master list to check students' work.
- Each bingo card presents four functions, labeled $A(x)$, $B(x)$, $C(x)$, and $D(x)$. The formulas are randomly selected from the twelve formulas on the master list so that each card includes two functions with even or odd symmetry, and two without.
- Use the formulas from the cards to match with functions on the master list. For example, $A(x)$ on one card will have a different formula from $A(x)$ on a different card.
- Sample cards are provided, along with a blank card. Make additional cards as needed by copying the blank and writing in function formulas. Make sure each card includes two functions with even/odd symmetry and two without. You may also wish to use your own formulas; if so, make sure all your y -values lie between -4 and 4 so students' graphs will fit on their cards.
- You will need a way to randomly choose combinations of letters (A , B , C , or D) and numbers (whole numbers between -5 and 5 , excluding 0). We recommend cutting out the combinations provided on the "Call Numbers" page and drawing them from a cup or bag.

Pre-Game

- We recommend splitting students into teams of two or three. This way one team member can be listening for and writing down the numbers called out while others work on calculating y values or plotting points.
- Each team should receive a different bingo card before game play begins.
- Announce the requirements for a "BINGO" – you may choose whether students need to complete a single graph for a short game or all four for a marathon. A completed graph will have at least three points plotted on each side of the y axis. The points will be connected with a curve correctly representing the overall shape of the graph.
- Go over the rules printed on the BINGO cards and answer any questions.
- Students may struggle with the instruction: "**You may also plot any other point(s) belonging on your graph which lie at the same distance from the x -axis.**" This is our way of saying "you may use symmetry" without mentioning "Even" and "Odd" – ideally students will discover for themselves that using their knowledge of even and odd will help them BINGO faster.
- You may want to give some examples like this: "If I call $A(2)$ and you determine that $A(2) = 3$, then you may plot the point $(2,3)$ on the graph for function A . Also, if you know of any additional points belonging on that same graph with a y -value of 3 or negative 3 , you may plot those points as well."
- If students ask how they could possibly know such a thing, grin mysteriously and say, "Look carefully at the formula. I expect some of you will know."
- Begin by instructing students to graph the y -intercept for each of the four graphs on their card. This is the equivalent of a "Free Space."

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Game Play

- Randomly select and announce a letter/number pair from the provided “Call Letters” list. The letter determines which function students should look at, and the number provides the x-value for the point they need to plot.
- Keep your called-out pairs organized so you can check students’ work against numbers that have been called.
- Give students a reasonable amount of time to plot each point before calling out the next. If needed, suggest they write down the x-values as you call them. Let students know they may continue to work on a point after you move on.
- Continue calling out letter/number pairs until somebody shouts, “BINGO.”
- When a team BINGOs, have them call out their function’s formula (so you can find it on the master list) along with their plotted points, and check the following:
 - All plotted points are accurate and were called out or could be inferred from points that were called out. (Use the master list to quickly check their y-values.)
 - The points are connected with a continuous curve.
 - End behaviors and the number of turning points are correct.
 - X and y intercepts are correct, or approximately so.
- If features of the graph are missing or incorrect, the team does not have a valid BINGO. Use your discretion as to whether you should point out their mistakes. Allow them to make corrections while you continue playing additional rounds. They may attempt a BINGO once more, when ready.
- If a team BINGOs quickly, you may wish to continue game play, allowing additional teams to BINGO as well. Stop when all teams have BINGOed or students have come to the end of their productive attention span.

Post-Game Analysis

After game play ends, use these questions to lead a discussion:

- Was anybody surprised that we BINGOed so quickly?
- Did anybody use the rule that you can plot more than one point?
- What was it that allowed you to plot a second point?
- Did you notice some functions were even/odd? Which were even? Which were odd?
- How did you know they were even/odd?
- Two functions, $f(x) = 3$ and $f(x) = 3|x|/x$ can be BINGOed in a single turn. Did anybody have one of those on their card? Why does it take only one turn to graph the entire function?

Play Again

If some students did not come up with the even/odd strategy on their own, and interest still seems high, play a second game with fresh cards. This gives everyone a chance at playing with use of symmetry as a strategy.