

Desmos Battleship

Watch the following Dude Perfect video

<https://www.youtube.com/watch?v=rdfC6XwXTW0&t=284s>

More detail on the activity can be found in the following article:

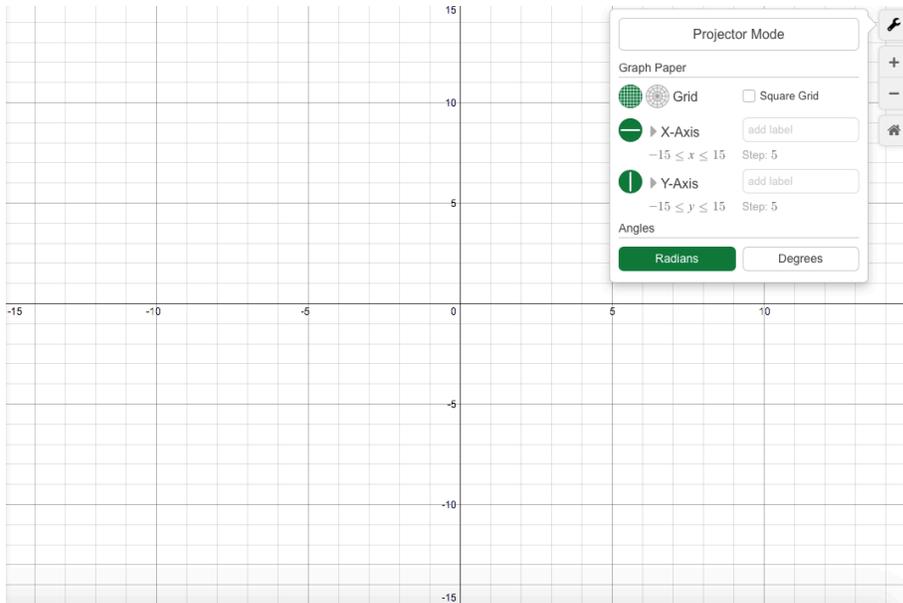
Stohlmann, M. (2017). Desmos battleship. *The Australian Mathematics Teacher*.

Desmos Battleship

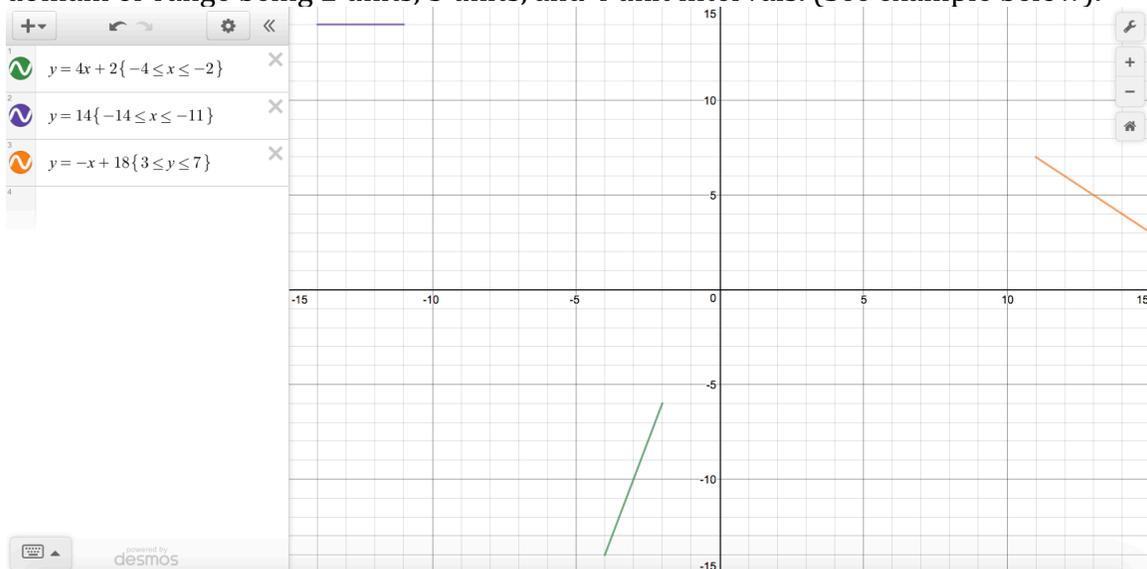
Battleship is a game of guessing, strategy, and logical thought. You will use your mathematical knowledge to set your ships; then play against another person to be the first to sink their ships.

Setting up your ships

To start, set up your grid so that it will be consistent for all players. Set the x-axis and y-axis to go from -15 to 15.



You will get three ships. The ships will be inputted as linear equations into desmos in the form of $y = mx + b$. For example $y = 4x - 2$. To determine the length of your ships you will need to either set the domain (x-values) or range (y-values) with the domain or range being 2 units, 3 units, and 4 unit intervals. (See example below).

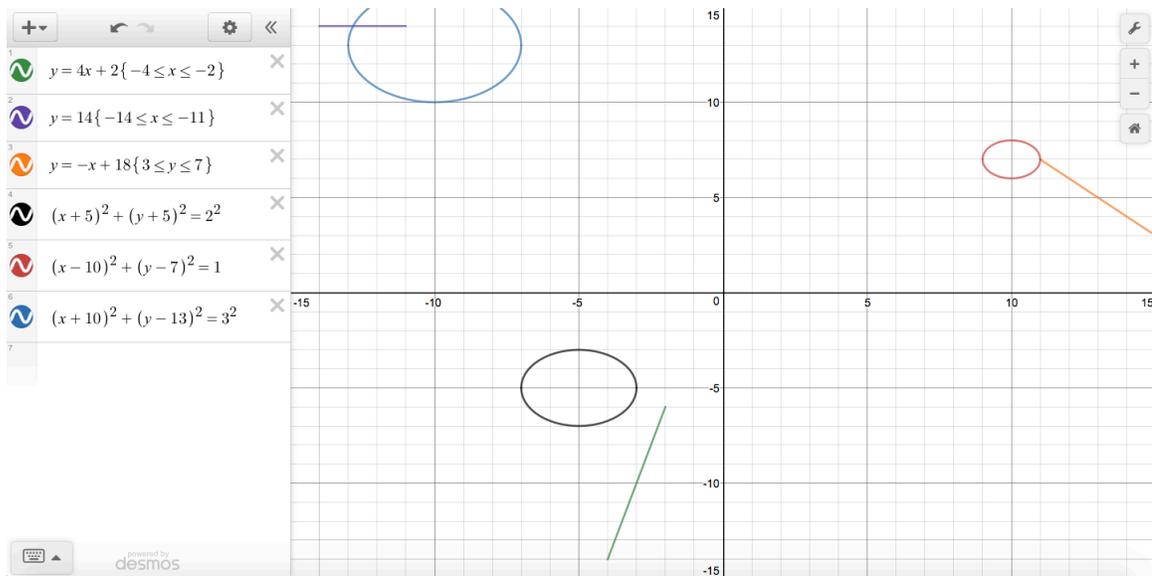


Playing the game

You will alternate turns until all of the other team's ships are sunk. Your torpedoes to sink your opponents' ships will come in the form of circles. If any part of the circle or inside of the circle touches a ship, that ship is sunk. The torpedoes will have different radiuses based on a roll of the dice. You will roll the dice before every turn. If you roll a:

- 1- radius of 1
- 2 - radius of 2
- 3- radius of 3
- 4 - radius of 4
- 5 - radius of 5
- 6- radius of 6

You get to pick the center of your circle which can be any point in the grid. The equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$. For this equation the center of the circle is (h, k) and the radius is r . The example below shows two hits and one miss. It will probably take more turns to sink ships, but this is just an example. The equations for each circle are inputted into desmos in the fourth, fifth, and sixth, lines. One player on your team will keep track of your opponents' guesses with your ships. The other player on his or her computer will keep track of your guesses.



For the example above the following would be 1 miss and 2 hits.

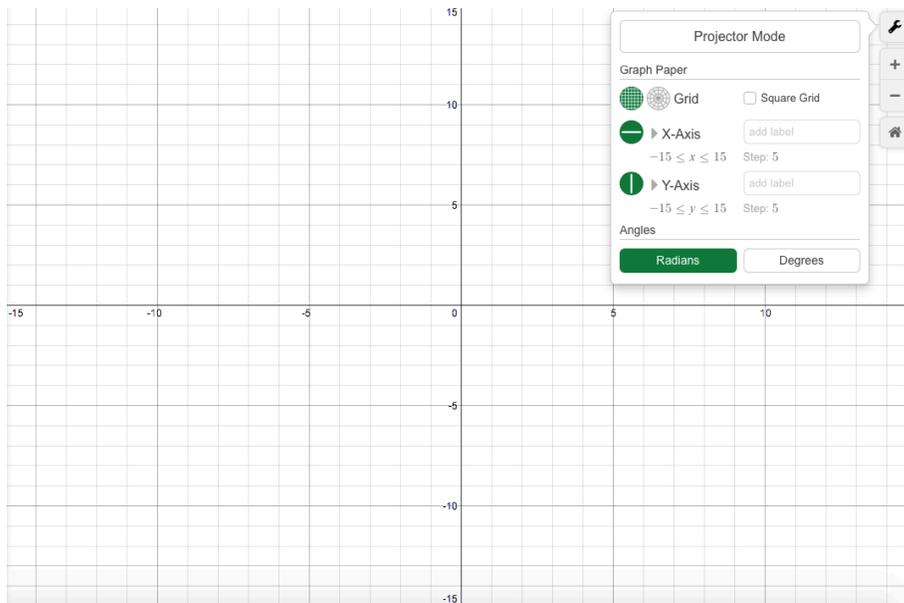
Radius	Center	Equation	Hit or miss
2	(-5, -5)	$(x + 5)^2 + (y + 5)^2 = 2^2$	Miss
1	(10,7)	$(x - 10)^2 + (y - 7)^2 = 1$	Hit
3	(-10,13)	$(x + 10)^2 + (y - 13)^2 = 3^2$	Hit

Desmos Battleship: Basic version

<https://www.desmos.com/calculator/9pc7ao3chm>

Setting up your ships

To start, set up your grid so that it will be consistent for all players. Set the x-axis and y-axis to go from -8 to 8. Move ships as desired.



You will alternate turns until all of the other team's ships are sunk. Your torpedoes to sink your opponents' ships will come in the form of linear equations. If any part of the line touches a ship, that ship is sunk. Each turn your team decides what linear equation to use.

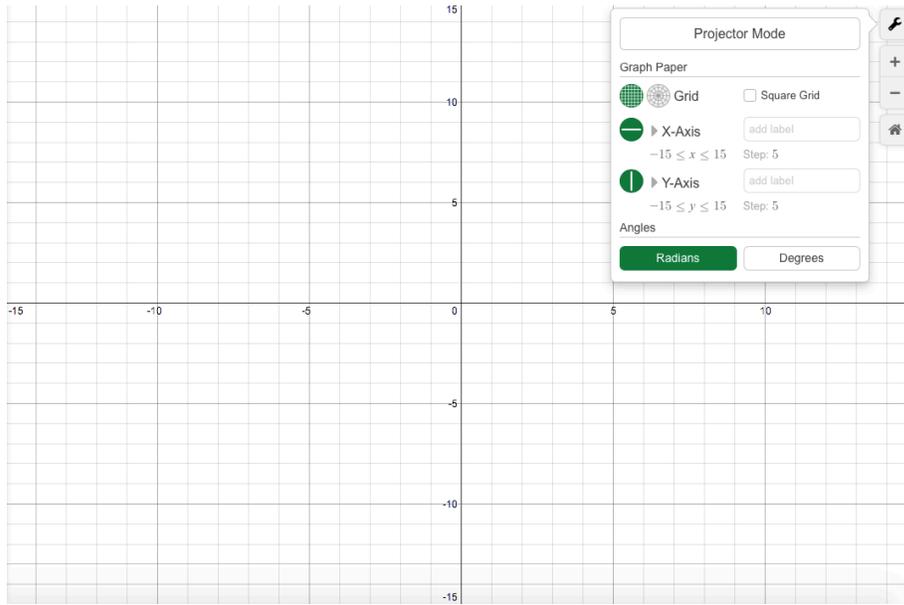
- One person in your team should keep track of your ships and the opponents guesses
- One person should keep track of your guesses

Desmos Battleship: basic version 2

<https://www.desmos.com/calculator/9pc7ao3chm>

Setting up your ships

To start, set up your grid so that it will be consistent for all players. Set the x-axis and y-axis to go from -15 to 15. Move ships as desired.



You will alternate turns until all of the other team's ships are sunk. Your torpedoes to sink your opponents' ships will come in the form of circles. If any part of the circle or inside of the circle touches a ship, that ship is sunk. The torpedoes will have different radiuses based on a roll of the dice. You will roll the dice before every turn. If you roll a:

- 1- radius of 1
- 2 - radius of 2
- 3- radius of 3
- 4 - radius of 4
- 5 - radius of 5
- 6- radius of 6

You get to pick the center of your circle which can be any point in the grid. The equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$ For this equation the center of the circle is (h, k) and the radius is r

- One person in your team should keep track of your ships and the opponents guesses.
- One person should keep track of your guesses.