

Coordinate Planes

Interactive Math Strategy Game

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Coordinate Planes

Interactive Math Strategy Game

Coordinate Planes is an interactive software application for students of Mathematics to display and exercise various concepts of the Cartesian coordinate system in an interesting and entertaining way. Gameplay consists of a Cartesian coordinate plane with various objects positioned in random locations on the grid. Opponents are shot down or destroyed by utilizing and performing essential Mathematical skills such as **Plotting Points**, **Slope**, calculating the **Equation of a Line**, and the **Pythagorean Theorem** (or Distance Formula). Classroom use can utilize both single and multiplayer modes.

I really believe this game can help enhance your classroom and students' learning experience. I know mine love it! This has been a 10 year project of passion, lots of snow days and summer evenings learning to program so I could offer this game.

System Requirements

Coordinate Planes requires:

- A reasonably modern PC running **Windows XP, Vista, 7**, or later.
- A **DirectX9** (or later) compatible graphics card with at least 32MB of memory.
- Also a **DirectX9** compatible sound card, or integrated sound chip, is required.
- It requires a screen resolution of at least 1024x768 and 65536 (16-bit) colors (but preferably 32-bit true color).
- It is always recommended that you make sure you have the most recent drivers installed for your system.
- **HTML5** compatible browser such as **Google Chrome**.
 - Web browser version is too big to run on a iPad or iPhone browser and should be played on a personal computer.

Coordinate Planes disk options:

- **Single User License**
 - Coordinate Planes is loaded onto a copy protected **green USB drive**. The installation folder can only be accessed a total of 5 times. Once installed, the USB drive is no longer needed, and it can be used as a normal flash drive.
- **School District License**
 - This version comes loaded onto a **red USB drive** and may be installed onto an unlimited amount of computers within a single local school district. Contact for information on purchasing a District License: <http://www.cplanes.com/contact/>

Topics	Gameplay
<p>Plot Points</p> 	<p>Destroy opposing teams' objects by entering the correct x and y coordinates of the target's location. This mode be played with <u>one</u> or <u>four quadrants</u>.</p>
<p>Slope</p> 	<p>Destroy opposing teams' objects by entering the correct slope of the line connecting the attack plane to the target. Coordinates will be given to aid student calculations. This mode can also be played with <u>one</u> or <u>four quadrants</u>.</p>
<p>$y = mx + b$</p> 	<p>Destroy opposing teams' objects by calculating the equation of the line connecting the attack plane to the target. This line would model the 2-dimensional trajectory of the bullet. Coordinates will be given to aid student calculations. The equation of the line must be entered in slope-intercept form ($y=mx + b$) and fractions must be entered as <u>improper</u> when necessary (no mixed numbers).</p>
<p>Distance</p> 	<p>Destroy opposing teams' objects by calculating the distance between the attack plane to the target. Once a target is selected, a triangle will appear to aid students' calculation. Can be solved use Pythagorean Theorem or the Distance Formula. Coordinates will also be given to aid student calculations. Answer must be rounded to the <u>nearest hundredth</u> whenever necessary.</p>
<p>Arithmetic Operations</p> 	<p>Allows for extra modes of play for students of all ages: Addition, Subtraction, Multiplication, and Division. Players destroy opposing teams' objects by calculating the solution to the given arithmetic problem (<i>all solutions will be whole numbers</i>).</p> <p>During setup, teacher can assign numbers to the set used in the operations by clicking on each number (remove number by clicking again). During setup a single operator must be chosen: +, -, x, / (if none is chosen game will <u>default</u> to x and 1-12).</p>

How to Play

Getting Started:

1. Select a **game mode** (top 5 are played in all 4 quadrants, bottom 2 are single quadrant only).
2. Select **single player** or the **number of teams** you would like.
3. Press “**Play Game**” button (it will appear after game mode and players have been selected).



Coordinate Planes Main Menu



Options: the options button will alter the in game timers, utilize saving options, and turn on revenge mode.



Webpage: the webpage button will link you to www.cplanes.com for new information and a post to let you play **Coordinate Planes** (HTML5 version) in your web browser. Your web browser must be HTML5 compatible.

How to Play

Options:

4. Click the clock to change **Game Timers**. The current **Shot Timer** and **Target Timer** will be displayed.
5. Select **Revenge Mode** to toggle **ON** and **OFF**. **Revenge Mode** allows players to still attack (and be engaged in the classroom) even after all their units are destroyed.
6. Click the **Save Disk** to enter save options. **Note:** Saving is not supported in the web browser version. Check out the Windows version for save state options.



Coordinate Planes Options Menu



Note: the attack plane is very stealthy. It only shows up when it is attacking, and it cannot be destroyed. Once a team's units are destroyed, the team is out of the game and cannot attack... unless you have Revenge Mode turned **ON** in the options menu.

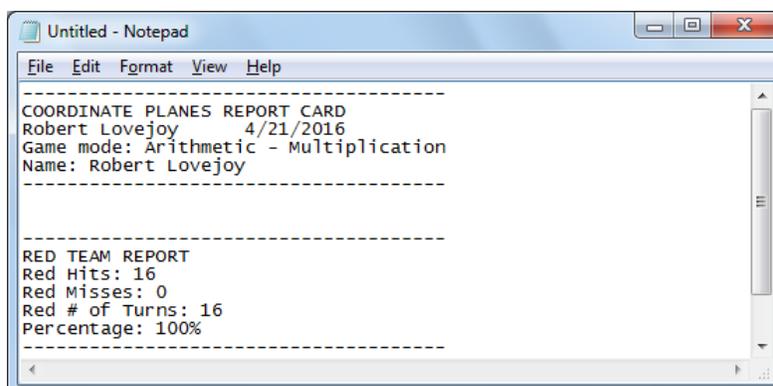
7. After pressing **Start Game**, a random team will become active. It's time to attack.
8. The **input device** (resembles a calculator, but has no computing power), is where student will enter their calculations. Buttons can be clicked with mouse, interactive whiteboard, or number pad on the computer keyboard (see **pg 7** for keyboard shortcuts).

- As game begins a random team will become active.
- Active team will be prompted to select a target.
- Click on any of the opposing units (not your team color) or press the random button to randomly and unbiasedly select a target.
- Using the input device, enter the correct solution to the given prompt.
- Double check solution and hit Fire.



9. **Game Over** condition.

- Gameplay continues until only a **single team** remains.
- Number of remaining units is displayed at the top right of screen.
- A report card is kept for each team.
- At the **endgame**, remaining team will be declared the winner.
 - A percentage of correct shots will be displayed for each team.
 - If playing the Windows version, a more detailed report can be copied to the clipboard. Simply paste into a text file or word processor for your records.
- If you wish to play another round, press next round to continue playing and build your current scores (**Single Player**: 10 rounds max and **Multiplayer**: 5 total team wins max).



Sample 1 player report



Note: The input device has a blue special character pad. These buttons are limited to their specific needs. The decimal point (.) is only active for distance. The fraction bar (/) is only active entering slope and y-intercepts. The undefined symbol (∅) is used to input an undefined slope. Lastly the negative symbol (-) toggles the last number between (+/-).

Keyboard Shortcuts

Hot Keys

Touch Screen	Keyboard Shortcuts
<p>Number Keys</p> 	<p>The number buttons on the touch screen input device can be activated by pressing the corresponding number keys on the keyboard or keyboard number pad.</p>
<p>Blue Pad</p> 	<p>The blue special character pad shortcuts:</p> <ul style="list-style-type: none"> • The decimal point (.) on the keyboard number pad. • The fraction bar (/) on the keyboard number pad. • The undefined symbol (∅) by pressing the (U) on the keyboard. • Pressing the negative symbol (-) on keyboard number pad toggles the last number between (+/-).
<p>Enter and Fire</p> 	<p>Enter and Fire can be activated pressing the (enter) key on the keyboard or keyboard number pad. After calculations are prepared and entered, the enter key will change to fire in order to fire on the targeted object.</p>
<p>Random</p> 	<p>Random can be activated by pressing the (space) key on the keyboard. This will randomly target an object from one of the opposing teams.</p>
<p>Clear</p> 	<p>Clear can be activated by pressing the (backspace) or (delete) keys on the keyboard. This will clear all inputted data for that turn, and player must input again.</p>
<p>Saving and Loading</p> 	<p>Saving and Loading can be activated pressing the (S) and (L) key respectively. Unfortunately saving is not supported in <i>Arithmetic Operations Mode</i> as the temporary number sets cannot be saved.</p>

End User License Agreement Prepared for Robert A. Lovejoy

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