How to build Circle Wars

Lightning reactions are essential in Circle Wars, a fast-paced game in which you hunt green circles while being chased by red ones. The game uses Scratch's clones feature, which can turn a single sprite into an army of sinister copies.

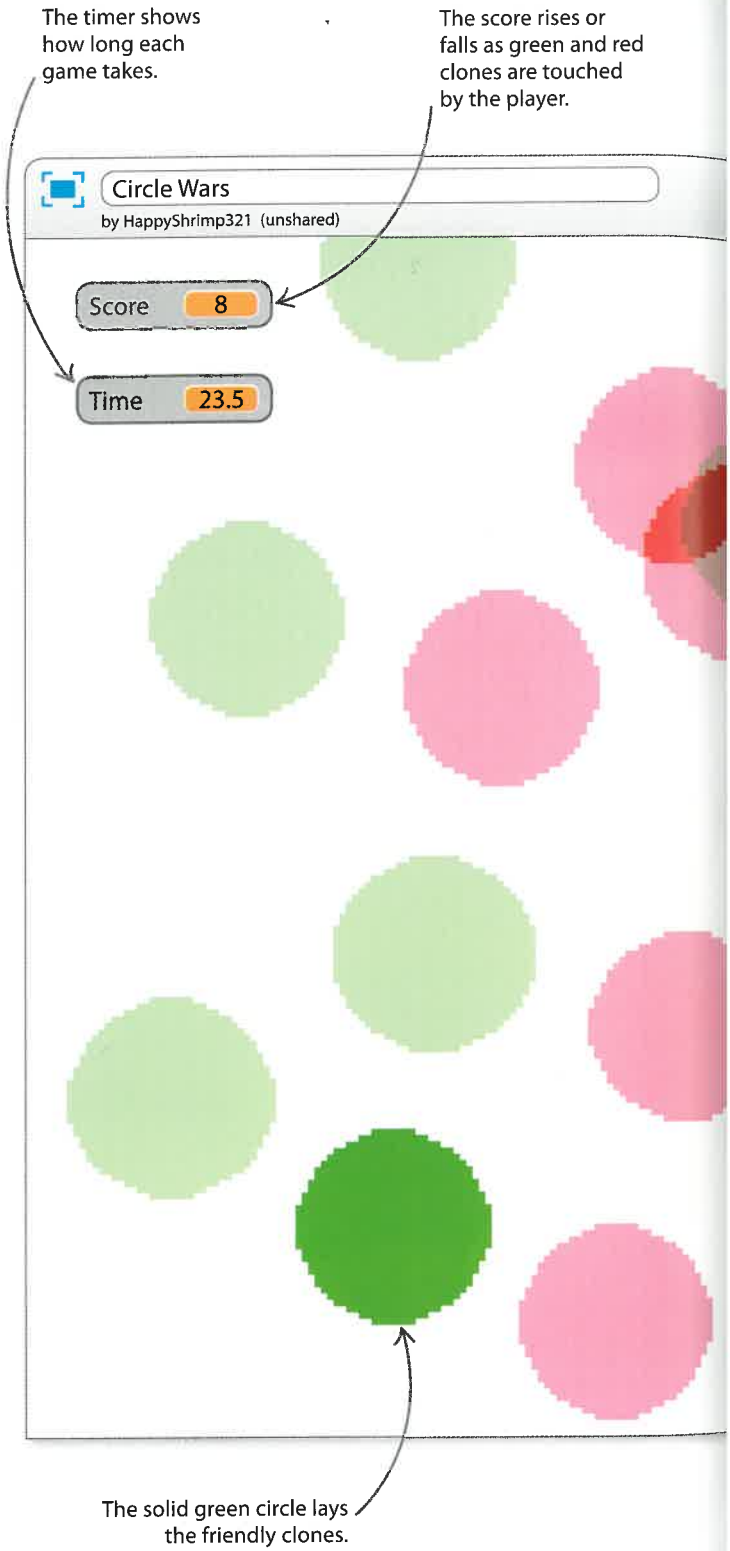
AIM OF THE GAME

Move the blue circle around the screen using the mouse. Collect the pale green circles, but avoid the red ones that march towards you like a zombie army. The solid green and solid red circles drop clones of themselves as they roam around. Score more than 20 points to win and go below –20 to lose.

◁ **Player**
The player is the blue circle. If you don't keep moving quickly, the enemy circles will soon overwhelm you.

◁ **Friends**
The friendly circles are green. When you touch one, you score a point and the circle disappears with a pop.

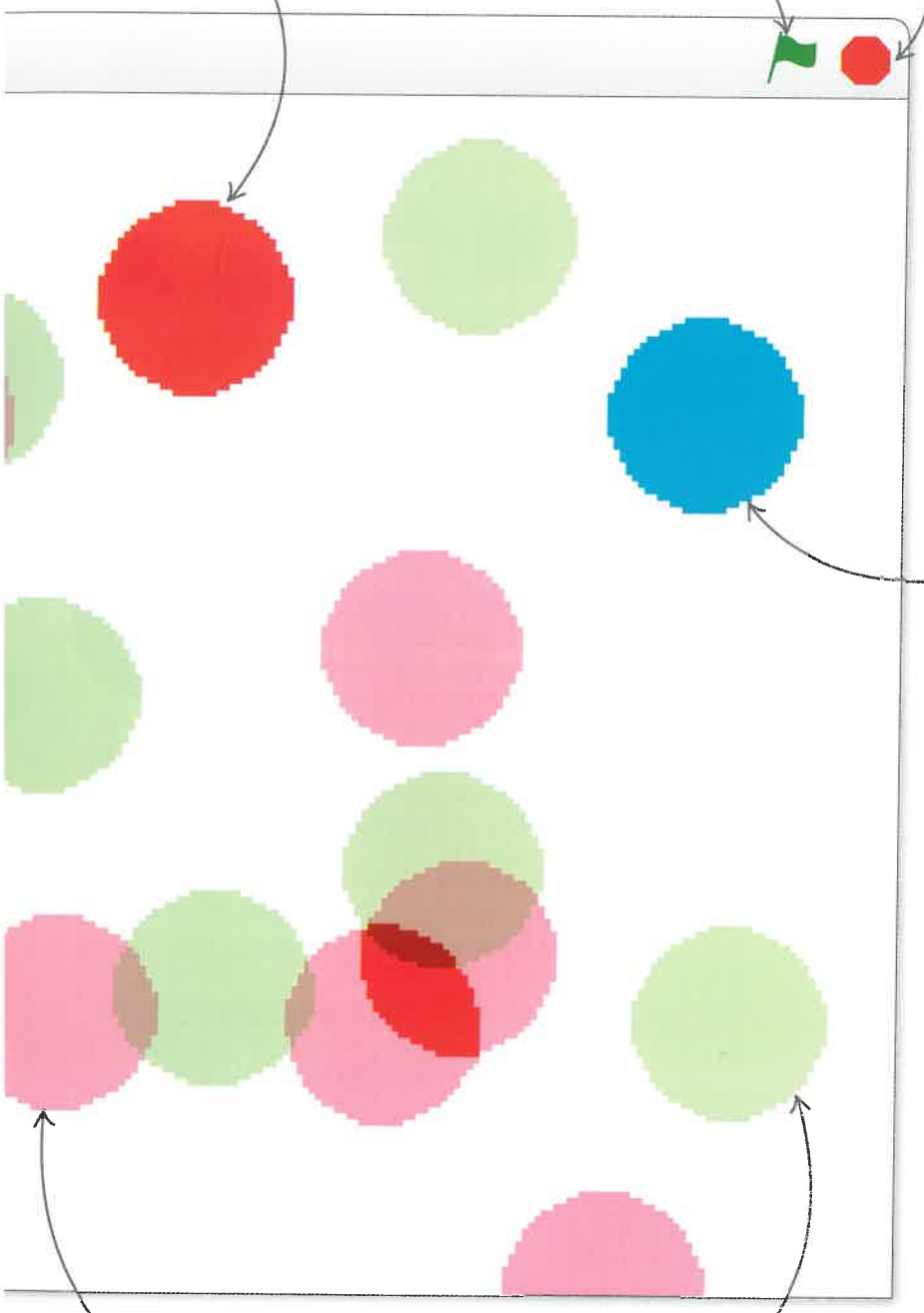
◁ **Enemies**
Steer clear of the red enemy circles. Touch one and it takes three points off your score, before vanishing with a clash of cymbals.



he solid red circle lays the enemy clones.

Click the green flag to start a new game.

Click the stop sign to end a game.



Player

Clones of the solid red circle chase the player.

Clones of the solid green circle chase the player.

GAME CONTROLS

Use a computer mouse or touchpad to control this game.

It's all my own work!

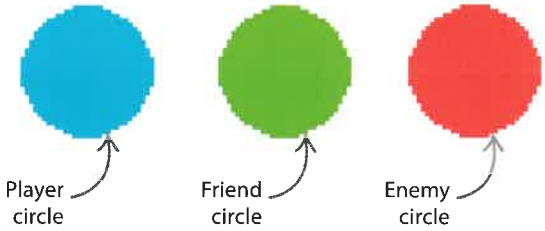
◁ Is it art?

Not all games use cartoon sprites. With its coloured circles, this game looks more like a piece of modern art. Once you've built it, why not make up a story to explain the game. You can change the sprites, colours, and backdrop to tell that story.

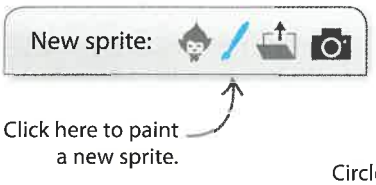
Don't let them get you!

Creating the sprites

First you need to create the three sprites for the main game. These are all simple coloured circles, so you can draw them yourself. Start by following these instructions to create the player's character – the blue circle.

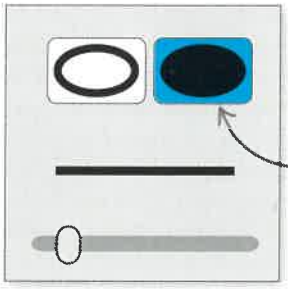


1 Start a new project and name it "Circle Wars". Click the paintbrush symbol at the top of the sprites list to paint a new sprite.



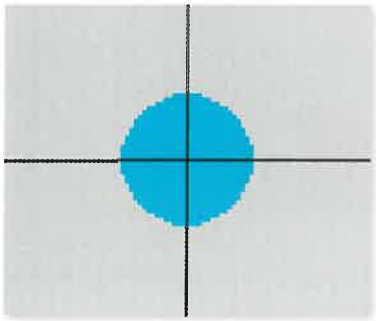
2 To draw a blue circle, first select "Bitmap Mode" (bottom right). Then choose blue in the colour palette.

3 Click the circle tool on the left and then select a solid colour (rather than an outline) at the bottom left of the paint editor.



4 While holding down the shift key (this gives you a circle rather than an oval), click with the mouse and drag to draw a circle. The circle should be about the size of the cat's head. When you're happy with the circle's size, delete the cat sprite (right-click on it and select "delete").

5 You now need to centre the sprite. Select the "Set costume centre" tool (top right) and then click in the very centre of the circle. Rename the sprite "Player" by clicking on the blue "i" in the sprites list.



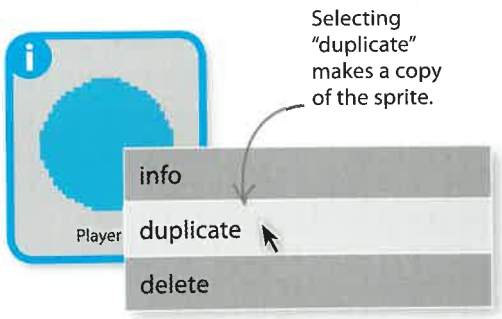
EXPERT TIPS

Resizing the circle

If your circle is too big or too small, you can change the size of it by selecting either the "Grow" or "Shrink" tool on the bar along the top of the Scratch screen, then clicking on the circle.

laking friends and enemies

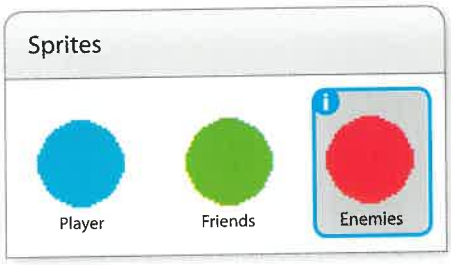
ou can now make the green friend and red nemy circles. You can use other colours if you ce, but make sure you can easily tell the three fferent circles apart.

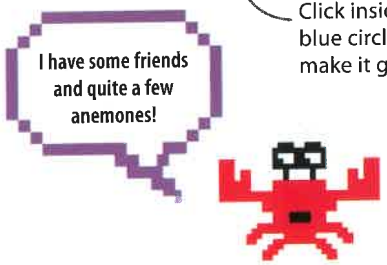


5 Start by right-clicking on the Player sprite and selecting "duplicate". Do this twice. You'll now have three blue circles. Rename Player2 as "Friends" and Player3 as "Enemies".

7 Select the Friends sprite and click the Costumes tab. Choose green in the colour palette. Select the "Fill with color" tool and click inside the blue circle to make it turn green.

8 Repeat the steps for the Enemies sprite, but colour this sprite red. You should now have three different coloured sprites.

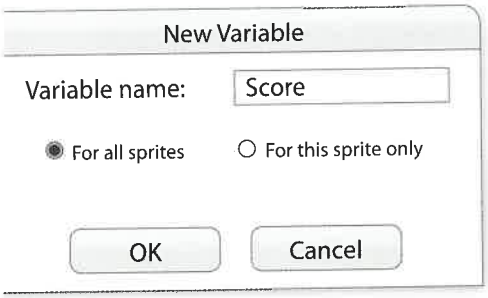




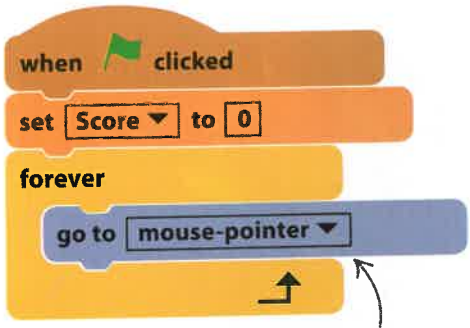
nstant player control

low add a score display and a script to make ne Player sprite stick to the mouse-pointer – ust like in Star Hunter.

9 Select the Player sprite, click Data, and make a variable called "Score" for all sprites. Then tick the variable's check box to show "Score" on the stage.

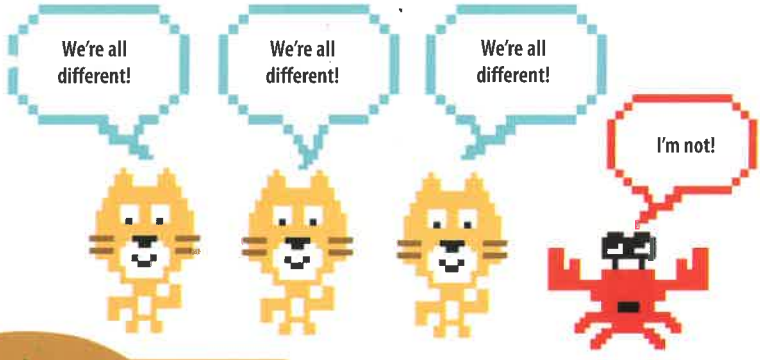


10 Add the script below to get the blue circle following the mouse. Read it through and make sure you understand what it does. Run the script to check it works. The red and green circles won't do anything yet.

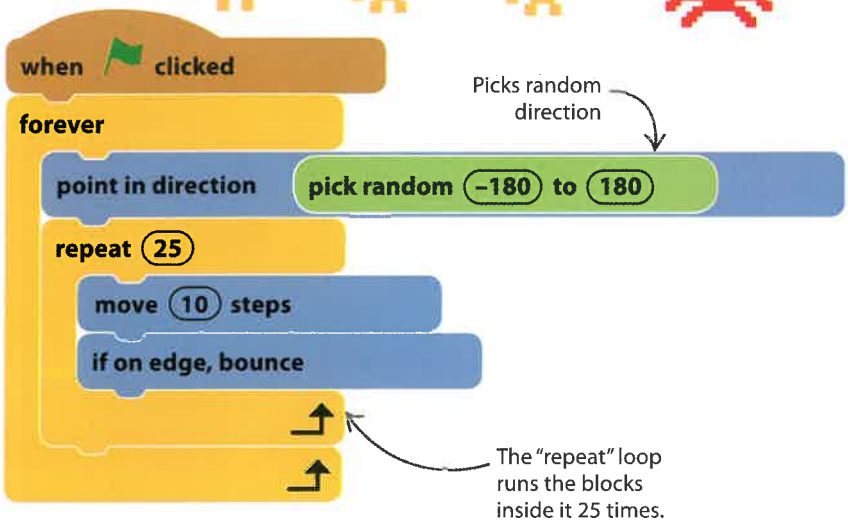


March of the clones

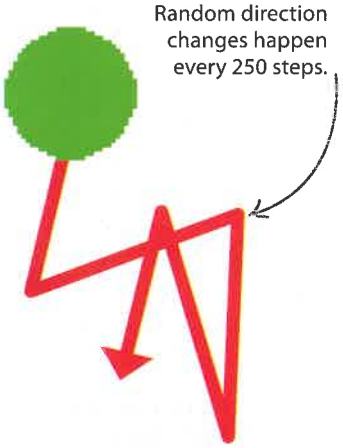
From just two sprites – the green and red circles – you can create an army of friends and enemies to pursue the player's blue circle. You can do this through the magic of cloning. Before you create your clones, first get the Friends sprite moving randomly around the stage.



11 Select the green Friends sprite. Add this script to make the circle bounce around the stage with a random change of direction every 250 steps.



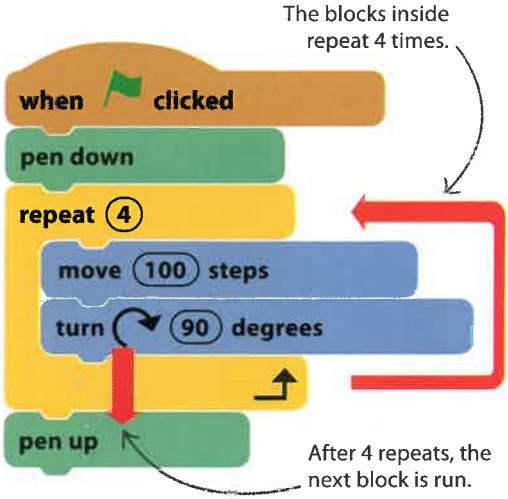
12 Run the project and watch the green circle's unpredictable journey. The Friends sprite moves 250 steps in 10-step jumps but it doesn't get stuck to the walls. After 250 steps, the "forever" loop goes back to the start. The sprite changes direction randomly and sets off again.



EXPERT TIPS

Repeat loops

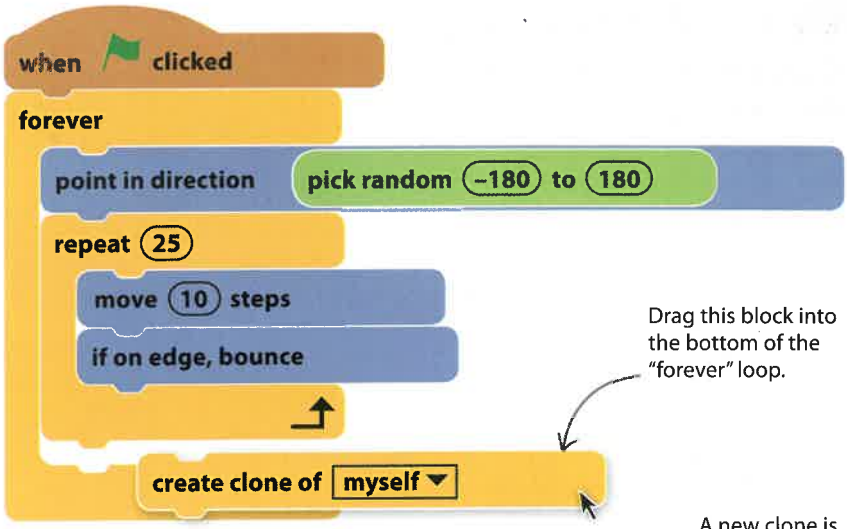
You've already seen "forever" loops that repeat a group of blocks nonstop. A "repeat" loop does a similar job, but it only repeats the blocks inside a fixed number of times. This type of loop is sometimes called a "for" loop, because it repeats *for* a certain number of times. The example shown here repeats an action four times to draw a square.

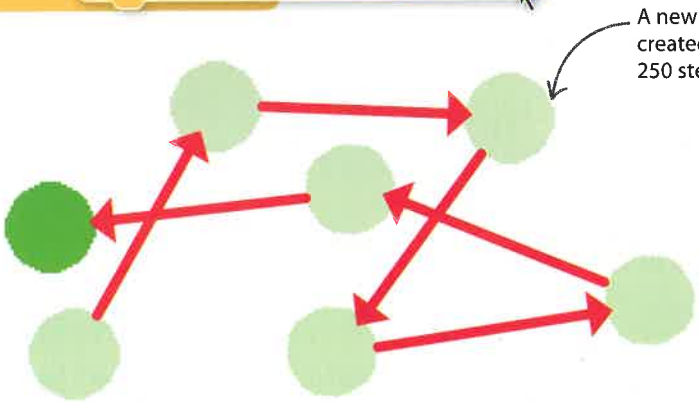


Making clones

Now we're going to make our friendly clone army. These are the clones you need to catch to score points.

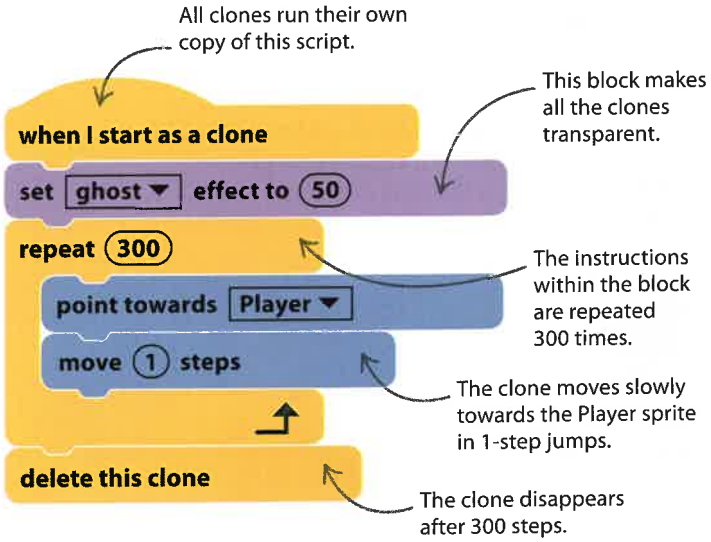
13 Add a "create clone of myself" block as the last block in the "forever" loop. You'll find it in the yellow Control section. This block will create a clone of the Friends sprite after each 250-step movement.





14 Run the project. At each change of direction, the sprite leaves a copy of itself – a clone. The clones aren't just pictures – they are fully working copies of the original sprite, and you can give them their own instructions.

15 New clones are controlled by a special script that starts with the block "when I start as a clone". Add the script below to the Friends sprite. The script tells each clone to move towards the Player sprite for 300 steps, after which the clone is deleted and vanishes from the stage. The clones move one step at a time. They move more slowly than the original Friends sprite, which moves in 10-step jumps.

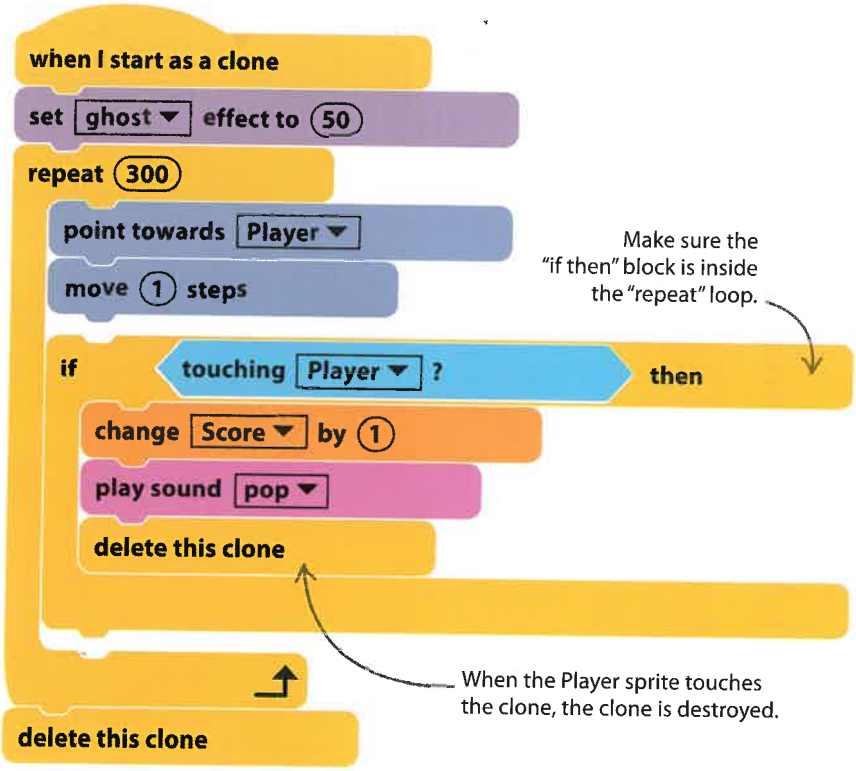


16 Run the script and watch the green clones advance slowly towards the Player sprite. Don't worry – they're the good guys!

Destroying clones

The last part of the script for the Friends clone checks if the clone is touching the Player. If it is, the clone gets deleted.

17 Add an "if then" block containing the blocks shown here to check whether the clone is touching the Player sprite after each move. Try running the project now – the score should rise as you touch green circles, which instantly disappear with a pop.



EXPERT TIPS

Clones

Clones are useful any time you want lots of copies of a sprite. Many programming languages let you make copies of things, but they are often called objects rather than clones.

Such languages are called "object oriented" languages and include Java and C++. In Scratch, there are three orange blocks that control clones, all found in the Control section.

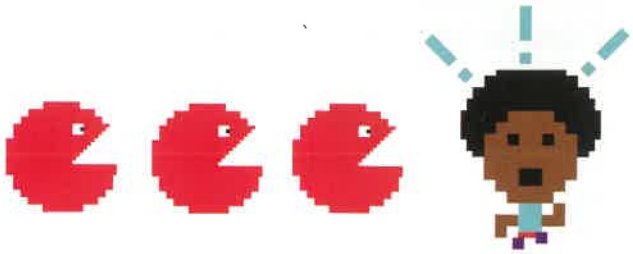
△ This block creates a clone of the sprite. The clone is identical to the sprite and appears in the same position and facing the same direction, so you won't be able to see it until it moves.

△ This block gets rid of the clone. All clones disappear from the stage when a project stops, leaving just the original sprite.

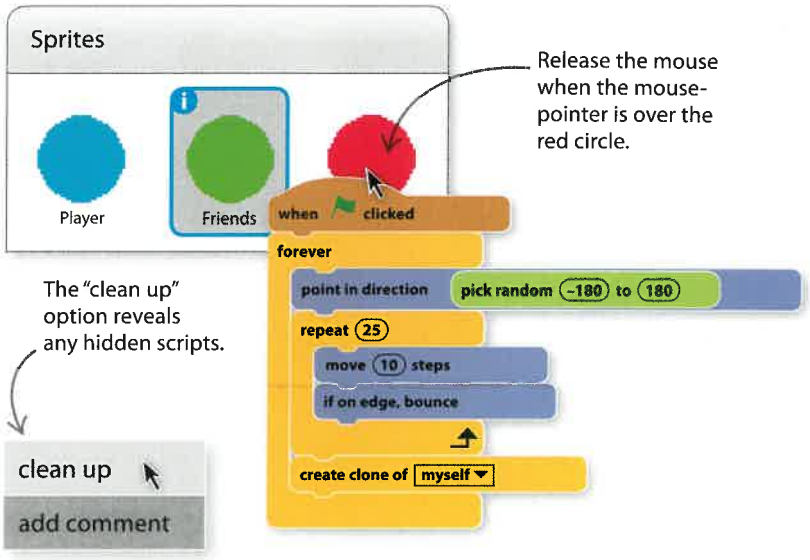
△ When a clone starts, it runs the script headed with this block. Clones don't run the sprite's main script, but they can run all other scripts in the sprite's scripts area, such as scripts triggered by messages.

nemy clones

ow you need to add scripts to the Enemies sprite
make it produce clones that chase the Player.
ou can do this by copying the scripts from the
iends sprite across to the Enemies sprite.

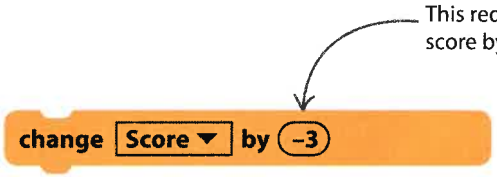


8 To copy scripts, just click, drag, and drop scripts from one sprite onto another. Drag the two scripts you made for the Friends sprite onto the Enemies sprite, one at a time. This makes copies of the scripts in the Enemies sprite.

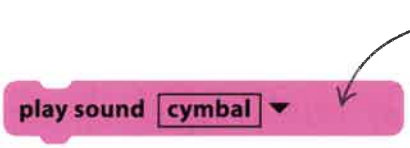


9 Select the Enemies sprite. The scripts you dragged and dropped will probably be on top of one another, because any copied script just appears at the top left of the scripts area. To rearrange them, right-click on the background and select "clean up".

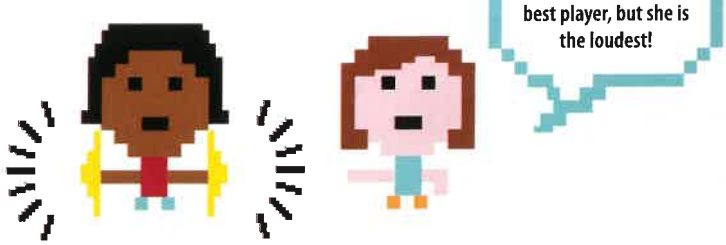
0 Now adjust the Enemies clone script so that it takes points away when the Player touches a red clone. Alter the "change Score by" block so it changes the score by –3 instead of +1. You really want to avoid those nasty red enemies!



1 Add a sound to tell the player that points have been lost. Load the cymbal sound into the Enemies sprite by selecting "cymbal" in the sound library. Alter the script to play "cymbal", not "pop". You'll now hear which type of clone you've touched.



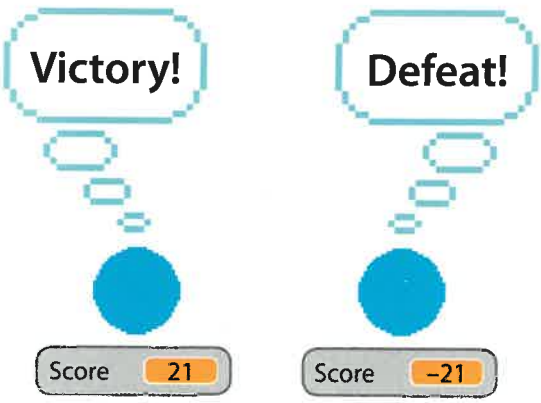
2 Run the project. Check that you now have both red and green clones, and that touching a red clone takes 3 points off your score.

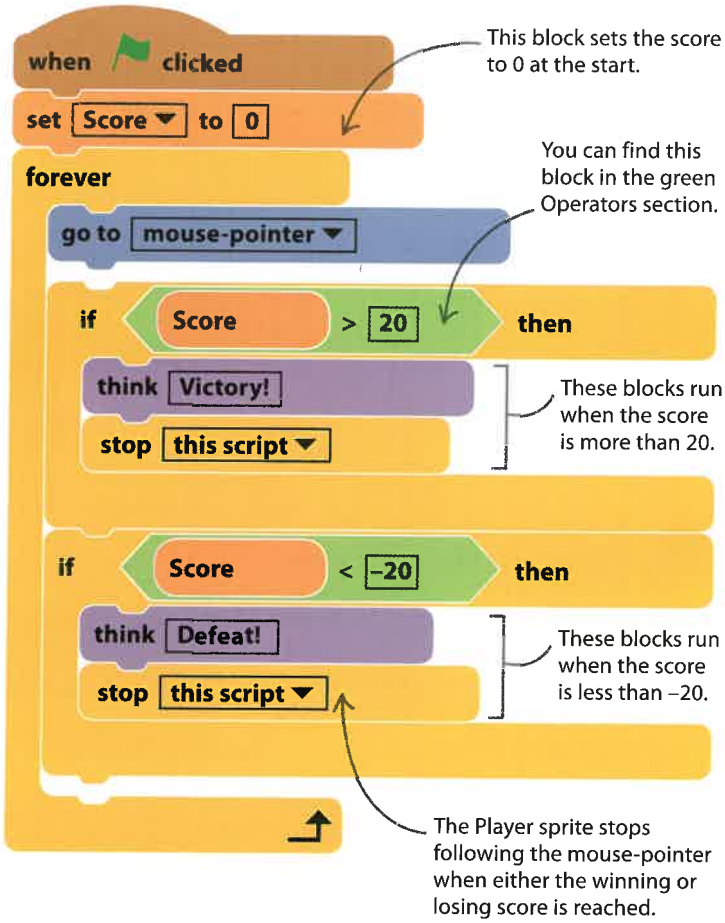


Win or lose?

You've created two ever-expanding clone armies: one of friendly circles that help you win points, and one of evil circles that make you lose points. Next you need to add the code that tells you if you've won or lost the game.

23 Add the new "if then" blocks shown here to the Player sprite. They check your score. If the score is greater than 20, you win, and a thought bubble with the word "Victory!" appears. If the score is less than –20, you lose, and the sprite thinks "Defeat!"

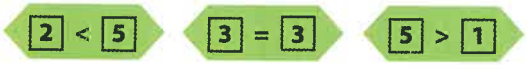




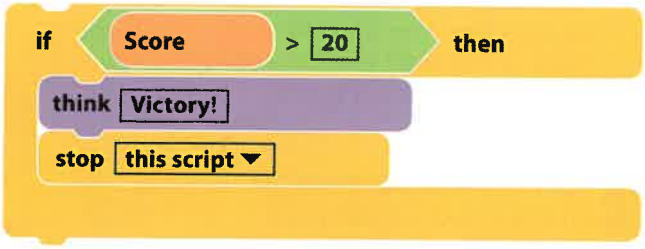
LINGO

Comparison operators

Earlier we saw how you can use "if then" blocks to create true or false statements – also known as Boolean expressions – that lead to different outcomes. For example, in Star Hunter, "if touching cat then play sound fairydust" makes a sound play only when the cat gets a star. We can do the same thing with numbers by using what are called comparison operators:



When we add these to "if then" blocks, they create statements that are either true or false. In Circle Wars, the "is more than" operator tells you that you've won the game when you score over 20.



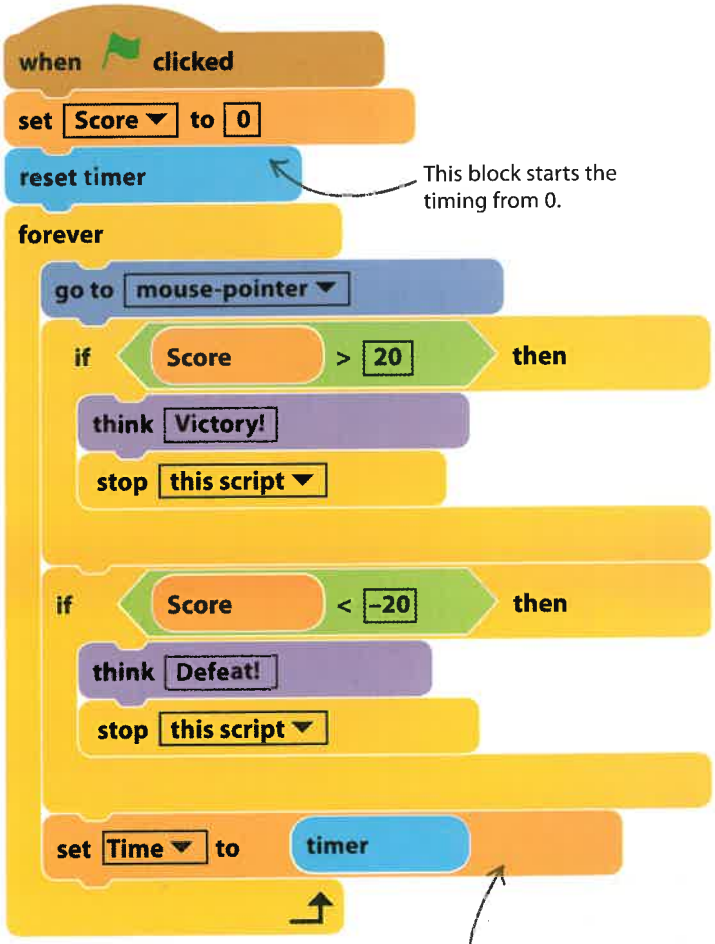
4 Run the game. Try to touch only the green circles. Check that the game ends when the key scores are reached, and check that the Player sprite thinks "Victory!" or "Defeat!" You can reduce the score needed to win if you find it too difficult. But don't make the game too easy – Circle Wars is meant to be a challenge!

ıdding a timer

› add some competition to the ame, you can include an on-screen mer that shows players how long ıey take to complete a game.

5 Click on the Data section and make a variable "Time" for all sprites. To show it on the stage, tick the box next to the variable's block. Select the Player sprite. Click on Sensing in the blocks palette. Add "reset timer" to the Player's script, just before the "forever" loop. Go back to Data and drag a "set Time to" block to the script and add "timer" to it, making it the last instruction in the forever loop.

6 By copying "timer" to the variable "Time", each trip around the loop will now display the time on the stage. But the moment the player wins or loses, the time stops being updated (the script is stopped) and the total time it took to win or lose is shown.



Instructions

Players need to know the rules of the game. Create a special sprite that shows the instructions for Circle Wars when the game begins.

27 Use the paintbrush symbol to create a new sprite and rename it "Instructions". Select "Bitmap Mode" and choose a colour. Select the "Fill with colour" tool and click on the drawing area to fill it with your chosen colour.

"Fill with color" tool 

28 Now select black from the palette as the colour for the text. Then choose the text tool and type out the instructions shown here.

Text tool 

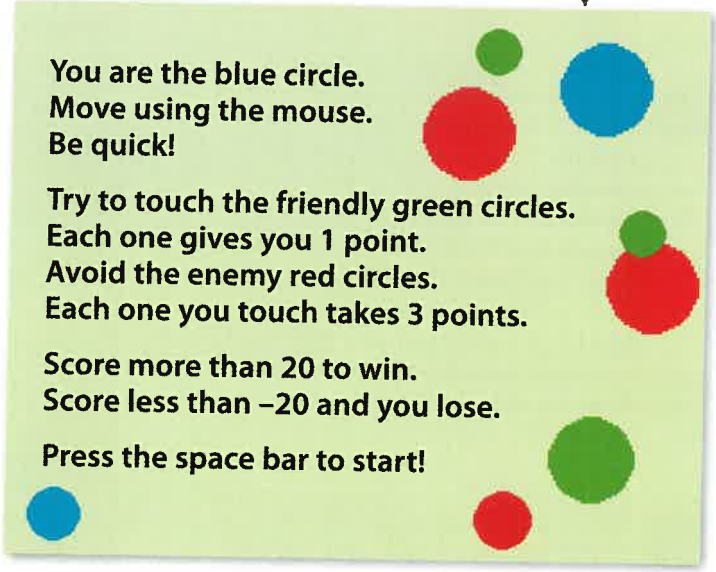
29 If the text doesn't fit, use the select tool to resize it by pulling the corner points in or out. When you've finished, click outside the box around the text to stop editing.

"Select" tool 

Use black for the text.

Choosing a light background colour will make the text easier to read.

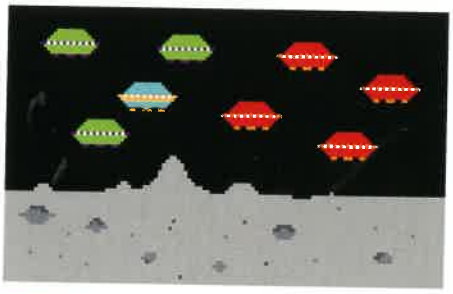
You may want to decorate your instructions with coloured circles.



GAME DESIGN

Game stories

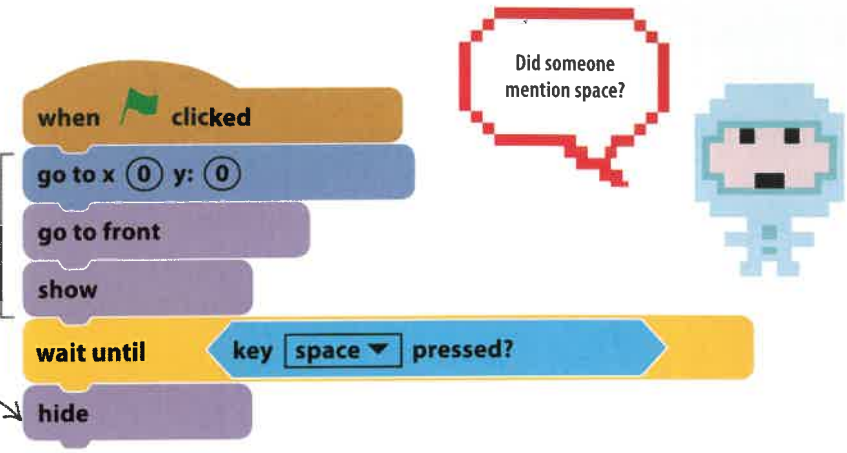
Computer games usually have a story to explain why the action in the game is happening. At the moment, Circle Wars has no story. Can you make one up? It could be a battle in space, with a blue spaceship saving friendly green spaceships and trying to avoid being hit by the red enemy craft. Let your imagination run riot! Including some of the story in your instructions will help to make the game more interesting and exciting for the player.



30 Add this script to the sprite to show the instructions on the stage at the start of the game. Read it carefully. Can you see how it works?

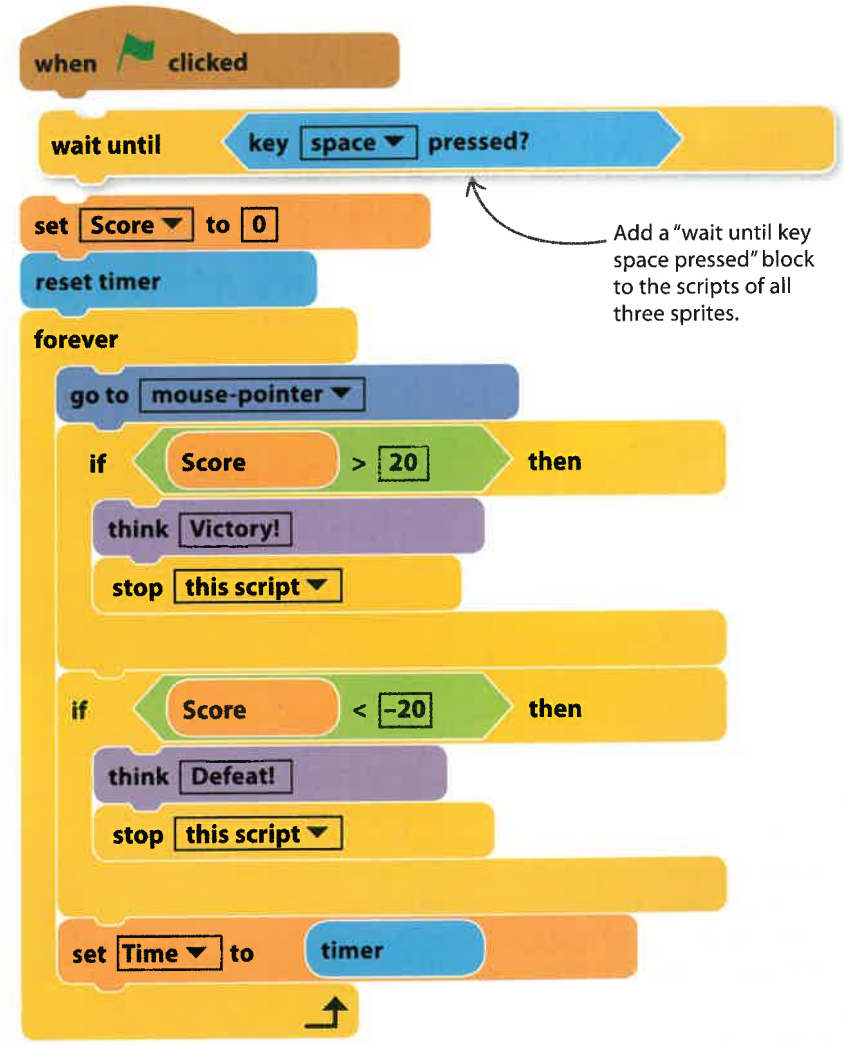
These blocks show the instructions in the centre of the screen in front of other sprites.

This block hides the Instruction sprite when the player presses the space bar to start playing.



31 You also need to add a "wait until key space pressed" block immediately after the green flag blocks in the Player, Friends, and Enemies sprites' scripts. This will hold back all the action until the space bar is pressed.

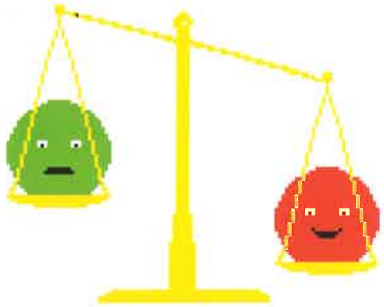
Add a "wait until key space pressed" block to the scripts of all three sprites.



32 Run the project and your instructions should appear, filling the screen until you press the space bar. Players will have plenty of time to read and understand the instructions, letting them start the game when they're ready.

Hacks and tweaks

You've got Circle Wars working – well done! Now to personalize it and make it your own. Try these suggestions and your own ideas. Once you've created something unique, why not share it on the Scratch projects website?



△ **Find a balance**

Experiment with different speeds, or change how many points you win or lose for touching Friends and Enemies. It's not difficult to make the game very hard or very easy, but can you find a balance to make it just the right level?

▽ **What's the story?**

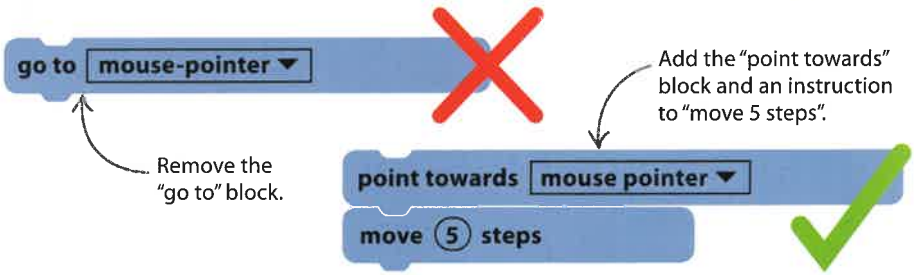
Did you think of a story to explain what's going on in Circle Wars? Maybe it's the attack of the dragons, and the princess player has to eat cakes to survive? Add some scenery and music to the game to fit with that story. Experiment with different stories and looks.

▷ **The war's over!**

Add a broadcast message to reveal a game-over sprite when the player wins or loses, like you did in Cheese Chase. You can change the text of the game-over sprite so that it relates to your story about the game.

▷ **Slow down, blue!**

To make things tricky, change the blue circle's script so that it no longer "sticks" to the mouse pointer but chases slowly after it. You could also invent simple keyboard controls for the sprite.

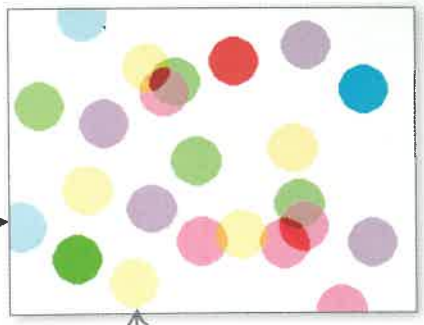


▽ **Tweak the timer**

The number in the timer flickers because it shows lots of decimal places. To round the value so it shows only whole seconds, use the green "round" block near the bottom of the Operators section. Try adding a "Best time" for winning players, just as you added a "High score" in Cheese Chase.

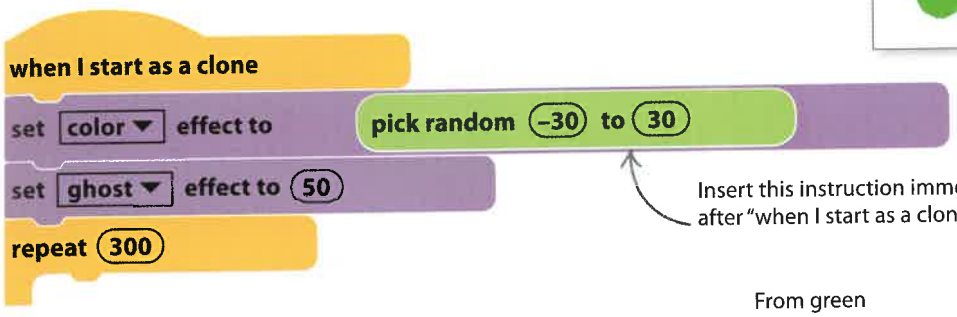
7 Change the colours

ary the clones' colours. Click on the Friends sprite. Add ıe "set color effect to" block from the Looks section to ıe sprite's clone script. Then drag "pick random" from ıperators into the block's window and change the alues to –30 and 30. Do the same for the Enemies prite. New clones will now have different colours!



Green and blue circles are friends.

Orange, yellow, pink, and purple circles are enemies.

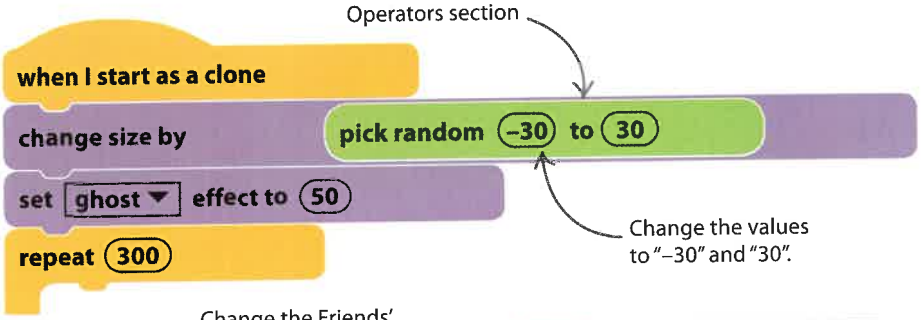


Insert this instruction immediately after "when I start as a clone".

> Change the size

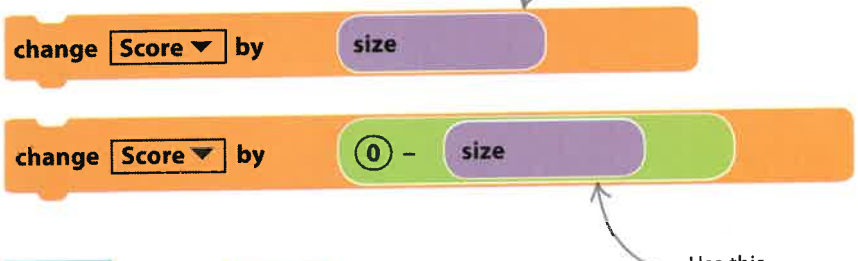
\dd the "change size by" block to he scripts of both the Friends and :nemies sprites to make each clone ı random size. Alter the scoring so hat the size of the circle you touch letermines how many points you :core. You'll also need to change he totals needed to win or lose. Try nore than 2000 points for victory, ınd less than –2000 for defeat.

From green Operators section

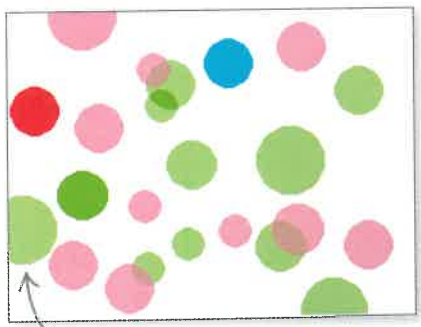


Change the values to "–30" and "30".

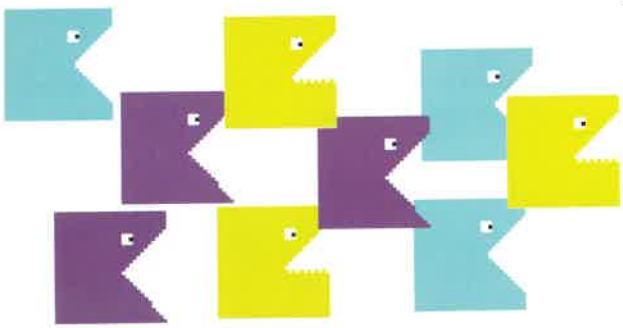
Change the Friends' score value to this.



Use this scoring for Enemies.



The bigger the clone, the more points you win or lose.



◁ Shape shifting

Introduce another shape into the game. It could be a square that eats red circles, a triangle that runs away from the player, a hexagon that makes the player shrink or grow, or anything else you want to try.