Introduction

In this project you'll create a maths quiz game in which the player has 30 seconds to give as many correct answers as possible.

What you will make

![Game Image]

What you will learn

- How to use broadcasts in Scratch
- How to create and use a custom Scratch block

What you will need

Hardware

- A computer capable of running Scratch 3

Software

- Scratch 3 (either online or offline)

Step 1: Create questions

You're going to start by creating random questions that the player has to answer.
Open a new Scratch project.

**Online:** open a new online Scratch project at rpf.io/scratch-new.

**Offline:** open a new project in the offline editor.

If you need to download and install the Scratch offline editor, you can find it at rpf.io/scratchoff.

Add a character sprite and a backdrop for your game. You can choose any you like! Here's an example:

Make sure you have your **character** sprite selected. Create two new variables, called **number 1** and **number 2**, to store the numbers for the quiz questions.

Add code to your **character** sprite to set both of the **variables** to a **random** number between 2 and 12.

Add code to **ask** the player for the answer, and then **say for 2 seconds** whether the answer was right or wrong:
Test your project twice: answer one question correctly, and the other incorrectly.

Add a `forever` loop around this code, so that the game asks the player lots of questions in a row.
Here is what your code should look like:

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**Step 2: Add a timer**

✅ Activity Checklist
Can you add a score to your game? You could add code so that the player scores a point for every correct answer. If you're feeling mean, you could also add code to reset the player's score to zero if they give a wrong answer!

Create a countdown timer on the Stage with the help of a new variable called `time`. The timer should begin at 30 seconds and count down to 0 seconds. Here is the what your new code should look like:

![Code example for a countdown timer]

Create a `broadcast` that sends the message 'end'. A `broadcast` is like an announcement over a loudspeaker: it can be heard by all of your sprites. Add the `broadcast` block to the end of the timer code so that the code will send and 'end' message when the `time` has counted down to 0.

![Code example for a broadcast]

Select your character sprite and add some code so that the sprite stops the other scripts when it receives the `end` message.

![Code example for stopping scripts]

Test your game again. It should continue to ask questions until the timer has counted down to 0.

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**Challenge: add a score and reactions**

Can you add a score to your game? You could add code so that the player scores a point for every correct answer. If you're feeling mean, you could also add code to reset the player's score to zero if they give a wrong answer!

Can you make your character react to the player's answer by changing to a
Step 3: Multiple games

Now you're going to add a 'Play' button, so that the player can play your game lots of times.

✔️ Activity Checklist

☐ Create a new 'Play' button sprite that the player needs to click to start a new game.
You can draw the sprite yourself, or edit a sprite from the library.
The new code includes another `broadcast` block, which sends the message 'start'.

The new code makes the 'Play' button sprite show when when player clicks on the flag. When the player clicks on the button sprite, the sprite hides and then broadcasts a message that other sprites can react to.

At the moment, the character sprite starts asking questions when the player clicks the flag. Change your game’s code so that character sprite starts asking questions when it receives the 'start' `broadcast`.

Select your `character` sprite and, in its code section, replace the `when flag clicked` block with a `when I receive start` block.

Click the green flag, and then click on the new 'Play' button to test whether it works. You should see that the game doesn't start before you click on the button.
Can you see that the timer starts when the green flag is clicked, instead of when the game starts?

Can you change the code for the timer so that the timer starts when the player clicks on the button?

Add code to your **button** sprite so that the button shows again at the end of each game.

Test the 'Play' button by playing a couple of games. The button should show at the end of each game.
To test the game more quickly, you can change the value of **time** so that each game is only a few seconds long.

You can change how the **button** looks when the mouse pointer hovers over it.
Can you add another backdrop that is going to be the start screen for your game?

You can use the `when I receive start` and `when I receive end` blocks to switch between the backdrops.

To show or hide the character when your game switches between backdrops, you can use `show` and `hide` blocks.

To show or hide the timer and score when your game switches between backdrops, you can use `show variable` and `hide variable` blocks.

**Challenge: create a start screen**

Can you add another backdrop that is going to be the start screen for your game?

You can use the `when I receive start` and `when I receive end` blocks to switch between the backdrops.

To show or hide the character when your game switches between backdrops, you can use `show` and `hide` blocks.

To show or hide the timer and score when your game switches between backdrops, you can use `show variable` and `hide variable` blocks.
Step 4: Add graphics

At the moment, the character sprite just says yes! :) or no :(! to the player's answers. Add some graphics to let the player know whether their answer is correct or incorrect.

✅ Activity Checklist

Create a new sprite called 'Result', and give it a 'tick/check' and a 'cross' costume.

Change your character sprite's code so that, instead of saying something to the player, it broadcasts the messages 'correct' or 'wrong'.

Now you can use these messages to show the 'tick' or 'cross' costume. Add the following code to the 'Result' sprite:
Can you see that the code for `when I receive correct` and `when I receive wrong` is nearly identical?
So you can change your code more easily, you are going to create a custom block.

Select the 'Result' sprite. Then click on My Blocks, and then on Make a Block. Create a new block and call it `animate`.

Test your game again. You should see the tick whenever you answer a question correctly, and the cross whenever you answer incorrectly!
Move the code to **show** and **hide** the 'Result' sprite into the **animate** block:

![Code block diagram](image)

Make sure you have removed the **show** and **hide** blocks below both of the **switch costume** blocks.

Then add the **animate** block below both of the **switch costume** blocks. Your code should now look like this:

![Code block diagram](image)

Because of the custom **animate** block, you now only need to make one change to your code if you want to show the 'Result' sprite’s costumes a longer or shorter time.

- Change your code so that the 'tick' or 'cross' costumes display for 2 seconds.
- Instead of **showing** and **hiding** the 'tick' or 'cross' costumes, you could change your **animate** block so that the costumes fade in.

![Code block diagram](image)

Can you improve the animation of the 'tick' or 'cross' graphics? You could add code to make the costumes fade out as well, or you could use other cool effects:
Challenge: sound and music

Can you add sound effects and music to your game? For example, you could have your game:

- Play a sound when the player gives a correct or incorrect answer
- Play a ticking sound as the countdown timer runs
- Play a sound when the player's time is up

Your game could also constantly play background music on a loop.
Challenge: race to 10 points

Can you change your game so that the player, instead of answering as many questions as possible in 30 seconds, answer 10 questions as quickly as possible.
To make this change, you only need to change your timer code. Can you see which blocks need to be different?

Challenge: instruction screen

Can you add an instructions screen that tells the player how to play the game?
For this, you need an 'Instructions' button, and another Stage backdrop.

You may also need to add a 'Back' button that lets the player go back to the start screen.