# Computing at Pipworth Community ry School

John Kelly

# Our Intent:

At Pipworth Community Primary School, we aim to equip our pupils, in order that they are able to participate in a rapidly changing world in which work and other activities are increasingly transformed by access to varied and developing technology. We recognise that computing is an important tool in both the society we live in and in the process of teaching and learning. Pupils use different tools to find, explore, analyse, exchange and present information responsibly and creatively. They learn how to employ computing to enable rapid access to ideas and experiences from a wide range of sources.

Our vision is for all teachers and learners in our school to become confident users of ICT so that they can develop the skills, knowledge and understanding which enables them to use the appropriate resources effectively as powerful tools for teaching & learning.

# Implementation:

The national curriculum for computing aims to ensure that all pupils:

- Can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation.
- Can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems.
- Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.
- Are responsible, competent, confident and creative users of information and communication technology.

# Implementation:

## Teach Computing Curriculum overview

### Brief overview

| | Computing systems and networks[1] | Creating media | Programming A | Data and information | Creating media | Programming B |
|---|---|---|---|---|---|---|
| Year 1 | Technology around us (1.1)* | Digital painting (1.2) | Moving a robot (1.3) | Grouping data (1.4) | Digital writing (1.5) | Programming animations (1.6) |
| Year 2 | Information technology around us (2.1) | Digital photography (2.2) | Robot algorithms (2.3) | Pictograms (2.4) | Digital music (2.5) | Programming quizzes (2.6) |
| Year 3 | Connecting computers (3.1) | Stop-frame animation (3.2) | Sequencing sounds (3.3) | Branching databases (3.4) | Desktop publishing (3.5) | Events and actions in programs (3.6) |
| Year 4 | The internet (4.1) | Audio production (4.2) | Repetition in shapes (4.3) | Data logging (4.4) | Photo editing (4.5) | Repetition in games (4.6) |
| Year 5 | Systems and searching (5.1) | Video production (5.2) | Selection in physical computing (5.3) | Flat-file databases (5.4) | Introduction to vector graphics (5.5) | Selection in quizzes (5.6) |
| Year 6 | Communication and collaboration (6.1) | Webpage creation (6.2) | Variables in games (6.3) | Introduction to spreadsheets (6.4) | 3D modelling (6.5) | Sensing movement (6.6) |

# Implementation:

| Key Skills | Digital Literacy | | Programming | | Understanding and Sharing Data | |
|---|---|---|---|---|---|---|
| EYFS Organistation of Knwoledge | Safe, effective and competent use of technology<br>Personal use, devices, safety | | Computer science and coding<br>Algorithms, programming | | Using information effectively<br>Personal information, software/application knowledge | |
| EYFS 2 | What is a Computer? | Tinkering: Bee-Bots | | We Control Technology | | |
| YEAR 1 | Technology Around Us | Digital Painting | Moving a Robot | Grouping Data | Digital Writing | Programming Animations |
| YEAR 2 | It Around Us | Robot Algorithms | Digital Photographs | Quizzes | Pictograms | Making Music |
| YEAR 3 | Connecting Computers | Creating Media – Stop-Frame Animation | Programming A – Sequencing Sounds | Data and Information – Branching databases | Creating Media – Desktop Publishing | Programming B – Events and actions |
| YEAR 4 | The Internet | Repetition of shapes | Repetition in Games | Photo Editing | Data Logging | Audio Editing |
| YEAR 5 | Systems and Searching - Greeks | Video Editing - Volcanic Eruption | Selection in Physical Computing - Solar System | Selection in Quizzes - Animals | Flat-File Databases - Gestation periods | Vector Drawing – London Skyline |

# Progression:

## Spiral curriculum

The units for key stages 1 and 2 are based on a spiral curriculum. This means that each of the themes is revisited regularly (at least once in each year group), and pupils revisit each theme through a new unit that consolidates and builds on prior learning within that theme.

This style of curriculum design reduces the amount of knowledge lost through forgetting, as topics are revisited yearly. It also ensures that connections are made even if different teachers are teaching the units within a theme in consecutive years.

| National Curriculum Coverage — Years 1 and 2 | 1.1 Technology around us | 1.2 Digital painting | 1.3 Moving a robot | 1.4 Grouping data | 1.5 Digital writing | 1.6 Programming animations | 2.1 Information technology around us | 2.2 Digital photography | 2.3 Robot algorithms | 2.4 Pictograms | 2.5 Digital music | 2.6 Programming quizzes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions | | | ✓ | | | ✓ | | | ✓ | | | ✓ |
| Create and debug simple programs | | | ✓ | | | ✓ | | | ✓ | | | ✓ |
| Use logical reasoning to predict the behaviour of simple programs | | | ✓ | | | ✓ | | | ✓ | | | ✓ |
| Use technology purposefully to create, organise, store, manipulate, and retrieve digital content | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Recognise common uses of information technology beyond school | ✓ | | ✓ | | | | ✓ | ✓ | | | | |
| Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies | ✓ | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | |

| National curriculum coverage - Years 3 and 4 | 3.1 Connecting computers | 3.2 Stop-frame animation | 3.3 Sequencing sounds | 3.4 Branching databases | 3.5 Desktop publishing | 3.6 Events and actions in programs | 4.1 The internet | 4.2 Audio production | 4.3 Repetition in shapes | 4.4 Data logging | 4.5 Photo editing | 4.6 Repetition in games |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts | | | ✓ | | | ✓ | | | ✓ | | | ✓ |
| Use sequence, selection, and repetition in programs; work with variables and various forms of input and output | ✓ | | ✓ | | | ✓ | | | ✓ | ✓ | | ✓ |
| Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs | | | ✓ | | | ✓ | | | ✓ | | | ✓ |
| Understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration | ✓ | | | | | | ✓ | | | | | |
| Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content | | | | | ✓ | | ✓ | ✓ | | | ✓ | |
| Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact | | ✓ | | ✓ | | | ✓ | ✓ | | | ✓ | |

| National curriculum coverage - Years 5 and 6 | 5.1 Systems and searching | 5.2 Video production | 5.3 Selection in physical computing | 5.4 Flat-file databases | 5.5 Introduction to vector graphics | 5.6 Selection in quizzes | 6.1 Communication and collaboration | 6.2 Webpage creation | 6.3 Variables in games | 6.4 Introduction to spreadsheets | 6.5 3D modelling | 6.6 Sensing movementz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts | | | ✓ | | | ✓ | ✓ | | ✓ | | | ✓ |
| Use sequence, selection, and repetition in programs; work with variables and various forms of input and output | | | ✓ | | | ✓ | | | ✓ | | | ✓ |
| Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs | | | ✓ | | | ✓ | | | ✓ | | | ✓ |
| Understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration | ✓ | | | | | | ✓ | | | | | |
| Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content | | ✓ | | ✓ | | | | ✓ | | | | |
| Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact | ✓ | ✓ | | | | | | ✓ | ✓ | | ✓ | |

# Planning:

## Year 6 – Programming A – Variables in games

### Unit introduction

This unit explores the concept of variables in programming through games in Scratch. First, learners find out what variables are and relate them to real-world examples of values that can be set and changed. Then they use variables to create a simulation of a scoreboard. In Lessons 2, 3, and 5, which follow the Use-Modify-Create model, learners experiment with variables in an existing project, then modify them, before they create their own project. In Lesson 4, learners focus on design. Finally, in Lesson 6, learners apply their knowledge of variables and design to improve their games in Scratch.

There are two Year 6 programming units:

- Programming A – Variables in games
- Programming B – Sensing

This is unit A, which should be delivered before unit B.

### Overview of lessons

| Lesson | Brief overview | Learning objectives |
|---|---|---|
| 1 Introducing variables | Learners are introduced to variables. They see examples of real-world variables (score and time in a football match) before they explore them in a Scratch project. Learners then design and make their own project that includes variables. Finally, learners identify that variables are named and that they can be letters (strings) as well as numbers. | To define a 'variable' as something that is changeable<br>• I can identify examples of information that is variable<br>• I can explain that the way a variable changes can be defined<br>• I can identify that variables can hold numbers or letters |

# Planning:

## Curriculum links

**National curriculum links**

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

## Learning objectives

To define a 'variable' as something that is changeable

- I can identify examples of information that is variable
- I can explain that the way a variable changes can be defined
- I can identify that variables can hold numbers or letters

## Key vocabulary

Variable, change, name, value

# Planning:

| | |
|---|---|
| **Introduction**<br>(Slides 3–4)<br><br>10 mins | **Changing the score**<br><br>Display slide 3. Show learners the questions on the slide and ask them to think about them as they watch the short clip.<br><br>Click the link to play a short video of highlights from a football match. At various points in the clip, there is a score and time caption in the top left-hand corner of the screen. Learners should identify that:<br><br>• The score changes when either team scores a goal<br>• The time changes as the clip progresses (note that this is a highlight clip, so the time jumps between the pieces of action)<br><br>Display slide 4 and click to show a simulation of the score from the clip. Explain that there are two variables for score in this clip: one for the USA's score and one for Japan's score. Explain that the value changes by one when a goal is scored, but not all variables change by one.<br><br>Make sure the learners understand that a variable can only hold one value at any one time. In the context of a football match, a team can only have one score at any one time. When they score a goal, the new score (value) replaces the old one. This is an important concept, which they will revisit throughout the unit. |
| **Activity 1**<br>(Slides 5–8)<br><br>5 mins | **Variables in a project**<br><br>Display slide 5 and direct learners towards the 'Score change' Scratch project' linked on the slide.<br><br>Ask learners to use the project and make a note of what they think is happening when each ball is clicked. They should identify that:<br><br>• The yellow ball increases the score by one<br>• The pink ball increases the score by three<br>• The green ball decreases the score by one |

# Lesson Design:

# Designing a project with a variable

## Introduction

Write the task in your own words and then complete the design.

Task: _____

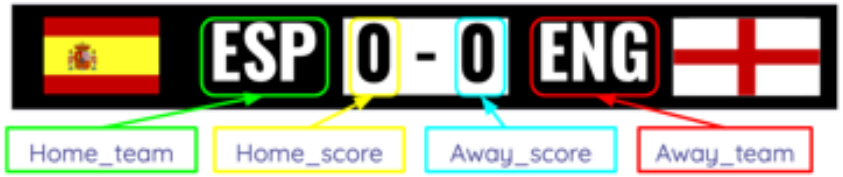
_____

_____

Variable name: _____

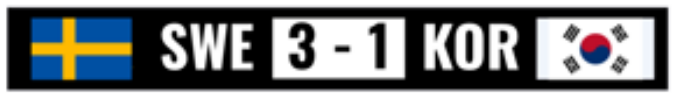
| Sprite | Event | Change in value |
|---|---|---|
| | When clicked | |
| | When clicked | |
| | When clicked | |

## Variable values




Using the format above, identify the values of each variable in the scores below.


| | Value |
|---|---|
| Home_team | |
| Home_score | |
| Away_team | |
| Away_score | |




| | Value |
|---|---|
| Home_team | |
| Home_score | |
| Away_team | |
| Away_score | |

# Impact:

Formative assessment

## Assessment opportunities

**Activity 1:** You can assess whether learners can relate real-world experiences of variables to a simple project in Scratch, identifying what is changing and how it changes.
**Activity 2 and 3:** Learners can demonstrate that they can design and code a simple project that includes a variable for 'score'.
**Plenary:** You can assess whether learners can identify that variables can hold letters or numbers.

# Summative assessment – Questions

## Variables in games

Q1. Which of these are important features of a variable? Tick all that apply.

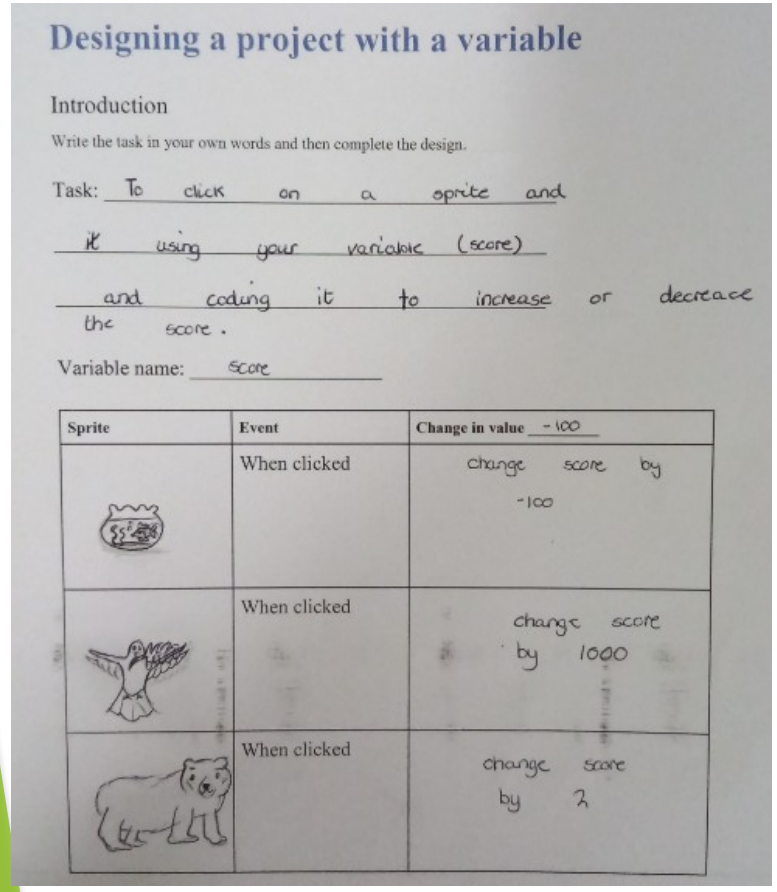
- ❑ Can be set
- ❑ Is a score
- ❑ Can be changed
- ❑ Has a clear name

Q2. Which data types can a variable hold?

A. Numbers only
B. Letters only
C. Numbers or letters
D. Pictures

Q3. How many values can a variable hold at any one time?

A. None
B. One
C. Two
D. Three



## Designing a project with a variable

### Introduction

Write the task in your own words and then complete the design.

Task: To click on a sprite and it using your variable (score) and coding it to increase or decreace the score.

Variable name: score

| Sprite | Event | Change in value -100 |
|---|---|---|
| | When clicked | change score by -100 |
| | When clicked | change score by 1000 |
| | When clicked | change score by 2 |

## Variable values

ESP 0 - 0 ENG

Home_team | Home_score | Away_score | Away_team

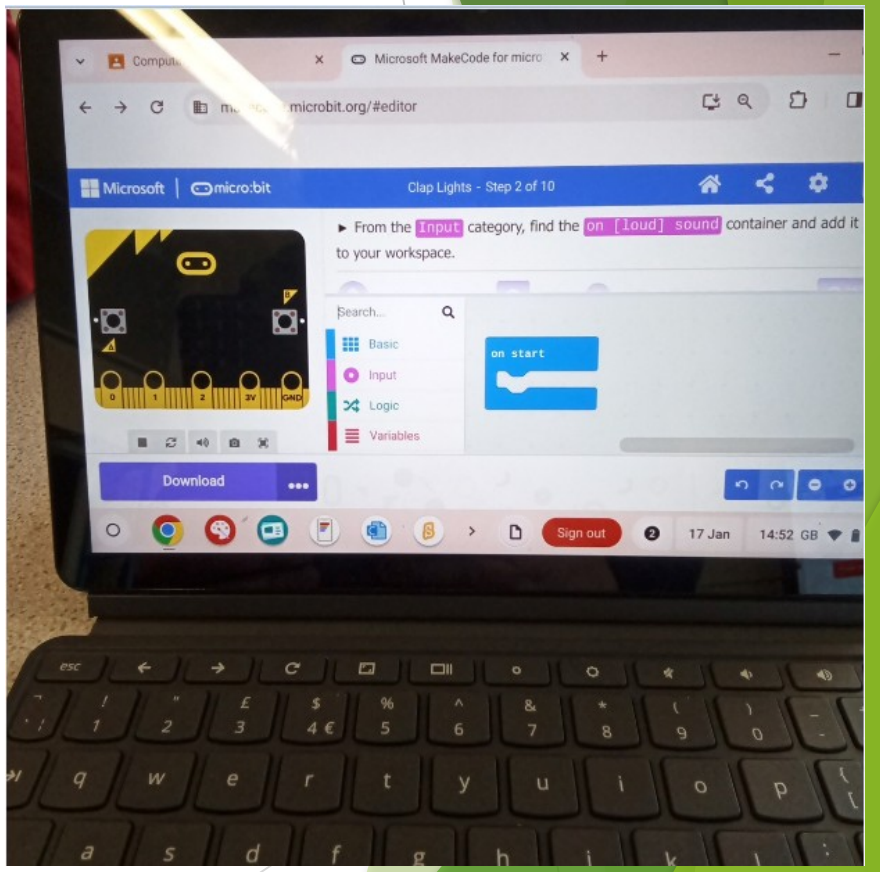
Using the format above, identify the values of each variable in the scores below.

GER 0 - 1 MEX

| | Value |
|---|---|
| Home_team | ~~Germany~~ GER |
| Home_score | 0 |
| Away_team | ~~Mexico~~ MEX |
| Away_score | 1 |

SWE 3 - 1 KOR

| | Value |
|---|---|
| Home_team | ~~SWEDEN~~ SWE |
| Home_score | 3 |
| Away_team | ~~Korea~~ KOR |
| Away_score | 1 |



# Monitoring:

We have regular dip-ins into lessons and collect evidence for each year group.  We look at the data for our children and look to see where our strengths are and if there are any areas of weakness.

Pupil voice is a valuable source of feedback that we use, allowing us to gather insight into the implementation and impact of our curriculum from the children themselves.

As a subject leader, I am keen to ensure that staff are supported in the teaching of Computing and will regularly meet individuals and year groups to support in the planning of units of work.

# Pupil Voice

## Do you enjoy Computing? Why?

I can learn new things!

Y4FW/LB

I want to learn more about programming.

Y4SL

Things are always changing.

Y5LB/RC

I enjoy the unplugged lessons.

Y3RB

We learn more about the things we use and how they work.

Y6JK

When something moves or changes, I like how I made it happen.

Y6SC/RWW

# Assessing Learning:

## Pupil Voice

Do you think the work in Computing is harder or easier than in your other subjects?

Sometimes harder, like when the Computer doesn't do what you want.

Y2SH/KT

Easier.

Y3RB

Easier.

Y6SC/ RWW

In between. It's harder when you type code because you have to be careful.

Y4FW/LB

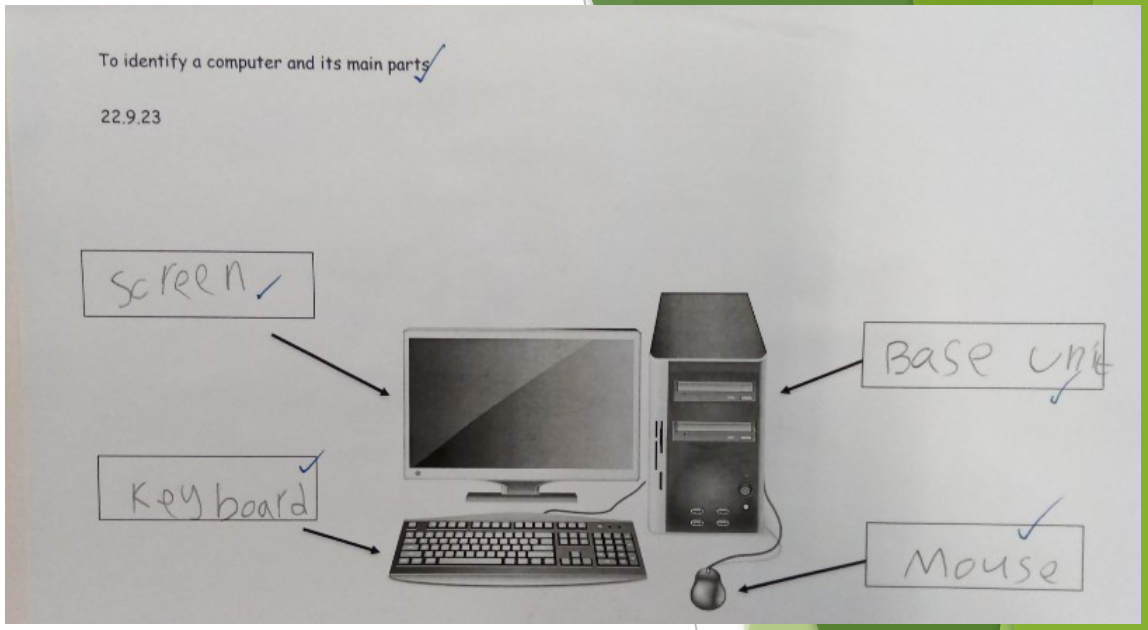
Mostly harder. You have to be so careful and not make any mistakes!

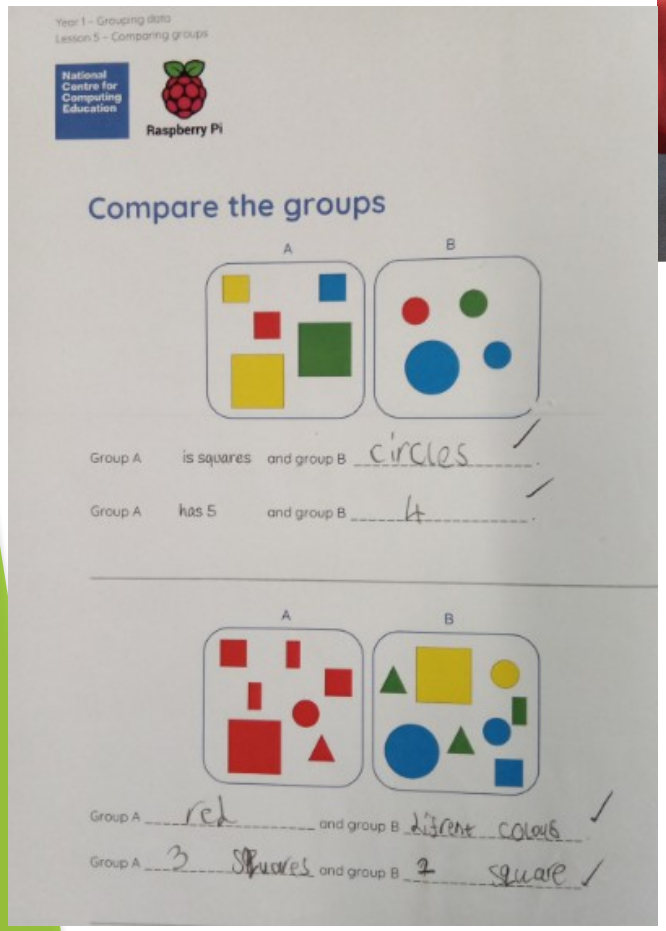
Y5RaB

Programming can be hard but I like doing art on the computer.

Y3AF

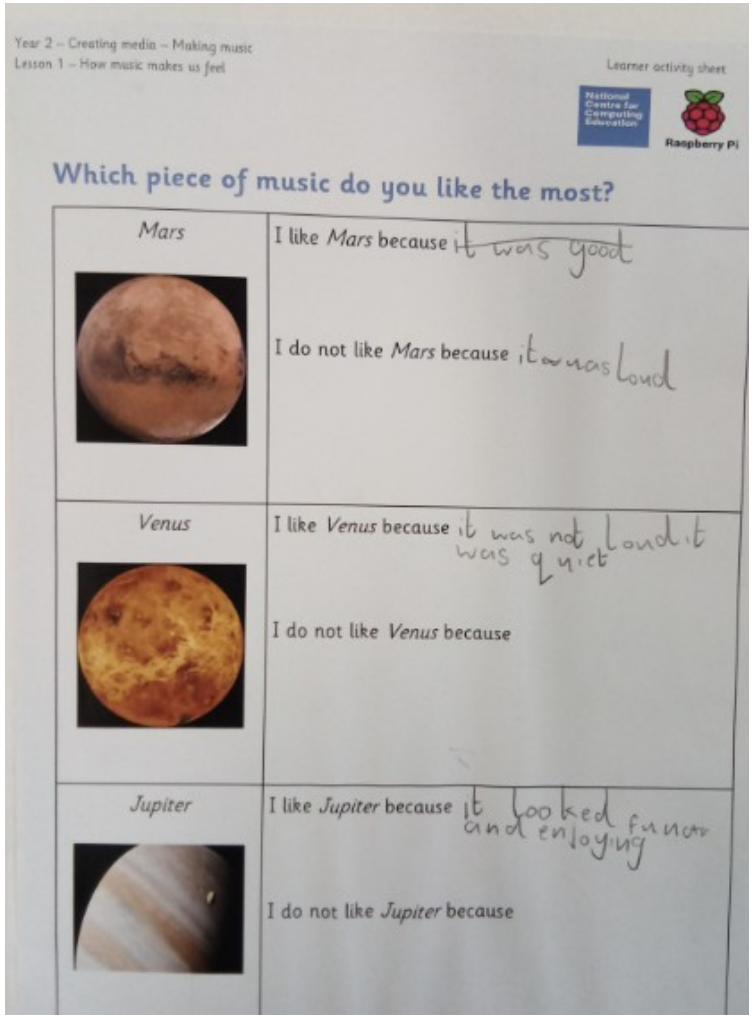
# Examples of Pupil work: Year 1




j2e Infant Tools

# Examples of Pupil work: Year 2



Year 2 – Creating media – Making music
Lesson 1 – How music makes us feel

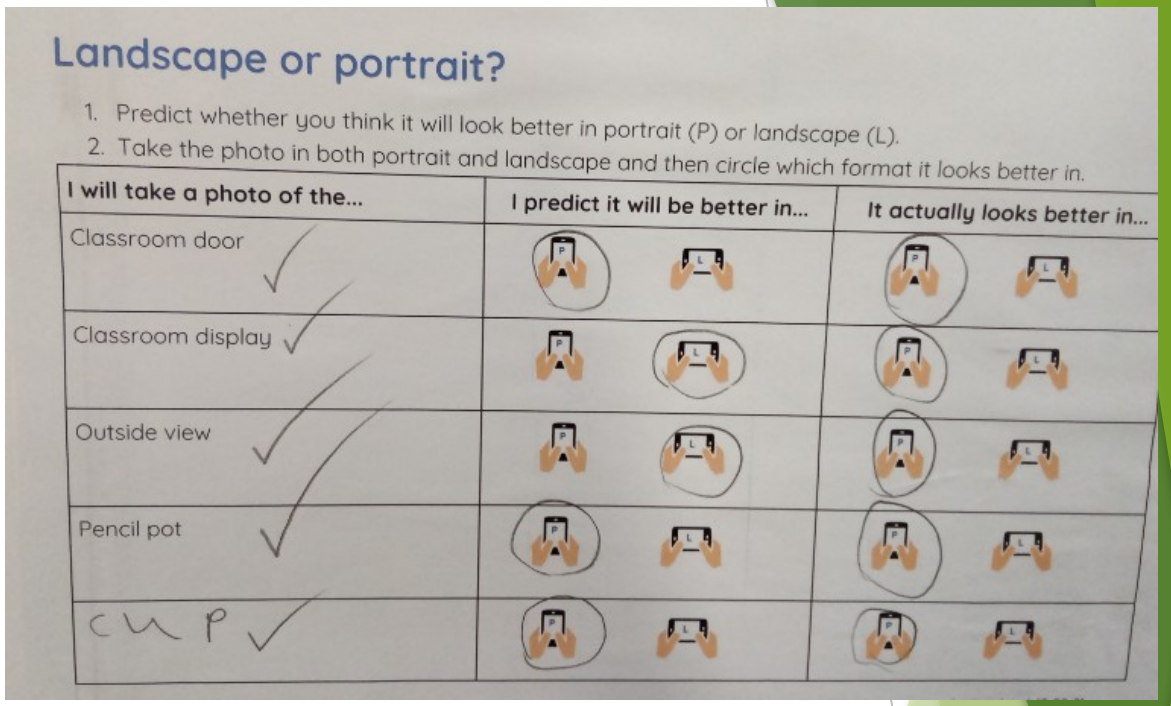
Learner activity sheet

National Centre for Computing Education

Raspberry Pi

**Which piece of music do you like the most?**

| | |
|---|---|
| *Mars*  | I like *Mars* because it was good<br>I do not like *Mars* because it was loud |
| *Venus*  | I like *Venus* because it was not loud it was quiet<br>I do not like *Venus* because |
| *Jupiter*  | I like *Jupiter* because it looked funny and enjoying<br>I do not like *Jupiter* because |



## Landscape or portrait?

1. Predict whether you think it will look better in portrait (P) or landscape (L).
2. Take the photo in both portrait and landscape and then circle which format it looks better in.

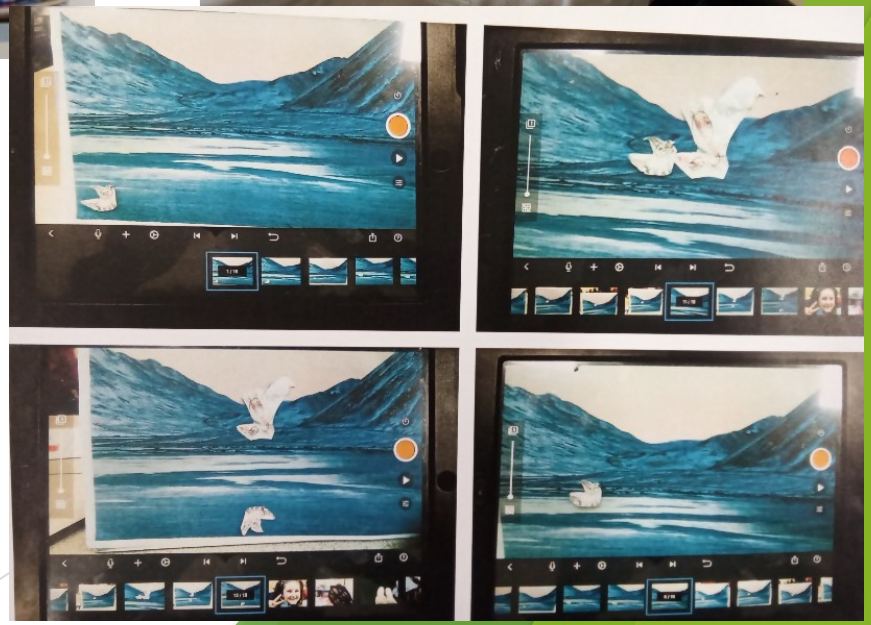
| I will take a photo of the... | I predict it will be better in... | It actually looks better in... |
|---|---|---|
| Classroom door ✓ | P L | P L |
| Classroom display ✓ | P L | P L |
| Outside view ✓ | P L | P L |
| Pencil pot ✓ | P L | P L |
| cup ✓ | P L | P L |


# Examples of Pupil work: Year 3

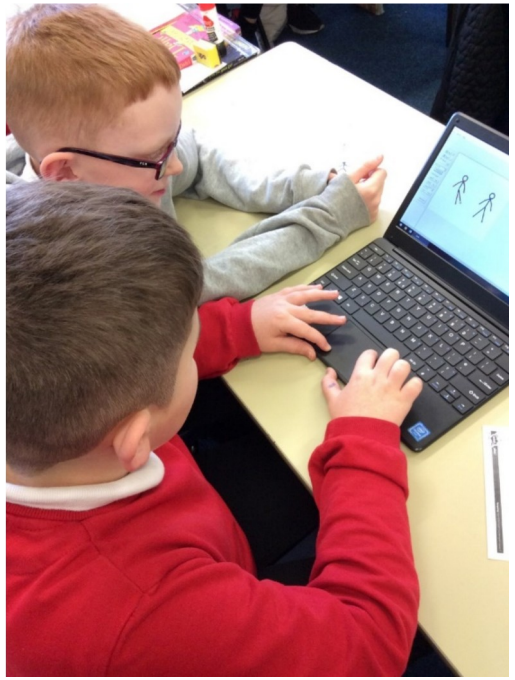


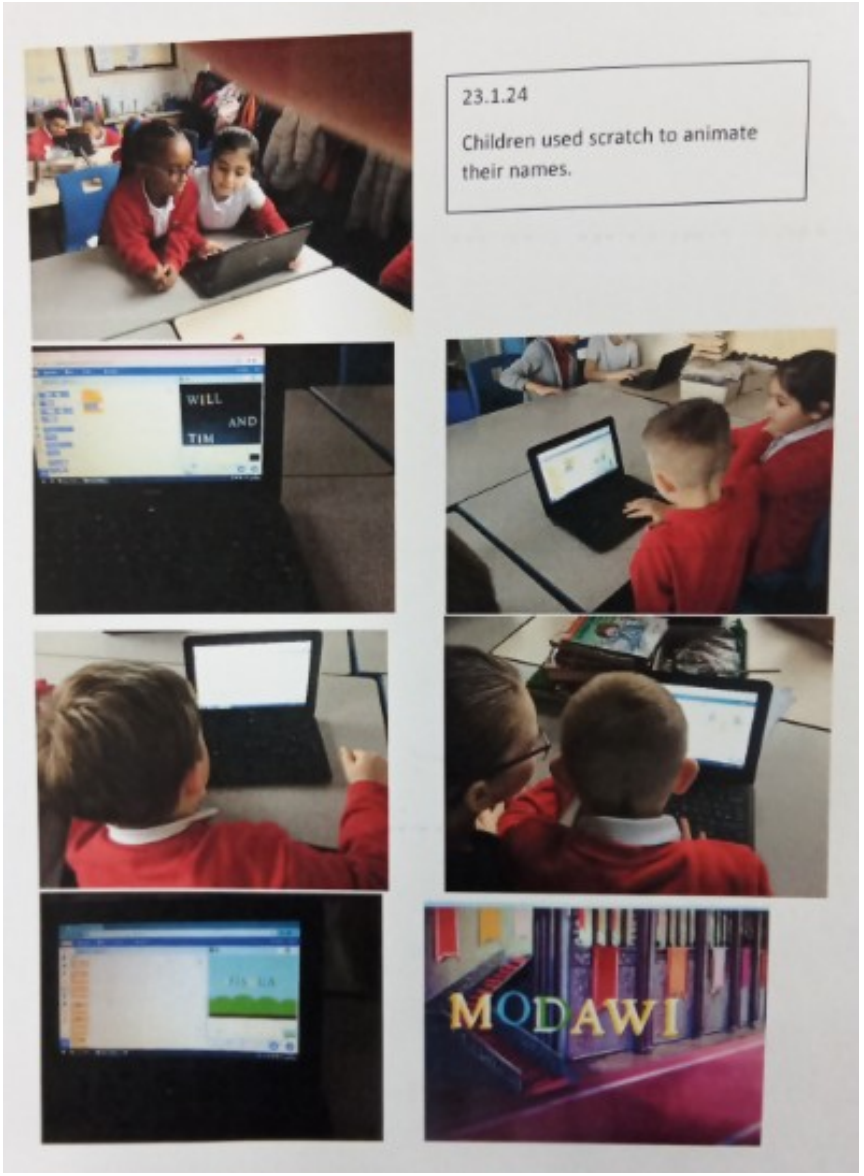
**What are the differences between these two code snippets?**

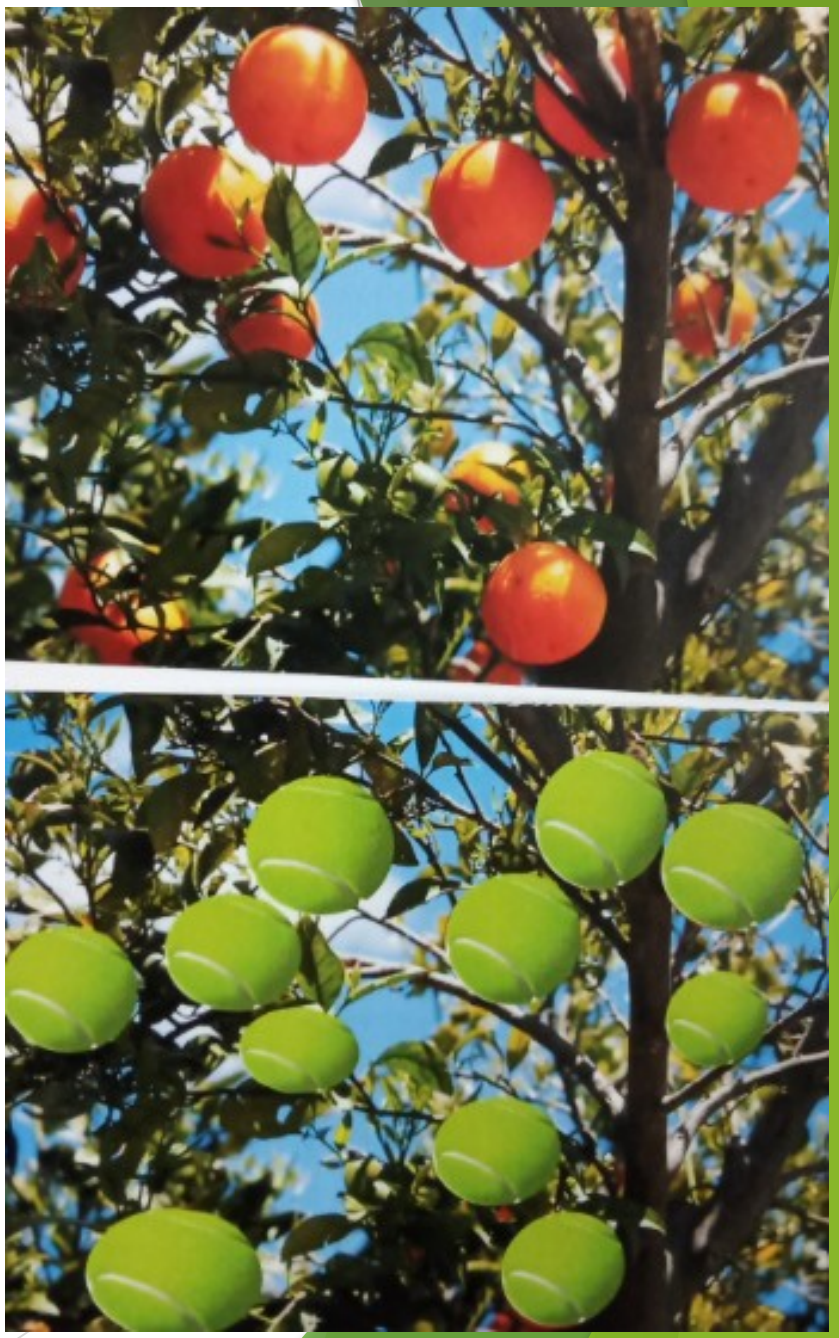
| | |
|---|---|
| when clicked<br>start sound D Guitar<br>start sound G Guitar<br>start sound B Guitar | when this sprite clicked<br>play sound D Guitar until done<br>play sound G Guitar until done<br>play sound B Guitar until done |
| This code will...<br>When the green flag is clicked this code will play three sounds (d, g, and b) together / at the same time. | This code will...<br>When the sprite is clicked this code will play note D then note G then note B, one after the other. |



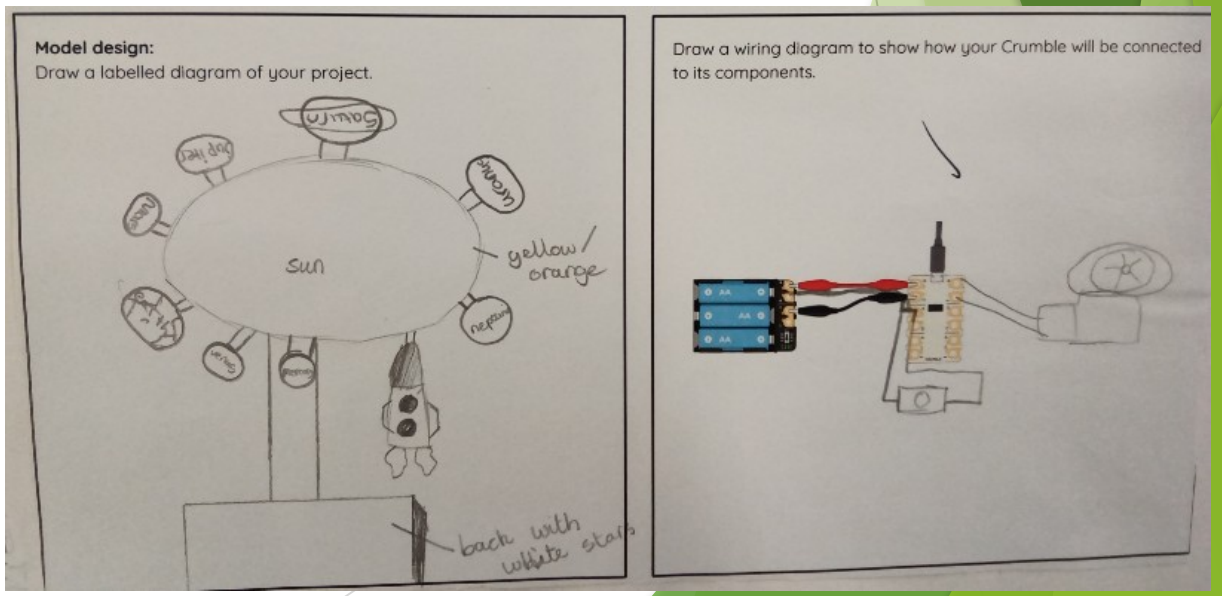
# Examples of Pupil work: Year 4



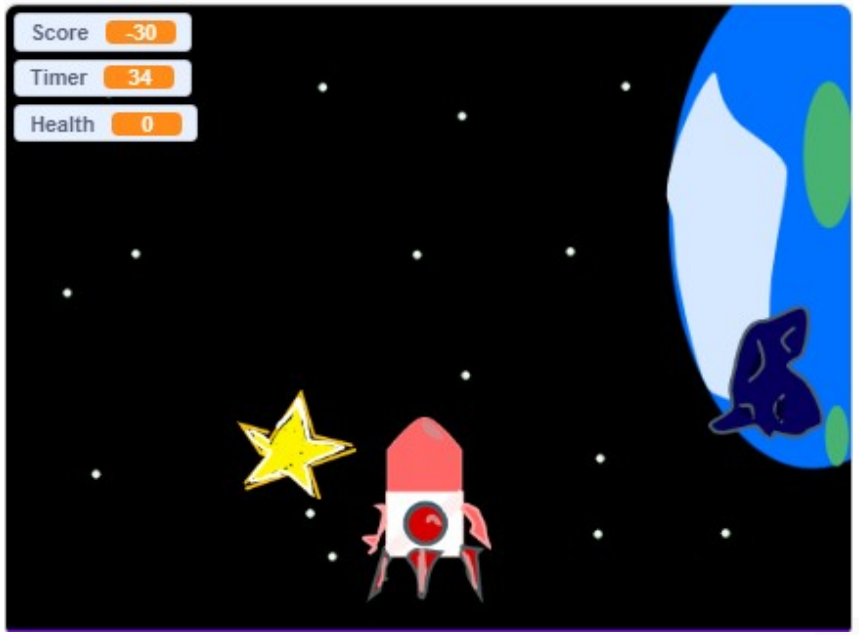


# Examples of Pupil work: Year 5



# Examples of Pupil work: Year 6




HARLEY AND MASON - Excel

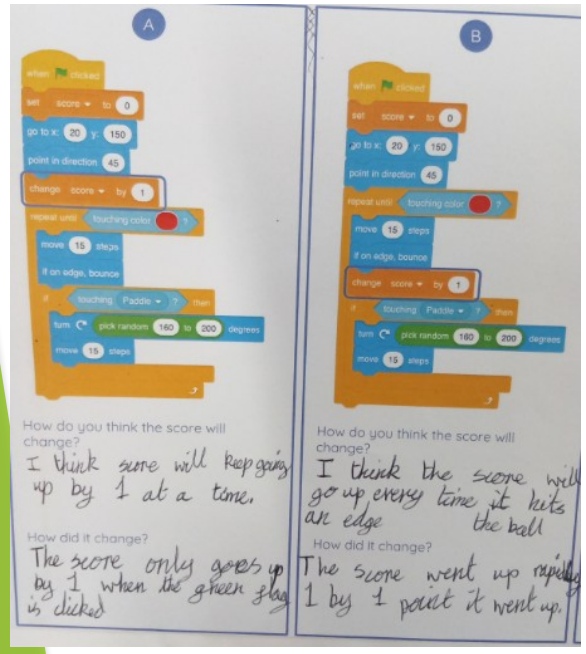
**Hockey League Table**

| | Team | Matches | Won | Drawn | Lost | Points | Goals For | Goals Against | Goal Diff |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Sheffield | 13 | 11 | 1 | 1 | 34 | 56 | 14 | 42 |
| 2 | Birmingham | 14 | 10 | 1 | 3 | 31 | 52 | 17 | 35 |
| 3 | Cardiff | 11 | 7 | 0 | 4 | 21 | 40 | 19 | 21 |
| 4 | Doncaster | 12 | 6 | 2 | 4 | 20 | 43 | 31 | 12 |
| 5 | Brighton | 12 | 5 | 0 | 7 | 15 | 32 | 38 | -6 |
| 6 | Cambridge | 13 | 4 | 1 | 8 | 13 | 25 | 31 | -6 |
| 8 | Wimbledon | 12 | 4 | 0 | 8 | 12 | 16 | 45 | -29 |
| 7 | Exeter | 14 | 2 | 3 | 9 | 9 | 14 | 49 | -35 |

3 points for a win
1 point for a draw
0 points for losing

Goal Diff = Goals For - Goals Against

The cells coloured in blue need to be calculated automatically using a formula. Can you create the correct formula in each column to complete the league table?




# Wider Curriculum links:

# Wider Curriculum links

# Wider Opportunities:


‘Makers Van’ visits