



BERWICKSHIRE HIGH SCHOOL

DESIGN & TECHNOLOGIES FACULTY

COMPUTING SCIENCE CURRICULUM: S1-3

S1 COMPUTING SCIENCE

Software Design and Development

- Scratch
- Kodu
- Sphero Bolts

Database Design and Development

- Microsoft Access

Web Design and Development

- HTML & CSS

Digital Literacy

- Cyber Resilience and Internet Safety

S2 COMPUTING SCIENCE

Software Design and Development

- Microbit
- Scratch
- Kodu

Database Design and Development

- Microsoft Access

Web Design and Development

- HTML & CSS

Animation

- Piskel

S3 COMPUTING SCIENCE

Software Design and Development

- Scratch
- Kodu
- Microsoft MakeCode Arcade
- Python

Database Design and Development

- Microsoft Access
- SQL in Microsoft Access

Web Design and Development

- HTML, CSS & JavaScript

Computer Systems

- Data Representation

S1 Computing Science

Sequencing Order: 1

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	Scratch	
Overview:	Design, implement, test and evaluate simple games using Scratch.	
Term	Knowledge & Skills	Experiences
1	<p>Design</p> <ul style="list-style-type: none">• Introduce computational thinking• Identify main parts of program using computational thinking• Narrative design - objective• Character design - hero• Level design - background• Gameplay design - points scoring, timer, how to win, how to lose <p>Implementation</p> <ul style="list-style-type: none">• First Person Shooter game - Splat the Cat• Maze game - Follow the Trail• Action game - Catch the Present• Third Person Shooter - Shoot the Balloon• Own game <p>Testing</p> <ul style="list-style-type: none">• Movement• Scoring/losing points• Timer• Winning• Losing	<p>Create Splat the Cat, Follow the Trail, Catch the Present and Shoot the Balloon Scratch games</p> <p>Carry out extension tasks</p>

	Evaluation <ul style="list-style-type: none">• Limitations• Improvements	
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Sequencing Order: 2

Level: 3 (TCH 3-15a)

Topic:	Database Design and Development	
Sub-Topic:	Microsoft Access	
Overview:	Design, implement, test and evaluate flat-file databases using Microsoft Access	
Term	Knowledge & Skills	Experiences
1	<p>Design</p> <ul style="list-style-type: none">• Data dictionary with entity name, attribute name, attribute type (text, number, date, time, Boolean, graphic) <p>Implementation</p> <ul style="list-style-type: none">• Create a flat-file database to match design• Create a simple report <p>Testing</p> <ul style="list-style-type: none">• Simple search (on one field) <p>Evaluation</p> <ul style="list-style-type: none">• Fitness for purpose	<p>Create Film Stars Access database with pictures</p> <p>Query Film Stars Access Database</p> <p>Design, implement, test and evaluate own Access database</p>

Sequencing Order: 3
Level: 3 (TCH 3-15a)

Topic:	Web Design and Development	
Sub-Topic:	HTML & CSS	
Overview:	Design a simple website. Implement simple web pages for a website using HTML. Style HTML web pages using inline styling with simple CSS. Test and evaluate websites.	
Term	Knowledge & Skills	Experiences
1	<p>Design</p> <ul style="list-style-type: none"> Website structure with Home page and at least one linked multimedia page <p>Implementation - HTML</p> <ul style="list-style-type: none"> html head title body h1, h2 p a img <p>Implementation - CSS</p> <ul style="list-style-type: none"> font-family color background-color <p>Testing</p> <ul style="list-style-type: none"> Hyperlinks work correctly Text and graphics display correctly 	Create Favourite Films website with inline styles using Notepad++

	Evaluation <ul style="list-style-type: none">• Fitness for purpose	
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Sequencing Order: 4

Level: 3 (TCH 3-03a)

Topic:	Digital Literacy	
Sub-Topic:	Cyber Resilience and Internet Safety	
Overview:	Learn how to keep safe and secure in online environments and be aware of the importance and consequences of doing this.	
Term	Knowledge & Skills	Experiences
2	<p>Keeping safe and secure in online environments</p> <ul style="list-style-type: none">• Personal information which someone should be careful sharing (full name, date of birth, address)• Identify theft and its consequences• How to use social media safely and responsibly (limit access to social media profile, do not post inappropriate status updates, comments or photos)• Risks of online communities (don't know who you're talking to)• How to act safely (ignore emails and friend requests from people you don't know, do not agree to meet people in real life who you have only met online)• Trustworthiness of websites (Wikipedia - anyone can edit whereas gov.uk, nhs.uk, police.uk, bbc.co.uk are trustworthy)• How to confirm that what is on a website is correct (check multiple sources) <p>Understanding different cyber threats and how to keep devices safe and secure in online environments</p> <ul style="list-style-type: none">• Spam email and how to avoid it (try to avoid giving out your email address, don't tick boxes without thinking)• Phishing and how to avoid being a victim of it (avoid clicking on a link in an email because it might take you to a fake website)• Different type of malware (viruses, Trojans, worms, spyware, scareware)	Discuss ideas in PowerPoints, answer review questions, and carry out extension tasks

	<ul style="list-style-type: none"> • Cyber extortion, ransomware and sextortion • How to protect devices and data (anti-virus software, firewall, passwords, encryption, wiping a device when finished with it) <p>Understanding the responsibilities and possible consequences of being online</p> <ul style="list-style-type: none"> • How to keep within the law when file sharing (do not share copyrighted material) • Possible consequences of breaking the law (reduction of internet speed, disconnection) • How to protect privacy online (think before you post, so not post photos/videos of others without their permission, do not share your location) • Cyberbullying (sending offensive texts or emails, posting lies or insults on social media sites, sharing embarrassing videos or photos online) • What to do if you think you've been a victim of cyberbullying (tell someone) 	
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Sequencing Order: 5

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	Kodu	
Overview:	Design, implement, test and evaluate simple games using Kodu.	
Term	Knowledge & Skills	Experiences
2	<p>Design</p> <ul style="list-style-type: none">• Introduce computational thinking• Identify main parts of program using computational thinking• Narrative design - objective• Character design - hero• Level design - background• Gameplay design - points scoring, timer, how to win, how to lose <p>Implementation</p> <ul style="list-style-type: none">• Action game - Apple Race• First Person/Third Person Shooter game - Shooting Castles• Racing game - Racing Bikes• Own game <p>Testing</p> <ul style="list-style-type: none">• Movement• Scoring/losing points• Timer• Winning• Losing <p>Evaluation</p> <ul style="list-style-type: none">• Limitations	<p>Create Apple Race, Shooting Castles, and Racing Bikes Kodu games</p> <p>Carry out extension tasks</p> <p>Design, implement, test and evaluate own Kodu game</p>

	<ul style="list-style-type: none">• Improvements	
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Sequencing Order: 6

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	Sphero Bolts	
Overview:	Design, implement, test and evaluate simple programs using Sphero Bolts.	
Term	Knowledge & Skills	Experiences
3	<p>Design</p> <ul style="list-style-type: none">• Introduce computational thinking• Identify main parts of program using computational thinking <p>Implementation</p> <ul style="list-style-type: none">• Remote control - aiming, choosing colour and speed• Program a line, square, rectangle and triangle without loops• Program square, triangle, hexagon and rectangle using loops• Program square, triangle and hexagon using functions <p>Testing</p> <ul style="list-style-type: none">• Movement <p>Evaluation</p> <ul style="list-style-type: none">• Efficiency	<p>Remote control Sphero Bolts</p> <p>Create programs for a line, square, rectangle, triangle and hexagon without loops and functions, then with loops and finally with functions</p> <p>Carry out extension tasks</p> <p>Design, implement, test and evaluate programs</p>

S2 Computing Science

Sequencing Order: 1

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	BBC MicroBit	
Overview:	Design, implement, test and evaluate simple programs using BBC MicroBits.	
Term	Knowledge & Skills	Experiences
1	<p>Design</p> <ul style="list-style-type: none">• Introduce computational thinking• Identify main parts of program using computational thinking <p>Implementation</p> <ul style="list-style-type: none">• Smiley Face• Hello World• Flashing Creeper Face• Rock Paper Scissor• Catch the Egg <p>Testing</p> <ul style="list-style-type: none">• Output <p>Evaluation</p> <ul style="list-style-type: none">• Fitness for purpose	<p>Create programs for a smiley face, hello world, flashing creeper face, rock paper scissors, catch the egg</p> <p>Carry out extension tasks</p> <p>Design, implement, test and evaluate extension task programs</p>

Sequencing Order: 2

Level: 3 & 4 (TCH 3-15a & TCH 4-15a)

Topic:	Web Design and Development	
Sub-Topic:	HTML & CSS	
Overview:	Design a simple website. Implement simple web pages for a website using HTML. Style HTML web pages using an internal style sheet with simple CSS rules. Test and evaluate websites.	
Term	Knowledge & Skills	Experiences
1	<p>Design</p> <ul style="list-style-type: none">Website structure with Home page and 4 linked multimedia pages <p>Implementation - HTML</p> <ul style="list-style-type: none">htmlheadtitlebodyh1, h2paimgulli <p>Implementation - CSS</p> <ul style="list-style-type: none">stylefont-familytext-aligncolorbackground-color	<p>Create Favourite Films website with inline styles using Notepad++</p> <p>Design, implement, test and evaluate own website with inline styles using Notepad++</p>

	<p>Testing</p> <ul style="list-style-type: none">• Hyperlinks work correctly• Text and graphics display correctly <p>Evaluation</p> <ul style="list-style-type: none">• Fitness for purpose	
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Sequencing Order: 3

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	Scratch	
Overview:	Design, implement, test and evaluate more complex games using Scratch.	
Term	Knowledge & Skills	Experiences
1	<p>Design</p> <ul style="list-style-type: none"> • Develop computational thinking • Identify main part of program using computational thinking • Narrative design - objective • Character design - hero, enemy • Level design - background • Gameplay design - points scoring, timer, how to win, how to lose <p>Implement</p> <ul style="list-style-type: none"> • First Person Shooter game - Bird Hunt • Action game - Under the Sea • Platform game - Platformer • Own game <p>Test</p> <ul style="list-style-type: none"> • Movement • Scoring/losing points • Timer • Winning • Losing <p>Evaluate</p> <ul style="list-style-type: none"> • Limitations 	<p>Create Bird Hunt, Platformer, Under the sea adventure, Extra level for Under the Sea, Haunted House and Space Invaders Scratch games</p> <p>Carry out extension tasks</p> <p>Design, implement, test and evaluate own Scratch game</p>

	<ul style="list-style-type: none">• Improvements	
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Sequencing Order: 4
 Level: 3 & 4 (TCH 3-15a)

Topic:	Animation	
Sub-Topic:	Piskel	
Overview:	Analyse, design, implement, test and evaluate animations using Piskel	
Term	Knowledge & Skills	Experiences
2	<p>Design</p> <ul style="list-style-type: none"> • Frames <p>Implementation</p> <ul style="list-style-type: none"> • Smiley face animated GIF • Own animated GIF to match design • Walking person animated GIF • <p>Testing</p> <ul style="list-style-type: none"> • Animated GIF in a web page • Animated GIF frames as costumes for a sprite in Scratch <p>Evaluation</p> <ul style="list-style-type: none"> • Fitness for purpose 	<p>Create a smiley face animated GIF and insert it into a web page using HTML</p> <p>Create a walking person animated GIF, insert the frames as costumes for a sprite in Scratch and program the sprite using Scratch code</p> <p>Design, implement, test and evaluate own animated gif in HTML and Scratch</p>

Sequencing Order: 5 & 7

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	Kodu	
Overview:	Design, implement, test and evaluate more complex games using Kodu.	
Term	Knowledge & Skills	Experiences
2 & 3	<p>Design</p> <ul style="list-style-type: none">• Develop computational thinking• Identify main parts of program using computational thinking• Narrative design - objective• Character design - hero• Level design - background• Gameplay design - points scoring, timer, how to win, how to lose <p>Implementation</p> <ul style="list-style-type: none">• First Person/Third Person Shooter game - Ship Hunt (introducing world with water)• Action game - Cycle-Boat Shoot Scoring (picking up, shooting and avoiding)• Action game - Kodu Health and Paths (introducing health and NPC following path)• Football game - Kodu Soccer• Own game <p>Testing</p> <ul style="list-style-type: none">• Movement• Scoring/losing points• Gaining/losing health• Timer	<p>Create Ship Hunt, Kodu Health and Paths, Racing Bikes Against The Computer, Kodu Duck Shoot and Kodu Soccer Kodu games</p> <p>Carry out extension tasks</p> <p>Design, implement, test and evaluate own Kodu game</p>

	<ul style="list-style-type: none">• Winning• Losing <p>Evaluation</p> <ul style="list-style-type: none">• Limitations• Improvements	
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Sequencing Order: 6

Level: 3 & 4 (TCH 3-15a)

Topic:	Database Design and Development	
Sub-Topic:	Microsoft Access	
Overview:	Analyse, design, implement, test and evaluate a flat-file database using Microsoft Access	
Term	Knowledge & Skills	Experiences
2	<p>Design</p> <ul style="list-style-type: none">• Data dictionary with entity name, attribute name, attribute type (text, number, date, time, Boolean, graphic) <p>Implementation</p> <ul style="list-style-type: none">• Create a flat-file database to match design• Create a simple report <p>Testing</p> <ul style="list-style-type: none">• Simple search (on one field)• Simple sort (on one field)• Complex search (on more than one field) <p>Evaluation</p> <ul style="list-style-type: none">• Fitness for purpose	<p>Create Film Access database with pictures</p> <p>Query Film Access Database</p> <p>Design, implement, test and evaluate own Access database</p>

S3 Computing Science

Sequencing Order: 1a

Level: 4 (TCH 4-15a)

Topic:	Database Design and Development	
Sub-Topic:	Microsoft Access	
Overview:	Analyse, design, implement, test and evaluate relational databases using Microsoft Access	
Term	Knowledge & Skills	Experiences
1	<p>Analysis</p> <ul style="list-style-type: none"> • End-user requirements • Functional requirement <p>Design</p> <ul style="list-style-type: none"> • Entity-relation diagram with entity name, attributes and relationship (one-to-many) • Data dictionary with entity name, attribute name, primary key, foreign key, attribute type (text, number, date, time, boolean), attribute size, validation (presence check, restricted choice, field length, range) <p>Implementation</p> <ul style="list-style-type: none"> • Create a flat-file database to match design • Create a relational database to match design with referential integrity <p>Testing</p> <ul style="list-style-type: none"> • Validation rules <p>Evaluation</p> <ul style="list-style-type: none"> • Fitness for purpose 	<p>Create Celebrities flat file Access database with pictures</p> <p>Query Celebrities flat file Access Database</p> <p>Design, implement, test and evaluate own flat file Access database</p> <p>Create Cartoons relational Access database with pictures</p> <p>Design, implement, test and evaluate own relational Access database</p> <p>Query Cartoons relational Access Database</p> <p>Create Streaming Access relational database with validation</p>

Sequencing Order: 1b

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	Scratch	
Overview:	Design, implement, test and evaluate more complex games using Scratch.	
Term	Knowledge & Skills	Experiences
1	<p>Design</p> <ul style="list-style-type: none">• Develop computational thinking• Identify main part of program using computational thinking• Narrative design - objective• Character design - hero, enemy• Level design - background• Gameplay design - points scoring, timer, how to win, how to lose <p>Implement</p> <ul style="list-style-type: none">• Maze game - Haunted House• Third Person Shooter - Space Invaders• First Person Shooter game - Shoot the Balloon• Own game <p>Test</p> <ul style="list-style-type: none">• Movement• Scoring/losing points• Timer• Winning• Losing <p>Evaluate</p> <ul style="list-style-type: none">• Limitations	<p>Create Haunted House with 2 levels, Racing Game, Space Invaders and Shoot the Balloon Scratch games</p> <p>Carry out extension tasks</p> <p>Design, implement, test and evaluate own Scratch game</p>

	<ul style="list-style-type: none">• Improvements	
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Sequencing Order: 2 & 6

Level: 4 (TCH 4-14a, TCH 4-15a)

Topic:	Software Design and Development	
Sub-Topic:	Python	
Overview:	Analyse, design, implement, test and evaluate more complex programs using Python	
Term	Knowledge & Skills	Experiences
1 & 2	<p>Analysis</p> <ul style="list-style-type: none">Identify functional requirements in terms of inputs, processes, outputs <p>Design</p> <ul style="list-style-type: none">Identify data types (string, integer, real) and data structures (1-D array)Read and understand structure diagrams, flowcharts, pseudocodeCreate pseudocodeCreate a wireframe to show input and output <p>Implementation</p> <ul style="list-style-type: none">Create programs which use:<ul style="list-style-type: none">Expressions to assign valuesExpressions to return values using arithmetic operations (addition, subtraction, multiplication, division and exponentiation)Selection constructs using simple conditional statements with >, <, >=, <=, =, <> operatorsSelection constructs using complex conditional statementsLogical operators (AND)Iteration and repetition using fixed and conditional loops	<p>Create Input String, Input Integer, Input Real, Calculation, Decision, Decision with string input, Multiple Decisions, Fixed Loop, Fixed loop with input, Fixed loop how many, Fixed loop running total, Fixed loop running total how many, Fixed loop running total array, Fixed loop running total array how many, Fixed loop running total traversing 1D array, Fixed loop running total and average, Fixed loop running total input validation Python programs</p> <p>Carry out extension tasks</p>

	<ul style="list-style-type: none"> ○ Predefined functions - round, length • Create programs which use standard algorithms: <ul style="list-style-type: none"> ○ Input validation ○ Running total within loop <p>Testing</p> <ul style="list-style-type: none"> • Identify syntax and logic errors <p>Evaluation</p> <ul style="list-style-type: none"> • Fitness for purpose • Readability - internal commentary, meaningful identifiers, indentation, white space 	
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Sequencing Order: 3 & 7

Level: 4 (TCH 4-15a)

Topic:	Web Design and Development	
Sub-Topic:	HTML, CSS and JavaScript	
Overview:	Design a website with four linked multimedia pages. Implement a website using HTML. Style HTML web pages using an internal style sheet and an external style sheet with CSS rules. Add interactivity to HTML web pages using JavaScript. Test and evaluate websites.	
Term	Knowledge & Skills	Experiences
1 & 3	<p>Design</p> <ul style="list-style-type: none">• Website structure with Home page and 4 linked multimedia pages, and external links• Wireframe with navigational links, consistency across multiple pages, relative vertical positioning of media displayed, file formats of media (text, graphics, video, audio)• Copyright, Design and Patents Act• Standard file formats<ul style="list-style-type: none">○ bitmapped - JPEG, GIF, PNG <p>Implementation - HTML</p> <ul style="list-style-type: none">• html• head• title• body• h1, h2• p• div• link• a (relative and absolute addressing)• img• audio• video	<p>Create Luxury Hotel website with an internal style sheet using Notepad++</p> <p>Design, implement, test and evaluate own business website with an internal style sheet using Notepad++</p> <p>Create Scotland website with an external style sheet using Notepad++</p> <p>Create UK website with an external style sheet using Notepad++</p> <p>Create a web page with a rollover using JavaScript</p> <p>Create a web page with an ID assigned to a hyperlink</p> <p>Carry out extension tasks</p>

	<ul style="list-style-type: none"> • ul • ol • li <p>Implementation - CSS</p> <ul style="list-style-type: none"> • style • font-family • font-size • text-align • color • background-color <p>Implementation - JavaScript</p> <ul style="list-style-type: none"> • onmouseover • onmouseout <p>Testing</p> <ul style="list-style-type: none"> • Hyperlinks and navigation work correctly • Media (text, graphics, and video) display correctly • Consistency <p>Evaluation</p> <ul style="list-style-type: none"> • Fitness for purpose 	
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Sequencing Order: 4a

Level: 3 (TCH 4-14b)

Topic:	Computer Systems	
Sub-Topic:	Data Representation	
Overview:	Describe how numbers, characters and graphics are represented using binary.	
Term	Knowledge & Skills	Experiences
2	<p>Numbers</p> <ul style="list-style-type: none">• Convert an 8-bit binary number from binary to denary• Convert from denary to an 8-bit binary number• Floating-point representation (mantissa and exponent) <p>Text</p> <ul style="list-style-type: none">• Describe extended ASCII (8-bit) used to represent characters• Calculate the number of bits needed to store a text message <p>Graphics</p> <ul style="list-style-type: none">• Describe the bit-mapped graphics method of graphic representation• Describe the vector graphics method of representation for common objects (rectangle, ellipse, line, polygon) with attributes (co-ordinates, fill colour, line colour)	Complete Converting from Binary to Denary, Converting from Denary to Binary, Floating Point Representation, Representing Characters, Graphics Representation worksheets

Sequencing Order: 4b

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	Kodu	
Overview:	Design, implement, test and evaluate more complex games using Kodu.	
Term	Knowledge & Skills	Experiences
2	<p>Design</p> <ul style="list-style-type: none">• Develop computational thinking• Identify main parts of program using computational thinking• Narrative design - objective• Character design - hero• Level design - background• Gameplay design - points scoring, timer, how to win, how to lose <p>Implementation</p> <ul style="list-style-type: none">• Two level game - Creating a Two Level Game• Own game <p>Testing</p> <ul style="list-style-type: none">• Movement• Scoring/losing points• Gaining/losing health• Timer• Winning• Losing <p>Evaluation</p> <ul style="list-style-type: none">• Limitations• Improvements	<p>Create Two Level game</p> <p>Carry out extension tasks</p> <p>Design, implement, test and evaluate own Kodu game</p>

Sequencing Order: 5

Level: 4 (TCH 4-15a)

Topic:	Database Design and Development	
Sub-Topic:	SQL in Microsoft Access	
Overview:	Design, implement, test and evaluate SQL queries in Microsoft Access for relational databases	
Term	Knowledge & Skills	Experiences
2	<p>Design - Query</p> <ul style="list-style-type: none">• Multiple tables• Fields• Search criteria <p>Implementation - SQL</p> <ul style="list-style-type: none">• SELECT• FROM• WHERE<ul style="list-style-type: none">○ AND, OR, <, >, = <p>Testing</p> <ul style="list-style-type: none">• SQL works correctly <p>Evaluation</p> <ul style="list-style-type: none">• Fitness for purpose• Accuracy of output	<p>Design, implement and test a variety of SQL SELECT queries</p> <p>Carry out extension tasks</p>

Sequencing Order: 6b

Level: 3 (TCH 3-13a TCH 3-15a)

Topic:	Software Design and Development	
Sub-Topic:	Microsoft MakeCode Arcade	
Overview:	Design, implement, test and evaluate more complex games using Microsoft MakeCode Arcade.	
Term	Knowledge & Skills	Experiences
2	<p>Design</p> <ul style="list-style-type: none">• Develop computational thinking• Identify main part of program using computational thinking• Narrative design - objective• Character design - hero, enemy• Level design - background• Gameplay design - points scoring, timer, how to win, how to lose <p>Implement</p> <ul style="list-style-type: none">• Maze Game• Floor is Lava• Final Frontier• Run Blinka Run!• Flappy Bird <p>Test</p> <ul style="list-style-type: none">• Movement• Scoring/losing points• Timer• Winning• Losing <p>Evaluate</p>	<p>Create Maze Game, Floor is Lava, Final Frontier, Run Blinka Run! And Flappy Bird games</p> <p>Carry out extension tasks</p>

	<ul style="list-style-type: none">• Limitations• Improvements	
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