Year 6 Programming 1 Test My Topic with Scratch (Core) inc RAG and PRIMM

Timing 6 - 8 sessions (depending on which optional sections you follow, see notes at bottom of children will section) of approximately 45 minutes	**Children will** • Create a Times Table quiz in Scratch • Make changes to improve their quiz and to make the programming more efficient • Use variables to add a score to the game • Plan a game adapting Times Table quiz for a quiz game based on your current topic • Collect/create sound and image files to use within game for different backgrounds, characters and objects • Plan an algorithm for the game, breaking it up into the parts required to make a game • Continue to test the game while making it and correct any errors in the programming and any errors in the algorithm used for the game Scratch online is suggested to enable children to work at home as well as in school. It also allows them to share their game with others. They can comment on their own and each other's games. ***Session 2*** *may become two sessions if you follow the optional activity where children make their program more efficient. This is optional, it can be done with the whole class or a group of children or not used.* ***Session 3*** *is optional if you wanted to include wide use of technology to collaborate on making a game* ***6 is optional*** *– it provides an opportunity for children to create their own sound files to use in their topic quiz*
e-safety links • I protect my password and other personal information. • I acknowledge the sources of information that I find online	**Objectives** **Programming** • I can deconstruct a problem into smaller steps, recognizing similarities to solutions used before (yr 5 to design an algorithm for a specific outcome and use this to write a program). • I can recognize when I need to use a variable to achieve a required output. • I can explain and program each of the steps in my algorithm to achieve a planned outcome. • I can evaluate the effectiveness and efficiency of my algorithm while I continually test the programming of that algorithm. • I can use logical reasoning to detect and correct errors in a algorithms and programs. **Multimedia** • I can talk about audience, atmosphere and structure when planning a particular outcome. • I can combine a range of media, recognising the contribution of each to achieve a particular outcome.

	• I can be digitally discerning when evaluating the effectiveness of my own work and the work of others.

Links to other learning:
History/Geography/RE/Science (Depending on your current topic): The children won't be using their knowledge of the topic until session four so this teaching block can run alongside other learning. You don't need to wait until the end of the topic.
Maths: Use negative numbers as part of a game to move characters on the screen and as part of algorithm to reduce the score within the game after particular events. Identify the mathematical operations required for using variables. Use appropriate angles of rotation to achieve movements of characters.
Art: Use the construction of 3d models of buildings or landscape to assist in designing settings for game. Photos of these could be used as backdrops in the game.

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Resources Scratch For optional activity in session 2 A5 paper Post-it notes		**Preparation** • Children can use Scratch offline and save games on your school network or they can work with Scratch online http://scratch.mit.edu/. This will allow them to work at home as well as in school and will allow them to play each other's games online in school and at home. • Should you have any concerns about the reliability / strength of your wireless connection, use Scratch offline for children to create their games and then upload to the Scratch online community so that they can play each other's games at home. • Children's Scratch accounts can be set up using a single email address. This is solely used if children forget their password. In Somerset we suggest a school logs a call with the helpdesk for a scratch(school number or name)@educ.somerset.gov.uk address • Use Scratch online as a basis for e-safety learning - See 'information about 'Scratch community' • Share information about Scratch online using this letter for parents. • Set up shortcuts for these Scratch projects or download for children to access offline ○ 1 Times tables cheer https://scratch.mit.edu/projects/323696136/editor ○ 2 Times tables dance https://scratch.mit.edu/projects/323693916/ ○ 3 Times tables dance score https://scratch.mit.edu/projects/323703651/ ○ 4 Times tables random dance score https://scratch.mit.edu/projects/323708423/ ○ Calculating Cat https://scratch.mit.edu/projects/323706226/ • Watch times table planning video • Download variable presentation.	
1	**Programming** I can evaluate the effectiveness and efficiency of an algorithm while I	**Creating a Times Table game using Scratch** • Pairs: Note down Scratch programming skills you have. Check: Have they shown awareness of sequence, repetition, selection and variables? Inputs and outputs? What does debug mean? Record any vocabulary that the children are not sure about.	Gold: Can I read and predict what a sequence of code will make happen and modify this to make my own program?

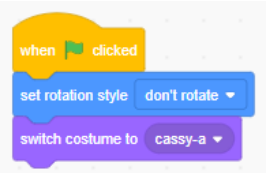
	continually test the programming of that algorithm. I can use logical reasoning to detect and correct errors in algorithms and programs.	• Tell the children we'll be developing a game using what we have learnt in our topic, but first we are going to use something familiar, a times tables game, to increase our knowledge of what we can do with Scratch. • 'Warm up' class with 4 block challenge. What can they make happen with these blocks?  Click on individual blocks to see what they do. Children will need to type in name and do a return for this to become 'answer'. What does join enable you to do? (*Can join Hello and answer for cat to say 'Hello Name'*) Make a short sequence with these blocks. • What do you do when you play a times tables game on a computer/tablet? Guide the children to the basic things which are part of any such game. List these as an algorithm ○ **Ask a question** – the program will need to sense the question and whether this is right. Tell the children that the answer is a text variable. ○ **If the answer is right say 'that's right'** ○ **If the answer is wrong say 'that's wrong'** • **Predict** ○ Show the class the sequence of blocks in the Times-tables cheer project. ○ Pairs: Talk through what you think this sequence will do. • **Run** ○ Pairs: Follow link to project to run the sequence – click on top of sequence ○ See what happens when you enter the correct answer, what happens when you enter an incorrect answer.	Silver: Can I read and predict what a sequence will make happen? Bronze: Can I use someone else's code and talk about what it makes happen?

- **Investigate**
  - What happens when you change what is in the blocks?

- **Modify** (Pause children in the middle of doing this to look at Predict and run below) Make changes to make it more of a game. Change the algorithm and then change the program:
  - Add more questions (remind children to use right click duplicate to copy the sequence for one question and change text and numbers for new question)
  - Change what happens if you get the answer right

- **Predict:** Pause the children in their modifying and ask them to **predict** what the Times tables Dance project will do.

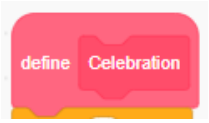
  - Talk about the sequence under 'Define Celebration'. This is a way to set a 'procedure' that can be used several times during the program. The sequence would become very long and difficult to manage if these blocks were all included in the program.
  - What does the short sequence do? *This is a set up sequence which makes sure that each time the quiz is run the sprite starts with the same costume and it won't rotate.*



- **Run:** (Make sure children have saved the times tables project they are working on) Let children follow link to run the program. Encourage them to click on the define celebration sequence separately so that they can see what the celebration block does. How does making the celebration block help? (*The block can be used each time a different question is asked in the quiz.)*

Make

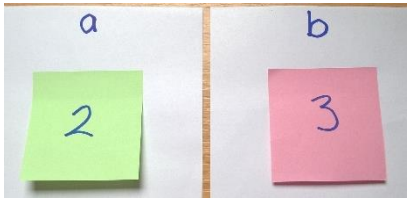
- Show children the My blocks section in Scratch
  - Make a block
  - Add in name

		○ Click OK ○ Put sequence of blocks for the procedure under define block ○ Each time the block you have made is used it will run the sequence.  • Let children continue to make their times tables quiz. Encourage them to think of how they could use the idea of making a block (making a procedure) to make their times tables quiz more interesting. • Review times tables games so far. What is working well? What could make the game more interesting? Prompt children to think of what makes other games more interesting eg having a score. • Tell the children they will be adding a score in the next session.	
2	I can recognize when I need to use a variable to achieve a required output.	**Refining and improving times table game** • Tell the children they will be making a score for their game and then thinking about other ways to make it more interesting. We can make a variable called score. • Remind them that a variable is a place to store information that they need to use in the program. Use the variable presentation to check children's understanding of a variable. Repeat post-it note activity in Year 5 Programming Core block if children seem unsure. • Ask children if they can remember how to make a variable. They will need to make a variable score in their game. At the beginning of the game they will set score to 0. They can change the score for each answer. They could add to the score if the answer is right or take away from the score if the answer is incorrect. • Show the children the Times tables dance project with score included. The score has been set to 0 in the set up sequence. The quiz sequence includes changing score by 10 for a correct answer and changing for -5 for an incorrect answer. • Let children have time to add a score to their game. **Scroll down and continue teaching sequence at TEST GAME** or follow:	Gold: Can I use variables to improve the efficiency of may quiz? (see optional activity) Silver: Can I use a variable to add a score to my quiz? Bronze: Can I talk about how a score could improve my game?

Optional for confident coders: Improving the code

Direct teaching: At the moment the sequence is getting longer and longer as we add questions to our times tables game. We can make the program more efficient if the computer sets our questions for us. We can do this by setting variables for the numbers to be multiplied in the times tables question.

Use the post-it note activity from Year 5 core programming block. You can do this as a whole class or give children two A5 sheets of paper one labelled ‘a’, the other ‘b’. Children write a single digit number on two colours of post-it note. (This can also be done on wipeboards but I have found changing the post-it notes can help they analogy of setting a value for the variable and then setting a new value for the variable.)



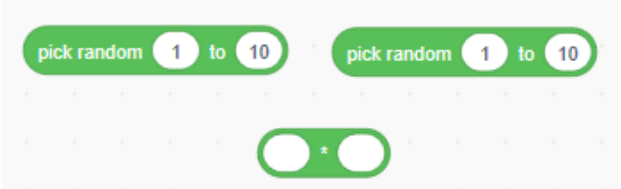
Get children to multiply the two variables and then to set a value for the variables for the next calculation.
We can set the variables in Scratch.

Investigate: How you can we use these blocks as a calculator?

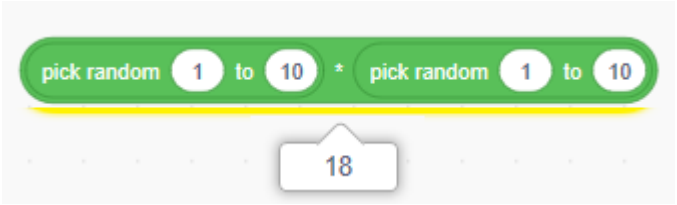
- Set the value of 'a' and 'b' - click on the block once you have entered the value – you need to click on the block to ‘tell the computer the values set’
- Put a and b in one of the operator blocks. Click on the operator block for the answer to the calculation

Direct teaching: We can set one value for the variable or we can set a ‘random’ value for the variable so that it changes every time we use it. Check children recognise and understand the word ‘random’.

Show children how ‘Pick random 1 – 10’ block can we used to change the calculation each time.



Put a ‘pick random block into each of the spaces in the multiplication operator.



Each time you click on the block a different answer will be given. Can the children suggest which number between 1 and 10 must be in each block for each answer that is shown?

Predict: Show children the sequences in Times tables random dance score. Can they predict what will happen?.

Run: Let children run the program. Remind them to use correct and incorrect answers as they run it.

Modify: Ask the children how they will modify their times tables game to make it more efficient.
Ask them to talk through in pairs, how they will use the pick random variables idea.
Give the children the opportunity to modify their game to make it more efficient.

- Watch https://www.youtube.com/watch?v=YHGyPfGg1x8&list=PL-myx4navrph4grpPotKfjFRZAurR_yok . This is a useful video to watch as a teacher but it is also good to show to children to let them see how a programmer thinks. *(Note: it is not just a case of a process where the algorithm is planned, programmed into the computer and then debugged – you are continually moving between these aspects. Some children will need to begin programming before they complete the algorithm.)*

		• Does this give the children any other ideas for their game? Encourage them to think of what could be moving across the screen. **Predict** • Look at the code for this Cat and mouse times table game. What will happen in this game? **Run** • Run the game, entering correct and incorrect answers. **Modify** • Make further changes to their game based on ideas from the cat and mouse game and the video they watched. Emphasis the need to keep testing sets of programming blocks to check they are doing what you want. **TEST THE GAME** Try the game out on another class. If time allows get the children to interview learners that have played their game to identify what is successful and what they could do to make it even better. **Review** • What was successful in your times tables game? • What have you learnt from making the game? How could we apply this to creating a game based on a Mayan quiz (or other topic)? What could it look like on screen? • Refer to the vocabulary list from the beginning of session 1. What have we learnt? Can we define all the words now?	
4	**Multimedia** I can talk about audience, atmosphere and structure	**Planning a quiz game using Scratch** Tell the children they are going to make a quiz game based on the topic they have been studying. Ask children to note down some of things they have found out during your topic that could be used in a quiz.	Gold: Can I solve a problem by designing a program and collecting/creating resources to achieve a specific goal?

	when planning a particular outcome. **Programming** I can deconstruct a problem into smaller steps, recognizing similarities to solutions used before. (Y5 – I use this to design an algorithm for a specific outcome and use this to write a program) **Multimedia** I can combine a range of media, recognizing the contribution of each to achieve a particular outcome.	• **Describe the planning process they will follow:** ▪ Design: ○ What will it look like? ○ What will happen on the screen? ▪ Think through algorithm ○ How will it happen? ○ Plan the process to achieve this ▪ Carry out your plan, continually checking / debugging, evaluating / improving • **Guide children through the process** to support them to achieve their own quiz game: ○ What skills have the children learnt? Which can they use in their game? What algorithm will they need to follow? ○ Children to think about how they will manage the questions and answers. ○ Consider how variables can measure what is happening in a game. ○ Children begin to plan their game. You can download one of these: ▪ Box planning A4 ▪ Hexagon planning A3 ▪ Simple planning ▪ Detailed planning ▪ or some children may find it easier to use a blank sheet of paper ○ Think about the audience for their game. What will the atmosphere be like? How will it be structured? Will it have different levels? Think about using variables to add scoring/timing. ○ What will the quiz game look like? ○ Consider the sprites, background they will use. Could they take photos of art work done during the current topic? Are there sprites and backgrounds in Scratch they can use?	Silver: Can I use a sequence of steps to make things happen and collect/create appropriate resources? Bronze: Can I select the bits of code to make things happen and collect/create resources?

Will they need to identify images online that have the necessary permissions for them to be used in a Scratch game?

- Give children time to create or discover backgrounds and sprites to use.
- Remind the children about copyright and the need to acknowledge the source of any resources belonging to others they used in the game.
- Optional: Let children think about how they could use the voice recorder in Sounds tab of a sprite or in backdrops to add sound files.
- What is the algorithm they will follow for their quiz game?
- Ask children to label their design with the sprites and background they will use. Label any variables that will be part of the quiz.

- Ask the children to RAG their design / algorithm as a self-assessment to see what knowledge and skills they already have that they can apply.

RAG: Self-assessment / Formative assessment Support Poster

- Ask children to **RAG** the design/algorithm, (highlighters or underline with coloured pencils).
  - Red: 'I do not know which objects, background and blocks to use to make this happen … yet.'
  - Yellow: 'I think I know what to do to make this happen but I am not sure. I am happy to have a go.'
  - Green: 'I know which objects, background and blocks to use to make this happen.'
- Use the self-assessment to **identify** children that may need:
  - Red: additional direct teaching
  - Yellow: Reinforcement
  - Green: confident to work independently

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5 and 6	**Programming** I can explain and program each of the steps in my algorithm to achieve a planned outcome. I can evaluate the effectiveness and efficiency of my algorithm while I continually test the programming of that algorithm.	**Creating a game and considering the possibilities** • Children begin creating their game. • Remind children to keep testing the game as they go. Underline importance of checking each part of the program before moving on to the next. *Spotting errors and debugging is fair more difficult when you program the whole design in one go.* • Encourage children to tick off steps in their design/algorithm as they achieve them. • Ask children to make changes to their design and algorithm as they identify the need to improve the design. • Remind children to acknowledge the sources of any clipart of sounds they collect to use that are imported from outside Scratch.	Gold: Can I use my design to program a game, recognizing changes I may need to make during the process? Can I detect and correct errors in a program? Silver: Can I use my design to program a game? Can I detect an error in a program? Bronze: Can I select the bits of code to make things happen? Can I spot a bit of code which may be wrong in a program?
7	**Programming** I can evaluate the effectiveness and efficiency of my algorithm while I continually test the	**Modifying my game and making it better** • Test and improve games. • Provide an opportunity for children in another class to play the games. • Evaluate and make appropriate changes based on feedback interviews. (Questions could be prepared before other children play the games – how will they evaluated the success of their game?). **Change the algorithm** (optional)	Gold: Can I evaluate my own and others work, making constructive and appropriate comments and making relevant changes? Silver: Can I evaluate my own and other work and offer constructive

	programming of that algorithm.
	
	Multimedia
	I can be digitally discerning when evaluating the effectiveness of my own work and the work of others.
		• Children may identify the problem of children needing to type the answer completely correctly to get the answer right. They could consider these starter projects to think about a different algorithm:
		
		  • Word choice quiz
		
		  • Multiple choice quiz
		
		Review plan
		
		• Ask children to look at their plan. Ask them to annotate changes they have made. Ask them to identify any Red or Yellow parts of the plan that they are now confident about. Was there anything they identified as Green that they needed further support to do?
		• Children could share their programs on the 'Scratch community website'. The project can be uploaded to the website http://scratch.mit.edu/ if they have been working with Scratch offline.
		• Modelling and guided writing of responsible and appropriate peer assessment could be used to prepare them to play each other's games online in school or at home. Talk about how they will comment in positive ways on each other's work.
		• Discuss the importance of keeping their passwords private. What are the consequences if someone logs in as you and makes a comment? Ask children to remind each other about the details they should not include when commenting online.
			comments for improvement?
			
			Bronze: Can I say what I think about my own and other work?