

## Scheme of Learning

## Curriculum area: KS3 Computing and ICT

Key Stage: 3

Resources Location: KS3 > Computational Thinking

Unit/Topic Title: **KS3 Computational Thinking**

<https://www.bbc.co.uk/bitesize/topics/z7tp34j>

N°	Lesson Aim	Learning Objectives / Outcomes	Lesson Content	Prior and Cross Curricular Learning	Home Learning Links
1	<p><b>Decomposition and Algorithms</b></p> <p>Students to decompose a problem and write an algorithm</p>	<ul style="list-style-type: none"> <li>Identify the 4 cornerstones of Computational Thinking</li> <li>Explain what is meant by the terms Algorithm and Decomposition</li> <li>Use Algorithms and Decomposition to solve a problem</li> </ul>	<p><u>Starter</u> Students are given an algorithm for making a cup of tea and need to put it in the correct order (<b>I CAN I WILL:</b> Drive, Risk Taking, Flexibility of Mind). Students are told about Starter for 10 keywords and prompted that the first one is next lesson</p> <p><u>Main</u> Teacher briefly identifies the 4 cornerstones of Computational Thinking (LO1)</p> <p><b>Algorithms</b> Teacher explains the term with examples and video, and carry out class activity as an example (LO2) Activity: Students listen to instructions by teacher, first instructions are vague, second set are much clearer. Explain to students the need for clear instructions in an algorithm.</p> <p><b>Decomposition</b> Teacher explains the term with examples and video, and carry out class activity as an example (LO2). Also get students to “guide teacher” around the room (<b>I CAN I WILL:</b> Initiative, Flexibility of Mind). Activity: Students make their own algorithms on a storyboard (<b>impact of drawing on retention and learning by Fernandes et al. (2018)</b>) (LO3)</p> <p><u>Plenary</u> Key Questions are asked to students around the class to determine their understanding and if they have met the learning objectives (<b>I CAN I WILL:</b> Reflectiveness).</p> <p><u>Homework</u>- Students to prepare for Starter for 10</p>	<p><u>Prior Learning</u> Student expected to know the actions for some basic tasks e.g. making a cup of tea</p> <p><u>Cross Curricular</u> Storyboarding and planning a set of instructions / actions</p> <p>Problem Solving skills</p>	<p><i>Lesson Content in more detail on Lesson PowerPoint</i></p> <p>Lesson PowerPoint Starter- Tea Algorithm Task 1- Clear Instructions Task 2- Algorithm Storyboard</p> <p>More able students expected to complete more detailed algorithms</p> <p>BBC Bitesize Notes: <a href="https://www.bbc.co.uk/bitesize/guides/zqqfyrd/revision/1">https://www.bbc.co.uk/bitesize/guides/zqqfyrd/revision/1</a></p> <p>Multiple Choice Quiz: <a href="https://www.bbc.co.uk/bitesize/guides/zqqfyrd/test">https://www.bbc.co.uk/bitesize/guides/zqqfyrd/test</a></p>

<p>2</p>	<p><b>Abstraction and Pattern Recognition</b></p> <p>Students to abstract information and recognise patterns in problems</p>	<ul style="list-style-type: none"> <li>• Re-cap what is meant by Decomposition and Algorithms</li> <li>• Explain what is meant by the terms Abstraction and Pattern Recognition</li> <li>• Use Abstraction and Pattern Recognition to solve a problem</li> </ul>	<p><u>Starter</u> Starter for 10 on keywords for the topic (<b>I CAN I WILL:</b> Resilience). Students to count the number of red balls (ignoring blue) on a moving image (repeating images)</p> <p><u>Main</u> Teacher briefly identifies the 4 cornerstones of Computational Thinking and asks students to explain Decomposition and Algorithms, with examples (LO2)</p> <p><b>Abstraction</b> Teacher explains the term with examples and video, and carry out class activity as an example (LO2) Activity: Students find specific items in a “Where’s Wally” ignoring irrelevant information (LO3) (<b>I CAN I WILL:</b> Curiosity)</p> <p><b>Decomposition</b> Teacher explains the term with examples and video, and carry out class activity as an example (LO2). Activity: Students complete Task 2 on patterns in numbers, letters and shapes- identifying next in sequence (LO3) (<b>I CAN I WILL:</b> Drive, Flexibility of Mind).</p> <p><u>Plenary</u> Key Questions are asked to students around the class to determine their understanding and if they have met the learning objectives (<b>I CAN I WILL:</b> Reflectiveness).</p> <p><u>Homework</u> None</p>	<p><u>Prior Learning</u> Beneficial if students have prior knowledge everyday events</p> <p>Understanding of number sequences and different basic shapes</p> <p><u>Cross Curricular</u> Psychology into how people think / see something</p> <p>Problem Solving skills</p>	<p><i>Lesson Content in more detail on Lesson PowerPoint</i></p> <p>Lesson PowerPoint Task 1- Where Wally Task 2- Find the Pattern</p> <p>Task 1 is differentiated by using simpler – harder images to suit different ability students.</p> <p>Task 2 contains many sequences, getting progressively harder to offer challenge</p> <p>BBC Bitesize Notes: <a href="https://www.bbc.co.uk/bitesize/guides/zxxbgk7/revision/1">https://www.bbc.co.uk/bitesize/guides/zxxbgk7/revision/1</a></p> <p>Multiple Choice Quiz: <a href="https://www.bbc.co.uk/bitesize/guides/zxxbgk7/test">https://www.bbc.co.uk/bitesize/guides/zxxbgk7/test</a></p>
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<p><b>3</b></p>	<p><b>Dr Snow's Algorithm</b></p> <p>Students to use 4 Computational Thinking Techniques to solve a problem (with help)</p>	<ul style="list-style-type: none"> <li>• Re-cap the 4 stages of computational Thinking</li> <li>• Summarise the 4 stages to Dr Snow's Algorithm</li> <li>• Apply Dr Snow's Algorithm to solve a problem</li> </ul>	<p><u>Starter</u> Students complete storyboard algorithm for a simple task (chosen by them) by breaking it down (<b>I CAN I WILL:</b> Initiative).</p> <p><u>Main</u> Question students on the 4 cornerstone of Computational Thinking and what they mean (LO1) (<b>I CAN I WILL:</b> Resilience, Risk taking).</p> <p>Discuss Cholera in Soho and how Dr Snow dealt with it; take responses from students as to how developed (<b>I CAN I WILL:</b> Curiosity, Initiative). Talk about stages to Dr Snow's algorithm (LO2)</p> <p>Activity: Students complete Dr Snow's Algorithm including colour coding the location of deaths and patterns found (<b>I CAN I WILL:</b> Drive, Flexibility of Mind) (LO3)</p> <p>Extension: Students research other ways Computational Thinking has been used to solve problems in real life (<b>I CAN I WILL:</b> Resilience).</p> <p>Review the stages to the algorithm after task and explain concept of generalisation</p> <p><u>Plenary</u> Key Questions are asked to students around the class to determine their understanding and if they have met the learning objectives (<b>I CAN I WILL:</b> Reflectiveness).</p> <p><u>Homework</u> Students prepare for Starter for 10 next lesson Students complete SAM learning task on Computational Thinking</p>	<p><u>Prior Learning</u> Beneficial if students have knowledge of everyday places i.e. pub/brewery</p> <p><u>Cross Curricular</u> Cholera and disease (germs and hygiene) affecting humans, biology lesson</p> <p>Outbreak in Soho, as water system in 19<sup>th</sup> century, history lesson</p> <p>Maths to add together number of deaths</p> <p>Problem Solving skills</p>	<p><i>Lesson Content in more detail on Lesson PowerPoint</i></p> <p>Lesson PowerPoint Starter- Algorithm Storyboard Task 1- Numbered map of Soho</p> <p>Task 1 can be completed in two different ways to differentiate between students / classes</p> <p>BBC Bitesize Notes: <a href="https://www.bbc.co.uk/bitesize/guides/ztttrcdm/revision/1">https://www.bbc.co.uk/bitesize/guides/ztttrcdm/revision/1</a></p> <p>Multiple Choice Quiz: <a href="https://www.bbc.co.uk/bitesize/guides/ztttrcdm/test">https://www.bbc.co.uk/bitesize/guides/ztttrcdm/test</a></p>
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<p>4</p>	<p><b>Malaria in Kitanga</b></p> <p>Students to use 4 Computational Thinking Techniques to independently solve a problem</p> <p><i>This lesson is further applications of lesson 3, so may not be required in the Scheme of Learning for all classes</i></p>	<ul style="list-style-type: none"> <li>• Re-cap Dr Snow's Algorithms and Generalisation</li> <li>• Use Generalisation to help solve a problem</li> <li>• Apply Generalisation to create an algorithm</li> </ul>	<p><u>Starter</u> Starter for 10 on keywords for the topic (<b>I CAN I WILL:</b> Resilience). Students to tell the teacher as many key terms / explanations as they can regarding Computational Thinking (<b>I CAN I WILL:</b> Risk Taking, Drive).</p> <p><u>Main</u> Re-cap 4 stages of Computational Thinking, Dr Snow's Algorithm and Generalisation; get students to tell teacher (<b>I CAN I WILL:</b> Resilience, Drive, Curiosity). (LO1)</p> <p>Using Dr Snow's Algorithm student's apply the techniques to tell the teacher how to solve problem of Malaria in Kitanga. Aim towards student led solution to aid understanding (<b>I CAN I WILL:</b> Resilience, Drive, Curiosity). (LO2)</p> <p>Activity: Students locate the swamp where Mosquito's most likely reside through generalising Dr Snow's Algorithm and analysing data (<b>I CAN I WILL:</b> Risk Taking, Drive, Flexibility of Mind). (LO3)</p> <p>Extension: Students to write a generalised algorithm for preventing Malaria in villages (<b>I CAN I WILL:</b> Initiative, Drive, Flexibility of Mind).</p> <p><u>Plenary</u> Key Questions are asked to students around the class to determine their understanding and if they have met the learning objectives (<b>I CAN I WILL:</b> Reflectiveness).</p> <p><u>Homework</u> None</p>	<p><u>Prior Learning</u> Student are expected to have a minimum basic knowledge of using an algorithm to solve a problem</p> <p><u>Cross Curricular</u> Learn about different cultures and environments, geography lesson</p> <p>Learn about habits of creatures and how they feed, biology lesson</p> <p>Problem Solving skills</p>	<p><i>Lesson Content in more detail on Lesson PowerPoint</i></p> <p>Lesson PowerPoint Task 1- East African News Spreadsheet tutorial (doc) Spreadsheet tutorial (mp4) 2_2A modelling malaria (xls) 2_2B modelling malaria (xls) 2_2C modelling malaria (xls)</p> <p>Task 1 can be completed as a class or on printed out table for lower ability groups</p> <p>Spreadsheet is differentiated for different groups (as well as tutorial documents), and activity can be completed without spreadsheet for lower ability groups</p> <p>BBC Bitesize Notes: <a href="https://www.bbc.co.uk/bitesize/guides/zpp49j6/revision/1">https://www.bbc.co.uk/bitesize/guides/zpp49j6/revision/1</a></p> <p>Multiple Choice Quiz: <a href="https://www.bbc.co.uk/bitesize/guides/zpp49j6/test">https://www.bbc.co.uk/bitesize/guides/zpp49j6/test</a></p>
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<p>5</p>	<p><b>Computational Thinking Revision (Make it Stick)</b></p> <p>Review and ensure clear understanding of how to use the 4 techniques</p>	<ul style="list-style-type: none"> <li>Define the key elements of Computational Thinking</li> <li>Explain the different elements of Computational Thinking</li> <li>Apply the different elements of Computational Thinking to solve a problem</li> </ul>	<p><u>Starter</u> Students complete bubble map on the 4 cornerstones of Computational Thinking independently (<b>I CAN I WILL:</b> Initiative, Risk Taking, Resilience).</p> <p><u>Main</u> Re-cap the 4 cornerstones of Computational Thinking, including what they mean and examples. Students should tell the teacher (<b>I CAN I WILL:</b> Initiative, Risk Taking, Resilience). (LO1 and LO2)</p> <p>Activity: Students use Computational Thinking to visit all locations on a map, and explain which they used and how (<b>I CAN I WILL:</b> Initiative, Drive, Resilience). (LO3)</p> <p>Activity: Students use Computational Thinking to group different, and explain which they used and how (<b>I CAN I WILL:</b> Initiative, Drive, Resilience). (LO3)</p> <p>Activity: Students independently complete revision sheet for the definitions and examples of the 4 cornerstones of Computational Thinking, so can be taken home to revise (<b>I CAN I WILL:</b> Initiative, Drive, Resilience). (LO2)- task also can be set for homework as aids revision</p> <p><u>Plenary</u> Students Complete a Kahoot on Computational Thinking, using their real names so scores can be recorded as additional assessment (<b>I CAN I WILL:</b> Reflectiveness).</p> <p><u>Homework</u> Students prepare for Starter for 10 next lesson Students use revision sheet to prepare for assessment on Computational Thinking</p>	<p><u>Prior Learning</u> Students expected to know the 4 cornerstones of Computational Thinking and at least have an idea how to use them</p> <p><u>Cross Curricular</u> Use of justification to explain answers, English Lesson</p> <p>Problem Solving skills</p>	<p><i>Lesson Content in more detail on Lesson PowerPoint</i></p> <p>Lesson PowerPoint Starter- 4 cornerstones of CT Task 1- The Grand City Tour Task 2- Revision Document</p> <p>Revision Document can be differentiated by how complete it is for students; they can then take home to revise with</p> <p>BBC Bitesize Notes: <a href="https://www.bbc.co.uk/bitesize/guides/zssk87h/revision/1">https://www.bbc.co.uk/bitesize/guides/zssk87h/revision/1</a></p> <p>Multiple Choice Quiz: <a href="https://www.bbc.co.uk/bitesize/guides/zssk87h/test">https://www.bbc.co.uk/bitesize/guides/zssk87h/test</a></p>
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<p>6</p>	<p><b>Computational Thinking Assessment</b></p> <p>Complete Assessment to test knowledge and understanding of Computational Thinking</p>	<ul style="list-style-type: none"> <li>• Prepare for Lesson Assessment on Computational Thinking</li> <li>• Complete Assessment on Computational Thinking</li> <li>• Review Assessment on Computational Thinking</li> </ul>	<p><u>Starter</u> Starter for 10 on keywords for the topic (<b>I CAN I WILL:</b> Resilience)- also acts as last minute review/revision before assessment</p> <p><u>Main</u> Students given some time to revise and prepare for assessment. As this was the homework as well, the amount of time given is at teacher’s discretion. (<b>I CAN I WILL:</b> Drive). (LO1)</p> <p>Activity: Students have 35 minutes to complete the assessment on Computational Thinking (<b>I CAN I WILL:</b> Initiative, Resilience, Risk Taking). (LO2)</p> <p>Activity 2: Depending on time given to revising before assessment, once assessment is complete students can peer mark the assessments. All students trade papers and as class go through paper with students correcting answers in purple pen (<b>I CAN I WILL:</b> Reflectiveness). (LO3)</p> <p><u>Plenary</u> Students get own papers back and total their marks for the assessment and write in the back, along with any scores from homework (SAM learning). (<b>I CAN I WILL:</b> Resilience).</p> <p>Papers are collected in for teacher to review the marking and check answers</p> <p><u>Homework</u> None</p>	<p><u>Prior Learning</u> Skills taught throughout the unit</p> <p><u>Cross Curricular</u> Problem Solving skills</p> <p>Assessment considers other areas of life i.e. sports, lessons in day, etc.</p> <p>Use of maths to work out percentage</p>	<p><i>Lesson Content in more detail on Lesson PowerPoint</i></p> <p>Lesson PowerPoint Computational Thinking Assessment Computational Thinking Mark Scheme</p> <p>Revision can be differentiated by time given</p> <p>Assessment can be differentiated by assistance given with prior revision and time allotted can be adjusted</p>
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<p>7</p>	<p><b>Assessment Review</b></p> <p>Target gaps in student's knowledge and areas for improvement</p> <p><i>This lesson could be completed with the assessment in a single lesson for high ability students</i></p>	<ul style="list-style-type: none"> <li>• Reflect on your performance in the Computational Thinking Assessment</li> <li>• Complete review questions based on the assessment topics</li> <li>• Engage in DIRT to make improvements to work</li> </ul>	<p><u>Starter</u> Students think of 1 thing about Computational Thinking they can tell the class; avoid repeating information (<b>I CAN I WILL:</b> Initiative). Teacher goes around room asking students for 1 fact/piece of information</p> <p><u>Main</u> Activity: Using their assessments, students reflect on how they performed and consider where they struggled most. (<b>I CAN I WILL:</b> Reflectiveness) (LO1) They then complete 3 questions based on the topics they struggled on the most (personalised learning)- 1 from each category (<b>I CAN I WILL:</b> Resilience, Drive) (LO2)</p> <p>Activity: Students look through their books and complete any improvements needed i.e. complete work, incorrect work, presentation, etc. (<b>I CAN I WILL:</b> Resilience, Reflectiveness) (LO3)</p> <p><u>Plenary</u> Students Complete a Kahoot on e-safety, using their real names so scores can be recorded as additional assessment (<b>I CAN I WILL:</b> Reflectiveness). This acts as a good "make it stick" activity to test how much they remember</p> <p><u>Homework</u> Homework could be set for Starter for 10 for next topic</p>	<p><u>Prior Learning</u> Students to have completed the assessment on Computational Thinking</p> <p><u>Cross Curricular</u> Use of justification to explain answers, English Lesson</p> <p>Problem Solving skills</p>	<p><i>Lesson Content in more detail on Lesson PowerPoint</i></p> <p>Lesson PowerPoint</p> <p>Review questions completed are personalised and differentiated, but can be further through questions completed (not 1 from each category)</p>
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-	<p><b>Flow Charts</b></p> <p>Students to use the different flow chart symbols to create a flow chart algorithm</p> <p><i>This lesson could be completed any point after lesson one and can be completed independently. Students are NOT assessed on flow charts</i></p>	<ul style="list-style-type: none"> <li>• Explain the purpose of a Flow Chart</li> <li>• Explain the different symbols of a Flow Chart</li> <li>• Create a flow chart using the different symbols</li> </ul>	<p><u>Starter</u> Students to draw and label the different symbols used in a flow chart in their books (<b>I CAN I WILL:</b> Initiative, Risk Taking)</p> <p><u>Main</u> Activity: Students independently research the purpose of a flow chart (<b>I CAN I WILL:</b> Initiative, Drive, Curiosity) (LO1)</p> <p>Activity: Students independently research the and explain the different symbols used in a flow chart (<b>I CAN I WILL:</b> Initiative, Resilience) (LO2)</p> <p>Activity: Students create their own flow chart based on a simple algorithm of their choice- they have examples and links to aid them (<b>I CAN I WILL:</b> Initiative, Flexibility of Mind, Curiosity) (LO3)</p> <p>Extension: Students create a poster (wall display) detailing flow charts with an example. If done well, these can be used on the teachers wall displays (<b>I CAN I WILL:</b> Drive, Resilience)</p> <p><u>Plenary</u> Various SAM learning and Kahoot tasks that can be set by the teacher on Flow charts; to determine their understanding and if they have met the learning objectives (<b>I CAN I WILL:</b> Reflectiveness).</p> <p><u>Homework</u> None</p>	<p><u>Prior Learning</u> KS3 Computational Thinking Lesson 1 and knowledge of Algorithms</p> <p><u>Cross Curricular</u> Problem Solving Skills</p> <p>Storyboarding and planning a set of instructions / actions</p>	<p><i>Lesson Content in more detail on Lesson PowerPoint</i></p> <p>Lesson PowerPoint Student Workbook</p> <p>Additional Lesson for Independent/additional learning; can be taught anywhere after Lesson 1</p> <p>Student can complete the work on their own PowerPoint which has the key information removed (independent learning)</p>
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