

## **Stretch and challenge for COMPUTING/COMPUTER SCIENCE**

### **KS3 - Computing**

- Seneca Learning KS3: complete exam question to extend learning to enable to prepare for KS4. (Paper 1 Systems Architecture and Paper 2 Computational thinking, algorithms and programming)
- Love4learning tasks: E-safety, spreadsheets, HTML, vector graphics and wide range of other tasks
- Digital Leader Ambassadors
- Project based learning: programming project network security project • STEM opportunities – projects to deeper understanding
- Trips to industry:
- Practical – projects (building pc and looking at components)
- KS3 unplugged computing incentives: solving computational thinking problems and investigating how algorithms are used in everyday life
- KS3 computational thinking puzzles/competitions: <https://www.tynker.com/> - MOD Minecraft, Learn Python and Explore AI and automated machines.
- **Challenge misconception:**
- Reverse learning: provide answer pupils to determine questions (programming)
- Flipp learning – learn from home and embed into next lesson
- Trips to industry
- Introduction of topics outside curriculum: AI (Artificial Intelligence, IoT (Internet of Things) how devices are used in school, at home and at work
- Extended reading – current topics/affairs: (how is Augmented Reality used in everyday life, data logging (record data about outside environment and analyse the data collected), stop-motion animation (express real life scenarios using stop-motion animation software and resources), how are networks devices used CCTV, antennas and broadband cabinets.
- Explore careers/GCSE subject options before selecting GCSE options: <https://www.careerpilot.org.uk/>

### **KS4 – Computer Science**

- CSUK revise – online platform: complete programming challenges and project to further deepen programming skill, knowledge and understanding

- Targeted - mentor/intervention
- Competitions: Cisco Cyber Camps (engage with cybersecurity experts to complete security challenges)
- Target intervention – how to achieve grade 9
- Exam questions
- Revision books
- Blank knowledge organisers
- Extended reading articles:
  - Hello World Magazines – online magazine platform.  
<https://www.raspberrypi.org/hello-world>
  - The Wired – online magazine platform
  - Introduction To Algorithms - T. Cormen
  - The Art of Computer Programming (Vol 1. in particular) - D. E. Knuth
  - Structure and Interpretation of Computer Programs - H. Abelson
- Love4learning challenges: 1.1 Systems Architecture – 2.1 Programming languages and IDE's
- Programming projects
- Program KS5 degree level opportunities: investigate university/college courses using <https://www.careerpilot.org.uk/>
- KS4 unplugged computing incentives: data structures for searching, sorting networks, binary number puzzles, algorithms putting computers to work
- **KS4 computational thinking puzzles**
- Reverse learning: provide answer pupils to determine questions (programming)
- Flipp learning – learn from home and embed into next lesson, <https://codefinity.com/>
- Introduction of topics outside curriculum: cryptography, modems unplugged, Scout Patrol (encryption), Brilliant (learn by doing) online problem solving challenges (<https://brilliant.org/>), <https://www.quantamagazine.org/computer-science/> - Neural Networks, AI and Robotics etc.
- Explore careers in computing and computer science: <https://www.careerpilot.org.uk/>
- Extended reading – current topics/affairs
  - Experience AI (Google DeepMind/Raspberry Pi resources)
  - A Brief History of Artificial Intelligence: What It Is, Where We Are, and Where We Are Going, Michael Wooldridge
  - A Human Algorithm: How Artificial Intelligence is Redefining Who We Are, Flynn Coleman

