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| **Safe Cracker** | | | |
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| Solving addition and subtraction problems to crack the safe code | | | |
| **Subject(s):** Mathematics  **Approx time:** 20 - 35 minutes |  | | **Key words / Topics:**   * Addition * Missing numbers * Subtraction * Three-digit number * Two-digit number |
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| **Suggested Learning Outcomes** |  | |  |
| * To add and subtract numbers with up to three digits mentally. * To add and subtract numbers with up to three digits using formal columnar methods. * To solve missing number problems involving addition and subtraction. | | | |
| **Introduction** |  | |  |
| This is one of a set of resources developed to support the teaching of the primary national curriculum. They are designed to support the delivery of key topics within maths and science. This resource focusses on solving addition- and subtraction- based numeracy problems to find the code that will open a safe door.  Do you have the maths knowledge to ‘crack the code’ and open the safe?! | | | |
| **Purpose of this activity**  In this activity learners will solve three addition and subtraction problems. The answer to each problem will give two out of the six digits needed to crack the code to a safe. They will reinforce their addition and subtraction knowledge and apply this in a fun context.  This activity could be used as a starter activity covering learning from the previous lesson, a plenary activity reinforcing learning that has just taken place, or as one of several activities within a wider scheme of learning focussing on addition and subtraction. | | | |
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| **Activity** |  | | **Teacher notes** |
| **Introduction (2-5 minutes)**  Teacher to explain that learners are going to be given three addition- and subtraction- based problems. The answer to each will give one of three two-digit numbers needed to ‘crack the code’.  Using the teacher presentation, show the safe with the door closed. Explain that learners must get all three answers correct to create the complete code and successfully open the safe.  **Answering the problems (10-20 minutes)**  Teacher to show and read out the three problems, one at a time, in increasing levels of difficulty. Give learners time to answer each one e.g. three minutes per problem.  For example:   * What is 102 - 7? * 600 - ? = 580. What is the missing number? * 327 + ? = 365. What is the missing number?   **Opening the safe and review of learning (5-10 minutes)**  Show the finished safe code and review how many learners managed to crack the safe. Show the safe opening.  For learners who did not crack the code review which questions they did not get right and go through the correct method of answering them as a class. Learners who got the correct answers could also share their responses. |  | | This is a game-based activity – the safe cracker aspect can be used to inject fun and competition into solving the problems. For added competition the teacher could set a time limit on how long learners have to answer each question, or split the class into pairs or small teams.  The problems to solve given in the teacher presentation are example addition and subtraction questions based on typical key stage 2 learning (see below for specific curriculum links). For lower ability pupils the teacher may wish to insert alternative calculations, then take them through the solutions to the problems one step at a time.  Learners should have access to paper or exercise books to write down their working as needed.  If the teacher wishes to repeat the exercise several times, or use with a different abilities and/or year groups, then the problems can be changed as many times as required.  Learners who successfully crack the code could be given a prize ‘from the safe’.  **Example problem answers:**   1. 95 2. 20 3. 38   Finished safe code = 95 20 38 |
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| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| Take learners through each problem, the correct working and the answers one at a time on the board.  Reduce the difficulty of the questions. |  | | Increase the difficulty by using problems that require the addition and subtraction of more challenging three-digit numbers and hundreds.  Include word-based, multiplication and division problems. |
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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Interactive whiteboard/projector screen * Paper and/or exercise books |  | | Teacher presentation – Safe cracker |
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| **Additional websites** |  | |  |
| * **TES Resources - Addition and subtraction:** Free resource to teach the column method of addition and subtraction. <https://www.tes.com/teaching-resource/year-3-4-column-method-for-addition-and-subtraction-12075148> * **YouTube - Adding using the column method:** Video demonstrating the column method for addition. <https://www.youtube.com/watch?list=PL_veIGcSU3qzVfqxqlEqyfDPLjfSNNVhf&v=eaRRt9BsnE8&feature=emb_logo> * **Twinkl – Missing number problems:** Worksheets with various examples of missing number problems. <https://www.twinkl.co.uk/resource/t2-m-1580-year-3-missing-number-problems-activity-sheet> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Recap the column method of addition and subtraction. * Quick-fire round of simple mental arithmetic questions to warm up the brain. | | **Extension** (Options)   * Repeat activity using problems that require the addition and subtraction of more challenging three-digit numbers and hundreds. * Repeat activity using multiplication, division and word-based problems.   **Plenary**   * Review answers and working out for each problem. * Self and peer assessment of responses. | |
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| **The Engineering Context** film |
| * Engineers are required to use mathematics knowledge and skills regularly as part of their everyday job. It is therefore essential that they have a good grasp of basic concepts, such as addition and subtraction. |

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| **Curriculum links** | |
| **England: National Curriculum**  Mathematics  KS2 Year 3 Number – addition and subtraction:   * add and subtract numbers mentally, including a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds * add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction * solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. | **Northern Ireland Curriculum**  KS2 - Mathematics and Numeracy  Processes in mathematics:   * understand mathematical language and use it to discuss their work and explain their thinking   Number:   * count, read, write and order whole numbers * develop strategies to add and subtract mentally. |
| **Scotland: Curriculum for Excellence**  Numeracy and Mathematics  Number and number processes:   * MNU2-03a | **Wales: National Curriculum**  Mathematics  KS2 - Using number skills:   * add and subtract 3-digit numbers using an appropriate mental or written method. |
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| **Assessment opportunities** | | |
| * Teacher assessment of responses and written working out. * Self and peer assessment of responses to problems. * Prizes and team points for successfully ‘cracking the code’. | | |
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