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| **KS2 Times Table Cake Challenge** | | | |
| A pattern spotting problem using multiplication knowledge | | | |
| **Subject(s):** Maths  **Approx time:** 45-50 minutes |  | **Key words / Topics:**   * Repeating pattern * Order * Multiple * What do you notice about… * I think that… * This is the same/different because… * I know that… because | |
| **Stay safe**  Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for:    • ensuring that any equipment used for this activity is in good working condition  • behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others    Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol: ⚠ | | | |
| **Suggested Learning Outcomes** |  | |  |
| * To reason mathematically by:   + identifying and noticing the patterns created, such as ‘every other cake has red sparkles’   + conjecturing relationships between similarly decorated cakes, such as ‘I think the next cake in the line will have just blue sparkles because….’   + and developing an argument, justification or proof using mathematical language. Such as ‘I know that the third and the sixth cake will have the dame decorations because….’ * To solve the cake problems by:   + applying multiplication knowledge of 3x,4x,8x times tables,   + breaking down the problems into a series of simpler steps and   + persevering in seeking a solution | | | |
| **Introduction** |  | |  |
| There are 24 cakes on a line on the table. These cakes need to be decorated using the following rules.   * Every third cake will have white icing * Every fourth cake will have blue sprinkles * Every eighth cake will have red smarties   This activity could be used in Key Stage 2 as a stand-alone activity, as a focused task to develop problem solving skills, or as a consolidation task related to 3x,4x,8x multiplication facts. | | | |
| **Purpose of this activity**  In this activity, pupils develop both their problem-solving and reasoning skills. They will also practice their mental recall of the 3x, 4x, 8 times multiplication tables. | | | |
| **Activity** |  | | **Teacher notes** |
| **Introduction (15 mins)**  Demonstrate a simplified version of the activity using 6 cakes.  Show the instructions first:   * Put white icing onto every second cake. * Put a red smartie onto every third cake.   Before decorating the cakes ask the pupils, with their talk partners, to predict:   * Are there any cakes that will have no decorations? Why do you think this? * Are there any cakes that will have both decorations? Why do you think this?   Use the sentence starters on the PowerPoint slide to support any explanations if necessary.  Record their responses on the Interactive White Board/Flip chart.  Now decorate the cakes and, using the decorated cakes, answer the questions.  **Decorating the cakes (15 mins)**  Working in groups of 4 the children have 15 minutes to decorate their cakes following the criteria provided.  Once they have finished, they need to number the cakes, using either digit cards, or white board pens.  **Exploring the pattern (10 mins)**  In groups children can record what they have noticed about the patterns.  There are some possible prompting questions that you could use to scaffold discussions here:   * Which are the cakes that have icing on? * Which are the cakes that have blue sprinkles? * Which are the cakes that have a smartie decoration? * What do you notice about the cakes that have no decoration? * What do you notice about the cake that has all three decorations? * What number would the next cake be that has 3 decorations again? * Why do all the cakes that have red smarties also have blue sprinkles?   You could provide each group with a mini hundred square and some pens so they can check their predictions and deepen their explanations.  **Plenary (10 mins)**  Groups explain the patterns they have discovered. |  | | **Introduction (15 mins)**  You may wish to number the cakes using digit cards to draw out the pattern.  To scaffold the learning, you could ask:  Which are the cakes that have icing on (2,4,6)  Which are the cakes that have a smartie decoration? (3,6)  Which cake has both decorations (6)  What do you notice?  What would happen if I had 10 cakes? Would there be another cake with both decorations?  How do you know?  How many cakes would I need to decorate to have another cake with two decorations?  **Decorating the cakes (15 mins)**  Working in groups of 4 give each group:   * 24 cakes, * a pot of red smarties, * a bowl of white icing and a spoon, * a bowl of blue sparkles and a spoon   Give a card with written instructions, also share these on the PowerPoint slide:   * First place your cakes out in a long line * Now put a spoonful of white icing on every third cake. * Put some blue sprinkles on every fourth cake. * Finally put a red smartie on every eighth cake.   You may wish to use:  Circles to represent the cakes  Red/white and blue counters/multilink cubes to represent the cake decorations.  **Exploring the pattern (10 mins)**  3,6,9,12,15,18,21,24  4,8,12,16,20,24  8,16,24  They are not multiples of 3,4 or 8  It is a multiple of 3,4, and 8  48  Because all multiples of 8 are also multiples of 4  **Plenary (10 mins)**  In the plenary draw out why 24 has all three decorations. You may choose to use a hundred square and highlight the multiples of 3, 4 and 8 so that children can deepen their understanding further. |

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| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Provide the learners with previously decorated cakes if they need more time to complete the task. |  | * Learners could create their own set of rules for decorating the cakes. * You could extend this further by giving them certain criteria their rules must meet such as the numbers 7, 16 and 27 must be decorated. |
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| For the introduction you will need:   * 12 cakes * a bowl of white icing * a bowl of red smarties * a bowl of blue sprinkles.   For the independent investigation each group will need:   * 24 cakes * a bowl of white icing * a spoon * a bowl of red smarties * a bowl of blue sprinkles   You could use a resource to represent the cakes and decorations such as circles and red, white and blue counters to represent the different decorations.  **You might also want to use:**   * Digit cards 1-24 * Mini Hundred squares |  | icon-ppt Presentation – KS2 Times Table Cake Challenge |
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| **Additional websites** |  |  |
| A couple of basic cake recipes to follow:   * <https://www.bbcgoodfood.com/recipes/iced-fairy-cakes> * <https://www.bakingmad.com/recipes/simple-fairy-cakes> | | |
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| **Curriculum links** | |
| **England: National Curriculum**   * To solve problems involving multiplication, using materials, repeated addition, and multiplication and division facts. * To develop conceptual understanding and the ability to recall and apply knowledge of multiplication rapidly and accurately * To develop reason mathematically by:   + identifying and noticing the patterns created, such as ‘every other cake has red sparkles’   + conjecturing relationships between similarly decorated cakes, such as ‘I think the next cake in the line will have just blue sparkles because….’   + and developing an argument, justification or proof using mathematical language. Such as ‘I know that the third and the sixth cake will have the dame decorations because….’ * To solve the cake problems by applying their multiplication tables knowledge of 3x,4x and 8x tables, including breaking down the problems into a series of simpler steps and persevering in seeking a solution | **Northern Ireland Curriculum**  **Mathematics and Numeracy Key Stages 2**  **PROCESSES IN MATHEMATICS**  **Making and Monitoring Decisions**  Pupils should be enabled to:   * take increasing responsibility for selecting and using the materials and the mathematics required for their work; * identify and obtain the information required for a task, suggesting appropriate sources to find the information; * plan and organise their work, learning to work systematically; * develop a range of strategies for problem-solving, looking for ways to overcome difficulties.   **Communicating Mathematically Pupils should be enabled to:**   * understand mathematical language and use it to discuss their work and explain their thinking; * compare their ideas and methods of working with others; * interpret situations mathematically using appropriate symbols or diagrams; * present information and results clearly.   **Mathematical Reasoning Pupils should be enabled to:**   * recognise general patterns and relationships and make predictions about them; * ask and respond to open-ended questions and explain their thinking; * understand and make general statements; * check results and consider whether they are reasonable   **Patterns, Relationships and Sequences in Number**  Pupils should be enabled to:   * explore and predict patterns and sequences of whole numbers, follow and devise rules for generating sequences. * understand and use multiples and factors |
| **Scotland: Curriculum for Excellence**   * Having explored the patterns and relationships in multiplication and division, I can investigate and identify the multiples and factors of numbers. **MTH 2-05a** * Having explored more complex number sequences, including well-known named number patterns, I can explain the rule used to generate the sequence, and apply it to extend the pattern. **MTH 2-13a** | **Wales: National Curriculum**  **Identify processes and connections**   * transfer mathematical skills to a variety of contexts and everyday situations * identify the appropriate steps and information needed to complete the task or reach a solution   **Identify processes and connections**   * explain results and procedures clearly using mathematical language   **Review**   * interpret answers within the context of the problem and consider whether answers are sensible   **Use number facts and relationships**   * recall 2, 3, 4, 5 and 10 multiplication tables and use to solve multiplication and division problems (y3) * use mental strategies to recall multiplication tables for 2, 3, 4, 5, 6 and 10 and use to solve division problems (y4) |
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| **Assessment opportunities** | | |
| * Questioning throughout the lesson * Pattern explanations in the plenary | | |
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