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| **Make a yule log** | | |
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| Chocolate Yule Log is super yummy and a perfect addition to the Christmas dessert table.  **There are three different sections to this cake, and if you’ve ever made a basic sponge cake, you’ll find the first bit easy.** | | |
| **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: ⚠ | | |
| **Age:** 7 to 11 years but younger children can bake this with supervision  **Approx time:** 1 hour [+30 mins cooling time] |  | **Key words / Topics:**   * DT * Science * Maths * Changing state * Cooling and heating * Measuring temperature * Weight |
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| **Equipment** ⚠ |  | **Ingredients** |
| * Large mixing bowl * 2 medium bowls, one for ganache, one to whip the cream * 33cm x 22cm Swiss roll tin * Spatula * Spatula knife * Electric whisk * Metal spoon * Baking parchment / greaseproof paper * Small saucepan * Fork – to create ‘bark’ effect in the icing * Piping bag and nozzle (optional) |  | **For chocolate sponge**   * 6 free range eggs – white and yolk separated * 100g caster sugar * 35g self-rising flour * 35g cocoa powered   **For chocolate buttercream**   * 85g softened butter * 175g icing sugar * 2 tablespoons cocoa power * 1 tablespoon milk   **For filling**   * 300ml double cream * Raspberry jam (optional)   Extra icing sugar for dusting |
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| **Instructions** ⚠ |  |  |
| **Step 1**  Preheat your oven to 200 degrees Celsius (°C) /180°C fan/gas mark 6.  **Step 2**  Grease the Swiss roll tin.  **Step 3**  Line the tin with non-stick paper or baking parchment, pushing it into the corners. (Use a ruler to measure the paper and cut it to size, as if it is too big, you’ll end up with a very thin Swiss roll, or if it’s too small your cake mix might overflow.)  **Step 4**  For the sponge, whisk the egg yolks with 40g of the sugar, one tablespoon at a time until they are pale.    In a separate bowl, whisk the egg white until they become soft peaks, then add the remaining sugar, one tablespoon at a time. The egg whites should hold their shape as you are doing this.    Then, gently fold the egg yolk and egg white mixtures together using a metal spoon. When it is combined, fold in the flour and cocoa powder, so that all of the ingredients are combined together.  **Step 5**  Pour the mixture into the lined tin and spread out evenly into the corners.  Bake in the middle of the preheated oven for 8–10 minutes, or until well risen and firm to the touch and the sides are shrinking away from the edge of the tin.  If you are not sure if it is quite cooked, gently slide a cocktail stick into the centre of the cake, if it comes out clean, then the cake is ready.  **Step 6**  Meanwhile, have ready a sheet of greaseproof or baking parchment the same size as before. Lay it on the work surface and sprinkle on some icing sugar.  **Step 7**  Here comes the tricky bit...  Turn out (gently tip out) the cake quickly onto the paper and trim away the edges. Place a second sheet of paper on top of the sponge and roll it up loosely using the sugared paper underneath as a guide. If you roll it up starting with the short edge, you will notice that there is a very distinct spiral through the middle of the Swiss roll.  Leave to cool completely on a cooling rack, covered in the paper. It is best to do this when the sponge is still slightly warm, as this will prevent it from cracking and splitting, it also means that the sponge is more pliable.  **Step 8**  **While the cake is cooling, make the buttercream topping and the cream filling.**  Sieve the icing sugar and coco powder into a bowl.  Put the softened butter into another bowl and using an electric whisk mix in 1/3 of the icing sugar/coco mixture, then another 1/3 along with the milk and add the final 1/3 until everything is well combined.  This buttercream icing needs to be fairly thick to pipe it. You can do this by hand, using a spoon, but it will take quite a while and you’ll need strong muscles! Put the buttercream aside for later.  **Step 9**  Pour the double cream into a bowl and whisk until it’s fluffy and firm. Careful not to over whisk or you’ll get butter!  **Step 10**  Uncurl the cold Swiss roll cake carefully and remove the paper. Spread the whipped cream on top and firming re-roll. But be careful not to squeeze the cream out as you roll! Transfer the rolled cake to a serving plate.  **TOP TIP:** You can add a layer of raspberry jam on the whipped cream before you roll this up for extra delicious flavours.    **Step 11**  Use a palette knife to spread the buttercream along the swiss roll and create a rough bark texture by running a fork along the length of the cake. If you are feeling ambitious, you can pipe the icing onto the cake – see step 12 below or skip to step 13 if not.  **Step 12 – if piping your buttercream**  First slide the nozzle down inside the cone of the bag so that it is sticking out of the bottom.  Then, put the icing bag into a tall glass, and roll the wide top edge of the bag down so that it is being held open by the top of the glass and the narrow part of the cone is hanging down inside the glass.  Carefully, spoon the buttercream into the piping bag.  Twist the piping bag at the top so the icing doesn’t spurt out when you start to pipe.  Hold the icing bag with two hands, keeping one had at the top to stop the twist from loosening and to squeeze the mixture out gently.  The other hand should squeeze lower down the bag and to guide the nozzle where you want it to pipe.  Pipe long thick lines along the cake, covering the cake completely so it looks like the bark of a tree.  Cover each end with icing or, if you wish to see the cream, leave un-iced.  **Step 13**    Dust with icing sugar to look like snow and decorate ready to serve. | | |
| **Baking brains** |  |  |
| * Look at the spiral you have created at the end of the cake, can you think of any plants or animals that have a spiral pattern in them? * How long is the cake? Measure it and work out how many centimetres of cake each person will get – don’t forget this cake serves 6 people. You might be able to get a couple more slices out of it. * How many centimetres will each person get if you are serving 7 or 8 people? * How big is the overall yule log? Can you measure it and work out the volume? * Now measure the end, circular part of the yule log. Can you work out both the radius and the diameter?   **Watch our ‘how-to’ video** **at Santa’s STEM Workshop online.** <theiet.org/santa> | | |
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| **The Engineering Context** film |
| Baking is engineering. It is using science, maths and technology skills to engineer and create solutions and new tasty ‘products’. So, engineers need all these skills – precision in weighing out ingredients, the safety required in the kitchen and product design and quality engineering to test, taste and improve with each bake! |

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| **Curriculum links** | |
| **England: National Curriculum**   * **Science; lower KS2** * observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). * **Science; upper KS2** * know that some materials will dissolve in liquid to form a solution. * demonstrate that dissolving, mixing and changes of state are reversible changes - explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible. | **Northern Ireland Curriculum**   * **Primary; The world around us** * KS1 The effect of heating and cooling some everyday substances. * KS2 changes that occur to everyday substances, for example, when dissolved in water or heated and cooled. |
| **Scotland: Curriculum for Excellence**   * **Science; Materials – Properties and uses of substances; Second**   By contributing to investigations into familiar changes in substances to produce other substances, I can describe how their characteristics have changed. | **Wales: National Curriculum**   * **Science KS2** use standard measures and S.I. units, e.g. kg, s, N, m.   **Science KS3** use a range of apparatus and equipment safely and with skill, taking action to control the risks to themselves and others |