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| **Make Rudolph shaped cookies** |
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| **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: ⚠  |
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| **Age range:** 11-14-year-olds or younger with adult supervision**Approx. time:** 45 minutes – 1 hour ( Plus time to freeze and thaw) |  | **Key words / Topics:*** ingredients
* measurements
* imperial
* metric
* BIPM
* accuracy
* consistency
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| **Introduction** |  |  |
| Christmas is a time when we enjoy treating ourselves with lots of delicious dinners and tasty things to eat. In this activity, learners will make Rudolph cookies, with his famous red nose. |
| **Equipment** ⚠ |  |  |
| * 125g/4.5oz butter, softened
* 70g/2.5oz caster sugar
* 1 egg yolk
* 1 teaspoon vanilla extract
* 500g/5oz plain flour
* A jar of raspberry or strawberry jam
* A packet of pretzel snacks and chocolate chips for decoration
* You will also need a mixing bowl and a wooden spoon or electric mixer
* Non-stick baking tray
* Teaspoon
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| **Instructions** ⚠ |  |  |
| **Step 1**Using a wooden spoon or electric mixer, mix the butter and sugar in a large bowl until smooth.**Step 2**Add the egg yolk and vanilla extract and mix until well combined.**Step 3**Sift over the flour and stir until all the flour has been mixed in and no dry bits are left – use (clean) hands to knead the mixture into a dough.**Step 4**Let the dough chill in the fridge for 20 minutes. Whilst the dough is chilling, pre-heat the oven to 180C/160C fan/gas mark 4. **Step 5** Roll out dough balls – about the size of a 10p coin – and place on the non-stick baking tray. Make sure to leave a gap between them as they will spread out a bit while they cook. **Step 6**Make Rudolph’s nose by pushing a thumb firmly into each dough ball to make a hollow in the centre. Be careful not to push your thumb all the way through to the tray or the jam will leak out the bottom!**Step 7**Using a teaspoon fill the thumbprint hollow with a small blob of jam in each cookie. **Step 8** ⚠Bake on the non-stick baking tray for 10-12 minutes until pale golden. When cooked, carefully transfer the cookies to a wire rack to cool and crisp up.**Step 9**While still soft, press chunks of pretzels into the top of the cookies for Rudolph’s antlers. Then, once the cookies are cool, use chocolate chips for his eyes.  |

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| **Science and maths** |  |  |
| For some recipes like soup, the exact amount of **ingredients** might not matter too much. One person might prefer a vegetable soup with lots of carrots, but someone else might prefer plenty of peas – the ingredients for recipes like these depend on preferences. However, for other recipes (such as cakes and bread) it is particularly important to get the amounts right. That’s because to create a fluffy sponge or a risen loaf a chemical change has to take place and the change depends on there being the right amounts of each ingredient.The weight measurements for the ingredients in this activity were given in both ounces and grammes. Ounces are part of the **imperial** measurement system**.** This includes ounces, pounds, and tonnes when measuring weight, and inches, feet, and yards and miles when measuring length. The imperial measurement system is the oldest measurement system and dates as far back as the Romans. The exact units of measurement in the imperial system can be different depending on where you are in the world – for example, the American ounce is fractionally bigger than the English measurement!Grammes are part of the **metric** measurement system. This includes grammes, kilogrammes and metric tonnes for weight and centimetres, metres, and kilometres for length. The metric system began to be adopted in the 1800s when many countries decided that they needed a common, shared system. It is the official system for our country, even though we still see imperial measurements in some places – such as cookery books and on road signs (miles). Only three countries still use imperial measurements as their official standard - the vast majority of countries use metric measurements and the sensational seven official base measurement units are below:

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| **Symbol** | **Name** | **Quantity** |
| s | [second](https://en.wikipedia.org/wiki/Second) | [time](https://en.wikipedia.org/wiki/Time) |
| m | [metre](https://en.wikipedia.org/wiki/Metre) | [length](https://en.wikipedia.org/wiki/Length) |
| kg | [kilogram](https://en.wikipedia.org/wiki/Kilogram) | [mass](https://en.wikipedia.org/wiki/Mass) |
| A | [ampere](https://en.wikipedia.org/wiki/Ampere) | [electric current](https://en.wikipedia.org/wiki/Electric_current) |
| K | [kelvin](https://en.wikipedia.org/wiki/Kelvin) | [thermodynamic temperature](https://en.wikipedia.org/wiki/Thermodynamic_temperature) |
| mol | [mole](https://en.wikipedia.org/wiki/Mole_%28unit%29) | [amount of substance](https://en.wikipedia.org/wiki/Amount_of_substance) |
| cd | [candela](https://en.wikipedia.org/wiki/Candela) | [luminous intensity](https://en.wikipedia.org/wiki/Luminous_intensity) |

We know that all metric measures are the same between different countries thanks to an organisation called the International Bureau of Weights and Measures (BIPM). The BIPM was created on 20 May 1875, in France following the signing of the Metre Convention. The organisation now includes 59 countries. They directly compare weights and measures with each other and master measurements for accuracy. |

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| **The Engineering Context**  |
| Life in the 21st century relies heavily on precision measurement. Often, we are not even aware of it. For example a satnav systems depend on ultra-stable clocks, as any small error in timing can throw navigation a long way off course. Nuts ordered from one supplier will fit together and work with bolts ordered from another. Food producers know the optimal temperature for preparing food perfectly, so that they do not waste any unnecessary energy. |
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| **Curriculum links** |
| * **Science: upper KS2**
* Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
 | **Northern Ireland Curriculum*** **Primary: the world around us**
* Use simple equipment and methods to estimate, measure and compare data, recognising the need to use standard units of measurement.
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| **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 KS3**
* Use a range of apparatus and equipment safely and with skill, taking action to control the risks to themselves and others.
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