

Have you ever
had a
double-yolk egg?



What is the chance
of getting a
double-yolk egg?

If the chance of getting a double-yolk egg is one tenth of one percent, why is the chance of getting a box of double-yolk eggs one in a trillion?

By Daily Mail Reporter

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The chances of cracking open a double-yolked egg are pretty slim. One tenth of one per cent, in fact.

So imagine the odds of going through a half-dozen box from the supermarket and finding that all of them had two yolks.

Fiona Exon has done exactly that. The art gallery owner was preparing scrambled eggs for Sunday breakfast when she started cracking the eggs.

Miss Exon, who lives in the Eden Valley in Cumbria, said: 'We bought a half dozen eggs from Morrisons and when I started to crack them to make scrambled eggs I was astounded when the first was a double-yolker.

'I had only ever seen one double yolk egg before, and that was when I was young. Cracking the second, I gasped when it too was a double.

'When the third was the same I called my partner Hector through to the kitchen and when the fourth was a double, then the fifth we began to feel a little spooked.

'By the sixth double we were just gobsmacked. I had to get my camera and take a picture.'

British Egg Information Service spokesman Kevin Coles said: 'The chances of an egg coming out with a double yolk are 0.1 per cent. It's extremely unusual to find six such eggs together in the one box.'



Is this really true?



Or are there other things that would affect the probability of getting a box of double-yolk eggs?

1. *Is the number plausible?* Answer – **No**. An extraordinary total of 11,000,000,000 eggs are eaten in the UK every year, that's on average 1 every 2 days for every single person. That's nearly 2,000,000,000 half-dozens, and so if this event were as rare as claimed, we would expect it to happen every 500,000,000 years, on average. even if it's a trillion to 1, it still would only happen on average every 500 years. Not plausible.

2. *Are the 'parameters' of the analysis right?* Answer – **No**. The 'risk' is not the same across all boxes. Double-yokes are more common in larger eggs, and the photos clearly show the box is of extra-large eggs.

3. *Are the assumptions underlying the 'model' right?* Answer – **No**. Eggs in a box are not independent events, they are likely to come from a similar batch and so once one double-yoker has been found it increases the betting odds on others being in the box.

4. *Are there 'unknown unknowns' we have not even thought of?* Answer – **Yes**. Double-yokes are detectable, [some branches of Waitrose](#) even sell boxes of double-yoked eggs.

So, sadly, another probability story in the news is shown to be so much (eggy) froth.



Up2d8 maths

Double yolk

Teacher Notes

Double yolk

Introduction:

Have you ever had a double-yolk egg? On 6 February this year, a woman in Cumbria was surprised to find that she had a box of double yolk eggs which she only discovered when she cracked them to make her scrambled eggs for breakfast. The media presented this amazing story as beating trillion-to-one odds. But is that really the case? In this resource, students are introduced to the double yolk story and then invited to question the assumptions made in calculating the probabilities..

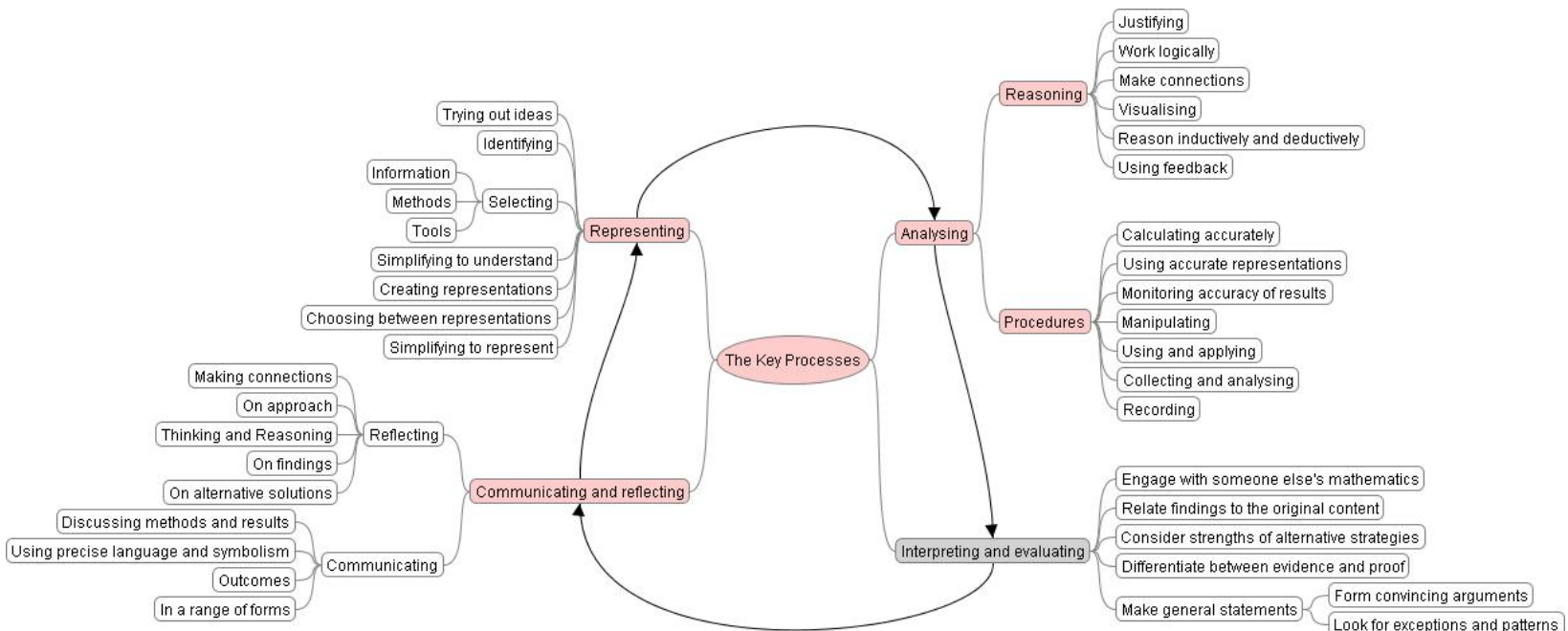
Content objectives:

This context provides the opportunity for teachers and students to explore a number of objectives. Some that may be addressed are:

- understand how to calculate the probability of a compound event and use this in solving problems
- critically examine the strategies adopted when investigating within mathematics itself or when using mathematics to analyse tasks
- comment constructively on the reasoning and logic, the process employed and the results obtained.

Process objectives:

These will depend on the amount of freedom you allow your class with the activity. It might be worth considering how you're going to deliver the activity and highlighting the processes that this will allow on the diagram below:



Activity: The activity gives students the opportunity to think about probability related to a real-life situation. The public are fascinated by big numbers and trillion-to-one odds intrigue the reader. In this resource, pupils are invited to consider what 'trillion-to-one' really means – and then consider whether this situation really does have 'trillion-to-one' odds. Professor David Spiegelhalter, the Winton Professor of the Public Understanding of Risk at the University of Cambridge, has a [blog entry](#) about this story which may help our understanding.

Differentiation: You may decide to change the level of challenge for your group.

To make the task easier you could consider:

- not calculating the 'trillion-to-one' odds
- considering how the probability of getting a double-yolk egg was defined as one tenth of one percent.

This resource is designed to be adapted to your requirements.

Outcomes: You may want to consider what the outcome of the task will be and share this with students according to their ability. This task lends itself to a letter to either the media or to Miss Exon who bought the box of eggs. The letter could explain why pupils think that either it was very unusual to buy such a box of eggs or give some explanations as to why it might not be quite so unusual.

Working in groups: This activity lends itself to paired work and small group work and, by encouraging students to work collaboratively, it is likely that you will allow them access to more of the key processes than if they were to work individually. You will need to think about how your class will work on this task. Will they work in pairs, threes or larger groups? If pupils are not used to working in groups in mathematics you may wish to spend some time talking about their rules and procedures to maximise the effectiveness and engagement of pupils in group work (You may wish to look at the SNS Pedagogy and practice pack Unit 10: Guidance for groupwork). You may wish to encourage the groups to delegate different areas of responsibility to specific group members.

Assessment: You may wish to consider how you will assess the task and how you will record your assessment. This could include developing the assessment criteria with your class. You might choose to focus on the content objectives or on the process objectives. You might decide that this activity lends itself to comment-only marking or to student self-assessment. If you decide that the outcome is to be a presentation or a poster, then you may find that this lends itself to peer assessment.

Probing questions: You may wish to introduce some points into the discussion which might include:

- have you ever had a double-yolk egg?
- is the chance of getting two double-yolk eggs bigger or smaller than the chance of getting one double-yolk egg?
- is the chance of getting a box of double-yolk eggs big or small? Why?
- how big is a trillion?
- what is an independent event?
- is the chance of getting another double-yolk egg when you already have one, a truly independent event?

You will need:

The PowerPoint presentation (there are five slides):



The first slide sets the scene.

The second slide introduces the newspaper story as introduced by the *Mail Online* and asks why the chance of getting a double-yolk egg is reported to be one in a trillion.

The third slide covers more of the media story.

The fourth slide challenges these odds.

The final slide is an extract from Professor David Spiegelhalter's blog that challenges the assumptions made.