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| **Triangular Numbers** |
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| How to calculate triangular numbers |
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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: ⚠ |
| **Subject(s):** Maths**Approx time:** 40 – 60 minutes |  | **Key words / Topics:** * Triangular
* Staircase
* Formula
* Addition
* Multiplication
* Problem solving
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| **Suggested learning outcomes** |
| * To know what a triangular number is
* To be able to calculate a triangular number using a staircase
* To be able to calculate any triangular number (*n*) using a formula
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| **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 focuses on the calculation of triangular numbers using the staircase method and the formula to calculate any triangular number *n.*We can use our maths and knowledge to better understand how to solve problems involving addition and multiplication. As we handle money and make food for big parties of people, we learn how to use addition and multiplication in everyday life. |
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| **Purpose of this activity** |
| In this activity learners will learn about triangular numbers and how, when a number sequence is added together, they can be drawn to make triangles as dots. They will also add together triangular numbers using a staircase and a formula to calculate any triangular number *n.*This activity could be used as a main lesson activity, to teach learners how to use addition and multiplication to solve practical problems. It could also be used as one of several activities within a wider scheme of learning focusing on the use of maths to understand ratio and proportion. |
| **Activity** |  | **Teacher notes** |
| **Introduction (5-10 minutes)**Teacher to explain that learners are going to learn about triangular numbers and how they can be drawn. Then methods to calculate triangular numbers using a staircase and a formula. Show teacher presentation explaining how to make triangular numbers using dots.**Triangular Number Staircase Activity (15-20 minutes)**Teacher to demonstrate the steps, shown in the presentation, explaining how to add numbers from 1 to 10 using a triangular staircase.Teacher to hand out equipment needed for the task to learners, and they make their own staircase to calculate a triangular number from 1 to 10. Teacher to refresh the safe use of scissors, if required. ⚠**Triangular Number Formula Activity (15-20 minutes)**Teacher to demonstrate the steps, using the formula shown in the presentation, explaining how to calculate any triangular numbers *n.*Learners to then carry out their own calculations using numbers of their choice for *n.***Discussing the results of the activity (5-10 minutes)**Teacher to discuss with the learners what they thought about the activity and how they used addition and multiplication to solve the triangular number problems. |  | This activity could be carried out as individuals or in pairs.**Triangular Number Staircase Activity**Explain to learners how to draw the triangular number staircase for 1 to 10. Use grid paper to help the learners draw the rows and columns.**Triangular Number Formula Activity**Explain to the learners how to use the formula to calculate any triangular number *n.* Have calculators available for the learners to use if required.  |
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| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| To help with understanding of triangular numbers watch video: **YouTube** – Corbett maths -Triangular numbers: https://www.youtube.com/watch?v=Wy4XlLUKuqoProvide learners will a part completed formula to allow them to focus on the workings out. |  | Make a paper triangular number staircase for 1 to 20. |
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| * Grid paper
* Pencils
* Erasers
* Rulers
* Calculators
 |  | icon-ppt Teacher presentation – Triangular numbers |
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| **Additional websites** |  |  |
| * **YouTube** – 2021 08 10 Santa loves STEM 08 WWT <https://www.youtube.com/watch?v=oYXoyvUv4DA&list=PLS_EtymQc9PMPa2ALIwrAL-pInR5A27lr&index=10>
* **YouTube** – Corbett maths -Triangular numbers: https://www.youtube.com/watch?v=Wy4XlLUKuqo
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| **Related activities (to build a full lesson)** |  |  |
| **Starters** (Options) * Show how triangular numbers can be made from dots.
* Watch video: **YouTube** – 2021 08 10 Santa loves STEM 08 WWT <https://www.youtube.com/watch?v=oYXoyvUv4DA&list=PLS_EtymQc9PMPa2ALIwrAL-pInR5A27lr&index=10>
 | **Extension** (Options) * Make a paper triangular number staircase for 1 to 20.

**Plenary*** Discuss with the learners what they thought about the activity and how they used addition and multiplication to solve the triangular number problems.
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| **The Engineering Context** film |
| It is important for engineers to know how many items are in a sequence. For example, production engineers, in ice cream manufacturing, need to know the number of different double-scoop ice creams possible given the number of different flavours available. |

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| **Curriculum links** |
| **England: National Curriculum**MathematicsKS2 Year 3 NumberMultiplication and Division* solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.
 | **Northern Ireland Curriculum**Mathematics and NumeracyKS2 Operations and their Applications* engage in a range of activities to develop understanding of the four operations of number, appreciate the use of brackets, add and subtract with up to two decimal places, multiply and divide decimals by whole numbers, use these operations to solve problems.
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| **Scotland: Curriculum for Excellence**Numeracy and MathematicsThird Level Number, money and measureNumber and number processes* MNU 3-03a
 | **Wales: National Curriculum** KS2 Mathematics - Using number skillsUse number facts and relationships* recall 2, 3, 4, 5 and 10 multiplication tables and use to solve multiplication and division problems
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| **Assessment opportunities** |
| * Formal teacher assessment
* Oral teacher feedback during the activities.
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