**STAIRCASES PROBLEM SOLVING**

**What you will need:**
- paper, pens and pencils
- calculator (optional).

**What to do:**
1. Read the Staircases information below and clarify your understanding. *What is the task asking you to do?*
2. Complete all 6 tasks.
3. Record your thinking and answers in a logical way. You might want to include drawings, lists, tables, graphs, etc.
5. Explain your thinking to someone in your house.

**What learning is happening:**
- learning to apply problem solving strategies
- using numeracy to solve problems
- justifying your thinking by using mathematical language.

**Links to more information:**
- Information about problem solving strategies - [https://nzmaths.co.nz/problem-solving-strategies](https://nzmaths.co.nz/problem-solving-strategies)  
  [https://www.projectmaths.ie/workshops/workshop3/ProblemSolvingPosters.pdf](https://www.projectmaths.ie/workshops/workshop3/ProblemSolvingPosters.pdf)
- [Learning at home](https://www.education.tas.gov.au/parents-carers/learning-at-home/) on the Department of Education website
Staircases

If one block is needed to make an up-and-down staircase, with one step up and one step down, then four blocks will be needed to make an up-and-down staircase with 2 steps up and 2 steps down.

In this problem there are six main tasks to complete.

Task 1
Draw what a staircase with 3 steps up and 3 steps down would look like.

**How many blocks would you use?**

Task 2
*How many blocks would be needed to build an up-and-down staircase with 5 steps up and 5 steps down?*

Show how you worked out your answer and prove that you are correct (eg by drawing a clear diagram).

Task 3
Show how many blocks are needed to make each staircase with: 1 step up and down, 2 steps up and down, 3 steps up and down, 4 steps up and down, 5 steps up and down, 6 steps up and down,…all the way up to, and including, 10 steps up and down.

- Calculate the best way to show this information.
- Explain why your choice is the best way and why you chose to show your information this way.

Task 4
A particular staircase is constructed using exactly 225 blocks.

- *How many steps up and steps down would it have?*
- Show how you worked this out. Think of a way that you could convince someone you are correct.

Task 5
Tom is convinced that it is possible to make a staircase using exactly 170 blocks.

- *Is he correct?*
- *How do you know?*

Task 6
Explain how you would work out the number of blocks needed to build a staircase with any number of steps. In your answer, mention any number patterns that you see in your work that you think are helpful.

Taking the learning further:
*Did you notice any patterns while working on this problem?*
If so, describe these patterns.