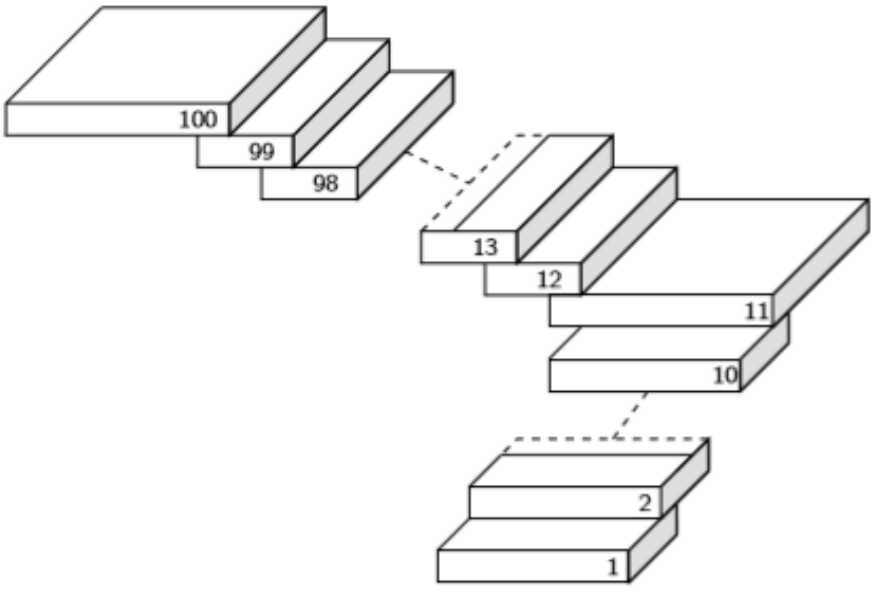
AUSTRALIAN MATHS TRUST

Maths Challenge Upper
Primary: Years 5–6
Practice Problem

UP2: Magic Staircase

The steps on the staircase that leads to the Mathemagician's Castle are numbered from 1 at the bottom to 100 at the top. Step 11 is a landing on which every climber is stopped by a guard.



When you arrive at the landing, the guard rolls a 20-faced die to give you a number from 1 to 20. From then on you have to take that number of steps at a time to get as close as possible to the castle courtyard, which is on step 100. Only on your final step up to the courtyard may you take less than your given number of steps.

For example, if your given number is 15, then from step 11 you move to steps 26, 41, 56, 71, 86, and then 100. If you make a mistake the courtyard guard at the top will send you back to the landing and make you do it again (instead of giving you a cup of hot chocolate, which is how you are welcomed if you climb the steps correctly)!

UP2: Questions

a. If you take 5 steps at a time, what is the number of the last step you would land on before reaching the courtyard?

b. Once when I climbed the stairs, the last step I landed on before the courtyard was 89. How many steps was I taking at a time from the landing? Explain your answer

c. Make a list of all the last steps you could have come from to land on step 95.

d. What is the number of the lowest step that you could land on immediately before landing on the courtyard? Explain your answer.