

## Identities and Algebraic Proof *ramp up*

|                                                                                                 |                                                                                                  |                                                                                            |                                                                                  |
|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>a</b> Show that<br>$(x+5)(x-1) - (x+2)^2 \equiv -9$<br><br>                                  | <b>b</b> $n$ is an integer.<br>Write $2n+1$ plus the next odd number as a multiple of 4.<br><br> | <b>c</b> Explain why<br>$2n+7$ is odd for every integer $n$ .<br><br>                      | <b>d</b> $x^2 > x$ for every value of $x$ .<br>Give a counterexample.<br><br>    |
| <b>e</b> Prove that the sum of four consecutive integers is never a multiple of 4.<br><br>      | <b>f</b> Prove that the product of any two odd numbers is odd.<br><br>                           | <b>g</b> Find $a$ and $b$ so that<br>$(x+a)^2 - (x-b)^2 \equiv 10x+5$<br><br>              | <b>h</b> Prove that $x^2 - 6x + 10$ is positive for every value of $x$ .<br><br> |
| <b>i</b> Prove that $3^{n+2} - 3^n$ is a multiple of 8 for every positive integer $n$ .<br><br> | <b>j</b> Prove that $n^3 - n$ is a multiple of 6 for every integer $n$ .<br><br>                 | <b>k</b> Prove that the square of any odd number is one more than a multiple of 8.<br><br> | <b>l</b> Prove that $n(n+1)(n+2)(n+3) + 1$ is a square number.<br><br>           |

*The Maths Habit*

## Identities and Algebraic Proof *ramp up*

|                                                                                                 |                                                                                                  |                                                                                            |                                                                                  |
|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>a</b> Show that<br>$(x+5)(x-1) - (x+2)^2 \equiv -9$<br><br>                                  | <b>b</b> $n$ is an integer.<br>Write $2n+1$ plus the next odd number as a multiple of 4.<br><br> | <b>c</b> Explain why<br>$2n+7$ is odd for every integer $n$ .<br><br>                      | <b>d</b> $x^2 > x$ for every value of $x$ .<br>Give a counterexample.<br><br>    |
| <b>e</b> Prove that the sum of four consecutive integers is never a multiple of 4.<br><br>      | <b>f</b> Prove that the product of any two odd numbers is odd.<br><br>                           | <b>g</b> Find $a$ and $b$ so that<br>$(x+a)^2 - (x-b)^2 \equiv 10x+5$<br><br>              | <b>h</b> Prove that $x^2 - 6x + 10$ is positive for every value of $x$ .<br><br> |
| <b>i</b> Prove that $3^{n+2} - 3^n$ is a multiple of 8 for every positive integer $n$ .<br><br> | <b>j</b> Prove that $n^3 - n$ is a multiple of 6 for every integer $n$ .<br><br>                 | <b>k</b> Prove that the square of any odd number is one more than a multiple of 8.<br><br> | <b>l</b> Prove that $n(n+1)(n+2)(n+3) + 1$ is a square number.<br><br>           |

*The Maths Habit*