All even numbers can be written in the form $2m$ where m is an Integer.

All odd numbers can be written in the form $2n + 1$ where n is an Integer.

Practice Run

Consider the following conjecture:

- An even number plus an odd number will always give an odd number.

a. Give two examples showing this conjecture works.

b. Prove the conjecture algebraically.

Compare your answers.

Consider the following conjecture:

- An even number plus an odd number will always give an odd number.

  a. Give two examples showing this conjecture works.

     Some possible answers are:
     $2 + 5 = 7$, an odd number.
     $16 + 19 = 35$, an odd number.

  b. Prove the conjecture algebraically.

     To prove this conjecture is true, you can show that, in general, adding an even number to an odd number results in an odd number.

     Proofs will vary. A sample is shown.

     An even number plus an odd number can be represented as:
     $(2a) + (2b + 1)$

     Rearranging this gives:

     $2a + 2b + 1 = 2(a + b) + 1$

     Since $2(a + b) + 1$ is of the form $2n + 1$, $2(a + b) + 1$ is an odd number.

Deductive reasoning is used to draw conclusions from premises. Deductive reasoning can also be used to prove statements to be true through a mathematical proof. A proof can take many forms, but it must always clearly show the reasoning used to draw conclusions. In the next lesson you will use reasoning to solve a variety of problems.