

The state vectors  $|+\rangle$  and  $|-\rangle$  form an orthonormal basis. Orthonormal bases have properties listed below.

For each property, write an equation that illustrates the property for both:

- The Cartesian basis vectors  $\hat{x}$ ,  $\hat{y}$ , and  $\hat{z}$ .
- The spin state vectors  $|+\rangle$  and  $|-\rangle$ .

1. The elements are **norm 1**.
2. The elements are **orthogonal**.
3. The elements form a **complete set**. Any vector in the space can be written as a linear combination of the two.