Fact Sheet B
# *Right-handed axes and cyclic order*

- A *right-handed Cartesian coordinate system* is one in which perpendicular x, y, and z axes are oriented such that rotating the axes from x towards y about the z-axis would cause a right-handed thread to advance in the $+z$ direction.

  For the axes shown below, the rotation defined above is counter-clockwise and hence, to form a right-handed system, the z-axis must come **OUT OF THE PAPER**.
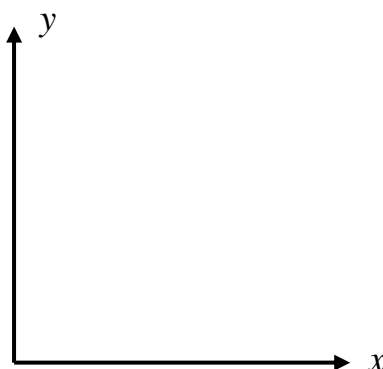
- Cyclic order for the *xyz* coordinates means any sequence of three taken from
  $x\ y\ z\ x\ y\ z$ ....

  Hence *xyz*, *yzx*, and *zxy* are in cyclic order, whereas *xzy*, *yxz* and *zyx* are not.

- The three cyclic order sequences can be obtained from the diagram below
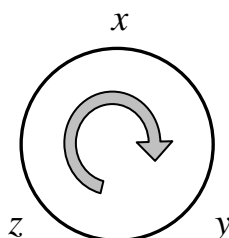
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ADDITIONAL MATERIAL (USEFUL FOR LATER)

The extension of these ideas to sequences of numbers comes in useful when evaluating determinants

- Sequences of three numbers may be called *even* when they are in cyclic order, and *odd* when they are not. The three even sequences are therefore

  123   231   312

- Sequences of four (or more) numbers can also be classified as *even* or *odd*. Even sequences are those that can be converted to the basic sequence 1234 by an even number of exchanges. Odd sequences are defined similarly.

Typical even sequences are:	2143	4132	3241
Typical odd sequences are:	3421	1432	2134