

## Definition of the direction of the magnetic field from the current balance

The force on the wire is given by:

$$\vec{F} = I\vec{L} \times \vec{B}$$

Align your current loop so that from red to black current flows along what you will call the  $+\hat{x}$  direction. Arrange your magnet so that the force reported by the scale is positive. You can call this direction the  $+\hat{y}$ . Then the force on the wire will be in the  $+\hat{z}$  direction.

According to Newton's third law, the force on the segment of wire must be in the opposite direction to the force on the magnet body. This means that the force on the magnet body must be downward which the scale considers to be a positive force. Then, verify with your compass that the magnetic field direction is in what you have called the  $+\hat{y}$  direction.

Note: you will need to be careful to run the current through your circuit in what is really the  $+\hat{x}$  direction. Use the property that says current flows from red to black and you'll be fine.