

[Magnetic Force] .quiz

1) ammeter

We want to use the exact same apparatus in Magnetic Force lab to measure the current on a wire, i.e. use it as an ammeter. We know the magnetic field of the magnet, and the force can be found using the number on the scale.

- a) Show magnetic field direction on the figures.
- b) Draw the forces on the horizontal and vertical parts of the wire.
- c) In a separate figure, draw the free body diagram for the magnet. Which force you are reading from the scale?
- d) Find the current in terms of the mass, m , the magnetic field, B , and the length, l . Calculate the minimum current we can read using this scale, I_{\min} , if $B = 0.1$ T, minimum mass that scale can measure, $m_{\min} = 0.01$ gr, and the length, $l = 4.0$ cm.

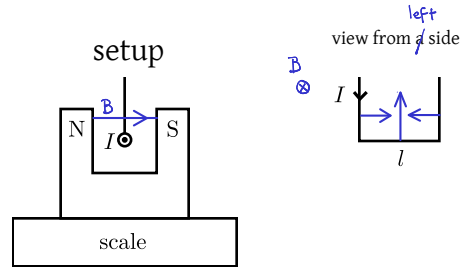
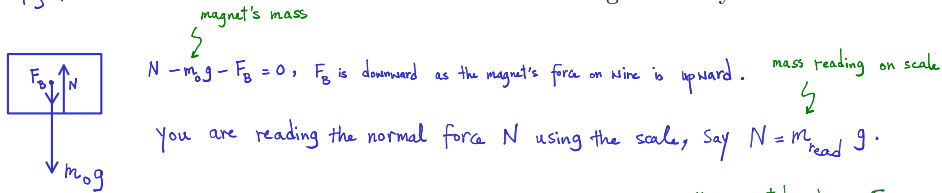


Figure 1: Ammeter, two views of the wire. One the left you see all the setup, on the right we only drew the wire.

a, b) See fig. 1.

c)



$$d) \quad F_B = IlB = N - m_0 g \quad \rightarrow \quad I = \frac{(m_{\text{read}} - m_0)g}{lB} = \frac{mg}{lB}$$

mass associated only on F_B

$$I_{\min} = \frac{m_{\min} g}{lB} = 25 \text{ mA.}$$