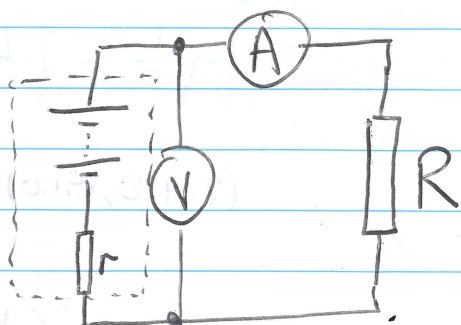


Measuring internal resistance of a battery



$$V = \underline{\underline{\epsilon}} - \underline{\underline{I}} \underline{\underline{r}}$$

Control variable: internal resistance.
Use switch to prevent batteries increasing temperature, PTC.

I/A	V/V
0.48	4.58
0.56	4.40
0.64	4.18
0.78	3.88
0.99	3.380
1.24	2.901
1.84	1.563

← (Autoscale adjust)

According to <https://batteryspecialties.com/assets/.../pdf/duacell-alkaline-technical-bulletin.pdf>

[accessed 0810 on 12/11/24], internal resistance expected to be $< 1\Omega$, measured to be 0.537Ω

$$V = -rI + \epsilon$$

Annotations:
 - V is labeled 'y' (green arrow)
 - $-r$ is labeled 'grad' (red arrow)
 - I is labeled 'x' (green arrow)
 - ϵ is labeled 'int' (red arrow)

x axis small sq = $0.025A$

y axis small sq = $0.05V$

$$\text{gradient} = -r = \frac{-(5.00 - 1.35)}{1.975 - 0.275} = -2.147\Omega$$

$$r = 2.147\Omega \text{ (4 cells)} \quad r_0 = 0.537\Omega \text{ (one cell)}$$

$$\epsilon = V + Ir = 1.35 + 1.975 \times 2.147 = 5.590V$$

$$\epsilon_0 = 1.398V \text{ (one cell)}$$

