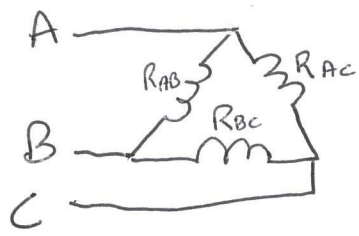
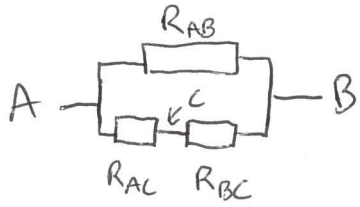
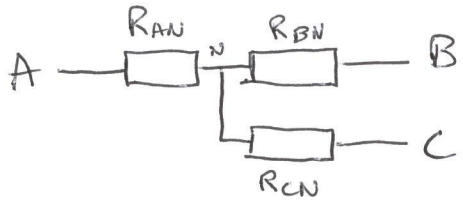






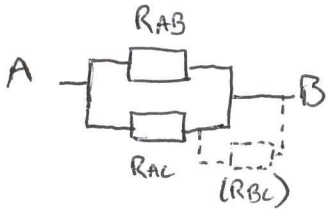
$$R_{AB} = R_{AC} = R_{BC} = R_\Delta$$

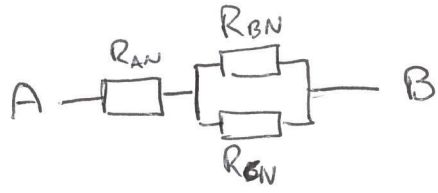
$$R_{AN} = R_{BN} = R_{CN} = R_*$$

$$R_T = R_{AB} /\!/ (R_{AC} + R_{BC})$$
$$= R_\Delta /\!/ 2R_\Delta$$
$$= \frac{R_\Delta \cdot 2R_\Delta}{3R_\Delta} = \frac{2}{3} R_\Delta$$

$$R_T = R_{AN} + R_{BN}$$
$$= R_* + R_*$$
$$= 2R_*$$

Now short B to C





$$R_{T(short)} = R_{AB} /\!/ R_{AC}$$
$$= R_\Delta /\!/ R_\Delta$$
$$= \frac{R_\Delta \cdot R_\Delta}{2R_\Delta} = \frac{1}{2} R_\Delta$$

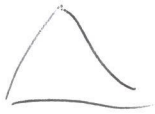
$$R_{T(short)} = R_{AN} + R_{BN} /\!/ R_{CN}$$
$$= R_* + (R_* /\!/ R_*)$$
$$= 3R_* / 2$$

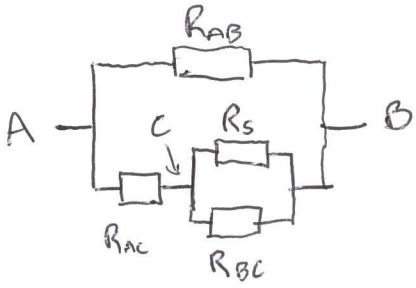
Using a rheostat, 2 legs of a potentiometer, or a long bit of wire, make a resistor the same resistance as R_T(short) i.e. the same resistance as you measured whilst 2 of the terminals were shorted. Call this R_S

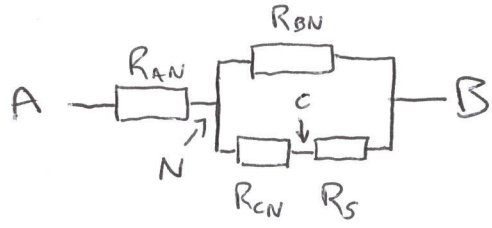
So if it's a Δ, $R_S = \frac{1}{2} R_\Delta$

if it's a $*$, $R_S = \frac{3}{2} R_*$

Replace the short between B and C with R_S:







$R_{AB} = R_{AC} = R_{BC} = R_\Delta$

$R_S = \frac{R_\Delta}{2}$

$R_{AN} = R_{BN} = R_{CN} = R_*$

$R_S = \frac{3R_*}{2}$

$R_{T(R_S)} = R_\Delta // \left[R_\Delta + (R_\Delta // \frac{R_\Delta}{2})\right]$

$= R_\Delta // \left[R_\Delta + R_\Delta/3\right]$

$= R_\Delta // \frac{4R_\Delta}{3}$

$= \frac{7R_\Delta}{4}$

$R_{T(R_S)} = R_* + \left[R_* // (R_* + \frac{3R_*}{2})\right]$

$= R_* + \left[R_* // \frac{5R_*}{2}\right]$

$= R_* + \frac{5R_*}{7}$

$= \frac{12R_*}{7}$

Your ratio of $\frac{R_S}{R_{T(R_S)}}$ tells you whether it's

$*$ or Δ :

Δ

$$\frac{R_S}{R_{T(R_S)}} = \frac{R_\Delta/2}{7R_\Delta/4}$$

$$= 1/2 \times 4/7$$

$$\therefore \frac{R_S}{R_{T(R_S)}} = 2/7$$

$*$

$$\frac{R_S}{R_{T(R_S)}} = \frac{3R_*/2}{12R_*/7}$$

$$= 3/2 \times 7/12$$

$$= 21/24$$

$$\therefore \frac{R_S}{R_{T(R_S)}} = 7/8$$

Now you know whether it's Δ or $*$, you can work out R_Δ or R_* :

Δ

$$R_S = R_\Delta/2$$

$$\therefore R_\Delta = 2R_S$$

$*$

$$R_S = \frac{3R_*}{2}$$

$$\therefore R_* = \frac{2R_S}{3}$$

Steve