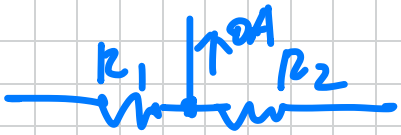
Review

Series:

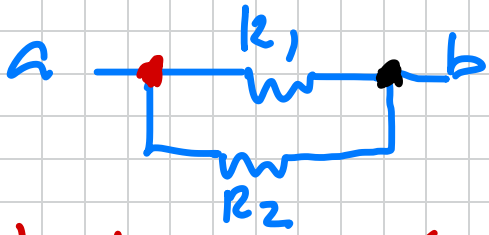
- Resistors share one common node, and no current loss



$R_{eq} = R_1 + R_2$

Parallel:

- Resistors share **two** common nodes



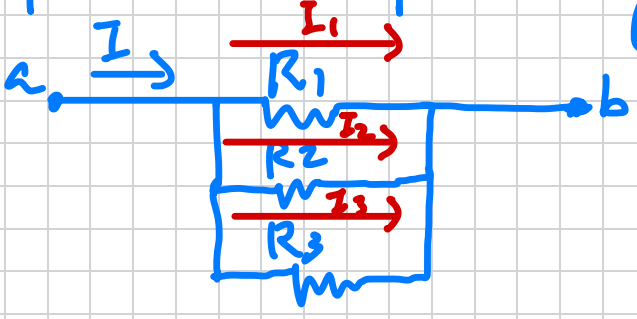
$R_{eq} = R_1 \| R_2 = \left(\frac{1}{R_1} + \frac{1}{R_2}\right)^{-1}$

Head connects Head

Tail connects Tail

- Point a, Point b must be conserved after you draw the equivalent circuit, as V_a, V_b need to be conserved

- A current can take n distinct paths to travel from point a to point b, which n is the parallel components between a and b. (Use this prop. to check yr answer)



3 paths from a to b

To solve the problems, you need to identify some pairs of resistors that are in series / parallel

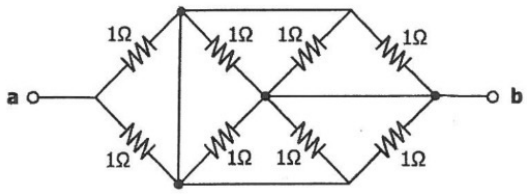
- Searching game!

Draw some intermediate equivalent circuit immediately after you find a single series and parallel pairs of resistors, you can simplify the circuit. The most important is, you can get partial credits !!!

欲速则不达，一步一步慢慢来

Don't redraw the whole circuits into some simple circuits, don't trust to teacher who teaches you this way. You will find this is very difficult as you may need to re-organise the whole circuit.

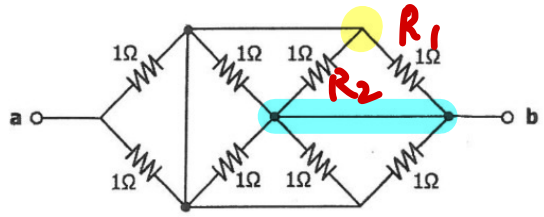
1. Find the equivalent resistance between the terminals **a** and **b** of the below resistor network.



let's play a game. Can u find some resistors that are in series / parallel?

First, I find that $R_1 \parallel R_2$

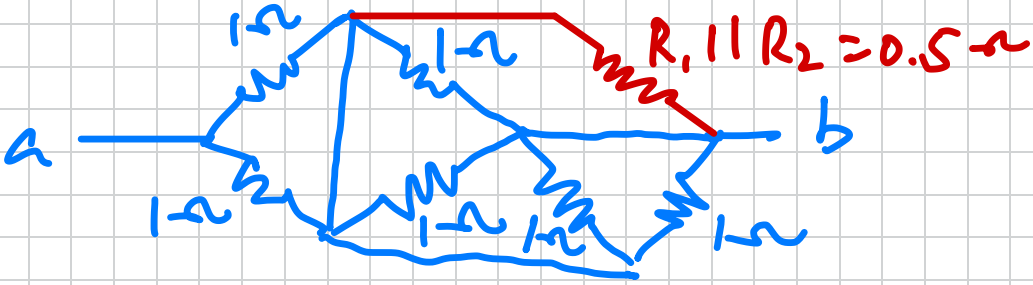
1. Find the equivalent resistance between the terminals **a** and **b** of the below resistor network.



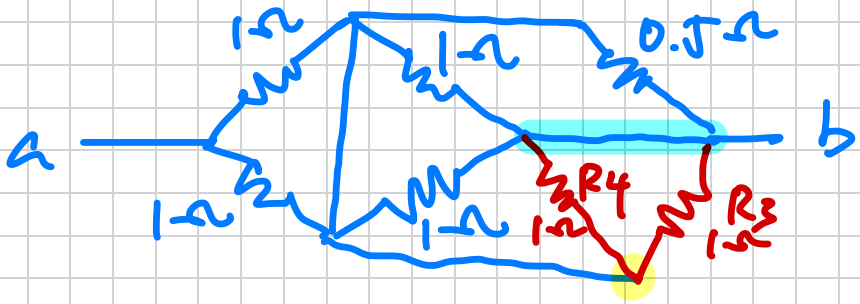
- Head to head
- Tail to tail

R_1 R_2 are in parallel

↝ No hesitate, draw equivalent circuit now,



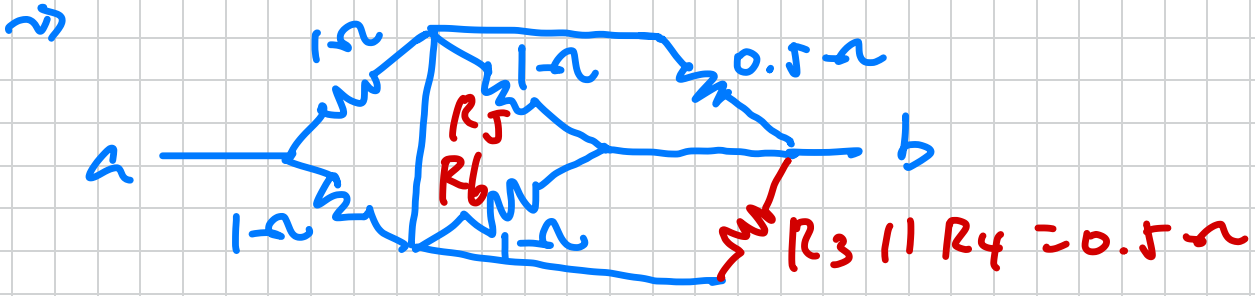
Congradulation, you get 1 mark already :)



Head to head

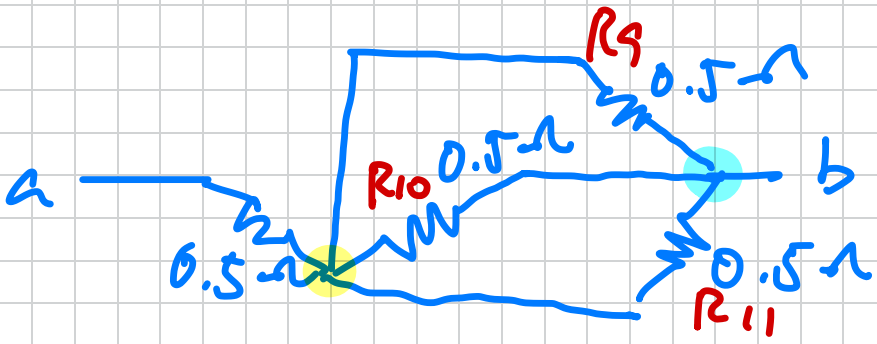
Tail to tail

R3, R4 are in parallel



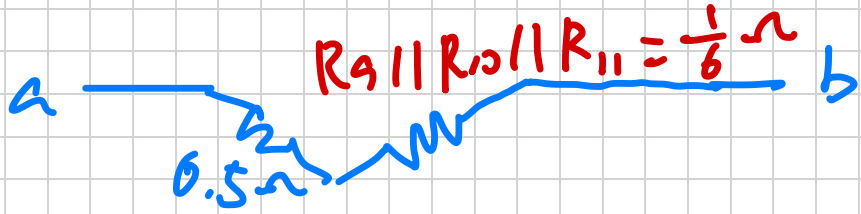
R5, R6 are also in parallel

R7, R8 are in parallel



R_9, R_{10}, R_{11} are in parallel

c)

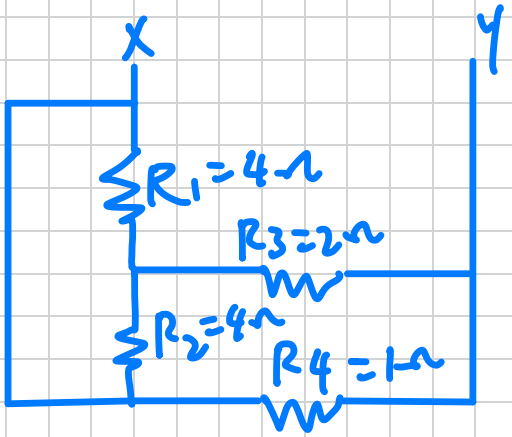


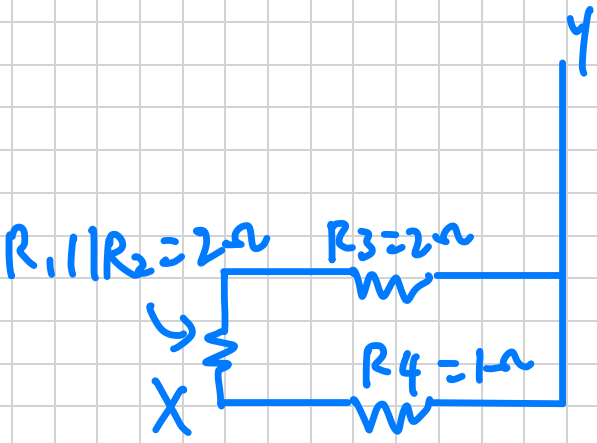
Final answer: $R_{eq} = 0.5 + \frac{1}{6}$

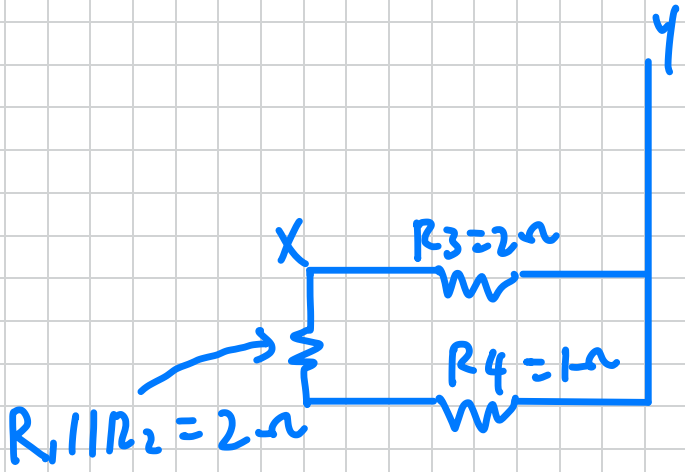
$= \frac{2}{3}\Omega$

Done!

Another example

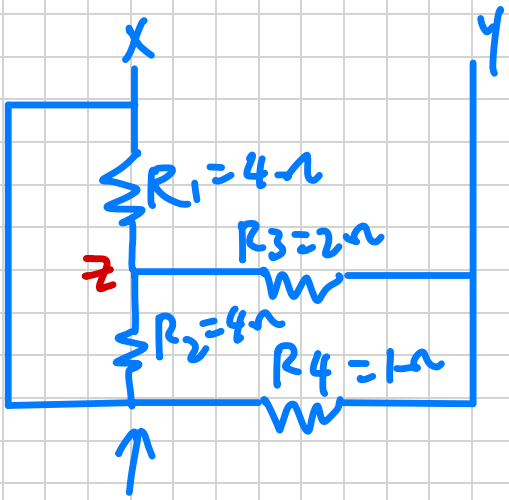




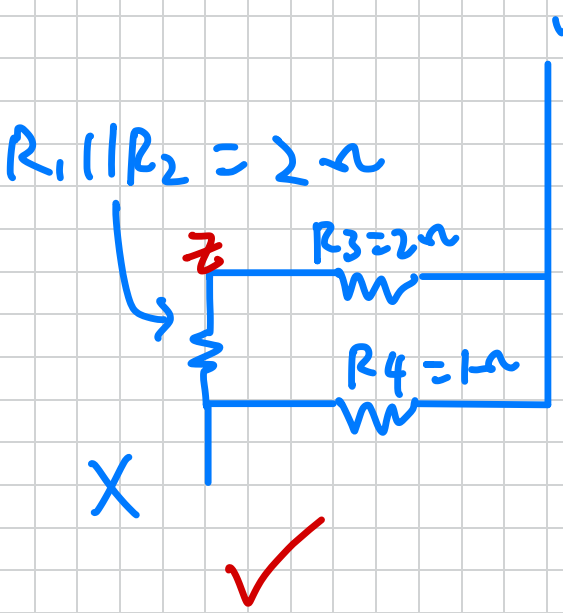


Which one is correct?

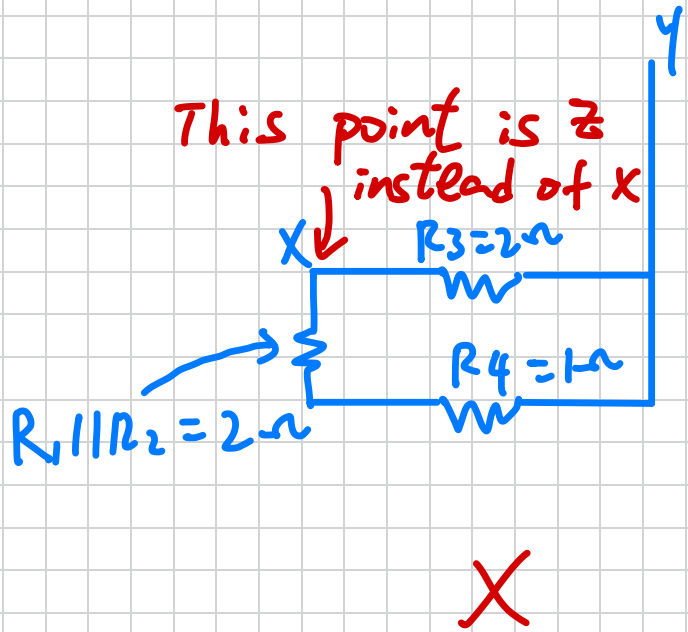
- Important Note:
Need to beware that all voltage points must be conserved before and after finding equivalent circuits!



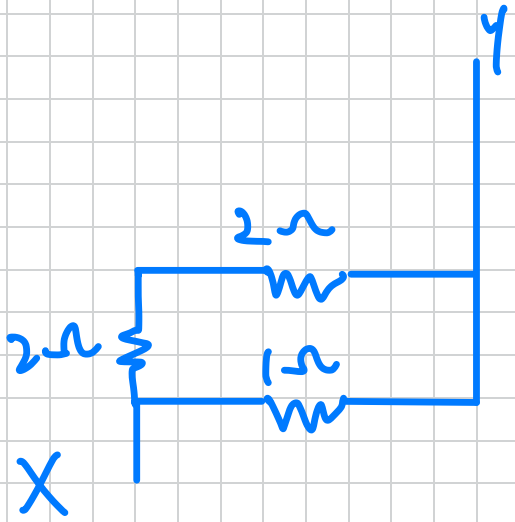
This point also X!



✓



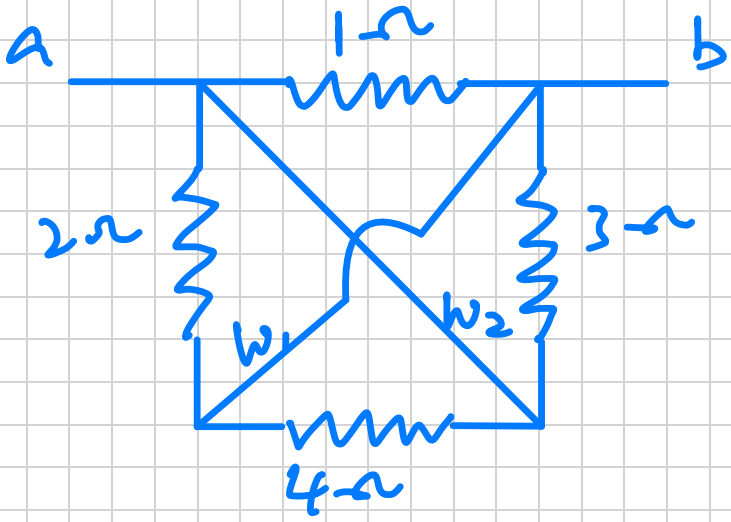
X



The problem is very straight foreward!

$R_{eq} = (2+2) \,||\, (1) = 0.8\,\Omega$

Self test



Remark: Wires w_1 and w_2 are **not** connect to each other.

Find R_{eq} between a and b.

Answer: $R_{eq} = 1 \| 2 \| 3 \| 4$

$= 0.48\,\Omega$

4 Resistors all in parallel!