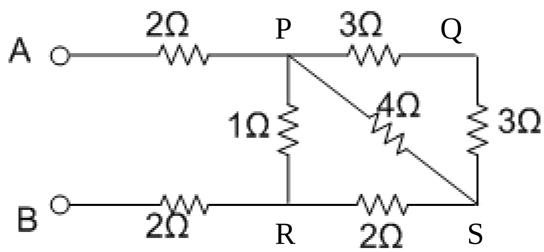
(a) Consider the circuit below.



a) Find the equivalent resistance of the combination.

As the two 3Ω resistances are in series their equivalent resistance will be 6Ω and this is connected in parallel to 4Ω this gives the resistance between points P and S equal to

$$R_{PS} = \frac{6*4}{6+4} = 2.4\Omega$$

This 2.4Ω resistance is in series with 2Ω resistance (SR) gives a total of 4.4Ω

This resistance is in series with 1Ω resistance in parallel and hence the equivalent resistance between points P and R will be given by

$$R_{PR} = \frac{1*4.4}{1+4.4} = 0.8\Omega$$

The circuit reduces to three resistances in series and thus the equivalent resistance of the circuit will be

R_{AB} = 2 + 0.8 + 2 = 4.8Ω

b) If a 10V potential difference (PD) is applied across the points A and B, find the PD across the 4 Ω resistor and current in it.

The current in the circuit when a 10V voltage is applied to AB will be

I = V/R = 10/4.8 = 2.08 A

Hence the Potential difference across 0.8Ω resistor or between points P and R is given by

V_{PR} = 2.08*0.8 = 1.66 V.

Hence the current in PSR branch in will be

I_1 = 1.66/4.4 = 0.38 A

Thus the potential different between points P and S will be

V_{PS} = 0.38*2.4 = 0.9 V

And the current in the 4Ω resistance will be

I_2 = 0.9/4 = 0.23A