# Problems for chapter 8.

Revision:

$$R_s = R_1 + R_2 + R_3$$

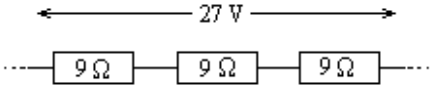
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$V_1 = \frac{R_1}{R_1 + R_2} V$$

$$I_1 = \frac{R_2}{R_1 + R_2} I$$

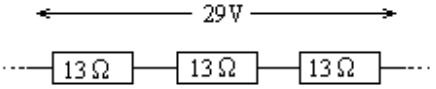
$$V_{fsd} = I_{fsd} R_m$$

1.* A voltage of 27 V is found across a series combination of three 9.0 Ω resistors.



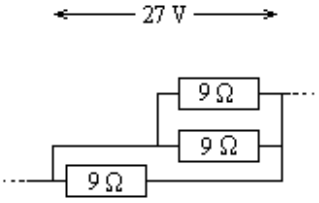

Find the current through each resistor and the voltage across each resistor.

2. A voltage of 29 V is found across a series combination of three 13 Ω resistors.



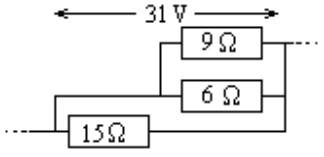

Find the current through each resistor and the voltage across each resistor.

3.* A voltage of 27 V is found across a parallel combination of three 9.0 Ω resistors.



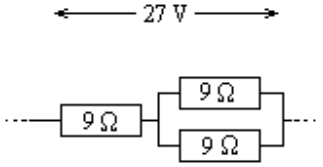

Find the current through each resistor and the voltage across each resistor.

4. A voltage of 31 V is found across the parallel combination of three resistors.



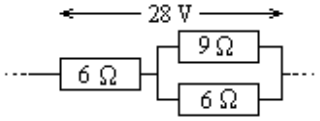

Find the current through each resistor and the voltage across each resistor.

5.* A voltage of 27 V is found across the following combination of three 9.0 Ω resistors.



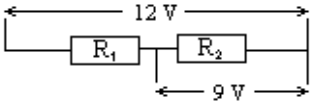

Find the current through each resistor and the voltage across each resistor.

6. A voltage of 28 V is found across the following combination of three resistors.



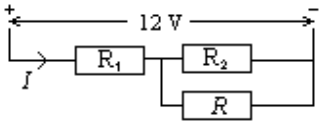

Find the current through each resistor and the voltage across each resistor.

7.* Two series resistors are used to step down the voltage of a 12 V circuit in a car and run a tape recorder at 9 V and 0.5 A, by connecting the recorder in parallel with one of the resistors.




What resistance values would you suggest? Warning: in practise this is not an easy or simple task unless you have small high power resistors. What is the power requirement of the tape recorder?

8. In a similar circuit to that used in question 7 we have $R_1 = R_2 = 20\ \Omega$, and a variable resistor *R*. What is the highest and lowest values of the current *I* as *R* is varied?




9.* An analogue meter has a resistance of 1.5 Ω and can cope with a full scale current of 2.5 mA. What is the full scale voltage for this meter?

10.* The meter of question 9., can be used to measure a current of 250 mA by shunting the excess 247.5 mA through a parallel resistor that is much smaller than 1.5 Ω. What is the value for this shunt resistor?

11.* The meter of question 9. can be used to measure a voltage of 1.0 V by using a resistor in series that is much larger than 1.5 Ω. This resistor acts as a voltage divider along with the resistance of the meter; the meter has its full scale value when 1.0 V is applied across the meter and the resistor. What is the value of this resistor that converts the meter to a voltmeter?

12. An analogue meter has a resistance of 0.5 Ω and can cope with a full scale current of 1.5 mA. What is the full scale voltage for this meter?

13. The meter of question 12, can be used to measure a current of 500 mA by shunting the excess 498.5 mA through a parallel resistor that is much smaller than 0.5 Ω. What is the value for this shunt resistor?

14. The meter of question 12. can be used to measure a voltage of 2.0 V by using a resistor in series that is much larger than 0.5 Ω. This resistor acts as a voltage divider along with the resistance of the meter; the meter has its full scale value when 2.0 V is applied across the meter and the resistor. What is the value of this resistor that converts the meter to a voltmeter?