WelTec
Te Whare Wānanga o te Awakairangi

DC fundamentals EE3103

Student workbook 2019

Power and energy theory and calculation exercises

Student name

25070 power formulae worksheet 2

Write the three power formula below

P = Power **P=** **P =** **P =**

Question 1

The colour bands on this resistor indicate that it has a nominal value of 1000 ohms

The physical size indicates that it has a power rating of 2 watts.

Calculate the maximum current this resistor can carry without risking it burning out

Answer question 1 (show full working)

Question 2

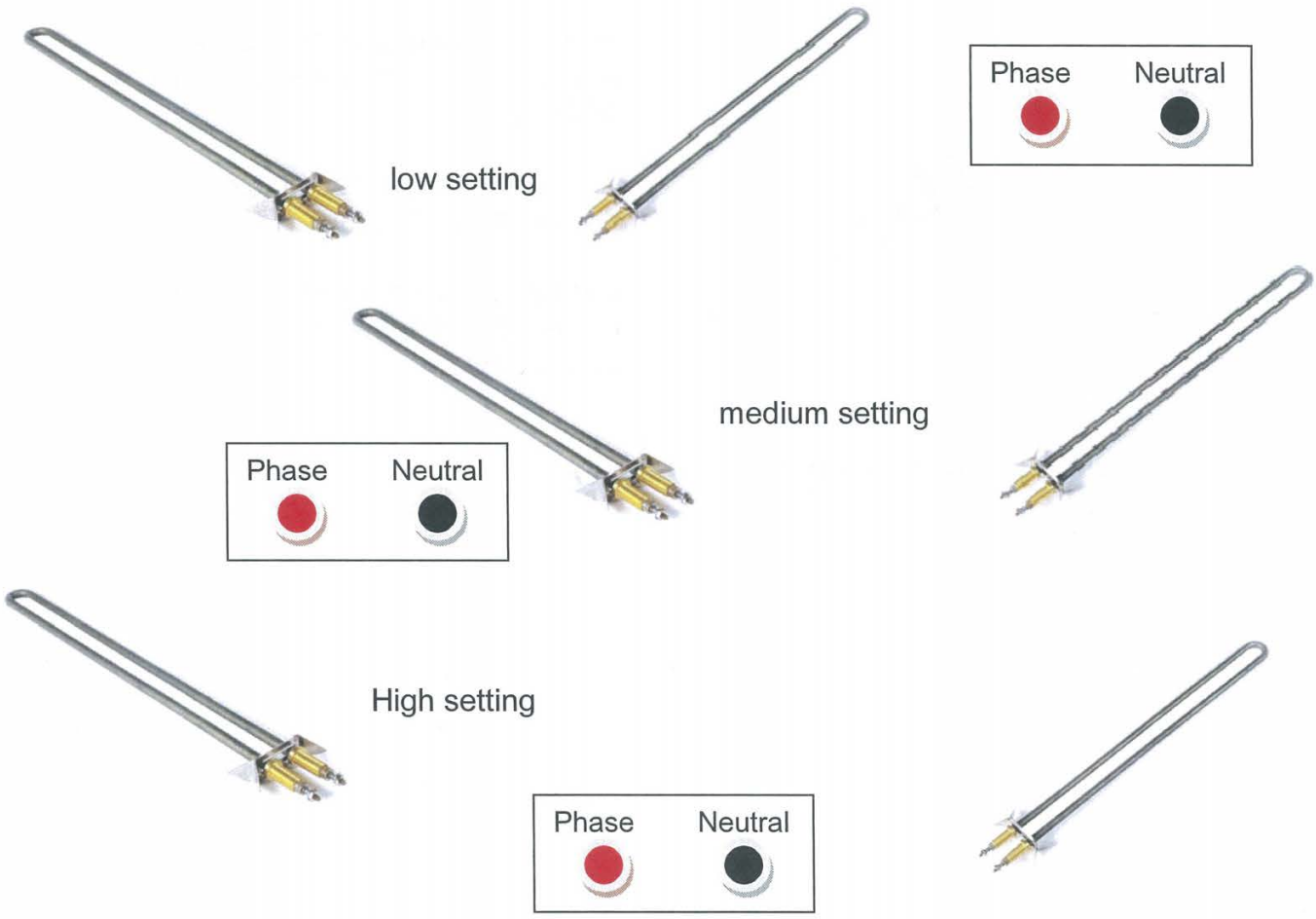
The resistor pictured below is rated at 500 watts and has a nominal value of 150 ohms. Calculate the power being dissipated by the resistor when 175 volts is applied across it.

Answer question 2 (show full working)

1) 44.7mA 2) 204 watts 3) 1323w 2645w 5290w 4) 1408 watts

Question 3

2 heater elements can be wired to achieve 3 different power settings. Low, medium or high. **Task** Wire each set of elements to achieve these three settings



Next calculate the power dissipated in each of these three settings.
Each element measures 20 ohms

Answer question 3 (show full working)

Power low

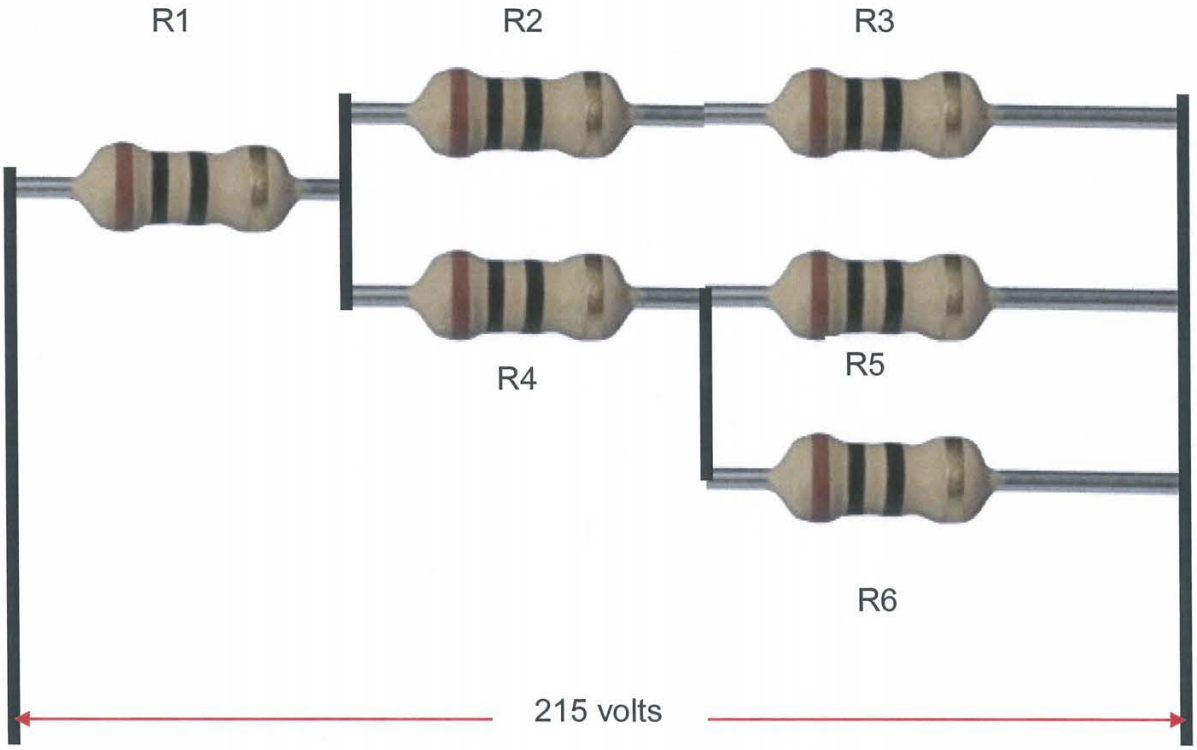
Power medium

Power high

1) 44.7mA 2) 204 watts 3) 1323w 2645w 5290w 4) 1408 watts

Question 4

These 6 resistors are all 10 ohms each



Calculate the power dissipated by each resistor and the total power dissipated by the complete circuit (show all working)

Answers

Power R1 =

Power R2 =

Power R3 =

Power R4 =

Power R5 =

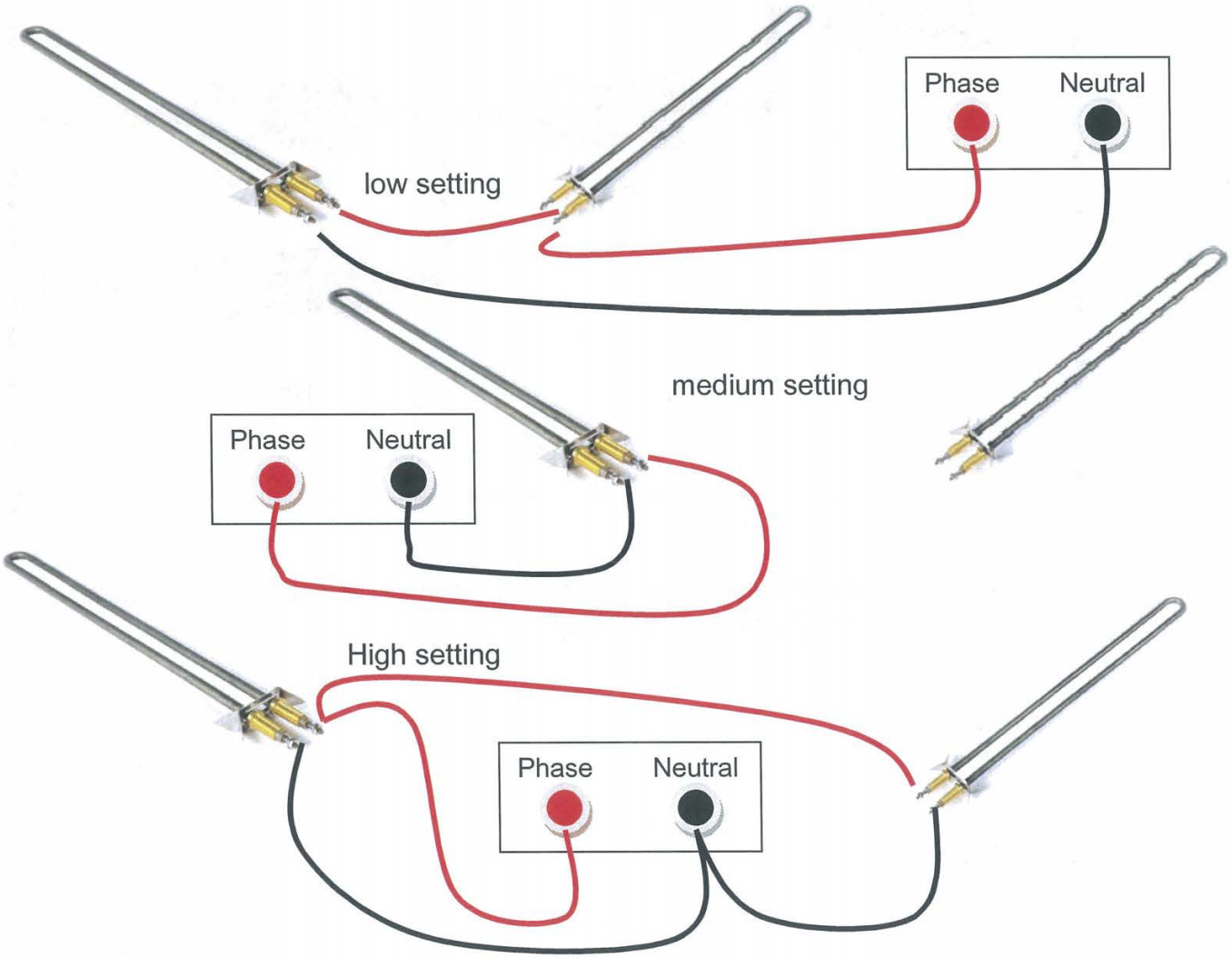
Power R6 =

Power total =

1) 44.7mA 2) 204 watts 3) 1323w 2645w 5290w 4) 1408 watts

25070 power formulae worksheet 2 ANSWERS **Question 3**

2 heater elements can be wired to achieve 3 different power settings. Low, medium or high. **Task** Wire each set of elements to achieve these three settings



Next calculate the power dissipated in each of these three settings. Each element measures 20 ohms

Answer question 3 (show full working)

Power low

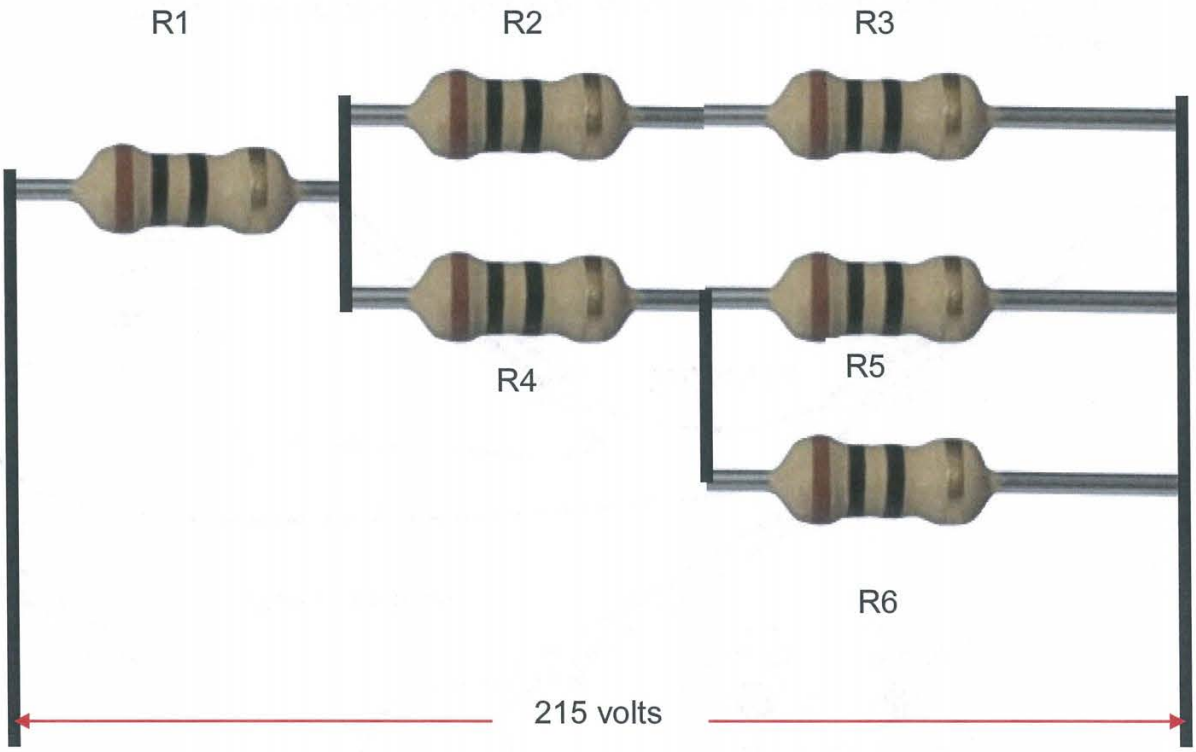
Power medium

Power high

1) 44.7mA 2) 204 watts 3) 1323w 2645w 5290w

Question 4

These 6 resistors are all 10 ohms each



Calculate the power dissipated by each resistor and the total power dissipated by the complete circuit (show all working)

Rt = (20//15) + 10

Rt = 18.57Ω

Is = $\frac{215v}{18.57\Omega}$

Is = 11.58A

Power R1 = 11.58^2 x 10 = 1341w

VD R1 = 11.58 x 10 = 115.8V

Therefore 49.6 v across R2 and R3 each

Power R2 = 246w
Power R3 = 246w

Current through R4 = $\frac{99.2V}{15\Omega}$ = 6.61A

1) 44.7mA 2) 204 watts 3) 1323w 2645w 5290w

Power R4 = 6.61^2 x 10 = 437w

And as current in R5 and R6 is half input current

Power R5 = 3.305^2 x 10 = 109w

Power R6 = 109W

Total power = 109 +109 + 437 + 246 + 246 + 1341 = 2488 watts

Total power = 11.58^2 x 18.57 = 2490 watts

Power R1 = 1341w

Power R2 = 246w

Power R3 = 246w

Power R4 = 437w

Power R5 = 109w

Power R6 = 109w

Power total = 2490w

1) 44.7mA 2) 204 watts 3) 1323w 2645w 5290w