

Homefun 10

Power to the Resistance!

MATH 150
10 points

Directions: Work in groups of 2 to 4 in class and then finish outside of class as necessary. Each group should submit **ONE** solution page for the group. (Be sure everyone's name is on it!)

A battery and a resistor create a simple circuit. The resistor has a load with resistance R , the battery has a voltage V , and there is also an internal resistance r within the battery. In such a circuit, the current $I = \frac{V}{R + r}$, and the power P transferred to the load is given by $P(R) = I^2 R$.¹

1. Find the resistance R of the load that maximizes the power transferred. [You are proving what is known as the Maximum Power Transfer Theorem.]

¹<https://www.allaboutcircuits.com/textbook/reference/chpt-1/dc-circuit-equations-laws/>