Programming Project 1 C++

Goals: Developing problem-solving skills, using single branched ifs to check validity of input, and using multi-branched decision structures.

Problem: You have been hired by a company to aid in calculating the resistance of some wires of different materials, cross sections, and lengths. The resistance of a wire can be calculated from the equation

$$R = \frac{L}{A} p$$

where R is the resistance of the length of wire, L is the length of the wire, A is the cross-section

of the wire and p is the resistivity of the wire composition. The resistivity of various materials is given in the table below.

Material	Resistivity (ohm meters)
Aluminum	2.8×10^{-8}
Copper	1.7×10^{-8}
Gold	2.4×10^{-8}
Platinum	0.98×10^{-7}
Zinc	5.5×10^{-8}
Silver	1.59×10^{-8}

You should create a program that will calculate the resistance of a wire given the material composition and dimensions of the wire. All the wires are cylindrical so the cross sections will be circles. Your program should prompt the user to enter the length and radius of the wire in centimeters and confirm these values are valid using a simple-if (single-branched if) for each value. The user should be prompted to select the material by using the first character of the material name, e.g. 'A' or 'a' for Aluminum, 'Z' or 'z' for Zinc, etc. The user should be allowed to enter either an upper or lower case character to select the material. Again the validity of the character should be confirmed using a simple-if (single-branched if). You should assume that the user will not enter an invalid value for a specific variable more than once.

Your program should use a multi-way branch (either if-else if or switch) structure to assign the resistivity for entered material and store the name of the material in a string object based on the entered single character. The resistance of the specific wire should be calculated and a message like that given below.

Use appropriate data types for entered values. The dimensions should be floating-point values. Use formatting concepts from Chapter 3 to output the cross section and length should be to 5 significant digits and the resistance to 3 significant digits. Note that numbers can be assigned using scientific notation, e.g. x = 3.567E-5; can be used to store 0.00003567 in x.