

RESISTANCE IN WIRE

Performance Standard 6D.J

This task uses electrical resistance in a wire as a context for finding the constant of proportionality and applying it to a new situation using electrical resistance in a wire:

- *Mathematical knowledge*: determine the constant of proportionality;
- *Strategic knowledge*: set up the variation equation and apply the constant; and
- *Explanation*: explain what was done and why it was done.

Procedures

1. Provide students with sufficient learning opportunities to develop the following in order to solve problems using comparison of quantities, ratios, proportions and percents:
 - Set up and solve proportions for direct and inverse variation of quantities involving powers and multiple variables.
2. Students are given a copy of the task to complete and submit. It is assumed that students have studied direct and inverse variation in single and compound situations.
3. Evaluate the students' work using the mathematics rubric:
 - A 4 in mathematical knowledge would require a correct answer of $k = 3.056124683 \times 10^{-5}$ and $d = 0.0986$ inch.
 - A 4 in strategic knowledge would require a correct set up of the variation equation in part a and correct application of the constant in part b.
 - A 4 in explanation would require a complete explanation of the process used and the reason for each step.

Examples of Student Work not available

Resources

- Copies of the "Resistance in Wire" task sheets
- Access to a scientific calculator
- Mathematics Rubric

Time Requirements

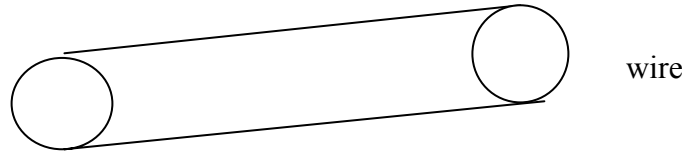
- One class period

NAME _____ DATE _____

RESISTANCE IN WIRE

Student Task Sheet

Resistance of a wire carrying an electrical current is directly proportional to the length and inversely proportional to its cross-sectional area.



If a copper wire has a diameter of 0.0246 inch, length 100 feet, and resistance of 6.43 ohms, find

- the constant of proportionality (in scientific notation),
- the diameter of a 15-foot wire with resistance 0.06 ohms using the constant of proportionality from part a (to the nearest 0.001 inch).

Write in words how you solved each problem and why you did each step.