

Material Matchup

Compare conductors and insulators in everyday designs.

PS.9.b "materials have different conductive properties;"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each material that the passage says conducts electric charge or thermal energy, and circle each material used to slow energy transfer so you can compare how materials are selected for different jobs.

Choosing Materials for Energy Transfer

- ① At a school makerspace, a team built a simple circuit to test materials as possible connections. They placed each sample between a battery and a small bulb. A copper strip made the bulb shine brightly because copper lets electric charge move easily. An aluminum strip also completed the circuit, though its performance can differ with size and shape. A plastic ruler and a dry wooden craft stick left the bulb dark. These materials resist the movement of electric charge and are called insulators.
- ② Conductivity is not limited to circuits. A metal pan transfers thermal energy from a stove burner to food more readily than a glass baking dish or a silicone handle. That is why many pots have metal bottoms but handles made from wood, plastic, or silicone. The handle materials slow the transfer of thermal energy to a person's hand. A material can be chosen for one job because it conducts well and another job because it insulates well.
- ③ Conductors and insulators are useful because designers match a material to its task. In a phone charging cable, metal wires inside carry electric charge. A rubber or plastic coating surrounds the wires, helping keep charge from traveling through a user's hand. Scientists compare materials by testing them under the same conditions, then using the results to make a claim. A good claim names the material, the kind of energy involved, and evidence from an observation or test.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Which two materials completed the circuit in the makerspace test?

2 What observation showed that the plastic ruler and dry wooden craft stick were insulators?

3 Why does a pot often have a metal bottom but a wood, plastic, or silicone handle?

4 In a phone charging cable, what material carries electric charge, and what material helps protect the user's hand?

3 YOUR TURN _____ Your own words

Design a tool that uses electricity or heat. Write exactly three sentences that name one conductor and one insulator, explain the energy transfer for each, and tell how the material choices make the tool useful or safe.

PART 1 • READ AND MARK

Underline each material that the passage says conducts electric charge or thermal energy, and circle each material used to slow energy transfer so you can compare how materials are selected for different jobs. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which two materials completed the circuit in the makerspace test?	The copper strip and the aluminum strip completed the circuit.
2	What observation showed that the plastic ruler and dry wooden craft stick were insulators?	The bulb stayed dark when either material was placed in the circuit, showing that the materials resisted electric charge.
3	Why does a pot often have a metal bottom but a wood, plastic, or silicone handle?	The metal bottom transfers thermal energy to the food readily. The handle materials slow thermal energy transfer to a person's hand.
4	In a phone charging cable, what material carries electric charge, and what material helps protect the user's hand?	Metal wires carry electric charge. Rubber or plastic coating helps protect the user's hand by slowing charge transfer through the cable's outside.

PART 3 • YOUR TURN (SAMPLE ANSWER)

I would make an electric soldering iron with a metal tip and a silicone grip. The metal tip conducts thermal energy to melt solder, while the silicone grip slows heat transfer to the user's hand. These material choices let the tool heat the solder while helping protect the user from burns.

Accept answers that correctly connect a material's conductive or insulating property to a specific job. For the open response, accept different reasonable tools and materials if the energy-transfer explanations are accurate and the response has exactly three sentences.