Name_____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1) Why can't the resistances simply be added together when calculating total resistance in a parallel circuit?

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2) What are three of the five ways to calculate the total resistance of a parallel circuit?

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3) What does Kirchhoff's current law state?

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4) Why is the total resistance of a parallel circuit less than the smallest resistance?

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5) Why are parallel circuits (instead of series circuits) used in most automotive applications?

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1) The current flow through each branch or leg varies depending on the resistance in that branch. A break or open in one leg or section of a parallel circuit does not stop the current flow through the remaining legs of the parallel circuit.

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2) The five methods that can be used to calculate the total resistance in a parallel circuit include:
   • Treat each leg or branch as a separate circuit and total the current flow

   • For two resistors in parallel use: $R_T = \dfrac{R1 \times R2}{R1 + R2}$

   • For any number of resistors in parallel use: $\dfrac{1}{RT} = \dfrac{1}{R1} + \dfrac{1}{R2} + \dfrac{1}{R3} + + +$

   • Use an electronic calculator to solve for total resistance
   • If equal value resistors are included, divide the value of the resistor by the number of resistors that are the same:

   $RT = \dfrac{value}{number}$

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3) Kirchhoff's Current Law states, "The current flowing into any junction of an electrical circuit is equal to the current flowing out of that junction."
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4) The total resistance of a parallel circuit is less than the resistance of the smallest resistance leg because the current splits, creating multiple paths for the current to flow back to the power source, thereby effectively reducing the overall resistance of the circuit.
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5) Parallel circuits are used in most automotive circuits because if an open circuit occurs in one part, the other components will continue to work.
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