

Name \_\_\_\_\_

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

1) How does a HEV heater work with during engine-stop mode?

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2) How does the coolant heat storage system work?

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3) Why is an HEV motor /electronics cooling system separate from that of the ICE?

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4) What types of compressors are used on hybrid /electric vehicles?

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5) What is the function of a PTC heater, and why is it used in an HEV heating system?

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## Answer Key

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1) Some vehicles, including some hybrid and non-hybrids, have a feature that allows the heater to keep operating when the engine is turned off. In cold climates, this keeps the vehicle warm during start/ stop operation. The main component is an electric pump, called an auxiliary water pump, along with a bypass valve.

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2) Heated coolant is stored during normal vehicle operation and is then used to warm the engine intake ports prior to a cold start.

The coolant heat storage system has four modes of operation. These include:

1. Preheat
2. Engine warm-up
3. Storage during driving
4. Storage during ignition off

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3) Electric motors and the motor controls tend to operate more efficiently at lower temperatures. The engine cooling system runs too hot to allow these components to operate at peak efficiency, so a separate low-temperature system is often used.

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4) 1. Belt-driven by the internal combustion engine (ICE) accessory drive.

2. Dual compressor where a large section of it is driven by the internal combustion engine and another smaller section driven by a high-voltage electric motor to provide cooling during idle/stop (start/stop) operation.

3. Electric-motor powered compressor used in all electric vehicles and many hybrid electric vehicles.

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5) PTC heaters convert electrical energy into heat, and this is used to boost heat to the passenger compartment.

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