

CHAPTER 01: Automotive Systems and Operations - Classroom Manual

True / False

1. The only purpose of the electrical system is to start and operate the engine.

- a. True
- b. False

ANSWER: False

2. The powertrain control module (PCM) is the largest single computer in a vehicle.

- a. True
- b. False

ANSWER: True

3. Thermodynamics is the study of heat and cooling of air conditioning systems.

- a. True
- b. False

ANSWER: False

4. A vacuum is any pressure less than atmospheric pressure.

- a. True
- b. False

ANSWER: True

5. Hybrid power vehicles run solely on electricity.

- a. True
- b. False

ANSWER: False

6. Biodiesel uses modified vegetable oils.

- a. True
- b. False

ANSWER: True

7. Constant variable ratio (CVR) transmissions have no internal gears.

- a. True
- b. False

ANSWER: True

8. The suspension system supports the vehicle and helps to provide a smoother ride.

- a. True
- b. False

ANSWER: True

9. Unibody frames are rigid parallel channels that run the entire length of the vehicle.

a. True

b. False

ANSWER: False

10. Vehicle accessory systems include computers that can store memory of seat position, pedal position, and even steering wheel position.

a. True

b. False

ANSWER: True

Multiple Choice

Two technicians are discussing automotive electrical systems. Technician A states that vehicle electrical systems operate on DC voltage. Technician B states that vehicle electrical systems operate on AC voltage. Who is correct?

11. Two technicians are discussing automotive electrical systems. Technician A states that vehicle elect...

a. A only

b. B only

c. Both A and B

d. Neither A nor B

ANSWER: a

12. Which statement reflects an original goal in developing electric-powered vehicles?

a. Electric vehicles should have a range of over 600 miles.

b. The majority of components, while nonrecyclable, should be environmentally friendly.

c. The power pack should be capable of quick recharge from 80 percent discharge.

d. The battery pack life should be approximately 450,000 miles.

ANSWER: c

Two technicians are discussing hybrid-powered vehicles. Technician A says that hybrid vehicles use the internal combustion motor to drive the generator that recharges the battery pack. Technician B says that the electric motors can be run through a power splitter or attached directly to the drive wheels. Who is correct?

13. Two technicians are discussing hybrid-powered vehicles. Technician A says that hybrid vehicles use t...

a. A only

b. B only

c. Both A and B

d. Neither A nor B

ANSWER: c

Two technicians are discussing alternative fuels. Technician A says that biodiesel is produced from vegetable oil that is used as cooking oil. Technician B says that biodiesel is produced from refined natural gas. Who is correct?

14. Two technicians are discussing alternative fuels. Technician A says that biodiesel is produced from ...

- a. Technician A
- b. Technician B
- c. Both A and B
- d. Neither A nor B

ANSWER: a

15. Which statement concerning fuel cell technology is correct?

- a. Hydrogen produces hydrochloric acid when burned.
- b. The only byproduct of a fuel cell vehicle is water.
- c. Fuel cell technology is ready to be deployed in a large scale.
- d. Fuel cell technology is based on running hydrogen through a catalyst where an electron is added.

ANSWER: b

Two technicians are discussing steering systems. Technician A says that the major components of a steering system are: steering wheel, linkage, and the dash support assembly. Technician B says that the major components include the steering wheel, linkage, steering knuckle, and gearing. Who is correct?

16. Two technicians are discussing steering systems. Technician A says that the major components of a st...

- a. Technician A
- b. Technician B
- c. Both A and B
- d. Neither A nor B

ANSWER: b

17. Which statement about vehicle brake systems is false?

- a. Once the mechanical force is converted to hydraulic, it doesn't change back.
- b. Antilock systems serve to prevent brake lockup on panic stops.
- c. Brake force is applied mechanically at the wheels.
- d. The brake system includes linkages and hydraulic circuits.

ANSWER: a

Two technicians are talking about vehicle frames. Technician A says that unibody frames utilize the body for some of the support. Technician B says that full-frame vehicles are

lighter than comparable size unibody vehicles. Who is correct?

18. Two technicians are talking about vehicle frames. Technician A says that unibody frames utilize the ...

- a. A only
- b. B only
- c. Both A and B
- d. Neither A nor B

ANSWER: a

Which fuel is manufactured by removing it from other natural elements, and, when ignited, it burns clean with very few harmful emissions?

19. Which fuel is manufactured by removing it from other natural elements, and, when ignited, it burns c...

- a. Ethanol
- b. Diesel
- c. Hydrogen
- d. Oxygen

ANSWER: c

Two technicians are discussing vehicle accessory systems. Technician A says that the navigation system is considered a vehicle accessory. Technician B says that many accessory systems require technical expertise for proper diagnosis. Who is correct?

20. Two technicians are discussing vehicle accessory systems. Technician A says that the navigation syst...

- a. A only
- b. B only
- c. Both A and B
- d. Neither A nor B

ANSWER: c

21. The transmission control module (TCM) controls ____.

- a. lighting
- b. shift solenoids
- c. the vehicle's intranet
- d. exhaust emissions

ANSWER: b

22. In the brake system, the force applied is transmitted via ____ to the brakes at the front and rear axles.

- a. computer
- b. gears
- c. hydraulics
- d. fuel lines

ANSWER: c

23. Refrigerant is an important component of which system?

- a. Climate control
- b. Powertrain
- c. Steering
- d. Brake

ANSWER: a

24. Which parts of a vehicle body become supporting members when closed?

- a. Wheels
- b. Windows
- c. Windshield wipers
- d. Doors

ANSWER: d

25. Which vehicle system is composed of the starter and control circuit?

- a. Starter
- b. Brake
- c. Steering
- d. Computer

ANSWER: a

Subjective Short Answer

26. What are the two subsystems of the starter system?

ANSWER: The two subsystems of the starter system are the starter and the control circuit.

27. Why is DC current used in automobile operation?

ANSWER: DC current is used to operate vehicle systems because AC current cannot be stored.

28. Why were computers originally installed on vehicles?

ANSWER: The original purpose of vehicle computer systems was to assist the manufacturer in meeting federal emissions and CAFE standards.

29. Define thermodynamics.

ANSWER: Thermodynamics is the use of heat to produce mechanical motion or energy.

30. What type fuel is used in a fuel cell?

ANSWER: Hydrogen is the fuel used in fuel cells.

31. What is main difference between a constant variable ratio (CVR) transmission and a conventional automatic transmission?

ANSWER: The CVR has no internal gears, only pulleys and a drive belt.

32. What does the suspension do in a vehicle?

ANSWER: The suspension supports the vehicle and helps provide a smoother ride.

33. Climate control includes what two systems?

ANSWER: Climate control includes the heating and air conditioning systems.

34. List four vehicle accessories.

ANSWER: Vehicle accessories include: 1. radio 2. windshield wipers 3. navigation system 4. keyless entry 5. DVD players 6. game controllers

35. Define combustion chamber.

ANSWER: A combustion chamber is the area of the cylinder where the air/fuel mixture is compressed and ignited.

Essay

36. Describe the purpose and operation of the park/neutral or clutch switch.

ANSWER: The park/neutral or clutch switch is designed to prevent engine startup if the transmission was in any drive gear or if the clutch was engaged.

37. Describe the operation of a vehicle computer system.

ANSWER: The vehicle computer system serves as an "intranet" that can comprise up to eighty separate computer modules. These systems must be designed to send and receive data in an orderly manner. The largest single computer module in the system is the powertrain control module (PCM).

38. Describe the operation of gasoline and diesel fuel ignitions.

ANSWER: The gasoline air-fuel mixture enters into the combustion chamber and is compressed to approximately one-eighth of its original volume and ignited by a timed spark. The diesel system compresses the air in the cylinder then injects the diesel fuel into the chamber under extremely high pressure. Diesel fuel is ignited by superheated air.

39. Describe hybrid power in motor vehicles.

ANSWER: Hybrid power is a combination of an internal combustion engine coupled with a large electric-current generator and an electric power pack. The internal combustion motor drives the generator and, when commanded, can also assist in moving the vehicle.

40. Describe fuel cell technology.

ANSWER: Fuel cell technology is the utilization of electricity created by hydrogen (H) that has been run through a catalyst where the hydrogen electron is stripped away. The electron is directed to an electric device such as a motor and then routed to a second catalyst. The hydrogen ion formed after the loss of its electron goes through the second catalyst, where it is combined with an oxygen molecule (O₂) and the freed hydrogen electron to form water (H₂O).