Multiple Choice Problem

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<question type="mc">
1. Matter is a substance that occupies space and has

a. color.
b. texture.
c. temperature.
d. mass.

Analysis**:**

a. Incorrect. Matter occupies space and has mass. See Matter.

b. Incorrect. Matter occupies space and has mass. See Matter.

c. Incorrect. Matter occupies space and has mass. See Matter.

d. Correct. Matter occupies space and has mass. See Matter.

<question type="mc">
2. Solid, liquid, and gas are the most common

a. states of matter.
b. specific volumes.
c. gravitational forces.
d. fossil fuels.

Analysis**:**

a. Correct. Solid, liquid, and gas are the most common states of matter. See Matter.

b. Incorrect. Solid, liquid, and gas are the most common states of matter. See Matter.

c. Incorrect. Solid, liquid, and gas are the most common states of matter. See Matter.

d. Incorrect. Solid, liquid, and gas are the most common states of matter. See Matter.

<question type="mc">
3. In what direction does a solid exert force?

a. Outward

b. Upward
c. Downward
d. Outward, upward, and downward

Analysis:
a. Incorrect. A solid exerts force downward. See Matter.
b. Incorrect. A solid exerts force downward. See Matter.
c. Correct. A solid exerts force downward. See Matter.
d. Incorrect. A solid exerts force downward. See Matter.

<question type="mc">
4. In what direction does a liquid exert force?

a. Outward
b. Upward
c. Downward
d. Downward and outward

Analysis:
a. Incorrect. A liquid exerts force both downward and outward. See Matter.
b. Incorrect. A liquid exerts force both downward and outward. See Matter.
c. Incorrect. A liquid exerts force both downward and outward. See Matter.
d. Correct. A liquid exerts force both downward and outward. See Matter.

<question type="mc">
5. Vapor exerts pressure in what direction?

a. Outward
b. Upward
c. Downward
d. Outward, upward, and downward

Analysis:
a. Incorrect. Vapor exerts pressure outward, upward, and downward. See Matter.
b. Incorrect. Vapor exerts pressure outward, upward, and downward. See Matter.
c. Incorrect. Vapor exerts pressure outward, upward, and downward. See Matter.
d. Correct. Vapor exerts pressure outward, upward, and downward. See Matter.

<question type="mc">
6. The weight per unit volume of a substance is defined as

a. mass.
b. density.
c. work.
d. specific gravity.

Analysis:
a. Incorrect. Mass is the weight per unit volume of a substance. See Density.
b. Correct. Mass is the weight per unit volume of a substance. See Density.
c. Incorrect. Mass is the weight per unit volume of a substance. See Density.
d. Incorrect. Mass is the weight per unit volume of a substance. See Density.

<question type="mc">
7. The density of a substance compared to the density of water is known as

a. specific gravity.
b. specific volume.
c. mass.
d. weight.

Analysis:
a. Correct. The density of a substance compared to the density of water is known as specific gravity. See Specific Gravity.
b. Incorrect. The density of a substance compared to the density of water is known as specific gravity. See Specific Gravity.
c. Incorrect. The density of a substance compared to the density of water is known as specific gravity. See Specific Gravity.
d. Incorrect. The density of a substance compared to the density of water is known as specific gravity. See Specific Gravity.

<question type="mc">
8. The volume occupied by 1 pound of a fluid is known as

a. specific gravity.
b. specific volume.
c. mass.
d. weight.

Analysis:
a. Incorrect. Specific volume is the volume occupied by 1 pound of a fluid. See Specific Volume.
b. Correct. Specific volume is the volume occupied by 1 pound of a fluid. See Specific Volume.
c. Incorrect. Specific volume is the volume occupied by 1 pound of a fluid. See Specific Volume.
d. Incorrect. Specific volume is the volume occupied by 1 pound of a fluid. See Specific Volume.

<question type="mc">
9. The density of tungsten is 1210 lb/ft^3. What would be its specific volume?

a. 0.0826 ft^3/lb
b. 0.00826 lb/ft^3

c. 0.000826 lb/ft^3
d. 0.000826 ft^3/lb

Analysis:
a. Incorrect. The specific volume of tungsten is 0.000826 ft^3/lb. See Specific Volume.
b. Incorrect. The specific volume of tungsten is 0.000826 ft^3/lb. See Specific Volume.
c. Incorrect. The specific volume of tungsten is 0.000826 ft^3/lb. See Specific Volume.
d. Correct. The specific volume of tungsten is 0.000826 ft^3/lb. See Specific Volume.

<question type="mc">
10. The specific volume of red brass is 0.001865 ft^3/lb. What would be its density?

a. 53.61 lb/ft^3
b. 56.19 lb/ft^3
c. 536.19 lb/ft^3
d. 536.19 ft^3/lb

Analysis:
a. Incorrect. The density of red brass is 536.19 lb/ft^3. See Density.
b. Incorrect. The density of red brass is 536.19 lb/ft^3. See Density.
c. Correct. The density of red brass is 536.19 lb/ft^3. See Density.
d. Incorrect. The density of red brass is 536.19 lb/ft^3. See Density.

<question type="mc">
11. Aluminum has a density of 171 lb/ft^3. What would be its specific gravity?

a. 2.74
b. 27.4
c. 4.72
d. 47.2

Analysis:
a. Correct. The specific gravity of aluminum is 2.74. See Specific Gravity.
b. Incorrect. The specific gravity of aluminum is 2.74. See Specific Gravity.
c. Incorrect. The specific gravity of aluminum is 2.74. See Specific Gravity.
d. Incorrect. The specific gravity of aluminum is 2.74. See Specific Gravity.

<question type="mc">
12. Four pounds of a gas occupy 10 ft^3. What would be its density and specific gravity?

a. 0.4 ft^3/lb
b. 0.4 lb/ft^3
c. 4.0 lb/ft^3
d. 4.0 ft^3/lb

Analysis:
a. Incorrect. The density and specific gravity of four pounds of a gas that occupy 10 ft3 would be 0.4 lb/ft^3. See Specific Gravity.
b. Correct. The density and specific gravity of four pounds of a gas that occupy 10 ft3 would be 0.4 lb/ft^3. See Specific Gravity.
c. Incorrect. The density and specific gravity of four pounds of a gas that occupy 10 ft3 would be 0.4 lb/ft^3. See Specific Gravity.
d. Incorrect. The density and specific gravity of four pounds of a gas that occupy 10 ft3 would be 0.4 lb/ft^3. See Specific Gravity.

<question type="mc">
13. Whose law states that the volume of a gas varies inversely with the absolute pressure, as long as the temperature remains constant?

a. Charles'
b. Boyle's
c. Newton's
d. Dalton's

Analysis:
a. Incorrect. Boyle's law states that the volume of a gas varies inversely with the absolute pressure, as long as the temperature remains constant. See Gas Laws.
b. Correct. Boyle's law states that the volume of a gas varies inversely with the absolute pressure, as long as the temperature remains constant. See Gas Laws.
c. Incorrect. Boyle's law states that the volume of a gas varies inversely with the absolute pressure, as long as the temperature remains constant. See Gas Laws.
d. Incorrect. Boyle's law states that the volume of a gas varies inversely with the absolute pressure, as long as the temperature remains constant. See Gas Laws.

<question type="mc">
14. At a constant pressure, how does a volume of gas vary with respect to the absolute temperature?

a. It will expand when it is heated or cooled.
b. It will remain constant.
c. It will expand when cooled or contract when heated.
d. It will expand when heated or contract when cooled.

Analysis:
a. Incorrect. A gas will expand when heated or contract when cooled. See Gas Laws.
b. Incorrect. A gas will expand when heated or contract when cooled. See Gas Laws.
c. Incorrect. A gas will expand when heated or contract when cooled. See Gas Laws.
d. Correct. A gas will expand when heated or contract when cooled. See Gas Laws.

<question type="mc">
15. Whose law states that the total pressure of a confined mixture of gases is the sum of the pressures of each of the gases in the mixture?

a. Charles’
b. Boyle’s
c. Newton’s
d. Dalton’s

Analysis**:**
a. Incorrect. Dalton’s law states that the total pressure of a confined mixture of gases is the sum of the pressures of each of the gases in the mixture. See Gas Laws.
b. Incorrect. Dalton’s law states that the total pressure of a confined mixture of gases is the sum of the pressures of each of the gases in the mixture. See Gas Laws.
c. Incorrect. Dalton’s law states that the total pressure of a confined mixture of gases is the sum of the pressures of each of the gases in the mixture. See Gas Laws.
d. Correct. Dalton’s law states that the total pressure of a confined mixture of gases is the sum of the pressures of each of the gases in the mixture. See Gas Laws.

<question type="mc">
16. What are the two types of energy most frequently used or considered in this industry?

a. Solar and fossil fuels
b. Nuclear and wind
c. Nuclear and solar
d. Wind and solar

Analysis**:**
a. Correct. Solar and fossil fuels are the two most frequently used or considered types of energy in this industry. See Energy.
b. Incorrect. Solar and fossil fuels are the two most frequently used or considered types of energy in this industry. See Energy.
c. Incorrect. Solar and fossil fuels are the two most frequently used or considered types of energy in this industry. See Energy.
d. Incorrect. Solar and fossil fuels are the two most frequently used or considered types of energy in this industry. See Energy.

<question type="mc">
17. The time rate of doing work is called

a. weight.
b. distance.
c. power.

d. force.

Analysis**:**
a. Incorrect. Power is the time rate of doing work. See Power.
b. Incorrect. Power is the time rate of doing work. See Power.
c. Correct. Power is the time rate of doing work. See Power.
d. Incorrect. Power is the time rate of doing work. See Power.

<question type="mc">
18. Force × distance is used to determine

a. weight.
b. work.
c. power.
d. volume.

Analysis**:**
a. Incorrect. Force × distance is used to determine weight. See Energy Used as Work.
b. Correct. Force × distance is used to determine weight. See Energy Used as Work.
c. Incorrect. Force × distance is used to determine weight. See Energy Used as Work.
d. Incorrect. Force × distance is used to determine weight. See Energy Used as Work.

<question type="mc">
19. If an air-conditioning compressor weighing 300 lb had to be lifted 4 ft to be mounted on a base, how much work, in ft-lb, must be done?

a. 12,000 lb/ft^3
b. 1200 ft^3/lb
c. 120 foot-pounds
d. 1200 foot-pounds

Analysis**:**
a. Incorrect. It would require 1200 foot-pounds of work to lift an air-conditioning compressor weighing 300 lb 4 ft. See Power.
b. Incorrect. It would require 1200 foot-pounds of work to lift an air-conditioning compressor weighing 300 lb 4 ft. See Power.
c. Incorrect. It would require 1200 foot-pounds of work to lift an air-conditioning compressor weighing 300 lb 4 ft. See Power.
d. Correct. It would require 1200 foot-pounds of work to lift an air-conditioning compressor weighing 300 lb 4 ft. See Power.

<question type="mc">
20. How many watts of electrical energy are equal to 1 hp?

a. 1492
b. 746
c. 74.6
d. 373

Analysis:
a. Incorrect. 1 hp equals 746 watts. See Electrical Power—The Watt.
b. Correct. 1 hp equals 746 watts. See Electrical Power—The Watt.
c. Incorrect. 1 hp equals 746 watts. See Electrical Power—The Watt.
d. Incorrect. 1 hp equals 746 watts. See Electrical Power—The Watt.

<question type="mc">
21. What unit of energy does the power company charge the consumer for?

a. Kilowatt-hour
b. Watt-hour
c. Btu/h
d. Therm

Analysis:
a. Correct. The power company charges consumers based on kilowatt-hours. See Purchase of Energy.
b. Incorrect. The power company charges consumers based on kilowatt-hours. See Purchase of Energy.
c. Incorrect. The power company charges consumers based on kilowatt-hours. See Purchase of Energy.
d. Incorrect. The power company charges consumers based on kilowatt-hours. See Purchase of Energy.

<question type="mc">
22. If 3000 ft^3 of air is crossing an evaporator coil and is cooled from 75°F to 55°F, what would be the volume of air, in ft^3, exiting the evaporator coil?

a. 288.7 ft^3
b. 28.7 ft^3
c. 2887.8 ft^3
d. 1392.2 ft^3

Analysis:
a. Incorrect. 2887.8 ft^3 would be exiting the evaporator coil. See Gas Laws.
b. Incorrect. 2887.8 ft^3 would be exiting the evaporator coil. See Gas Laws.
c. Correct. 2887.8 ft^3 would be exiting the evaporator coil. See Gas Laws.
d. Incorrect. 2887.8 ft^3 would be exiting the evaporator coil. See Gas Laws.

<question type="mc">
23. A gas is compressed inside a compressor's cylinder. When the piston is at its bottom dead center, the gas is initially at 10 psig, 65°F, and 10.5 in^3. After compression and when the piston is at top dead center, the gas is 180°F and occupies 1.5 in^3. What would be the new pressure of the gas in psig?

a. 196
b. 19.6
c. 1.96
d. 1960

Analysis:
a. Correct. The new pressure of the gas would be 196 psig. See Gas Laws.
b. Incorrect. The new pressure of the gas would be 196 psig. See Gas Laws.
c. Incorrect. The new pressure of the gas would be 196 psig. See Gas Laws.
d. Incorrect. The new pressure of the gas would be 196 psig. See Gas Laws.

<question type="mc">
24. How many Btu/h would be produced in a 12-kW electric heater?

a. 4095 Btu/h
b. 40,956 Btu/h
c. 400,956 Btu/h
d. 495 Btu/h

Analysis:
a. Incorrect. A 12-kW electric heater would produce 4095 Btu/h. See Electrical Power—The Watt.
b. Correct. A 12-kW electric heater would produce 4095 Btu/h. See Electrical Power—The Watt.
c. Incorrect. A 12-kW electric heater would produce 4095 Btu/h. See Electrical Power—The Watt.
d. Incorrect. A 12-kW electric heater would produce 4095 Btu/h. See Electrical Power—The Watt.

<question type="mc">
25. How many Btu of heat can be produced by 4 kWh of electricity?

a. 136,520 Btu/h
b. 136 Btu/h
c. 1365 Btu/h
d. 13,652 Btu/h

Analysis:
a. Incorrect. 4 kWh of electricity can produce 13,652 Btu/h of heat. See Electrical Power—The Watt.
b. Incorrect. 4 kWh of electricity can produce 13,652 Btu/h of heat. See Electrical Power—The Watt.
c. Incorrect. 4 kWh of electricity can produce 13,652 Btu/h of heat. See Electrical Power—The Watt.
d. Correct. 4 kWh of electricity can produce 13,652 Btu/h of heat. See Electrical Power—The Watt.