

Jerusalem Science Contest 5783
Environmental Sustainability and Energy
Test 5
Form – A
Answer Key

- 1) Electricity may be best described as which of the following?
 - a) A flow of moving protons
 - b) A flow of moving electrons**
 - c) Heat energy
 - d) Light energy

- 2) A space heater is plugged into the wall which delivers 120 V, where 12 amps are drawn. How much energy is used?
 - a) 1440 Watts**
 - b) 1440 Kilowatts
 - c) 10 Watts
 - d) 10 Kilowatts

- 3) A 9 volt battery produces which?
 - a) A direct current, DC**
 - b) An alternating current, AC
 - c) A magnetic field
 - d) An oscillating current

- 4) The unit used to describe electrical current is which?
 - a) The ampere or amp**
 - b) The volt
 - c) The watt
 - d) The kilowatt

- 5) The force that opposes or hinders the flow of electrons and may result in creating heat is called what?
 - a) Resistance**
 - b) Voltage
 - c) Current
 - d) Amperage

6) If the electric company charges \$0.44 per kWh, how much does it cost to run an appliance for 6 hours at 2000 watts?

- a) **\$5.28**
- b) \$5280
- c) \$0.88
- d) \$888

7) Most onshore wind turbines have a capacity to produce over 6 million kilowatt hours (kWh) of electricity every year. That's enough to meet the electricity demand of around 1,500 average households. Assuming that there are 365 days in a year, this suggests that the average household uses approximately _____ kWh each day.

- a) 22,000
- b) 11,000
- c) **11**
- d) 22

8) The spinning electromagnet within a DC motor is the

- a) **Rotor**
- b) Commutator
- c) Stator
- d) Invertor

9) A spinning wire between the poles of a permanent magnet may generate electricity.

- a) **True**
- b) False

10) For a typical wind turbine, the wind serves what purpose?

- a) Provides the force needed to rotate the permanent magnet inside the generator
- b) **Provides the force needed to spin the rotor inside the generator**
- c) Provides the force necessary to produce voltage
- d) Provides force necessary to operate the commutator inside the generator

11) The number of electrons flowing through a circuit is called what?

- a) Resistance
- b) The circuit
- c) Voltage
- d) **Amperage**

12) The force that causes electrons to flow is referred to as

- a) **Voltage**
- b) Resistance
- c) Current
- d) Amperage

13) Inside a DC motor, the function of the commutator is which?

- a) **To continually reverse current flow through the electromagnet**
- b) To periodically reverse the polarity of the permanent magnet
- c) To convert DC current into AC current
- d) To manually spin the rotor

14) True or False: If a copper wire is tightly wrapped around an iron nail, its ends (the wire's) are connected to opposite terminals of a battery, and the nail is positioned closely between the poles of a larger magnet, then the nail may orient itself in a specific direction.

- a) **True**
- b) False

15) In a power plant, what pushes the spinning material that generates electricity?

- a) **Steam**
- b) Coal
- c) Uranium
- d) Batteries

16) What Mitzvah in the Torah is the most popular proof for environmental sustainable practices?

- a) שילוח הקן – “You shall surely send away the mother, and the offspring you may take for yourself...” (Devarim 22:7)
- b) **לא תשחית – “You shall not destroy its trees...” (Devarim 20:19)**
- c) ונטעתם – “When you come to the land and you will plant fruit-trees...” (Vayika 19:23)
- d) ואהבת לרעך כמוך – “Love your neighbor as yourself” (Vayikra 19:18)

17) The verse in the Torah *explicitly* prohibits wasteful destruction of:

- a) **Fruit-bearing trees.**
- b) Fruit-bearing trees and fruit.
- c) Fruit-bearing trees, fruit, and all food.
- d) Fruit-bearing trees, fruit, all food, clothing, fuel, and all items that have some usefulness.

- 18) The Mitzvah of Bal Tashchis tells us a specific commandment. What more general lesson does it teach us?
- a) It teaches mankind to appreciate the natural resources of the world.
 - b) It teaches mankind not to abuse the position he was granted as master over the natural world.
 - c) It teaches mankind to love that which is good and beneficial, and to avoid bad and destructive things and practices.
 - d) All of the above.**
- 19) Which of the following acts would not be included in the prohibition of Bal Tashchis?
- a) Cutting down a fruit-bearing tree to use the wood in your fireplace.
 - b) Cutting down a non-fruit-bearing tree to test the strength of your power saw.
 - c) Cutting down an old fruit-bearing tree (that produces sour, inedible fruit) in order to use its wood to build benches for a park.**
 - d) All of the above are included in the prohibition.
- 20) The Gemara in Shabbos 67b teaches that a person who causes the oil in a lamp to unnecessarily burn faster transgresses the prohibition of Bal Tashchis. This Gemara might have practical implications for someone who:
- a) Doesn't turn off the light when he leaves the room.
 - b) Uses a 500 watt incandescent bulb instead of a 50 watt LED bulb
 - c) Uses the trunk of his car as a storehouse for all of his old textbooks
 - d) All of the above**