

Assessment Module 2

Electric Motors

Test your knowledge of Electric Motors

1. The electrostatic force is the attraction of _____.
- magnetic poles
 - masses
 - charged particles

Answer: c Charged particles attract and repel each other. This force is the electrostatic force.

Incorrect: b The attraction of objects with mass is the gravitational force.

Incorrect: a The attraction of magnetic poles is due to the magnetic force.

2. A motor can produce a torque on a propeller. What is torque?
- An object's mass times the object's acceleration.
 - A force that causes an object to rotate.
 - A force that pushes on an object and changes the displacement.
 - The ability to do work.

Answer: b Torque is a force that causes rotation. The equation for torque is $\tau = r \times F$.

Incorrect: a $F = ma$ is the equation for force. It is also known as Newton's 2nd Law.

Incorrect: c This is the definition of work. $W = Fd$

Incorrect: d The ability to do work is the definition of energy.

3. When a compass is placed near a loop of wire carrying a current the needle is deflected depending on _____.
- the amount of the electric current.
 - the number of loops in the wire.
 - Neither a nor b.
 - Both a and b.

Answer: d A current flowing through a wire induces a magnetic field. This magnetic field interacts with the magnetic field of the compass. The size of the induced magnetic field depends on the current and the number of loops.

Incorrect: a This answer is partially correct because the current does impact the size of the induced magnetic field.

Incorrect: b This answer is partially correct because the number of loops in the wire does impact the size of the induced magnetic field.

Incorrect: c This is not true because it is the exact opposite of the correct answer.

4. The purpose of a commutator in a motor is to _____.
- change the direction of the current so the motor stops moving.
 - change the direction of the current so the motor spins.
 - Keep the direction of the current the same so the motor spins.

Answer: b If the current does not change directions the motor will move and then come to a stop. The commutator allows the current to change directions so the motor will spin.

Incorrect: a The commutator changes the direction of the current but the purpose is not to stop the motor.

Incorrect: c The commutator does not keep the current in the same direction.

5. A motor converts _____
- a. potential energy due to gravity into kinetic energy
 - b. mechanical energy into electrical energy
 - c. electrical energy into mechanical energy

Answer: c The power supply carries charged particles which have electrical energy. The current passes through the magnetic field and this makes the wire spin. When something is moving it has kinetic energy which is a type of mechanical energy. Therefore the motor takes electrical energy and transforms it into mechanical energy.

Incorrect: b This would be true if the question was asking about a generator. A generator takes mechanical energy (somebody turning a crankshaft) and transforms this motion into electrical energy (a current running in a wire).

Incorrect: a Potential energy due to gravity is due to an object's position relative to the ground. As an object falls off a ledge it transforms potential energy into kinetic energy. This is a common type of energy transformation but not related to motors.

6. Two magnets are attracted to each other if _____
- a. The north pole of one magnet is placed close to the north pole of the other magnet.
 - b. The north pole of one magnet is placed close to the south pole of the other magnet.
 - c. The south pole of one magnet is placed close to the south pole of the other magnet.

Answer: b This is true because opposite poles attract each other.

Incorrect: a This is incorrect because like poles repel each other.

Incorrect: c This is incorrect because like poles repel each other.