#24



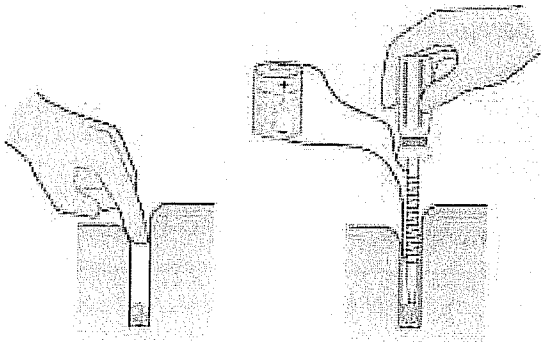
# QUIZ

Name Desk Copy Date Class

**Part I: Multiple Choice**

**(Questions 1–2)** Refer to the following situation.

Clara is helping her father work on the family car. Her father holds a small steel nut used to fasten down an engine part to a bolt. He accidentally drops the nut and it lands in a long, narrow channel in the engine. Both Clara and her father try to stick their fingers in the channel to lift out the small nut, but their fingers are too thick to reach down into the channel.



Clara, an *InterActions* student, suggests coiling a wire around a long, thin steel screwdriver and connecting the wire ends to a cell battery. Then her father inserts the screwdriver down into the channel, and lifts out the small steel nut by touching it with the screwdriver.

Consider the pairs of objects that are interacting to enable Clara's dad to lift out the steel nut.

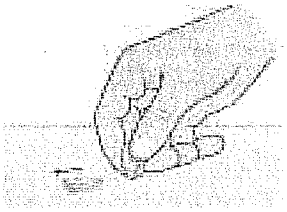
1. The battery and the coil of wire around the steel screwdriver are interacting. What is the **type** of interaction between the cell battery and the **coil of wire** around the screwdriver?


   **a)** Mechanical
   **b)** Magnetic
   **c)** Electric-Charge
   **d)** Light
   **e)** Electric-Circuit

2. The steel screwdriver wrapped with the coil of wire and the steel nut are interacting. What is the **type** of interaction between the **screwdriver/coil** and the **steel nut**?

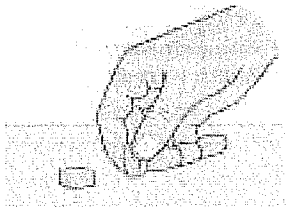

   **a)** Mechanical
   **b)** Magnetic
   **c)** Electric-Charge
   **d)** Light
   **e)** Electric-Circuit

3. Chad holds a magnet near an object on a table and observes that the object moves away from the magnet he holds. What can you conclude from this one observation?



   a) The object must be a magnet.
   b) The object is not a magnet, but could be made of iron or nickel.
   c) The object is not a magnet, but could be made of aluminum or copper.
   d) The object could be made of plastic or wood.
   e) There is not enough information to decide.

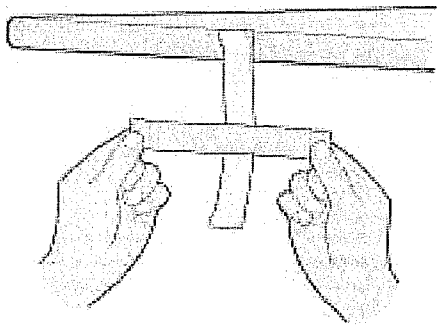
4. Chad replaces the object on the table with an object known to be a magnet. He holds a magnet near the magnet on the table, and observes that the magnets move towards each other. He turns over the magnet that he holds, and brings it near to the magnet on the table again. What will Chad observe?



   a) The object **does not move** because the interaction only happens on one side of the magnet.
   b) The object **moves toward** the magnet because the same effect occurs even when the magnet is turned around.
   c) The object **moves away** from the magnet because the opposite effect occurs when the magnet is turned around.
   d) There is not enough information to decide.

5. Which of the following statements about magnets is **true**?
   a) For magnets made of the same material, the larger the magnet, the stronger the interaction with magnetic materials that are not themselves magnets.
   b) Magnets attract all metals.
   c) Magnets can either attract or repel other magnetic materials that are not themselves magnets.
   d) A magnetic interaction only occurs if the interacting objects are touching.
   e) None of the above four statements is true.

6. Alan performs a sticky tape experiment like the one done in class. He holds the sticky side of a charged tape near another charged hanging tape, causing the hanging tape to move away from the held tape.



   If Alan turns around the charged tape he holds so that the non-sticky side faces and is brought near the hanging tape, what would he observe?
   a) The hanging tape **does not move** because the interaction only happens on one side of the tape.
   b) The hanging tape **moves toward** the held tape because the opposite effect occurs when the tape is turned around.
   c) The hanging tape **moves away** from the held tape because the same effect occurs even when the tape is turned around.
   d) There is not enough information to decide.

7. Which of the statements below is NOT true? If statements a through d are all true, select answer e.

   **a)** Electrically-charged objects can attract non-charged objects.

   **b)** Electrically-charged objects can either attract or repel other electrically-charged objects.

   **c)** An electric-charge interaction can occur even if the interacting objects are not touching.

   **d)** Electrically-charged objects can only interact with objects that are made of metal.

   **e)** All of the above four statements are true.

8. Which of the following descriptions would support the claim that **no interaction** has occurred?

   **a)** A bicyclist applies her brakes and skids along the pavement to a stop.

   **b)** On a sunny day, you put your hand on an outdoor playground slide, and your hand gets warmer.

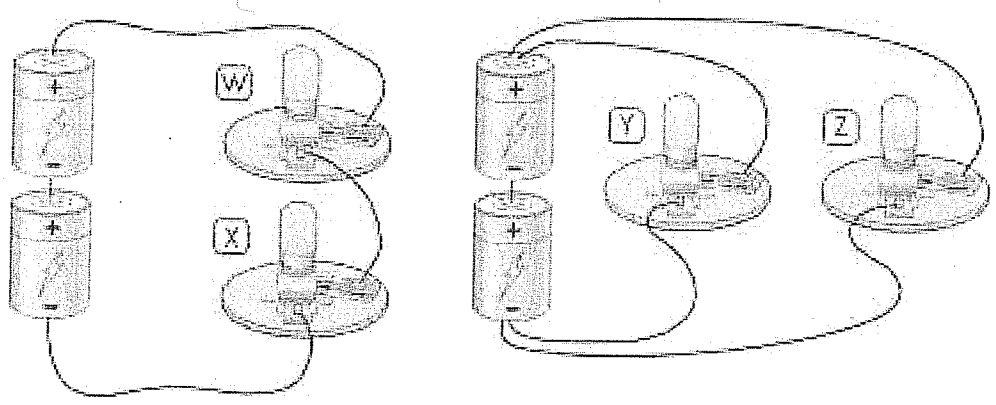
   **c)** A dry sponge absorbs water and becomes slightly larger in size.

   **d)** Some chocolate powder and milk are mixed together with a spoon to make chocolate milk.

   **e)** A magnet is held close to an object, and the object remains in place.

9. In two electrical circuits, two bulbs are connected to two cell batteries, but the bulbs are hooked up differently. The first (series) circuit shows both bulbs W and X and the cell batteries in a single loop. The second (parallel) circuit shows each bulb Y and Z connected in its own separate loop to the cell batteries.

   If bulbs W and Y are unscrewed from their sockets, what happens to the other bulbs in each circuit (X and Z)?




   **a)** Both bulbs X and Z go out.

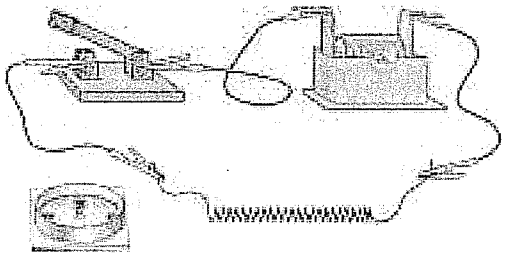
   **b)** Both bulbs X and Z remain lit.

   **c)** Bulb X remains lit, but bulb Z goes out.

   **d)** Bulb X goes out, but bulb Z remains lit.

   **e)** Both bulbs X and Z become brighter.

**10.** Suppose you were performing an experiment with a coil of wire in an electric circuit. You also had available additional cell batteries and bulbs, a switch, a compass, and an iron nail.



Which one of the following changes would probably **decrease** the strength of the magnetic interaction between the coil of wire with electric current flowing through it and a compass placed near each other? (Assume the switch is closed.)

**a)** Add more cell batteries (in series) to the circuit.

**b)** Add bulbs in series to the circuit.

**c)** Insert an iron nail inside the coil of wire.

**d)** Increase the number of turns in the coil of wire.

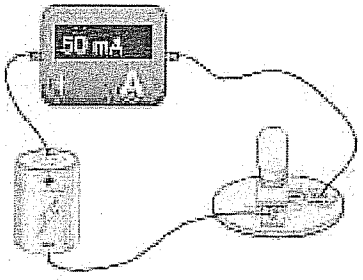
**Part II: Analyzing an Experiment**

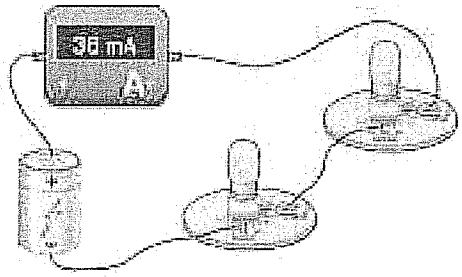
**(Questions 11–14)** Refer to the following situation.

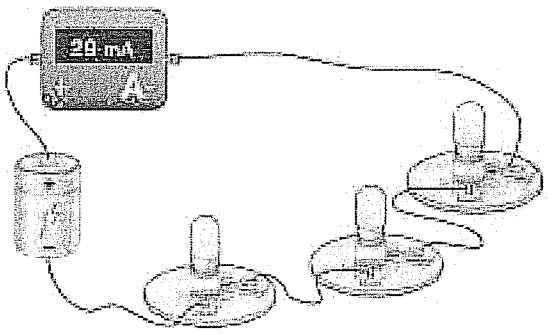
A group of students were investigating electric circuits. They were interested in determining the answer to the following experiment question:

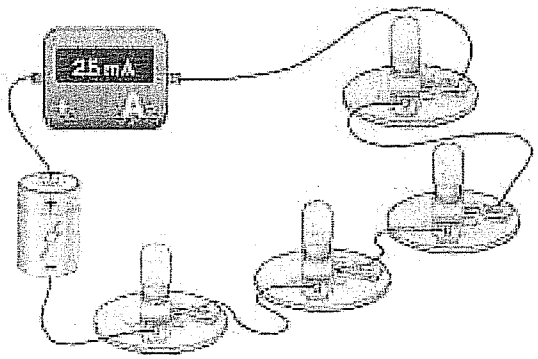
*What is the relationship between the number of bulbs connected together in a loop and the electric current in the circuit?*

To find out, they did an experiment using the computer simulator, and set up the following four circuits. Each circuit had a battery, an ammeter (to measure electric current), and one or more bulbs. All bulbs were identical.



They recorded the readings of the ammeter in a table.

**Table: Number of Bulbs vs. Amount of Electric Current**

| Number of bulbs | Amount of electric current (mA) |
|---|---|
| 1 | 50 |
| 2 | 36 |
| 3 | 29 |
| 4 | 25 |

Answer the following questions. Assume the experiment was a **fair test**. Since each value of the electric current was taken from the simulator, there is no uncertainty for each of these values.

**11.** The **manipulated variable** in this experiment was

**a)** the number of batteries.

**b)** the number of bulbs.

**c)** the number of wires.

**d)** the value of the electric current.

**12.** Which variable was kept the same (**controlled**) during the experiment?

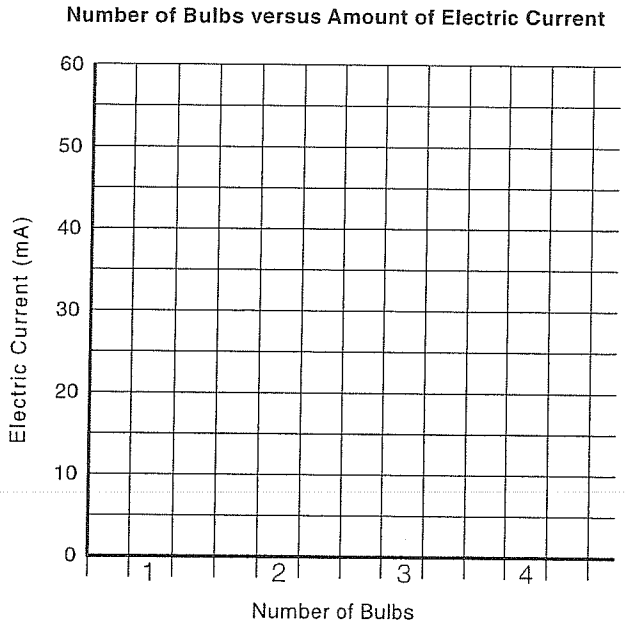
**a)** the number of batteries

**b)** the number of bulbs

**c)** the number of wires

**d)** the value of the electric current

**13.** Draw a **bar graph** to represent the data presented in the table above.



**14.** Write your **experiment conclusion** and **supporting reason**: Use *How To Evaluate an Experiment Conclusion* to make sure your supporting reasons are good.

As the number of bulbs in a loop increases, the electric current in the circuit _____ (increases, decreases, remains the same).

The reason is that _____

_____

_____

**Part III: Learning About Questions**

**15.** An electromagnetic interaction occurs when an interaction occurs between

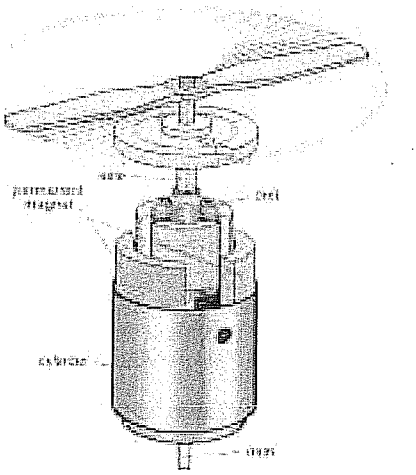
**a)** an electrically-charged object and a magnetic metal.

**b)** a magnet and an electric current.

**c)** a magnet and an electrically-charged object.

**d)** an electromagnet and any other object (for example, a baseball).

**16.** Which statement best explains why the axle (rotor shaft) in a motor (see diagram) spins rapidly?



**a)** An electromagnetic interaction occurs between the current in the coils of wire and the permanent magnets.

**b)** A magnetic interaction occurs between the permanent magnets and the axle, which is a magnetic metal.

**c)** An electric circuit interaction occurs between the coils of wire, the magnets and the batteries hooked up to the motor.

**d)** An electromagnetic interaction occurs between the coils of wire and the axle, which is a magnet.

**17.** In a meter with a magnetic needle that is free to rotate (such as an ammeter or a compass that is wrapped in electric wire), what is the relationship between electric current and the number of degrees that the needle rotates?

**a)** As the current increases, the number of degrees that the needle rotates increases.

**b)** As the current increases, the number of degrees that the needle rotates decreases.

**c)** As the current increases, the number of degrees that the needle rotates stays the same.

**d)** As the current increases, the number of degrees the needle rotates first increases and then decreases.

18. A magnetic material is

a. a metal that interacts with a magnet.
b. a metal that is magnetic.
c. any material that interacts with a magnet.

19. An electrical conductor is

a. a material made of metal.
b. a material that does not allow electric current to exist in it.
c. a material that allows electric current to exist in it.
d. a material that is not made of metal.

20. A magnet is brought very near to a suspended magnetic material that is free to move. The suspended magnetic material ...

a. moves toward the magnet.
b. moves away from the magnet.
c. moves toward or away from the magnet, but we can't say which way without more information.
d. stays in the same place.

21. A magnet is brought near another magnet that is suspended and free to move. The suspended magnet ...

a. begins to move toward the magnet.
b. begins to move away from the magnet.
c. begins to move either toward or away from the magnet.
d. stays in the same place.
e. There is not enough information to decide.

22. A closed electric circuit consists of one battery and one bulb. If a second battery is added as shown, what happens to the brightness of the bulb when the circuit is closed?

a. The bulb becomes brighter.
b. The bulb becomes dimmer.
c. The brightness of the bulb does not change.
d. There is not enough information to say what happens.

23. When an electrically charged object is brought near an uncharged charged object it_____.

a. repels the uncharged charged object
b. attracts the uncharged charged object
c. attracts or repels the uncharged charged object depending on the type of electrical charge
d. neither attracts nor repels the uncharged charged object

24. When an electrically charged object is brought near another electrically charged object it_____.

a. repels the electrically charged object
b. attracts the electrically charged object
c. attracts or repels the electrically charged object depending on the type of electrical charges interacting
d. neither attracts nor repels the electrically charged object

25. Which of the variables listed below will increase the strength of the magnetic interaction between an electromagnet and a magnet?

I. The number of turns of wire.

II. The amount of magnetic material placed within the turns of wire.

III. The amount of electric current in the wires.

a. I and III
b. II and III
c. I and II
d. I, II, and III