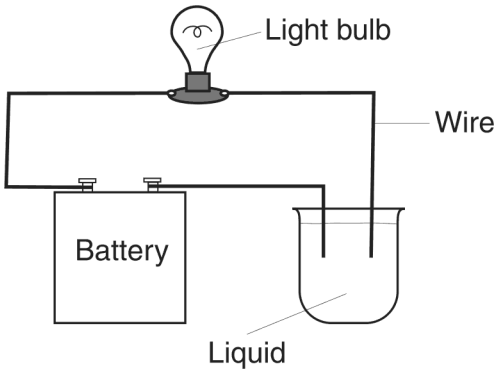
Electricity

Name: _____ **Date:** _____

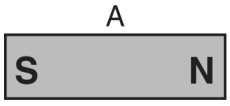
1. The diagram below shows an experiment to test a certain property of liquids. 1. _____

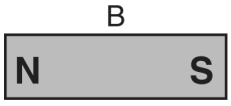


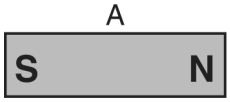
Which property of the liquid is being tested?

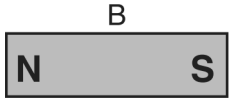
A. density
B. magnetic attraction
C. conductivity
D. freezing point

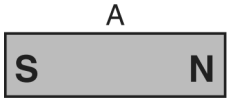
2. Magnets *A* and *B* are of equal magnetic strength. In which position will magnets *A* and *B* have the greatest attractive force toward each other? 2. _____

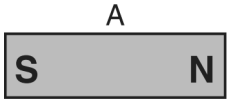
A.


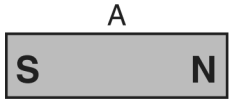


B.




C.


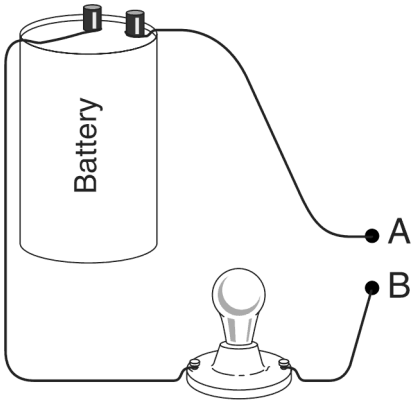
D.




3. Plastic is used to cover the copper wires in the power cords of appliances because plastic differs from copper in 3. _____

A. density
B. hardness
C. phase at room temperature
D. electrical conductivity

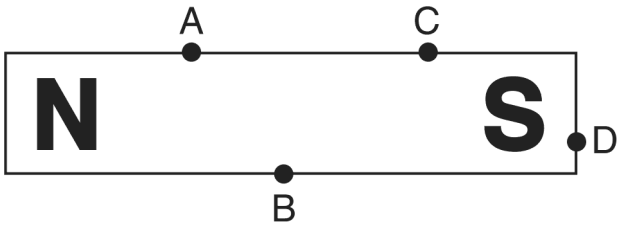
4. The diagram below shows an *incomplete* circuit. 4. _____



Which item would allow the bulb to light up if it were used to connect point *A* to point *B*?

A. a glass rod B. a metal coin C. a plastic comb D. a paper cup

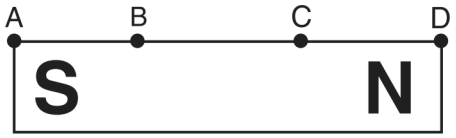
5. Letters *A*, *B*, *C*, and *D* represent locations on a bar magnet. 5. _____



Which location has the greatest magnetic force?

A. *A* B. *B* C. *C* D. *D*

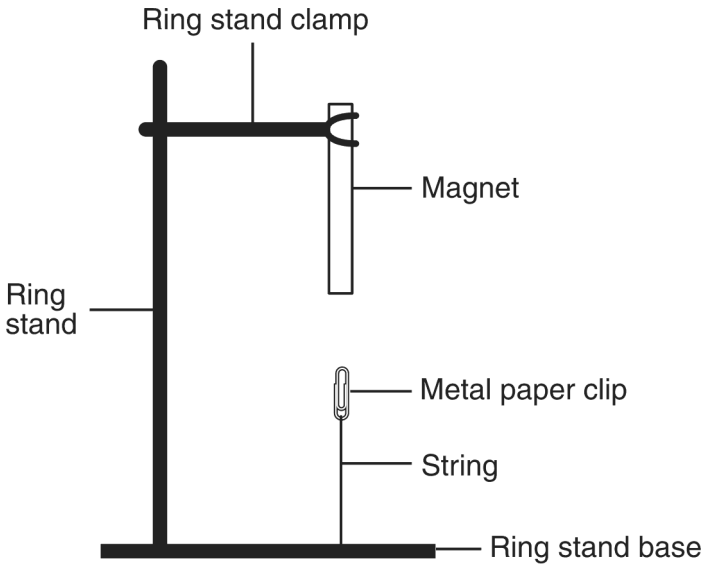
6. The diagram below shows a bar magnet. Points *A*, *B*, *C*, and *D* are locations on the magnet. 6. _____



Which position on the bar magnet would have the strongest attraction to the north pole of another bar magnet?

A. *A* B. *B* C. *C* D. *D*

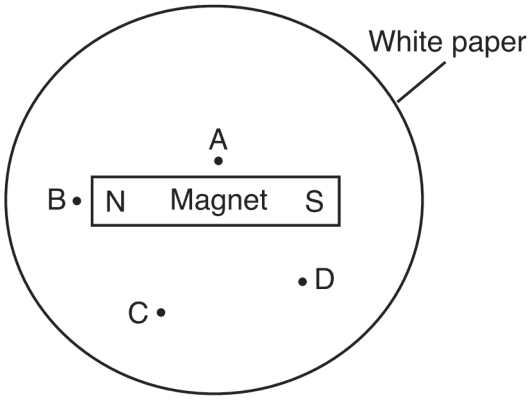
7. Base your answers to the questions on the diagram below and on your knowledge of science. The diagram shows a metal paper clip attached to the base of a ring stand with a string. A magnet is attached to the ring stand with a clamp. 7. _____



What would happen to the metal paper clip if the string were cut?

8. Explain how this diagram would be different if the paper clip was made of plastic. 8. _____

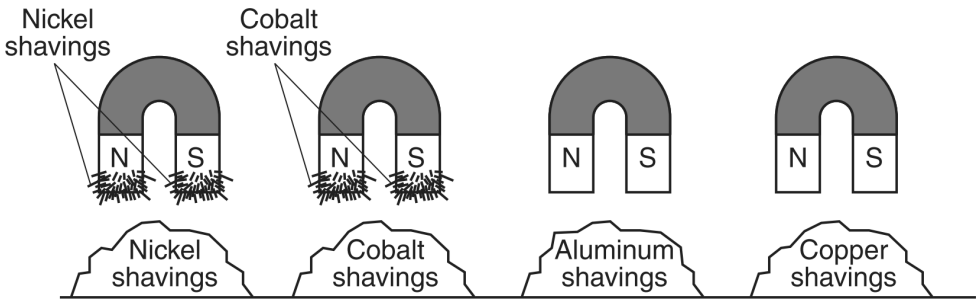
9. The diagram below shows a bar magnet resting on top of a piece of white paper. The north and south poles of the magnet are labeled N and S. Points *A*, *B*, *C*, and *D* represent four locations around the magnet. 9. _____



If iron filings were sprinkled evenly across the entire paper circle, at which location would the greatest concentration of iron filings be found after 30 seconds?

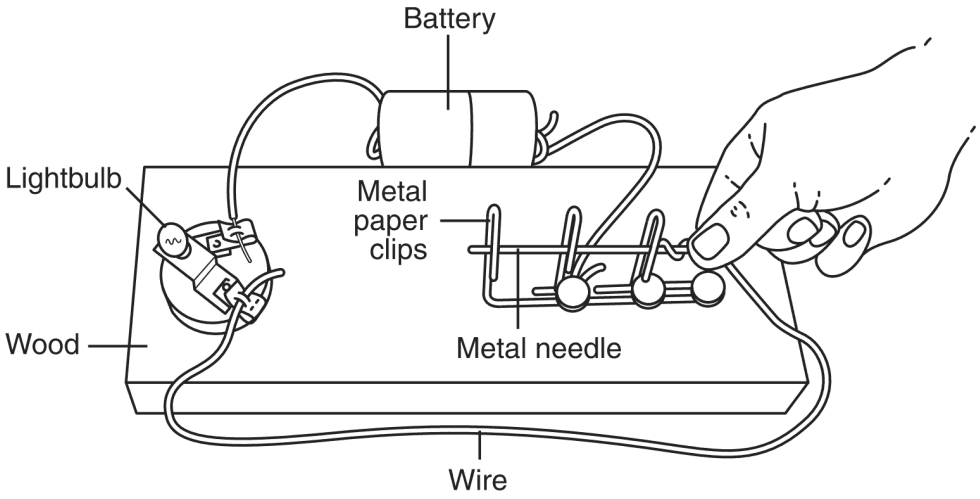
A. *A* B. *B* C. *C* D. *D*

10. The diagram below shows four identical magnets that have been dipped into piles of shavings of four different metals. 10. _____



Write a conclusion about a magnet's ability to attract metals based on what is shown in this diagram.

11. The diagram below shows a game where players try to move a metal needle through three metal paper clips without letting the needle touch the clips. A bulb lights when the needle touches a paper clip, signaling that the player has lost. 11. _____



Why does the bulb light when the needle touches a paper clip?

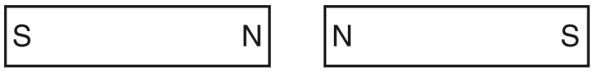
A. Convection cells are produced.

B. Vibrations set up wavelike disturbances.

C. A circuit is completed.

D. A phase change occurs.

12. The diagram below shows two magnets. 12. _____



If the magnets are brought closer together, they will

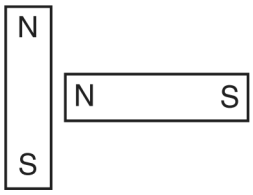
A. attract each other with a stronger force

B. attract each other with a weaker force

C. repel each other with a stronger force

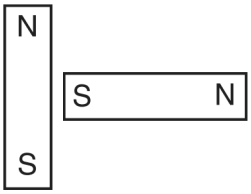
D. repel each other with a weaker force

13. Which position of two magnets results in the greatest attraction between the magnets? 13. _____

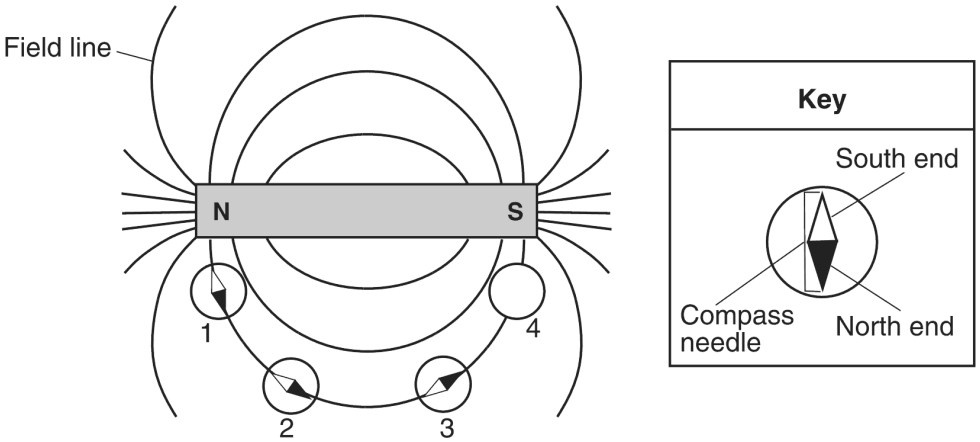
A. 

B. 

C. 

D. 

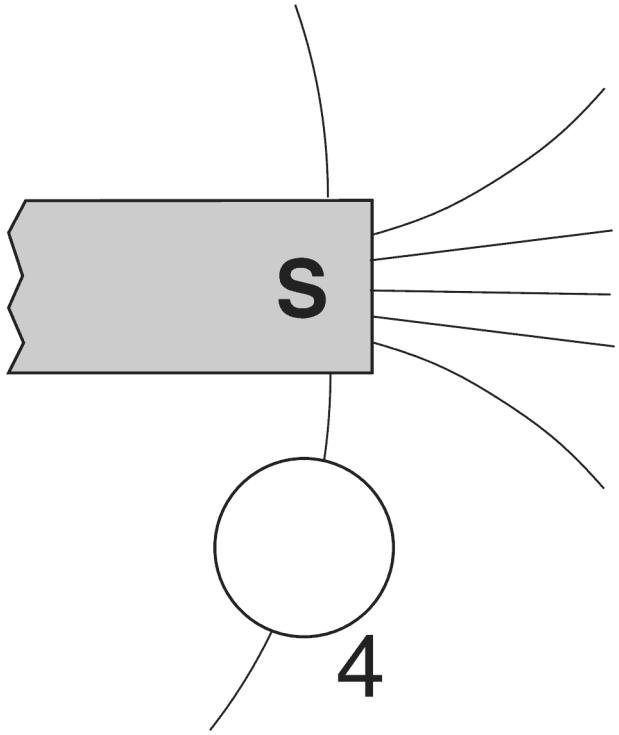
14. Base your answers to the questions on the information and diagram below and on your knowledge of science. The diagram represents the magnetic field lines of a bar magnet. Four magnetic compasses, labeled 1, 2, 3, and 4, are located along one of the field lines. The compass needle inside compass 4 has been left out. 14. _____



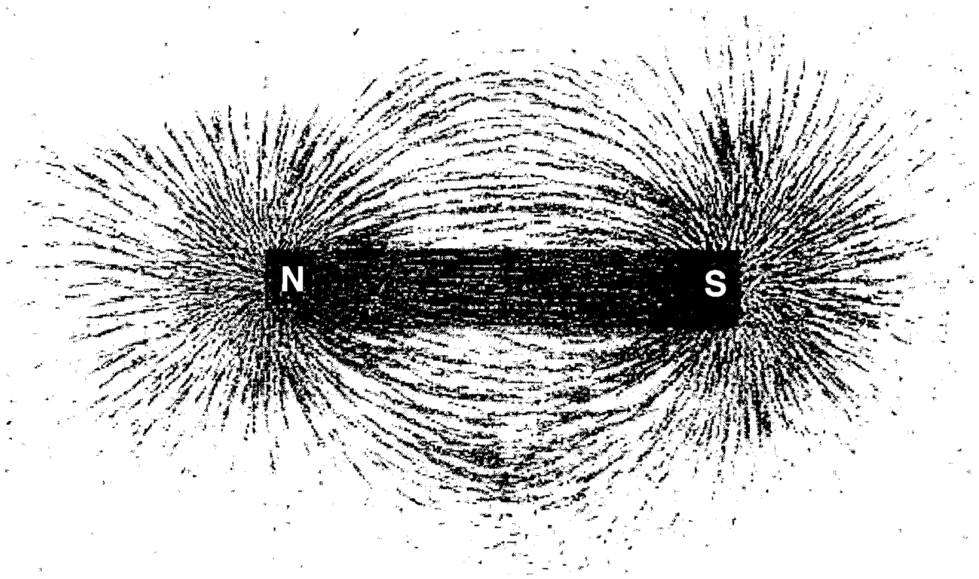
Explain why the south end of the needle in compass 1 is pointing toward the north pole of the magnet.

15. Explain why the magnetic force acting on compass 1 is greater than the magnetic force acting on compass 3. 15. _____

16. On the diagram of compass 4 below, draw the needle of the compass correctly oriented to the magnet, and shade the north end of the compass needle to show how the compass should appear at that position. 16. _____



17. The diagram below represents a bar magnet. When iron filings were placed near the magnet, they moved to form the pattern shown. 17. _____



Explain why more iron filings are located at the ends of the magnet than at the center of the magnet.

18. The diagrams below represent the same two magnets placed in four different positions. The North (N) and South (S) poles are labeled. At which position will the force of attraction between these two magnets be greatest? 18. _____

A. 

B. 

C. 

D. 

19. Base your answers to the questions on the passage and data table below and on your knowledge of science. 19. _____

A group of students were experimenting with building electromagnets in science class. To do this, the students wrapped a piece of insulated copper wire around an iron nail and then connected the two ends of the wire to a battery, making the nail magnetic. The number of wraps of the wire around the nail affected the number of metal paperclips that the electromagnet could pick up at one time. The results of the students' experiment are shown in the data table below.

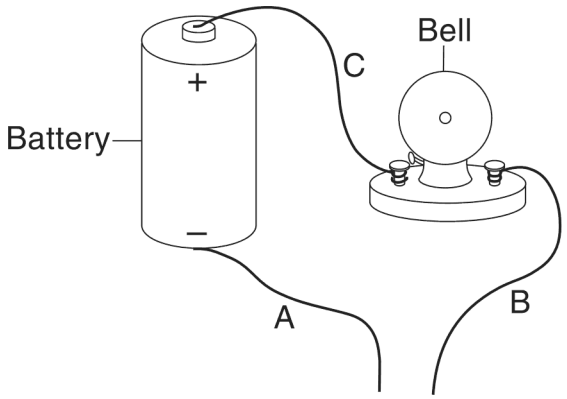
Electromagnet Strength

Number of Wire Wraps	Number of Paperclips Picked Up
10	4
15	7
20	9
25	13

When the wires were disconnected from the battery, all of the paper clips fell off the nail. Explain why the battery is needed to pick up the paperclips.

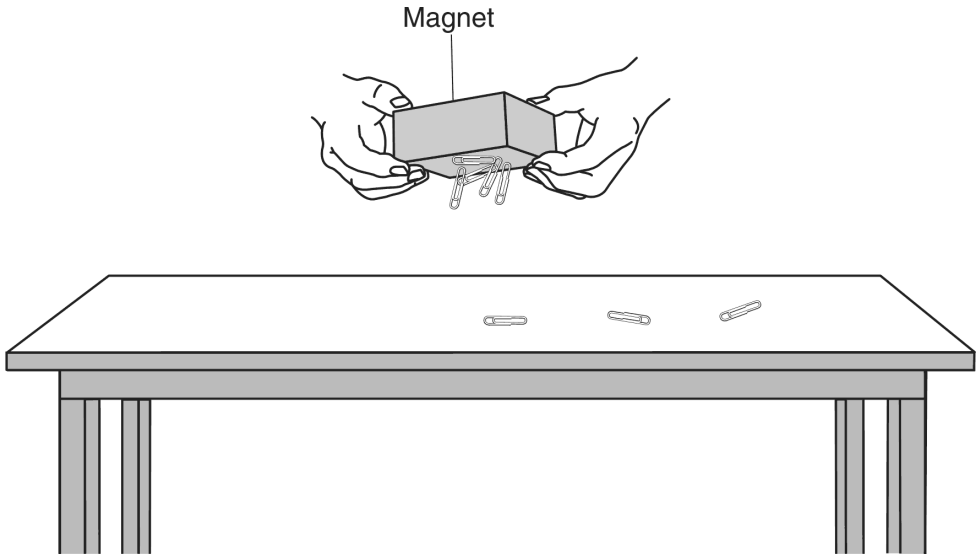
20. Predict how many paperclips the electromagnet would have picked up if the students had wrapped the wire around the nail only five times. 20. _____

21. The diagram below shows part of an electrical circuit that includes a battery, a bell, and three wires labeled *A*, *B*, and *C*. 21. _____



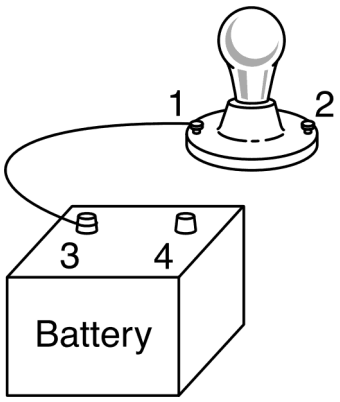
The bell does *not* make a sound. Explain what needs to be done to the circuit so that the bell will make a sound.

22. The diagram below shows a magnet picking up paper clips from a table. 22. _____



Give *one* reason why the magnet was able to pick up only *some* of the paper clips on the table.

23. The diagram below shows an open circuit. The bulb is *not* lit. Four places in the circuit are labeled 1, 2, 3, and 4. One wire has been connected between 1 and 3. 23. _____



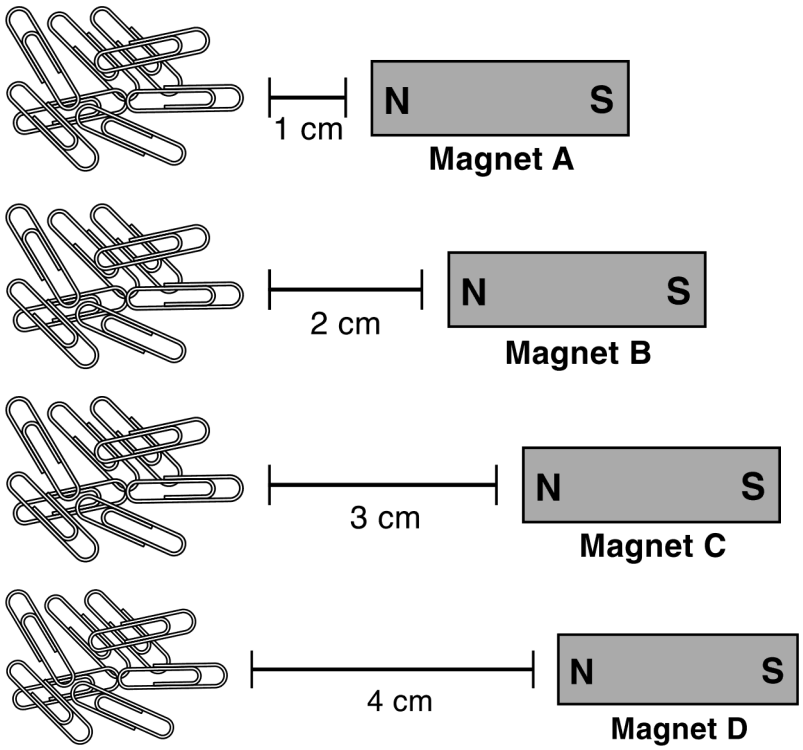
In order to light the bulb, another wire should be connected between

A. 1 and 2 B. 1 and 4 C. 2 and 3 D. 2 and 4

24. Which material is the best conductor of electricity? 24. _____

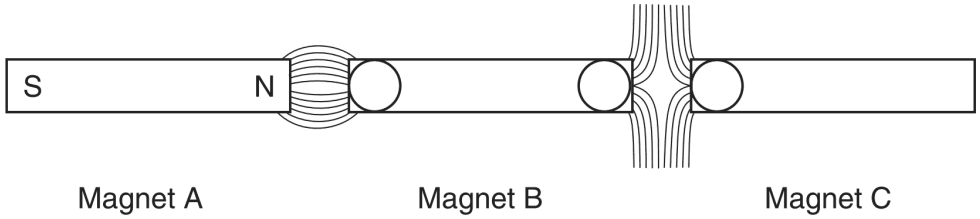
A. rubber B. plastic C. metal D. glass

25. The diagrams below show four identical magnets, *A*, *B*, *C*, and *D*. The magnets were placed at different distances from four identical piles of metal paper clips. 25. _____



A student predicts that magnet *C* will attract the most paper clips. Explain why the student's prediction is *not* correct.

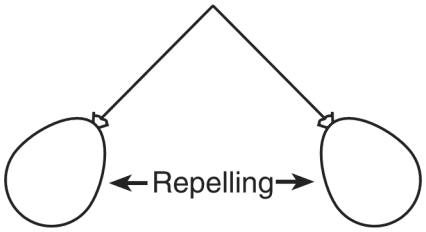
26. The diagram below shows three bar magnets. The south and north poles have been labeled *S* and *N* on magnet *A*. The lines between each magnet show how iron filings line up when sprinkled around the magnets. 26. _____



a) On the magnets shown, place an *S* in each circle that is a south pole and an *N* in each circle that is a north pole.

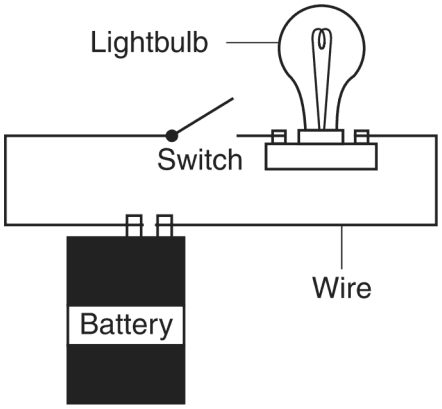
b) State the scientific reasoning you used to label the poles.

27. A student attached two balloons to equal lengths of string and tied them to the same point. The student observed that the balloons repelled each other, as shown in the diagram below. 27. _____



In terms of electrical charges, explain why the balloons repelled each other.

28. The diagram below shows a lightbulb, battery, and switch connected by wires. 28. _____



Explain why the lightbulb is not lit when the switch is in the position shown.

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1.
Answer: C
Objective: NYS I.PS.3.1a
Points: 1

2.
Answer: C
Objective: NYS I.PS.4.4g
Points: 1

3.
Answer: D
Objective: NYS I.PS.3.1a
Points: 1

4.
Answer: B
Objective: NYS I.PS.3.1a
Points: 1

5.
Answer: D
Objective: NYS I.PS.4.4g
Points: 1

6.
Answer: A
Objective: NYS I.PS.4.4g
Points: 1

7.
Answer: Example answer: The metal clip would move toward the magnet.
Objective: NYS I.PS.4.4g
Points: 1

8.
Answer: Example answer: The plastic clip would fall.
Objective: NYS I.PS.3.2d
Points: 1

9.
Answer: B
Objective: NYS I.PS.4.4g
Points: 1

10.
Answer: Example answer: Magnets attract nickel and cobalt, but do not attract aluminum and copper
Objective: NYS I.S3.2d
Points: 1

11.
Answer: C
Objective: NYS I.PS.4.4e
Points: 1

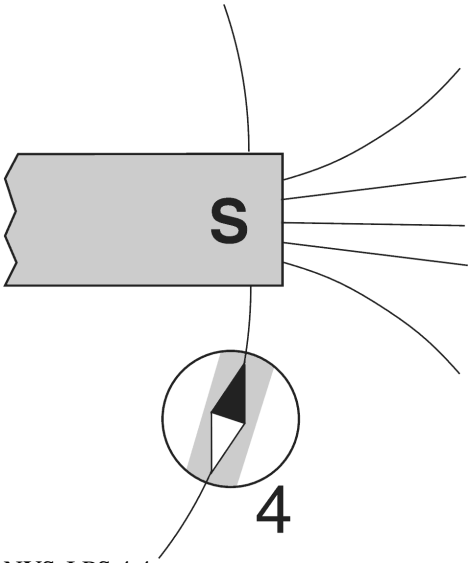
12.
Answer: C
Objective: NYS I.PS.4.4g
Points: 1

13.
Answer: B
Objective: NYS I.PS.4.4g
Points: 1

14.
Answer: Example answer: Like poles repel.
Objective: NYS I.PS.4.4g
Points: 1

15.
Answer: Compass 1 is closer to the pole of the bar magnet.
Objective: NYS I.PS.4.4g
Points: 1

16.
Answer:



Objective: NYS I.PS.4.4g
Points: 1

17.
Answer: Example answer: Greater magnetism is at the ends.
Objective: NYS I.PS.4.4g
Points: 1

18.
Answer: B
Objective: NYS I.PS.4.4g
Points: 1

19.
Answer: Example answer: an electric current/power/charge is needed to produce a magnetic field, without electricity, the magnetic field breaks down
Objective: NYS I.T1.2
Points: 1

20.
Answer: 0 to 3 paper clips
Objective: NYS I.M2.1a
Points: 1

21.
Answer: Example answer: added a closed switch between *A* and *B*, connect wires *A* and *B*
Objective: NYS E.PS.4.1e
Points: 1

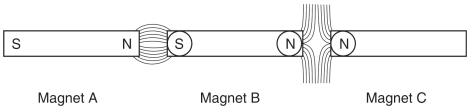
22.
Answer: Example answer: the other paper clips are not metal, the magnet is too far away to pick all of them up
Objective: NYS E.PS.5.1e
Points: 1

23.
Answer: D
Objective: NYS E.PS.4.1e
Points: 1

24.
Answer: C
Objective: NYS E.PS.4.1c
Points: 1

25.
Answer: Example answers: Magnet C is not the closest to the clips.
Objective: NYS E.PS.5.2b
Points: 1

26.
Answer:



Example answer: opposite poles attract each other, like poles repel each other
Objective: NYS I.PS.4.4g
Points: 1

27.
Answer: Both balloons have the same charge
Objective: NYS I.PS.4.4f
Points: 1

28.
Answer: Example answer: The circuit is open.
Objective: NYS I.PS.4.4e
Points: 1