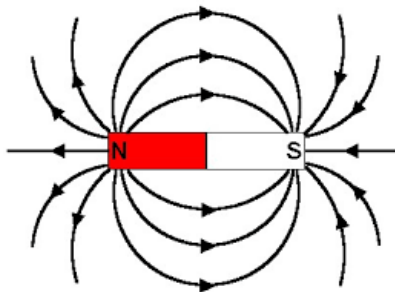


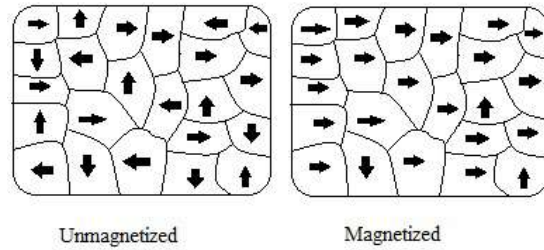
Forces Acting in Nature Study Guide **ANSWER KEY**

1. Describe the relationship between gravity and the mass of two objects. *The greater the mass of two objects, the greater the gravitational force between the two objects. As mass, increases gravitational force increases. An object with more mass has more gravity.*
2. Explain what happens to the gravitational force when two objects move away from each other? *As distance increases between two objects, the gravitational force decreases. As distances decreases between two objects, the gravitational force increases.*
3. Explain how any object has a gravitational field? *If an object has mass, it has a gravitational field around it.*
4. Explain what would happen to the planets (that are motion) if the sun's gravitational force were to suddenly disappear. *The planets would continue moving away in straight lines.*
5. What is magnetism or magnetic force? *Magnetism is a force; it is a push (repelling) or pull (attraction) between magnets or a magnet and a ferrous metal.*
6. Explain the poles of a magnet. *Magnets have a north and south pole. Opposite poles attract; like poles repel.*
7. When a rocket attempts to launch, its engine exerts a force downward, the rocket will not launch until the force of the engine is greater than the weight of the rocket. Why? *The force of the engine must be greater than the force of gravity.*
8. Describe and draw a magnetic field? *The area around a magnet where the repelling and attracting force is exerted.*



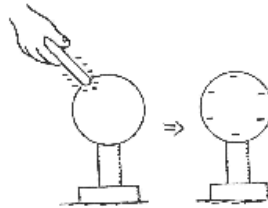
9. Give specific examples of magnetic objects. *Iron, cobalt, nickel, ...ferrous material*

10. Draw an illustration of a magnetized domain and an unmagnetized domain.



11. If you drop a leaf and an acorn with the same mass, the leaf floats slowly to the ground, while the acorn falls more quickly. Explain why this happens. *Air resistance affects an open leaf more than a spherical shaped acorn.*

12. Describe and draw a picture of conduction. *Conduction is the process by which a neutral object obtains an electrical charge through direct contact.*



13. Define induction. *Induction is the process by which a neutral object obtains an electrical charge through an electrostatic field without touching.*

14. What do static electricity, friction, induction, and conduction have in common? *Friction, conduction, and induction all involve the charging of electrons to create static electricity.*

15. How can turning off the television and the hairs on your arms standing up be an example of induction? *This is an example of static charge by induction because as you approach without touching the static charge builds up attracting the hairs on your arm WITHOUT touching the TV.*

16. What will happen to a balloon if you are rubbing it back and forth on carpet or a sweater? *The balloon will build up negative charges.*

17. Why are the wires in cables of household gadgets covered with plastic? *This is because plastics are insulators; and, insulators are poor conductors of electricity.*

18. How can you create a static charge using friction with a plastic tube and a silk cloth? *Friction can be used by rubbing the plastic tube with the silk cloth.*

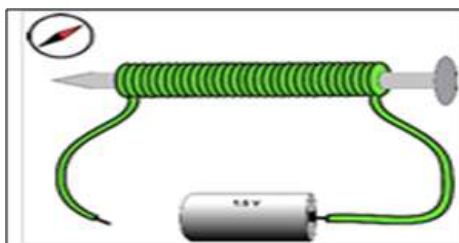
19. Describe the force that keeps electrons in orbit around the nucleus. *The positively charged protons in the nucleus attract negative charges from the electrons.*

20. Explain why two balloons that are rubbed with wool cloth push away from each other. *The balloons have the same electric charge and like charges repel each other.*

21. Explain what would happen if you placed a magnet near an aluminum can, copper wire, and iron nail. *The magnet would not be attracted to the aluminum can or copper wire. These two are not magnetic. The iron nail would be attracted and stick to the magnet.*
22. Explain how like poles of magnets provide evidence for magnetic fields. *When like poles of two magnets are NEAR each other, not touching, they push apart. The distance between these two show the magnetic field.*
23. Give examples of electric charges. *Positive charged protons and negative charged electrons.*
24. Describe what happens to the electric force if two negatively particles move closer together. *The force of a two negatively charged particles increase as they move closer together.*
25. If you create a circuit with two batteries, 3 wires with clamps on the end, and a light bulb to test objects to see which ones are conductors and which ones are insulators, how will you know if the material is a conductor or insulator? *If it is a conductor, like aluminum foil, the light bulb will light. If it is an insulator, like cotton, the bulb will not light.*
26. Define a dry cell. *A dry cell is a battery with an electrolyte paste inside.*
27. The table shows results from an experiment in which objects made up of different materials are rubbed with each other. Based on the results, what can be predicted if an object made of rubber is rubbed with an object made of glass? *The rubber object will become negatively charged, and the glass object will become positively charged.*

Different Materials Experiment		
Material 1	Material 2	Material 3
Cotton	Glass	Cotton became negatively charged.
Wool	Glass	Glass became positively charged.
Rubber	Aluminum	Aluminum became positively charged.
Rubber	Cotton	Rubber became negatively charged.

28. Draw, label, and describe the components of an electromagnet. *A wire with loops, a dry cell battery, and an iron core.*

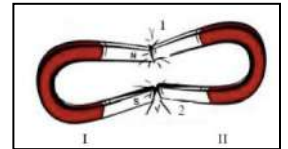


29. Describe how to make an electromagnet stronger without increasing current. *Increase the number of loops.*

30. What type of core is needed to make a strong electromagnet? Why? *An iron core because it increases the magnetic field which makes the electromagnet stronger.*

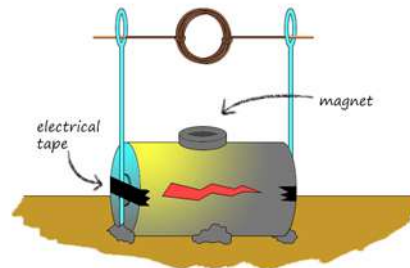
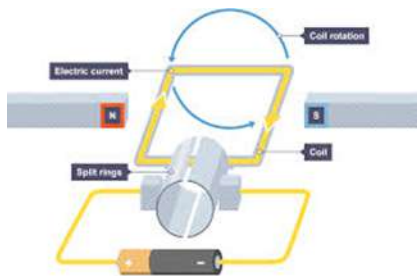
31. How could you use a compass and iron filings to test an electromagnet ? *See if the compass changes directions when placed next to the wire when the current is on. If the compass moves, it will show a magnetic field. See if the iron filings will stick to the nail before turning the current on and again while the current is on. The iron filing should not stick to it with the current off. The iron filing should be attracted and stick to it when the current is on.*

32. Describe what happens to the attractive force when the two magnets with opposite poles touching are pulled slightly apart. *Even though they are not touching, the magnetic force exists and they are pulling on each other.*



33. Describe the materials needed to create a simple electric motor. *several lengths of wire, battery, paper clips, tape, rubber eraser, and a permanent magnet*

34. Draw and explain what a simple motor does. *It converts electrical energy into mechanical energy.*



35. Explain how a simple motor works. *A simple motor works when a wire carrying electric current is placed in magnetic field. The wire is moved by a force. The force is created by the two magnetic fields.*

36. Why is a generator considered to be the exact the opposite of a motor? *It converts mechanical energy into electrical energy.*

37. Describe a generator. *A generator is a rotating metal coil placed in a magnetic field.*

38. Explain how a bicycle and a wire could be used to turn on a light bulb. *If a wire and a magnet are attached to the wheel of a bicycle, the bicycle could act as a generator and create electric current to turn on the light bulb.*