**3. Energy and Change**

**Forces**

**Question 1**

1. Force
2. Distortion
3. Deceleration
4. Balanced forces
5. Non-contact forces
6. Shear
7. Torsion
8. Friction
9. Gravity
10. Field lines

 **Question 2**

1. Friction, gravity
2. Mass is the amount of matter in an object. The weight of an object is the force of gravity on an object.
3. Weight = mg

 = 10x10

 = 100N

 4a. friction

 4b. Friction between our shoes and the floor prevents us from slipping.

 Friction between tyres and the road stops vehicles from skidding.

 Friction between the brakes and the wheels enables vehicles to slow down or stop.

 5. Tension, Compression, Torsion, Shear forces, Bending forces

**Question 3**

1. It can cause a change in the shape of an object (distortion).

It can decrease the speed of a moving object.

It can increase the speed of a moving object.

It can change the direction in which the object is moving.

It can cause a stationary object to move.

 2. W= mg

 = 50 x10

 = 500N

 3a. unbalanced, forces on either are different.

 3b. 320N – 200N = 120N

**Question 4**

1. Gravitational force
2. Gravitational force is the force that all objects that have mass exert on each other.
3. Mass of the object. Distance between the objects.

 4a. The gravitational force on the moon is smaller than the gravitational force on earth.

 The person will be pulled with a greater force on earth than on the moon.

 5a. W = mg

 =60x10

 = 600N

 b. W= 60x 1,6

 = 96N

 6. Galileo demonstrated that all objects fall at the same rate irrespective of their mass.

 7. 10m/s

 8a. Tides are caused by the gravitational interaction between the Earth and the Moon.

 8b. The gravitational force of the sun on the planets.

**Question 5**

1. iron, steel, nickel and cobalt.
2. Act over a distance

3a.

 

3b. The magnetic field is the area around a magnet in which there

 is magnetic force.

4………repel……. attract

 5a. Industry

 Electric generators in power stations rely on magnets to convert mechanical

 energy into electricity.

 Maglev Trains does not have any wheels but operate by using two opposing

 magnets that cause the train to float above the rail making it extremely fast.

 Electromagnets in cranes attract and move large amounts of metal.

 5b. Home

Refrigerator magnets hold papers and other small items to the refrigerator.

Credit and debit cards make use of magnetic strips that contain financial information.

Magnets are found in phones, door bells and children's toys. Magnetic strips are used on cupboard and fridge doors to keep them shut.

5c. Health and Medicine

 Magnets are found in certain medical equipment such as X-rays and MRI

 machines. MRI machines passes a magnetic field over the human body creating a

 picture or image of all the body tissues enabling any abnormalities or damaged

 tissues to be detected.

 5d. Computers and Electronics

 All computers contain magnets for data storage on hard drives and to display

 images on computer screens.

 Magnets are found inside the speakers attached to computers, televisions and

 radios.

**Question 6**

1a. B

1b. A

1c. C

2. A and C. they are oppositively charged objects

3. electroscope

4. C

5. A thunder cloud becomes charged when air particles and water particles in the clouds rub together. When the thunder cloud becomes highly charged there is a massive discharge (release of charge) between the cloud and the ground. This massive release of charges from the atmosphere towards the earth is lightning.

6 Seek shelter in a building or a car, but make sure the windows in the car are shut.

Stay away from trees. Crouch down in the open area put your feet together and place your hands over your ears to minimize hearing damage from thunder.

Swimming, snorkelling and scuba diving are not safe.

Stay away from fences and metal objects.

Avoid any contact with water. Water is a great conductor of electricity, so do not take a shower, wash your hands or wash dishes.

Do not use a corded telephone. Lightning may strike exterior phone lines.

Switch off electric equipment like computers and television sets.

Stay away from windows and open doors.

**Electricity**

**Question 1**

1. Insulators
2. Electrical
3. Voltmeter
4. Parallel
5. Electric current
6. Fuse
7. Coal
8. National Electricity Grid

 **Question 2**

1. A cell is a device in which chemical reactions takes place producing high energy electrons.
2. A flow of charges through a circuit is called an electric current.
3. The ability of a cell to produce an electric current is called voltage.
4. Resistance is the property of an object or substance that opposes the flow of electrical.

**Question 3**

|  |  |  |
| --- | --- | --- |
| **Electrical Quantity** | **Unit of measurement** | **Instrument of measurement** |
| Electric current | ampere | ammeter |
| Voltage | volt | voltmeter |
| Resistance | ohm | ohmmeter |

**Question 4**

1. Total Resistance = R1 + R2 + R3

 = 2+3+1

 = 6 ohms

 2. 2 amperes

3. V = IR

 = 2x3

 = 6 V

4. parallel

5. conducting wires, ammeters, voltmeter, resistors, cell, switch

Question 5 Refer to study guide

**Question 6**

1 R= V/I

 = 3/0.75

 = 4ohms

2. V= IR

 = 5x40

 = 200V

3. I=V/R

 = 220/50

 = 4.4amperes

**Question 7**

1. Reading on A1 is 2A. The sum of the current through each resistor is equal to the total

 current in the circuit.

2. **Type of material**

Different conducting materials have different resistance to an electric current.

**Thickness of the conductor**

 Thinner wires have greater resistance than thicker wires.

**Length of the conductor**

Longer wires have more resistance than shorter wires.

**Temperature of the conductor**

Generally hotter conductors (metals) have higher resistance than colder conductors.

3. • Cover electrical outlets with child-proof covers if they are within reach of small children.

 • Don't use appliances that have frayed or damaged power cords.

 • Always unplug an electrical appliance before attempting any repairs.

 • Don't insert anything into an electrical outlet except a proper plug for an electrical

 appliance.

 • Don't overload an electrical circuit, by trying to operate too many appliances at once

 from a single plug point.

 • Pull on the plug, not the wire when unplugging an appliance from a plug point.

 • Make sure that the 3 pin plug of all appliances have all three wires connected to it as a

 safety measure.

**Question 8**

1



 2. Circuit breakers trip a spring mechanism, which shuts off the flow of electricity through the circuit, when there is too much current.

 3. Coal is first crushed into a fine powder, which increases the surface area and allows

 it to burn more quickly.

 The powdered coal is placed into a boiler where it is burnt at a high

 temperature.

The heat energy produced converts water into steam.

The high pressure steam is then passed into a turbine containing thousands of propeller-like blades.

The steam pushes these blades causing the turbine to rotate at high speed.

A shaft connects the steam turbine to the generator so when the turbine spins, so does the generator.

The generator uses an electromagnetic field to convert this mechanical energy into electrical energy.

4. Cost= power rating x time x unit price

 = 3kW x 24hr x 80c

 = 576c

 =R5,76

**Question 9**

1. wind, solar energy, water, nuclear energy

2. The National grid is made up of

* power stations
* overhead cables
* pylons
* transformers

**Question 10**

a. Cost = power rating x time x unit price

 = 1kW(1000W/1000) x 1hr x R1,50

 = R1,50

b. Cost = power rating x time x unit price

 = (3x 60W/1000) x 6hr x R1,50

 = R1.62

c. Cost = power rating x time x unit price

 = (1500W/1000) x 0,75hr x R1,50

 = R1,69