**Using materials cont……………………………………………**

**PHYSICAL PROPERTIES OF MATERIALS AND THEIR USES**

**Copy and complete the table below on materials, their physical properties and uses**

|  |  |  |
| --- | --- | --- |
| MATERIALS | PHYSICAL PROPERTIES | APPLICATIONS/USES |
| Wood | * Hard * Poor absorbency * Elastic * High tensile   strength/strong | * Furniture * Building construction * Boat construction |
| Paper | * Good absorbency * Opaque * Lightweight * Flexible * Biodegradable | * Filter papers * Printing and writing * Packaging material * Toilet paper and napkins |
| Plastic | * Flexible * Water proof * High tensile strength * Flexible | * Packaging materials * Rain coats * Building construction |
| Cotton | * Absorbs moisture * Soft * Elastic * Flexible | * Textiles e.g t-shirts, underwear, socks, dresses and shirts * Medical dressing * Diapers and sanitary towels |
| Polyester | * Water proof * Strong * Easy to dye * Chemical resistant * Wrinkle resistant | * Making tents * Textiles e.g shirts, trousers, skirts and sportswear * Ropes * Seat belts |
| Wool | * Soft and smooth * Elastic * Absorbs moisture * Durable * Resistant to wear and tear | * Textile e.g sweaters, suits, trousers, skirts and dress |
| Silk | * Strong * Absorbs moisture * Elastic * Soft * Lightweight | * Textiles e.g dresses, blouses, scarves, ties and lingerie |
| Nylon | * High tensile strength * Water proof * High tensile strength/strong * Chemical resistant | * Ropes * Curtains * Fishing nets |
| Polythene | * Flexible * High tensile strength/strong * Water resistant * Lightweight | * Packaging materials * Used in construction |
| Sisal | * Absorbs moisture * High tensile strength * Lightweight * Biodegradable * Not elastic * Strong * Durable | * Making ropes * Making handicraft such as baskets, hats and other decorative items |
| Rubber | * Elastic * Soft * Durable * Water proof | * Car tyres * Condoms * Gloves * Rubber bands |
| Glass | * Brittle * Water proof * Fire proof * Chemical resistant | * Making window and door shutters |
| polytetrafluoroethene | * Low tensile strength * High melting point * High tensile strength/strong * Durable | * Maing frying pan handles |

**THE MOLECULAR STRUCTURE OF MATERIALS AND THEIR USES**

The molecular structure of materials plays a crucial role in determining their properties and uses.

|  |  |  |
| --- | --- | --- |
| Material | Structure | Applications/uses |
| Metals | Have crystalline structure where atoms are arranged in regular, repeating pattern. | Construction  Electrical wiring  Packaging  Jewelries |
| Polymers | Are long chains of repeating molecular units called monomers | Packaging  Clothing  Automotive parts  Medical devices |
| Ceramics | Have a crystalline structure but with ionic and covalent bonds. | Pottery  Tiles  Bricks  Biomedical implants  Aerospace components |
| Glass | Has amorphous structure with no long-range order, making it transparent and brittle | Windows  Bottles  Fiber optics  Laboratory equipments |
| Composites | Made from two or different materials combined together. | Construction  Sports equipments  Aerospace components  Automotive components |

**BUILDING MATERIALS**

Are any materials used for construction purposes.

**Examples of building materials**

These include; wood, metals (iron, aluminium), bricks, cement, stones, concrete, clay.

The choice of building materials is based on their cost effective for building project.

Building material are generally categorized into two;

* Natural materials
* Synthetic/artificial materials

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Material | Category | Reason | | Properties | Applications/uses |
| Burned bricks | Synthetic | Man-made | | * Fir resistant * Hard * Durable * Strong | * Constructing walls |
| Glass | Synthetic | Man-made | | * Strong * Fire resistant * High melting point * Strong * Transparent | * Window and door shutters |
| Iron bars | Synthetic | Man-made | | * high melting point * strong * malleable * ductile * good thermal conductivity * good electrical conductivity | * Window and door shutters * Door and window frames * Constructing bridges |
| Aluminium sheets | Synthetic | Man-made | | * high melting point * strong * malleable * ductile * good heat conductivity * good electrical conductivity * Bright appearance * Durable * Corrosion resistant | * Used for roofing |
| Concrete blocks | Synthetic | Man-made | | * Hard * High tensile strength * High compressive strength * Fire resistant * durable | * Constructing walls |
| Wood | Natural | God-made, exist in nature, its formation is not influenced by man | | * Hard * Durable * High tensile strength/strong * Lightweight when dry * Renewable * Chemical resistant * Absorbs sound/sound proof | * Door and window shutters * Door and window frames |
| Plastics | Synthetic | Man-made | * Water proof * Chemical resistant * Flexible * Poor electrical and thermal conductivity * Durable * Lightweight | | * Plumbing pipes * Thermal insulation in walls * Window and door frames * Waterproofing basements, foundation |
| Grass | Natural | God-made; hence exists in nature | * Easily catches fire * Easily attacked by termites * Absorbs heat * Absorbs water * Lightweight when dry | | * Used for roofing |

**Side effect of the material on the environment and their mitigation**

Burned bricks

* Leads to deforestation. **Mitigation** by planting trees that grow faster

Glass

* Can cut if improperly disposed. **Mitigation** by recycling

Iron bars

* Deletes soil fertility. **Mitigation** by recycling

Aluminium sheets

* Depletes soil fertility. **Mitigation** by recycling

Concrete blocks

* Generates waste materials. **Mitigation** By recycling

Wood

* Easily attacked by termites. **Mitigating** by oiling

Plastics

* Can cause air pollution when burned. **Mitigation** by recycling

Grass

* Process of obtaining grass contributes to habitat loss. **Mitigation** by use of other alternative resources e.g polythene

**Natural and synthetic processes of making polymers**

**Poly**: many

**Mer**: parts/units

A polymer is a long chain of small units/parts.

The small units/parts are called monomers

Polymers are categorized as;

Natural polymers

Synthetic polymers

|  |  |  |
| --- | --- | --- |
| **Polymer** | **Category; Reason** | **Applications/uses** |
| Polythene | Synthetic; man-made | Packaging |
| Polyvinyl chloride (PVC) | Synthetic; man-made | Plumbing pipes |
| Starch | Natural; God-made, hence exists in nature | Energy giving |
| Rubber | Natural; God-made, hence exists in nature | Car tyres |
| Proteins | Natural; God-made, hence exists in nature | Body building |
| Silk | Natural; God-made, hence exists in nature | Night clothes |
| Wool | Natural; God-made, hence exists in nature | Sweater, clothes |
| Polyester | Synthetic; man-made | Clothes |
| Polytetrafluoroethene | Synthetic; man-made | Pan handles |
| Polystyrene | Synthetic; man-made | Food packaging materials |
| Cotton | Natural; God-made, hence exists in nature | Clothes, pajamas |

**Common materials that can pollute the environment and which materials can be recycled**