**Electrical appliances**

* Electrical/mechanical devices use or generate electricity and transform it into another form of energy
* They usually accomplish household functions, such as cooking, cleaning or entertainment
* Basic types:
  + Electrothermal (ET)
  + Electromechanical (EM)
* Classification of home appliances
  + Major appliances = white / heavy appliances
    - ET
      * Cooker
        + A standard cooker can have 4 burners and up to 2 ovens
        + Types:

Gas – uses natural gas, propane, butane

Ceramic

Electric – an electric powered device

Induction – requires special material of cooking vessels – ferromagnetic metal such as cast iron or stainless steel

Cook stove – heated by burning wood, charcoal, animal dung

* + - * Fridge
        + It uses electricity to preserve food at a cold temperature (from 3 to 7 °C)
        + It consists of a thermal insulated compartment and a heat pump that transfers heat from its inside to its external environment
        + Heat pump:

Mechanical

Electronic

Chemical

* + - * + History

1930s – Not flammable synthetic refrigerant such as Freon-12 were introduced.

However R-12 damaged the ozone layer.

Since 1990 less harmful tetrafluoroethene (R-134) has been in common use.

Nowadays, the most common used coolant is R-600a, or isobutane.

* + - * + How it works:

Compressor – heart of the fridge (it circulates the refrigerant throughout the system and makes it hot)

Condenser – the refrigerant is cooled down inside and condenses here – it turns from a gas back into a liquid

Evaporator

Capillary

Thermostat

* + - * + Types of fridges:

Compressor fridge

The most common type

The most efficient

Give greatest cooling effect

They make a noticeable noise

Absorption fridge

May be used in caravans, trailers and places without electricity

Is powered by gas, kerosene or 12V batteries

Solar fridge

They do not use refrigerants

Use ammonian as the working gas and solar panels

American style fridge

Very spacious

Popular for its unusual features, e.g. ice maker, instaview, built-in camera, SodaStream

Magnetic fridge

They work on the magnetocaloric effect

* + - * + Special features

Auto-defrost, self-defrosting – it regularly defrosts the evaporator

Adjustable shelves and trays

Door locks and alarms

In-door ice maker, coffee maker

Smart fridges knows what kind of products are being stored inside and keep a track of the stock through barcode or RFID scanning

* + - * + Energy label – shows the energy efficiency scale A-G
        + Noise emission class
        + Total volume of a fridge/freezer in litres
      * Freezer
        + A refrigerated cabinet or room for preserving food at very low temperature
        + It is designed to hold food at -18°C for a long term storage
        + The majority of freezers are bottom freezers, having the freezer compartment below the refrigerator compartment
        + Basic types:

Upright freezer

Under-counter freezer

Chest freezer

Drawer freezer

* + - * + Special features:

Fast freeze function

No frost/frost free

Temperature alarm

Freezer defrost

* + - * + Rating system:

\* -6°C

\*\* - 12°C

\*\*\* -18°C

\*\*\*\* -18°C (with fast freezing function)

* + - * Oven
        + Electrothermal appliance based on the generation of heat by passing current through a conductor
        + Types:

Built-in oven

Free-standing

Steam oven

Light oven

* + - * + Gas ovens are more expensive to purchase than electrical ovens, but they cost less to run
        + Special features:

Dehydration options

Touch screens

Speed cooking

Wireless connection

Ventilation

* + - * Dishwasher
        + The first dishwasher woth electric motor was invented by Miele in 1929
        + Mechanical machine that cleans off dishes through spraying bursts of hot water (45°C – 75°C) and detergent at the dishes
        + How does it work:

Mix of water and detergent is pumped to one or more rotating spray arms.

Once the wash is finished, the water is drained, and the rinse cycle begins.

After the rinse cycle finishes and the water is drained, the dishes are dried.

* + - * + Advantages

More efficient than hand washing – it uses around six times less energy, water and detergent

Saves your energy – you may wait several days for it to be full before running it

* + - * + Disadvantages

You cannot wash certain items in a dishwasher (made of wood, aluminium, children’s dishes with design, fine china dishware)

* + - * + Special features

Anti-flood protection

Fan or auto-open

Adjustable plate racks

Height-adjustable baskets

Cutlery tray

Child lock

Sensor-assisted wash cycles – adjust the wash duration to the number of dirty dishes

* + - * + Types of dishwashers:

Built-in

Double

Portable

Countertop

* + - * + Energy label – water and energy rating, the new labe shows the energy consumption in kWh/100 washing cycles
      * Water heater
      * Heating appliances
    - EM
      * Washing machine
        + An electrical appliance used to wash laundry
        + Early Miele washing machine with a mangle (probably 1930)
        + How does it work:

There are 2 drums, one inside the other

Bigger drum holds the water while the inner drum (in a front loader) or the agitator (in a toploader) rotates

Operation of washing machine is split into 3 cycles:

Wash cycle – here clothes are washed in water with detergent

Rinse cycle – here dirt which is separated from clothes is drained

Dry cycle – here clothes are made to be dried

* + - * + Types:

Top-loading

Have shorter cycle times

Operate more quietly

Easy to add clothes

Use more water, energy, and washing detergent

Cost more to run

Front-loading

They usually use less energy, water and detergent

Their maximum spin speeds are higher – up to 2000 RPM (revolutions per minute)

More expensive and louder

* + - * + Special features

Delayed start

Predefined programmes for different laundry types

Variable temperatures, including cold wash

Time remaining indication

Rotation speed settings

Wi-Fi connectivity

Child lock

Steam washing

* + - * + Energy label – Washing performance and spin efficiency are graded in the range A – G, other information include noise level of spinnig cycle, maximum wash time and capacity
      * Grass mower
      * Vacuum cleaner
  + Small appliances
    - ET
      * Electrical kettle
      * Coffee maker
      * Deep fryer
      * Grill
      * Toaster
      * Curling iron
      * Hair straightener
      * Microwave oven
        + Used mainly for defrosting, cooking, heating or melting
        + Advantages:

Melting and defrosting process is easy

Heating is simpler, without burning

Cooking time is shorter

* + - * + Disadvantages

Not suitable for all food

Certain cookware can’t be used

* + - * + Inside the solid metal box, there is a microwave generator called a magnetron
        + Magnetron tube – converts high voltage energy into electromagnetic energy
        + Microwaves aren’t dangerous because she electromagnetic waves stop as soon you cut off the power and open the door, and they don’t remain in the food and make it radioactive
        + Microwave radiation is not dangerous to humans, but can sometimes cause interference to Wi-Fi and Bluetooth
    - EM
      * Blender
      * Food processor
      * Grinder
  + Consumer electronics
    - Devices for entertainment
      * TV
      * DVD player
      * Game console
      * Remote control cars
    - Devices for communication
      * Smartphone
      * Headphones
      * Laptop
      * Tablet
    - Devices for home-office activities
      * Desktop computer
      * Printers
      * Paper shredders
* Energy label
  + Provides information about the product’s energy consumption and other specific data (the product’s noise, emissions, or water consumption)
  + A new generation of labels was released on 1st March 2021
  + Changes:
    - The QR code
    - The rescaled energy efficiency class
    - The annual energy consumption