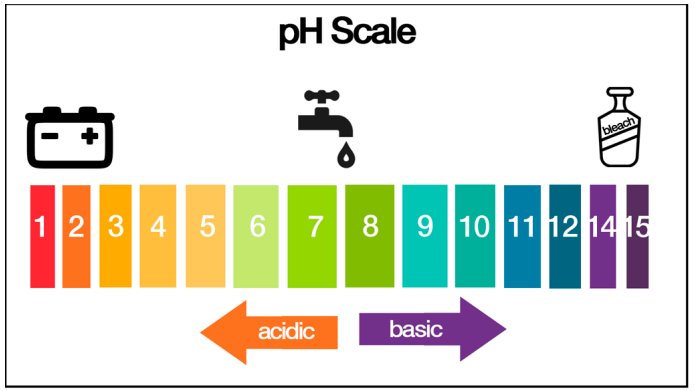
Food Preparation and Nutrition
GCSE AQA
Food Science

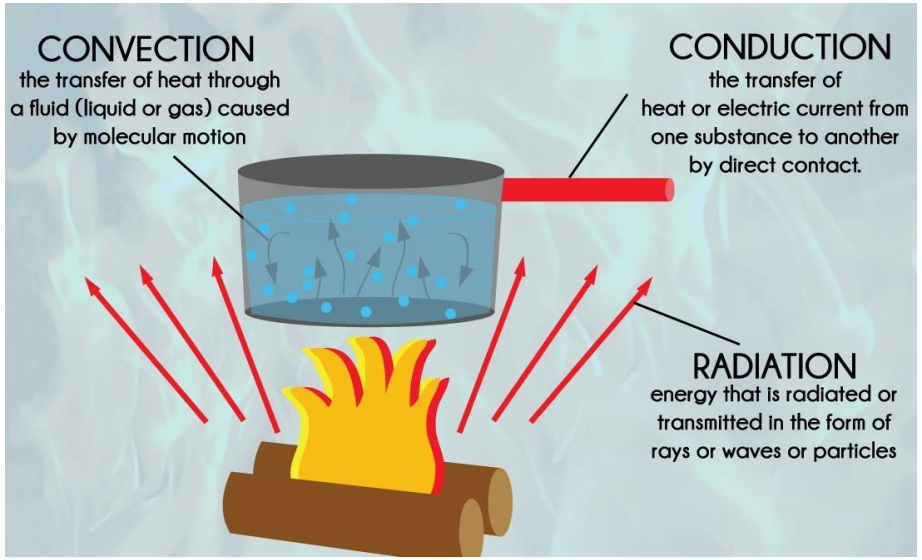
Fats
Some **solid** at room temperature, others, with less hydrogenation are **liquid**
Dissolve certain **flavour** compounds, **fat-soluble vitamins**, and colours that water cannot **dissolve**
Tenderise foods
Fat smokes at 191°C
Oils smoke at 232°C

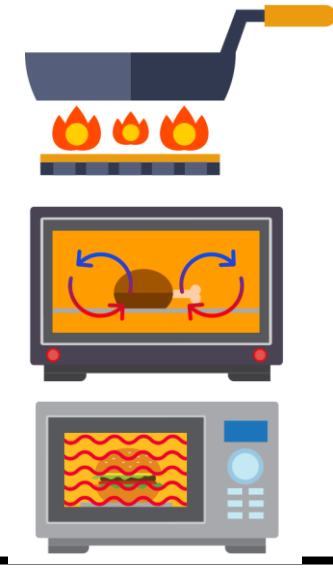
Proteins
Determine the **texture** of food
Proteins shaped like coils that react to certain items
Heat, salt, and acids make coils unwind, producing a **soft texture and loose bonds**
Tight bonds result in **coagulation**, forming a denser texture (like custard)
Kneading proteins produces **tight bonds (bread dough)**
Coagulation causes proteins to **loose water**

Carbohydrates: Starch
Breads, pasta, grains, starchy vegetables, fruits
Starch molecules soften in moisture
Absorb moisture and **swell**, causing liquids to **thicken**
Starch cells stick to one another and **trap moisture**
Carbohydrates: Sugar
Water molecules are **attracted** to **sugar** so the presence of significant **sugar** in a cake **will** help capture and hold on to liquid.
This results in a moister cake.
Leavening – When **sugar** is creamed with butter, the **sugar** crystals help drive air into the mixture



Acids and alkalis
pH range measures level of acid/alkali in food
pH scale is 1–14,
1 being the most acidic
7 is neutral (water)
1–6 acid
8–14 alkaline
Foods being close to either end are not usually considered potentially hazardous





Conduction
The transfer of heat from one object to another by direct contact.
Examples of how heat transfer via conduction works:
Touching a burner on a stove and being burned
Pancakes
Grilling steak, chicken breasts, or pork chops
Using ice water to blanch vegetables after steaming to keep them from losing their colour.

Convection
Examples of how heat transfer via convection works:
Water coming to a boil and circulating in the pot
Running cold water over frozen food, which transfers heat into the food to thaw it more quickly
Room temperature air moving around frozen food to thaw it.

Radiation
Radiation is the process where heat and light waves strike and penetrate your food through electromagnetic energy.
There is no direct contact between the heat source and the cooking food.

Infrared Radiation
Utilises an electric or ceramic heating element that gives off **electromagnetic energy waves.**
These **waves travel** in any direction at the **speed of light** to quickly heat food, and are mainly **absorbed** at the **surface** of whatever you're preparing.
Examples of things that create infrared radiation are:
Glowing coals in a fire
Toaster
Grills

Microwave Radiation
Utilises **short, high-frequency waves** that **penetrate** food, which a**gitates its water molecules** to create **friction** and **transfer heat.**
If you're heating a solid substance, this heat energy is transferred throughout the food through **conduction**, while liquids do so through **convection**.
Microwave heat transfer usually **cooks** food **faster** than infrared radiation, as it is able to penetrate foods **several inches** deep.
Keep in mind that microwave radiation works best when cooking **small batches** of food.