**Chapter 1: *Energy from food***

* Carbohydrates are broken down into glucose for energy - glucose released into the bloodstream - glucose reacts with oxygen in body cells AKA cellular respiration - carbon dioxide and water produced, removed by exhalation and perspiration/urine respectively
* Come glucose converted to glycogen as a short term energy reserve - stored in liver and muscles - converted back to glucose when the body needs it
* calorie: the amount of energy required to raise the temperature of 1g of water by 1⁰C (in joules)
* Common units to measure energy in food: kilocalorie, kilojoule
* Energy value of food changed when 1. method of cooking (eg deep-frying - more oil- absorb fats- increased energy value) 2. addition of other ingredients (eg add butter to potatoes- butter high in fats- energy value increases)
* Basal metabolism: the minimum amount of energy required to maintain vital functions while our body is at rest
* Thermic effect of food: energy required for digestion and absorption of nutrients from food
* The energy need of individuals depend on
* Age (larger body frame - higher energy need)
* Gender (males have more muscle mass- higher energy need)
* Size (taller and heavier- higher energy need)
* Level of activity (physically active vs sedentary)
* Occupation (desk-bound vs manual labor)
* Energy input: energy provided by the food we consume
* Energy output: the amount of energy used up by the body
* Energy balance: total energy input of food consumed = energy output
* Energy imbalance

1. Input>output

* Positive energy balance
* Weight gain
* Excess energy is stored as fats

1. Output>input

* Negative energy balance
* Weight loss
* The body breaks down fats/muscles for energy

Both increase risk of developing health problems

* Body mass index (BMI)
* Weight,kg / height x height (m)
* 18.5: at risk of osteoporosis
* 18.5-22.9: low risk of CHD, HBP, stroke
* 23.0-17.4: moderate risk of CHD, HBP, stroke
* >27.5: high risk of CHD, HBP, stroke
* Eating disorders

1. Anorexia nervosa

* Self-starvation
* Obsessive fear of gaining weight + take excessive measures to achieve a dangerously low body weight
* May over-exercise
* The body uses proteins from muscles as a source of energy
* Effects: cold, body weakness, hair loss, abdominal pain

1. Bulimia nervosa

* A cycle of binge eating followed by purging
* Indulge in large quantities of food (high energy) in a very short period of time
* Attempt to get rid of excess food through vomiting or over-exercising
* Effects: kidney problems, bad breath, body weakness, damaged gums

1. Binge eating disorder

* Excessive intake of energy and nutrients
* Periods of uncontrolled, impulsive, or continuous eating beyond the point of feeling comfortably full
* Factors: stress, depression

**Chapter 2: *Guidelines for meal planning***

* Balanced diet: body obtains all the essential nutrients in the correct proportions
* Malnutrition: insufficient or excessive intake of energy and nutrients in the diet
* Physiological factors
* Metabolic rate: a person with a higher metabolic rate requires more food than a person with a lower metabolic rate
* Gender: males have higher energy need
* Age : child<adult>elderly
* State of health: eg pregnant women need more iron and calcium
* Level of physical activity: active vs sedentary
* Economic factors
* Budget: care must be taken to obtain value for money
* When the demand for food is greater than the supply, its price goes up
* Choose cheaper alternatives of food with similar nutritional value: eg chicken vs beef, house brands vs well-known brands
* Psychological factors
* Consider the food preferences of people: likes & dislikes eg sashimi
* Influenced by cultural background & environment
* Social factors
* Special dietary restrictions because of religious or moral beliefs. Eg Muslims X pork, Hindus X beef
* Influenced by ethnic customs and traditions, parents, peers, social media
* ABCs of healthy eating

A: Aim to achieve and maintain healthy body weight (BMI)

B: Base diet on My Healthy Plate

C: Choose wisely for good health

* Eat a sufficient amount of grains (whole-grain food): vitamins, minerals, dietary fiber
* Eat more fruits and vegetables: vitamins, minerals, dietary fiber, antioxidants
* Choose and prepare food with less fats: saturated & trans fats can lead to chd and stroke | consume oily fish twice a week: omega-3 fatty acids
* Choose and prepare food with less salt and sauces: too much sodium increases the risk of HBP, chd, stroke
* Choose food and beverages with less sugar: too much sugar increases the risk of obesity, tooth decay
* Consume alcohol in moderation: excess alcohol increases the risk of developing HBP, stroke, liver disease
* Dietary guidelines birth to 18
* Aim for variety and balance
* Develop healthy habits eg eat healthily, perform 60mins of physical activity for at least 5 days a week
* Cut down on saturated fats: choose monounsaturated and polyunsaturated fats
* Eat enough fruits and vegetables: dietary fiber and antioxidants
* Go for whole-grain food: vitamins, minerals, dietary fiber
* Bone up on calcium
* Limit your salt intake: too much sodium increases the risk of developing HBP, CHD, stroke in adult life
* Watch the sugar: too much sugar leads to tooth decay and obesity
* Ways to modify meals
* Modify portion sizes of food: decrease portion size- reduce total energy intake
* Reduce or substitute ingredients: reduces the number of fats and cholesterol/ increases the amount of dietary fiber and minerals eg lean meat/ skinless chicken instead of ham and fatty meat
* Use healthier methods of cooking: grilling, boiling, steaming - use less oil. Deep fry- food absorbs a lot of fat
* Ways to choose food wisely
* Avoid appetizers that are breaded, fried, or filled with cheese
* Order broth-based soups instead of cream-based soups (minestrone>clam chowder)
* Grilled meat > fried meat
* Choose lean cuts of meat / white meat eg chicken and turkey breast
* Order dishes with vegetables or whole grain/salad with low-fat dressing
* Take less cream-based sauces (high salt content)
* Skip dessert or share a portion with friends
* Order fresh fruit for dessert instead of cakes

**Chapter 3: *Different types of nutritional needs***

* Young children

Naturally very active, require a lot of energy

Should consume food high in energy to support their rate of growth and development

* Serve meals in small portions, frequent and regular intervals + presented attractively to stimulate appetite
* Complex carbohydrates: provide energy for physical activities
* Proteins: helps in rapid growth and development
* Unsaturated fats: needed for proper absorption of vitamins A, D, E, K and the development of the brain and nervous system
* Milk: calcium, phosphorus, and vitamin D helps to form strong bones and teeth
* Fruits and vegetables: vitamins, minerals, and dietary fiber
* Drink water
* Limit fats and sugar: prevent childhood obesity
* Toasts and rusk: strengthen and develop jaw muscles
* School-going children

Highly energetic, need to consume food to support their energy needs and rapid growth

Fussy eaters: need guidance to choose their food wisely

* Serve a variety of food presented attractively to stimulate appetite
* Breakfast: complex carbohydrates and proteins, provides energy to start their day
* Proteins: needed for growth and development
* Milk: calcium, phosphorus, and vitamin D helps to form strong bones and teeth
* Fruits and vegetables: vitamins, minerals, and dietary fiber
* Water: keep them hydrated
* Limit saturated and trans fats: opt for low-fat products
* Limit sugars: too much sugar increase the risk of tooth decay and childhood obesity
* Teenagers

Have the freedom to make their own food choices, eating more often at fast food outlets

* 3 well-balanced meals every day
* Complex carbohydrates: provide energy for their active lifestyle
* Proteins: helps with the rapid growth of the body
* Calcium: bones grow longer and stronger
* Iron-rich food: Needed for the production of red blood cells (girls undergo menstruation)
* Healthier snacks: vitamins, minerals, dietary fiber eg fruits, nuts
* Water: 8-10 glasses daily
* Limit processed food: reduces the risk of developing HBP in adulthood
* Elderly

>65 years old

Less active, have a lower rate of metabolism

Sense of taste and smell become less sensitive- poor appetite

Loss of teeth: avoid hard or chewy food

* Serve meals in small portions, presented attractively to stimulate appetite
* Food low in energy but high in nutrients
* Proteins: help with repairing of worn-out body tissues and wound healing
* Calcium: maintain strong bones and teeth + prevent osteoporosis
* Fruits, vegetables, whole grain: dietary fiber- improves bowel movement + prevents constipation
* Food easy to chew and digest, free from bones to prevent choking + use healthier methods of cooking
* Limit sugar, salt, and fats: prevent obesity, hypertension, high cholesterol, type 2 diabetes mellitus
* Overweight people
* Food low in energy but high in nutrients + serve meals in smaller portions
* Healthier methods of cooking: reduces fat content and energy value
* Water: creates a feeling of fullness, which decreases appetite and prevents overeating
* Limit intake of sugar, salt, and fats: prevent CHD, HBP
* Underweight people
* Ensure regular meals are eaten at appropriate times
* Serve food high in energy + gradually increase portion sizes
* Iron and zinc: cell reproduction and tissue growth
* Juice, milk, and healthy snacks
* Vegetarians

1. Vegan/ strict vegetarian: do not eat any food of animal origin
2. Lacto-ovo: do not eat animal meat, eat animal products
3. Lacto: do not eat animal meat, eat animal products except eggs
4. Ovo: do not eat animal meat, eat eggs but do not eat other animal products

* A balanced meal with a variety of plant food
* HBV proteins: tofu/complementary proteins
* Calcium: tofu, soya milk
* B12 supplements
* Vitamin C: aids in the absorption of iron from dark green leafy vegetables
* Iodine: seaweed, iodized salt
* Pregnant & Lactating women
* Complex carbohydrates and proteins: Energy and protein requirements increase during pregnancy
* Food rich in proteins, minerals, and vitamins: Required to product milk + replace nutrients used in the production of milk
* Calcium: development of baby’s bones + foundation for baby’s teeth
* Iron: needed to form RBC for the developing baby
* Vitamin B9 (folate): prevents birth defects eg spina bifida, the incomplete development of the spinal cord
* Dietary fiber: prevents constipation
* Convalescents

People who are recovering from an illness, accident, or operation

Low levels of energy, poor digestion, lack of appetite

* Proteins: help in the repair and production of new cells
* Calcium: repair fractured or broken bones
* Iron: replenish blood lost during bleeding
* Food easy to eat and digest
* Water and liquids
* Serve small amounts of food + avoid oily food: they have poor appetites and are inactive
* Serve a wide variety of food presented attractively to stimulate appetite
* Ensure sufficient fluid intake: replace the loss of water in the body
* Athletes
* Complex carbohydrates: provide the energy required for endurance competition

\*Carbohydrate loading: consumption of high-carbohydrate meals for several days before a competition

* Proteins: repair and maintain muscle tissues
* Calcium: maintain strong bones
* Iron: forms haemoglobin for the transport of oxygen in RBC
* B-group vitamins: helps to convert carbohydrates, proteins, and fats into energy
* Fluids: replenish fluids lost through heavy perspiration
* Food allergy: our body’s immune system reacts with an ingredient within a food, an allergen stimulates the reaction.
* Food intolerance: when people react badly to a certain food.

1. Lactose intolerance

* Cannot digest lactose due to lack of enzyme lactase in the digestive system

1. Coeliac disease

* Sensitivity to the protein gluten

**Chapter 4: *Carbohydrates***

Carbon, Hydrogen, Oxygen

* Functions

1. Provides a source of energy

* Carbo- glucose- glycogen: a short term energy reserve in the body, stored in the liver and muscles

1. Aids the digestion of food (NSP)

* Aids the digestion of food + the elimination of waste materials from the body

Simple carbohydrates

* Monosaccharides

The simplest form of sugar molecules

Dissolve in water to form sweet, colorless solutions

* Glucose
* Fructose
* Galactose
* Disaccharides

Made of 2 monosaccharides joined together

White crystalline solids, sweet and soluble in water

* Lactose: Glucose + Galactose
* Maltose: Glucose + Glucose
* Sucrose: Glucose + Fructose

Complex carbohydrates

* Polysaccharides

Made up of many monosaccharides linked together

1. Glycogen

* Short-term energy reserve
* Excess glycogen not used- converted to body fats

1. Starch

* Photosynthesis: plants store their excess glucose by converting it to starch
* Made of many glucose molecules linked together

1. Cellulose

* Strong structural material that provides support to plants
* Made of many glucose molecules linked together
* Does not dissolve in water, cannot be digested
* Aids digestion: makes it easier to remove waste materials from the body

1. Pectin

* Found in citrus fruits, apples, and plums
* Helps lower blood cholesterol and blood sugar levels
* Used as a setting agent for jams
* RDA: 5-7 servings, 2-3 of which are whole grains

Benefits of whole grains

* More nutrients: B-group vitamins, vitamin E, iron, magnesium
* Dietary fiber: healthy bowel function
* Lower glycemic index (GI) value: high GI value- causes blood sugar to rise- a similar surge in insulin- causes a sharp fall in blood sugar level- triggers hunger and overeating
* Ways to reduce the intake of simple carbohydrates in the diet
* Choose water or milk over sweetened drinks
* Use sugar substitutes instead of sugar
* Use spreads and jams sparingly
* Choose food labeled with ‘unsweetened’ or ‘low in sugar;
* Effects of insufficient carbohydrate intake
* The body uses energy reserves- lose weight due to loss of body fats and muscles- leads to undernutrition
* Effects of excessive carbohydrate intake

1. Weight gain
2. Tooth decay and gum diseases

* Bacteria in the mouth react with sugar on the teeth- forms plaque- infects gums- produces acid- corrodes teeth

1. Diabetes mellitus

* Insulin: a hormone produced by the body which stimulates the conversion of glucose into energy
* Type 1: Body unable to produce insulin due to medical reasons- insulin has to be injected into the body
* Type 2: Body unable to respond to insulin being produced by the body- glucose remains longer in the bloodstream instead of being used for energy by body cells

**Chapter 5: *Cereals***

* Composed of:
* Endosperm: food reserve of the grain, 82% total weight. Contains LBV proteins, starch, B-group vitamins, soluble dietary fiber
* Bran: outer coat of the grain, 15% total weight. Contains insoluble dietary fiber, LBV proteins, essential fatty acids, iron, B-group vitamins
* Germ: embryo, 3% total weight. Contains essential fatty acids, LBV proteins, B-group vitamins, vitamin E, iron, potassium, zinc, calcium
* Effects of cereal processing
* Miling: removal of bran and germ- extends shelf life as presence of fats in bran and germ causes cereal to turn rancid easily
* Refined food: bran and germ removed
* Whole-grain food: bran and germ intact, do not lose much nutrients but turn rancid easily
* Choosing cereals
* Check expiry date
* Ensure that there are no weevils or worms present
* No powdery residue: a sign that it has been kept for too long
* Avoid buying whole-grain food in large quantities: turn rancid easily
* Cooking cereals
* Baking: heat from the oven causes gluten to coagulate: forms the structure of the baked product. Starch granules gelatinize- moist texture
* Boiling: Starch granules absorb water and gelatinize

**Chapter 6: *Fats***

Carbon, Oxygen, Hydrogen

* Functions

1. Provide warmth: fats under the skin acts as an insulator to keep our body warm- prevents excessive heat loss
2. Protect internal organs: surrounds and cushions organs- protects against shock and damage
3. Solvent for fat-soluble vitamins: vitamins A, D, E, K s=absorbed and stored in fat tissues temporarily, used when needed
4. Source of energy: Provide twice the amount of energy as compared to carbohydrates. When the supply of carbohydrates are insufficient, fats are used to provide energy

* Types of fats

1. Saturated

* Made of saturated fatty acids
* Carbon atoms linked to the maximum possible number of hydrogen atoms: only contain single bonds
* Chemically least reactive
* Eg palmitic acid, stearic acid

1. Unsaturated

* Made of unsaturated fatty acids
* Carbon atoms in the hydrocarbon chain can take in more hydrogen atoms
* Chemically more reactive: turn rancid more easily
* Monounsaturated: can take in 1 more pair of hydrogen atom, one double bond eg oleic acid
* Polyunsaturated: can take in two or more pairs of hydrogen atoms, two or more double bonds eg omega-3 fatty acids

1. Trans-fats: saturated fatty acids formed through hydrogenation

\*Hydrogenation: process in which unsaturated fatty acids react with hydrogen to form saturated fatty acids

* Visible fats: fats on meat, butter, oils
* Invisible fats: hidden fats that are constituents of food, eg cakes, nuts, fried food
* RDA: 55-65g per day
* Ways to reduce fat intake at home
* Use less oil for cooking, avoid re-using oils more than twice and choose oils high in unsaturated fats
* Adopt healthier cooking methods
* Replace coconut milk with low-fat milk
* Use fat spreads sparingly
* Choose low-fat or fat-free options for dairy products, select lean meat, and skinless poultry
* Consume fish at least twice a week
* Replace meat with beans and tofu on some days
* Refrigerate soups and remove fat when it solidifies
* Ways to reduce fat intake when eating out
* Choose dishes prepared without coconut cream
* Replace fried noodles with soup noodles
* Limit deep-fried food <2 times a week
* Consume high-fat baked products less often
* Remove visible fat and skin from the meat
* Request for less oil and gravy when ordering
* Eat less fast food
* Effects of insufficient fat intake
* Weight loss
* Cause disruptions to normal body function eg absorbing fat-soluble vitamins, maintain body temperature, healthy functions of cells in brain and heart
* Deprived of essential fatty acids (only obtained from food)
* Effects of excessive fat intake
* Obesity: BMI>27.5, ⅓ of body weight are body fats.- increased risk of CHD, HBP, type 2 diabetes mellitus
* CHD: the flow of blood in arteries is blocked by the build-up of plaque (fatty deposits made of LDL cholesterol)- can damage arteries and cause blood clots. Blocked arteries- reduced supply of blood and oxygen to heart muscles- during exertion, the heart is unable to meet the increased demand for oxygen- experience severe chest pain AKA enigma
* Heart attack: if arteries are fully blocked
* Stroke: blood vessels in the brain are blocked or ruptured- disrupts the supply of blood and oxygen to brain cells. Can cause permanent brain damage + lose physical abilities
* Hypertension (HBP): >140/90mmHG. Caused by narrowing of coronary arteries and high salt intake- heart forced to work hard, kidneys overloaded with having to remove excess salt from the body.

**Chapter 7: *Proteins***

Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur, Phosphorus

* Functions

1. Growth, repair, and maintenance of body cells: body cells need to be replaced at regular intervals
2. Acts as energy reserve: excess energy from protein converted to fats
3. Formation of enzymes: forms enzymes that speed up chemical reactions in the body
4. Maintain a healthy immune system: needed to make antibodies which detect and ‘fight’ harmful substances- protects the body from illnesses and infections

* Essential amino acids: body cannot produce, must be obtained from food. Eg lysine, phenylalanine
* Non-essential amino acids: the body can produce. Eg glutamine, proline
* HBV proteins: proteins which provide our body with all the essential amino acids in the right proportions
* LBV proteins: proteins which lack one or more essential amino acid
* Complementary proteins: 2 incomplete plant foods, when eaten together, each supplements the essential amino acid lacking in the other. Eg peanut butter + bread, rice + dhal curry
* RDS: 0.8g protein per 1kg body weight
* Effects of insufficient protein intake
* Internal organs become weak, wounds cannot heal properly
* Weakened immune system: cannot produce enough antibodies
* Lack of essential amino acids: body breaks down proteins from muscle tissues to obtain amino acids
* Skin becomes full and dry
* Protein-energy malnutrition (PEM)

1. Kwashiorkor: children 18m-24m, insufficient protein due to arrival of a new baby- a child is no longer given breast milk- diet replaced with food rich in starch

Symptoms: thinning of hair, patchy skin, bloated stomach, and edema (swelling of face and limbs due to water retention)

1. Marasmus: children 6m-18m, severe lack of energy and proteins in the diet- slowly starved to death.

Symptoms: loss of muscle mass, anaemia, weakened heart muscles

* Effects of excessive protein intake
* Excess protein is broken down by the liver into carbon-containing (converted to body fats) and nitrogen-containing (converted to urea and excreted as urine) amino acids.
* Most protein food from animal sources- high in saturated fats and cholesterol- increased risk of CHD, HBP, obesity

**Chapter 8: *Meat and alternatives***

* Meat: edible flesh of domesticated animals
* Structure
* Muscles: bundles of thread-like fibres made of proteins myosin and actin- bound together by connective tissues made of collagen and elastin

Collagen: insoluble in water, can be converted to soluble gelatine when heated with water

Elastin: tough, insoluble in water, can be broken down using mechanical methods during food preparation.

* Marbling fats: fats within muscles of meat
* Nutritional content
* Saturated fats
* HBV proteins
* Vitamins B1, B2, B3, B6, B9
* Iron, zinc, copper, phosphorus, sulfur
* Factors affecting tenderness
* Cut of meat: more exercised parts are tougher
* Breed of the animal: eg Angus cattle contains more marbling fats
* Age of animal: young animal- less connective tissues- more tender
* Diet: grain-fed animals have more tender and better-flavored meat than hay and grass-fed
* Different cuts of beef
* Pot roast: braising, stewing, boiling
* Back ribs: grilling, roasting
* T-bone steak: grilling, roasting
* Sirloin steak: grilling, pan-frying
* Rump roast: braising, roasting, stewing
* Flank: braising, boiling, stewing
* Ground beef: boiling, steaming, baking
* Brisket: braising, boiling, stewing
* Choosing meat
* Colour: beef- red, mutton- dull red, pork- pink, veal- pinkish beige
* Smell fresh, not unpleasant
* Springy to the touch
* Grains should be fine and even
* Not many bones or visible fat
* Colour of fat: beef- creamy, mutton- white, pork- white + smooth + oily, veal- pinkish
* Preparing meat for cooking
* Slicing: slice meat against the grain to shorten muscle fibres
* Mechanical method: pound meat with a meat pounder to break down muscle fibres
* Marinate with acid: acidic ingredients help to break down muscle fibres and impart flavors into the meat
* Use tenderizers: help break down proteins eg papain in unripe papaya. Avoid using for too long- connective tissues break down too much- mushy texture
* Using meat in cooking
* Dry heat: proteins in meat coagulate- meat shrinks- loss of water causes meat extractives to become concentrated. Fat melts- meat becomes darker brown color- brown crust formed

\*Extractives: substances which give meat its special flavor

* Moist heat: collagen converted to soluble gelatine- meat becomes tender. Water-soluble nutrients and meat extractives dissolve into cooking liquid- meat tastes bland but the cooking liquid is tasty.
* Poultry: Birds which are reared for their meat
* Nutritional content
* HBV proteins
* Saturated fats (under the skin and around organs)
* Vitamins B1, B2, B3, B6 B9
* Iron, magnesium, potassium, phosphorus, zinc
* Water & cholesterol (liver, kidney)
* Choosing poultry
* Flesh: creamy pink color, firm, no bluish or greenish tinge to indicate that the bird was bruised
* Breast meat should be plump and springy
* Smell fresh and not unpleasant
* Using poultry in cooking
* Young birds: dry-heat methods as they are tender with little fats
* Old birds (>10 months): moist heat methods as they have tough meat
* Offal: internal organs of an animal
* Nutritional content:
* HBV proteins
* Iron
* Vitamin A
* Seafood: any edible aquatic animal or plant
* Fish
* White fish: little or no fat, fats found in the liver. Eg pomfret, catfish, cod
* Oily fish: more than 5% of fats, darker-colored flesh. Eg mackerel, salmon, tuna
* Shellfish: invertebrates with no backbone
* Molluscs: small, soft-bodied aquatic animals with no legs. Eg abalone, cockles, clams, squids
* Crustaceans: aquatic animals with legs and segmented bodies, covered with external skeletons. Eg prawns, crabs, lobsters
* Structure of seafood
* Fish: less connective tissue, collagen breaks down more easily- tender and easy to digest. Has short muscle fibres arranged in layers
* Shellfish: tougher and more chewy- less digestible
* Nutritional content of fish
* HBV proteins
* Polyunsaturated fats eg omega-3 fatty acids
* Vitamins B1, B2, B6
* Sodium, chlorine, iodine, potassium, calcium
* Water and cholesterol

\*Water makes up 80% of white fish and 67% of oily fish

* Nutritional content of shellfish
* HBV proteins
* Polyunsaturated fats
* Iron, iodine, calcium
* Water and cholesterol
* Choosing fish
* No unpleasant smell
* Flesh: firm and moist
* Gills: bright red
* Eyes: full and not sunken
* Scales: many and intact
* Choosing shellfish
* Prawn’s head should be firmly attached to the body, not black
* Molluscs should be bought fresh and alive: no broken shells
* Preparing fish: remove scales by scraping from tail to head, slit open belly and remove internal organs- wrap entrails in an old newspaper before throwing them away, wash fish in a basin half-filled with water, rub inside of fish with salt to remove the smell.
* Preparing shellfish: scrub clean hard outer shells and soak in clean, salted water- allows live molluscs to get rid of any mud or sand when they open their shells.
* Cooking seafood
* Oily fish: grilling, baking, pan-fry
* White fish: deep-fry
* Dry-heat: proteins in fish coagulate- shrink- extractives deposit on surface of the fish- adds flavor
* Moist-heat: water-soluble nutrients and extractives dissolve into cooking liquid- fish becomes less tasty
* Should not be cooked for too long- seafood becomes tough and chewy
* Eggs: oval, thin-shelled reproductive products which come from birds
* Parts of an egg
* Eggshell: hard and porous shell made of calcium carbonate- protects the contents of the egg. Tiny holes allow the egg to ‘breathe’
* Egg white: colorless and sticky liquid, 87% water and 10% proteins which foam well due to ability to trap air
* Egg yolk: a source of nourishment for the chick, contains cholesterol
* Chalazae: 2 rope-like structures which anchor the egg yolk in the middle of the egg white
* Shell membrane: helps enclose the air space (separates at the large end of the egg)
* Air space: enlarges over time as air passes into it- bacteria may enter- eggs go bad
* Nutritional content of an egg
* HBV proteins: egg white, ovalbumin | egg yolk, lipovitellin
* Saturated fats in the form of an emulsion in egg yolk
* Vitamins A, D, E, K, B1, B2, B3
* Iron, magnesium, phosphorus, sodium, sulphur
* Water and cholesterol
* Choosing eggs
* Feels heavy: no moisture from air space has evaporated
* Eggshell feels rough: the presence of tiny holes
* No visible cracks
* Effects of heat on eggs
* Protein coagulates- clumps and solidifies. Egg white changes from transparent to opaque, yolk becomes dry and powdery.

Yolk: coagulates at 60 degrees celsius

White: coagulates at 70 degrees celsius

* Using eggs in cooking
* Raising agent: egg whites trap air eg meringues, sponge cakes
* Setting agent
* Emulsifier: lecithin present in egg yolk
* Bind ingredients together eg meat patties
* Coat food for frying
* Glaze
* Increase the nutritional value of food eg egg drop soup
* Garnish eg mee siam
* Main dish eg omelettes

Dairy products

* Types of milk processing:
* Homogenized: fat globules in milk rise to the surface and form a layer of fat, milk homogenized to break up the layer of fat and disperse them throughout the milk
* Pasteurized: homogenized milk heated to 72 degrees for 15 seconds, then cooled rapidly (AKA HTST)- kills harmful bacteria, must be kept refrigerated at all times
* Sterilized: Homogenised milk packed in bottles, then heated at 115 degrees for 15-20mins- alters the taste, color, and nutritional value. Can be stored for 9 months without refrigeration- once opened, should be refrigerated
* UHT milk: Homogenised milk heated to 132 degrees for 1 minute, can be stored for 10 months without refrigeration- once opened, should be refrigerated
* Nutritional content of milk
* HBV proteins eg caseinogen
* Saturated fats: in the form of tiny droplets dispersed throughout the milk- contribute to the creamy flavor
* Simple carbohydrates: in the form of lactose
* Vitamins A, D, B1, B2: in fat and watery parts of milk respectively. B1 and B2 are easily destroyed by heat and exposure to sunlight
* Calcium, phosphorus, sodium, potassium, magnesium
* Water and cholesterol
* Uses of milk
* Added to beverages for flavor eg coffee
* Added to cake mixtures for moisture
* Used to make desserts eg ice cream
* Used as the main ingredient eg creamy soups
* Actions of heat on milk: when milk is boiled, the proteins in it coagulate, forming a layer of film/scum on the surface- hot air gets trapped under the layer- causes milk to overflow
* Cheese: a solid food made from curdled milk
* Rennet (enzyme from cow’s stomach) and lactic acid (converted from lactose by bacteria) coagulate milk proteins- forms a solid mass AKA curd. Curd separated from liquid whey- pressed into molds- left to mature to become cheese
* Different types of cheese
* Very hard (30-32% moisture) eg parmesan
* Hard (37-40% moisture) eg cheddar
* Semi-hard (40-50% moisture) eg edam
* Soft (50-75% moisture) eg cream cheese, cottage cheese
* Nutritional content of cheese
* HBV proteins
* Saturated fats
* Vitamins A, D
* Calcium, phosphorus, sodium, potassium, magnesium
* Water and cholesterol
* No lactose: lactose converted to lactic acid
* No B-group vitamins: lost in liquid whey
* Cheese in cooking
* Heating cheese for too long: proteins over-coagulate, becomes tough and stringy.
* How to improve the digestibility of cheese:
* Fats separate from cheese- makes food oily
* Grate and chop cheese into smaller pieces- cooks faster
* Cook cheese with starchy food so melted fats are absorbed by starch granules in the food
* Add cheese last during cooking to prevent cheese from being tough and stringy
* How to use cheese:
* Make dishes for Lacto-vegetarians eg baked rice
* Make snacks like cheese straws
* Make desserts like cheesecakes
* Spreads eg cheese spread
* Add flavor eg toppings for pizza
* Yogurt: AKA cultured milk, made by adding bacteria into milk to ferment it.
* Lactose converted to lactic acid: lactose-free
* Nutritional content of yogurt
* HBV proteins
* Saturated fats
* Vitamins A, D
* Calcium, phosphorus
* Water and cholesterol
* Butter: a yellowish food product made by churning fresh milk or cream
* Nutritional content of butter:
* Saturated fats (81%)
* Vitamins A, D, E
* Calcium, sodium, potassium, phosphorus
* Water and cholesterol
* Uses of butter
* Melted and used for frying food
* Used as a spread on toasts
* Used as an ingredient for cakes, pastries
* Cream: dairy product obtained by removing the layer of fat that floats on the surface of unhomogenized milk
* Nutritional content
* Saturated fats
* Sodium, calcium, phosphorus
* Vitamins A, D
* Types of cream
* Single: 18% fat- eg poured over puddings, used to thicken sauces
* Whipped: 35% fat- used as toppings eg for tarts
* Double: 48% fat- used for making rich desserts like pudding
* Legumes: pods of leguminous plants eg long beans, snow beans
* Pulses: edible dried seeds within pods of leguminous plants eg peanuts, soybeans
* Nutritional content of legumes and pulses
* LBV proteins except for soya beans
* Polyunsaturated fats
* Complex carbohydrates
* Vitamins B1, B2, C, A, K
* Calcium, magnesium, phosphorus, zinc, iron
* Dietary fibre: in the outer skin of legumes and pulses
* How to choose pulses
* Not too many cracked or shriveled pulses- shows that they have been kept for too long
* Avoid pulses with powdery residue
* No weevils present
* How to use legumes and pulses in cooking
* Soak dry pulses in water for 5-8 hours- absorb water to be soft enough to cook
* Cook thoroughly to destroy toxic substances
* Soya bean products
* Soya beancurd (豆干)
* Soya bean milk
* Tempeh: fermentation process changed proteins to amino acids- easy to digest
* TVP- meat extender made from defatted soya bean flour, source of HBV proteins

**Chapter 9: *Digestion***

Common last topic

**Chapter 10: *Vitamins***

Fat-soluble vitamins

* Vitamin A (retinol)
* Needed to form visual purple, a pigment in the retina of the eye which allows us to see in dim light
* Needed for healthy skin
* Acts as antioxidant
* Provide resistance to infections
* Needed for normal growth and development of body
* Found in liver, fish oils, mangos, tomatoes, milk
* Deficiency: night blindness, dry and rough skin, poor growth in children
* Toxicity: fatigue, painful joints, hair loss, skin disorder
* Vitamin D (cholecalciferol)
* Helps the body to absorb calcium and phosphorus- forms strong bones and teeth
* Our skin absorbs UV rays from the sun and converts it to vitamin D
* Found in oily fish, milk, cheese, liver
* Deficiency: weak bones and teeth, osteomalacia (softening and weakening of bones in adults), rickets (bowed legs and stunted growth in children)
* Toxicity: Hypercalcemia (hardening of arteries and organs) due to increased calcium in the blood
* Vitamin E (tocopherol)
* Acts as an antioxidant: protects our body from free-radicals (substances produced by undesirable chemical reactions in the body which can cause cancer)
* Helps maintain healthy nerves and muscles
* Found in liver, egg yolk, vegetable oil, nuts
* Deficiency: Haemolysis, the rupture of RBC, anaemia
* Toxicity: decreased absorption of vitamin K
* Vitamin K (naphthoquinone)
* Needed for normal blood clotting
* Found in liver, dark green leafy vegetables, vegetable oils
* Produced by bacteria in the large intestine
* Deficiency: excessive bleeding of wounds as blood cannot clot properly
* Toxicity is rare

Water-soluble vitamins

* Vitamin B1 (thiamin)
* Helps break down food into energy
* Needed for normal functioning of nerves
* Found in soybeans, mushrooms, meat, cereals
* Deficiency: Beriberi, limbs become weak, the heart enlarges and swelling of leg occurs
* No toxicity
* Vitamin B2 (riboflavin)
* Release of energy from food
* Needed for normal growth and development of the body
* Found in dairy products, meat, spinach, soya beans
* Deficiency: ariboflavinosis- dry scaly lips, nerve disorder, inflammation of the tongue
* Vitamin B3 (niacin)
* Release of energy from fats and carbohydrates
* Found in potatoes, whole grain food, meat, liver
* Deficiency: pellagra- scaly sores, diarrhoea, loss of energy
* Toxicity: glucose intolerance, liver damage, blurred vision
* Vitamin B6 (pyridoxine)
* Produce and break down amino acids- support growth and maintenance of body cells and tissues
* Found in whole grain food, meat, fish, watermelon, banana
* Deficiency: anaemia, numbness, dermatitis
* Toxicity: skin lesions, nerve damage
* Vitamin B9 (folate/ folic acid)
* Release of energy from amino acids
* Helps manufacture new cells and genetic materials (DNA)
* Works with iron and B12 to form RBC
* Found in dark green leafy vegetables, milk, liver, cereals
* Deficiency: anaemia, spina bifida (incomplete closure in the spinal column) in babies
* No toxicity
* Vitamin B12 (cobalamin)
* Helps in the production of RBC
* Maintains enzyme system
* Normal functioning of nerves
* Found in cheese, milk, meat, fish
* Deficiency: pernicious anaemia- leads to degeneration of nerves, paralysis
* No toxicity
* Vitamin C (ascorbic acid)
* Forms proteins like collagen which gives structure to bones, muscles, and blood vessels
* Maintains healthy skin, heals cuts and wounds, prevents infections
* Helps to absorb iron from dark green leafy vegetables
* Acts as an antioxidant
* Found in citrus fruits, guava, cauliflower, spinach
* Deficiency: scurvy (dry and scaly skin, bleeding gums, painful joints), poor wound healing
* Toxicity: diarrhoea, abdominal cramps, kidney stones

**Chapter 11: *Minerals***

Major minerals (>100mg per day)

* Calcium
* Works with phosphorus and vitamin D to form strong bones and teeth
* Needed for normal blood clotting
* Needed for normal functioning of nerves and muscles
* Found in dairy products, tofu, fish with edible bones, watercress
* Deficiency: osteoporosis, the thinning of bone tissues and loss of bone density over time
* Toxicity: formation of kidney stones + prevents absorption of other minerals
* Potassium
* Works with sodium to regulate the movement of fluids and minerals in and out of body cells
* Essential for muscle development and nerve functioning
* Found in bananas, watermelon, whole-grain foods, meat
* Deficiency: muscle weakness, fatigue, loss of appetite
* Toxicity: (at risk: people with kidney problems)- unable to excrete excess potassium, High levels of potassium in the body leads to a heart attack
* Phosphorus
* Works with calcium and vitamin D to maintain strong bones and teeth
* Needed to convert fats and carbohydrates into energy
* Helps to maintain fluid balance in the body
* Found in eggs, milk, cheese, fish
* Deficiency: bone loss, stunted growth, poor dental health
* Toxicity: (at risk: people with kidney diseases/ people who take vitamin D supplements)- causes spasms and convulsions
* Sodium chloride
* Chloride: needed for the production of hydrochloric acid in the stomach
* Sodium: needed to control nerves and muscles
* Both: needed for the regulation of fluid in the body
* Found in salted eggs, table salt, soy sauce, meat
* Deficiency: painful muscle cramps, diarrhoea, vomiting
* Toxicity: bloating and swelling of body tissues due to water retention, hypertension

Trace minerals (<100mg per day)

* Iron
* Essential for the formation of haemoglobin (oxygen-carrying proteins in RBC) and myoglobin (oxygen-carrying proteins in the muscle cells)
* Needed for cellular respiration: the breakdown of carbohydrates to release energy in cells
* Found in liver, red meat, dark green vegetables, cereals
* Deficiency: anaemia (insufficient oxygen transported around the body), heavy and continuous bleeding, immune system deficiency
* Toxicity: diarrhoea, dizziness, damage to heart and kidneys
* Iodine
* Essential for the production of thyroxine, a hormone which controls the rate of metabolism in the body
* Promotes general growth and development of the body
* Found in seaweed, seafood, iodized salt
* Deficiency: Goitre (swelling of the thyroid gland), weight gain, lethargy
* Toxicity: Goitre as the production of thyroid hormones are blocked, acne-like lesions on the skin

**Chapter 12: *Water and dietary fibre***

* Functions of water
* Regulation of body temperature: body temperature rises- sweat glands secrete sweat onto the surface of the skin- as sweat evaporates it produces a cooling effect- excess body heat removed through perspiration
* Medium for chemical reactions: chemicals are more reactive in aqueous solutions than in solids.
* Removal of waste materials: water-soluble waste products are excreted as urine + water adds bulk to solid waste materials and lubricates the colon- prevents constipation
* Transportation of nutrients: 85% of blood is made up of water- carry dissolved substances like oxygen to body cells and remove waste products like carbon dioxide
* Lubricate joints and organs: joints are protected by cartilage and synovial fluid- both composed mainly of water- helps to absorb shock and promote smooth joint actions. Water also moistens the food we eat and cleanses our eyes (tears)
* How to increase the daily intake of water
* Start the day with a glass of water
* Include a glass of water, juice, soups, or milk every meal
* Consume fruits and vegetables
* Carry a bottle of water outdoors
* RDA: 1.5-2 liters or 5-8 glasses
* Factors affecting water intake
* State of health-

1. Ill people lose more water- need to drink more water to replace the loss
2. Pregnant women- water needed to form amniotic fluid which surrounds and protects the baby in the womb
3. Lactating women- lose water through breastfeeding

* Diet

1. Excessive intake of diuretics (a substance that increases the rate of urination in the body) results in an excessive loss of water from the body- an increased intake of water needed to replace the water lost through frequent urination. Eg coke, coffee, tea
2. Diet high in dietary fiber results in high absorption of water from the colon- reduces lubrication on the walls of the large intestine + slows down the movement of waste materials- increased intake of water needed to prevent constipation

* Environment

1. Hot and humid climate- perspire more easily- need to drink more water to replace water lost through perspiration
2. Cold and dry environment- lose more water- increased intake of water needed to prevent dehydration

* Level of activity: people who are more active and engage in strenuous exercise perspire more- require more water than those who are sedentary
* How does water intake affect health
* Dehydration: body experiences an excessive loss of water

Symptoms: concentrated urine, dryness of mouth, nausea, confusion

* At risk: the elderly (weakened senses make them feel less thirsty than they actually are) and elderly (unable to tell that they are thirsty)
* Dehydration results in constipation
* Water intoxication: too much water- kidneys unable to work fast enough to get rid of excess water- blood becomes diluted
* Dietary fibre (NSP)- materials not digested by our body
* Types of dietary fibre
* Insoluble: absorb water and add bulk to waste materials. Eg cellulose
* Soluble: dissolve in water and swell to form a gel-like material. Eg pectin
* Sources of dietary fiber
* Insoluble: stems and skins of vegetables and fruits, whole-grain cereals, nuts, and seeds. Eg carrots, broccoli, long beans, wholemeal bread, peanuts
* Soluble: fruits and vegetables eg lemon, orange, apples, plums, potatoes, oats
* Functions of insoluble dietary fiber
* Maintains a healthy digestive system: insoluble fiber absorbs and retains water- makes waste materials soft and bulky. Stretching of walls of the colon by bulky waste materials stimulates their muscular activity- prevents constipation, makes it easier for waste materials to be excreted, and reduces the risk of developing intestinal diseases.
* Functions of soluble dietary fiber
* Lowers blood cholesterol level: prevents dietary cholesterol from being absorbed into the bloodstream.
* Regulates blood glucose level: slows down the rate at which glucose is released into the bloodstream
* Provides high satiety value: ability to absorb water and expand- slows down the movement of food in the digestive tract- gives a feeling of satiety + prevents us from over-eating
* How to increase intake of dietary fiber
* Eat a serving of fruit after a meal
* Include a serving of vegetables in every meal
* Replace white rice with brown rice
* Choose whole-grain bread and breakfast cereals instead of white/refined ones
* Use wholemeal flour instead of plain white flour
* Snack on high-fiber food eg nuts, seeds, dried fruits
* Eat fruits with their skins on
* Include beans and legumes into dishes
* Insufficient dietary fiber intake
* Constipation: a condition in which a person has difficulty removing waste materials from his or her body. Dietary fiber absorbs water- without water, waste materials become hard and dry- makes defecation difficult.
* Diverticulosis: development of small blown-out pouches known as diverticula, which grows from within the walls of the colon- occurs when muscular walls of the large intestine are strained due to the force needed to push waste materials along the colon. Diverticula get inflamed- causes great discomfort
* Colorectal cancer: development of cancerous cells in the colon/ rectal area of the large intestine- constipation: cancer-causing substances have more time to come into contact with walls of the intestines
* Haemorrhoids: part of the anus becomes swollen due to the strain exerted during defecation
* Effects of excessive dietary fiber intake
* Limits absorption of certain nutrients in the body: extra bulky waste materials in the intestines- difficult for the digestive enzymes to come into contact with the food
* Nutrient deficiencies: high-fiber food makes stomachs feel full- limits consumption of other foods containing important sources of nutrients
* Constipation: high-fiber diet needs an increased amount of water- lack of water causes waste materials to become hard and difficult to get rid of

**Chapter 13: *Fruits and vegetables***

* Types of fruit
* Citrus: acidic and tangy eg orange, lemon
* Tropical: cultivated in warm countries eg pineapple, banana, mango
* Melon: have a tough rind and flesh high in water content eg watermelon, honeydew
* Pome: have a central core where many seeds are found eg apple, pear
* Dried fruit: have their water content reduced to less than 30% eg raisin, prunes
* Berry: small and fleshy with many seeds eg blueberry, raspberry
* Drupe: have a fleshy part surrounding the pit eg plum, apricot, cherry
* Nutritional value of food
* Carbohydrates: glucose, fructose, sucrose
* Fats: monounsaturated eg olives, avocados, durians
* Vitamin A: in the form of beta-carotene, converted to vitamin A by the body. Eg peaches, cherries, plums
* Vitamin C: eg orange, lemon, grapefruit. When fruits are processed into jams, the amount of vitamin C in them is reduced due to the heat treatment during processing
* Minerals: potassium, phosphorus, magnesium, copper, zinc. Dried fruits contain iron
* Dietary fiber and water: from cellulose and pectin in skin, seeds, and cell walls. Eg guavas
* Others: berries contain vitamin E, K, and B-group
* Choosing fruit
* Bright and vibrant color
* Firm
* No visible damages caused by damage
* Free of punctures, bruises, and decay
* No wrinkles: indicate loss of moisture
* How are fruits used in cooking
* Eaten raw
* As a puree to make desserts or jams
* As a garnish
* Salads
* Effects of heat on fruit
* Heat softens cellulose and hemicellulose- the protein in acidic fruit dissolves in warm acidic conditions- softens tissues.
* Heat inactivates enzymes- prevents it from turning brown
* Causes a loss in B-group and C vitamins
* Cooked fruit is softer and duller looking
* Vegetables: plants or parts of a plant which are edible
* Types of vegetables
* Stems: the part of a plant which holds up the plant structure eg celery, asparagus
* Tubers: swollen, edible fleshy stems that grow underground eg potato, tapioca
* Leaves: the part of the plant which uses sunlight and carbon dioxide to carry out photosynthesis to produce food for the plant eg cabbage, kale
* Roots: starchy vegetables which are anchored to the ground eg carrot, radish
* Bulbs: short, fleshy underground stems above the roots which store food for the leaves eg onion, garlic
* Flowers: the flowering part of the plant which is edible eg broccoli, cauliflower
* Fruits: the part of the plant developed from the flower but is usually not sweet eg tomato, chili, brinjal
* Nutritional value of vegetables
* Carbohydrates: glucose, starch, fructose
* Vitamins A, C
* B-group vitamins in leaves, stems, bulbs, and fruits
* Vitamin E: leaves and flowers
* Vitamin K: green leafy vegetables
* Minerals: calcium, phosphorus, potassium, magnesium, sulphur, iron
* Dietary fiber and water
* How to choose vegetables
* Strong and rich color
* The firm, smooth, and free of blemishes/ bruises
* Leafy vegetables should be firm, crisp, and free of worm-eaten holes
* Root vegetables should be firm without blemishes and look clean with no signs of sprouting
* Buy vegetables in season: best quality + freshest
* How to use vegetables in cooking
* During cooking: cellulose in vegetables are softened- vegetables shrink
* Moist heat: starch granules in vegetables swell and gelatinize

To prevent unnecessary loss of vitamins and nutrients:

* Ensure vegetables are fresh when buying
* Do not soak vegetables in water: prevents loss of water-soluble vitamins
* Rinse leafy vegetables gently: prevent bruising of leaves- leads to oxidation- loss of vitamin C
* Keep leaves of vegetables intact- break leaves just before cooking
* Peel vegetables thinly: vitamins and minerals are found just below the skin. If the skin does not need to be removed, it should be scrubbed clean
* Prepare vegetables just before cooking to prevent the destruction of vitamins by oxidation
* Boil vegetables in a small amount of cooking water: cooking liquid should be consumed or used for other dishes- avoid loss of water-soluble nutrients
* Cook vegetables for a short time: prolonged cooking can destroy heat-sensitive vitamins such as B-group and C vitamins
* Salads should be served immediately: prevent loss of vitamin C

**Chapter 14: *Heat transfer and methods of cooking***

* Reasons for cooking food
* Make food safe for consumption: cooking kills microorganisms present in raw food + destroys toxins eg raw meat, raw beans
* Makes food easier to chew, swallow and digest: cooking softens food and reduces the bulk of green leafy vegetables- fiber softened during cooking eg rice grains
* Improves flavor and appearance of food: flavors of meat are developed through cookie + eg flour on its own is dull and unappetizing, but when combined with other ingredients and made into cakes and pastries, the result is tasty
* Adds variety to the diet: each cooking method uses different ingredients and seasonings- the same food looks and tastes different
* Makes food last longer: enzymes and microorganisms destroyed during the cooking process eg raw vs sterilized milk
* How heat is transferred during cooking:
* Conduction: heat travels from heat source to the food by direct contact- heat causes molecules in the cooking utensil to vibrate and collide with each other- produces heat- transferred to food in direct contact with the utensil
* Convection: heat transferred by the movement of liquid or gas- as the fluid heats up, hotter portion rises and cooler portion sinks- forms convection currents
* Radiation: does not need a medium- heat energy travels to one point to another by infrared rays- cannot be seen but can be felt as heat- heat absorbed by food when they fall on the food
* Dry-heat cooking
* Baking: method of cooking food in an enclosed space. Pre-heating allows food to cook immediately when it is placed in the oven, uses radiation and convection eg carrots, potatoes, cakes, bread
* Grilling: method of cooking food using a heated grill or a bed of hot glowing charcoals, uses radiation and convection. Food should be brushed with oil- prevent charring; turned frequently- prevent loss of juices + cook evenly; control temperature- avoid burning outside eg sausage, bacon, mushroom, tomato
* Roasting: the method of cooking food in a rotating spit or on a baking tray, uses radiation and convection eg rotisserie (food cooked with an electronic heat source), requires basting (moistening meat with oil) so food will not be dry and hard. Eg carrots, turkey, chicken, potato
* Moist-heat cooking
* Boiling: cooking food in boiling water at 100 degrees celsius, uses convection- the leftover liquid should be used as soup- water-soluble nutrients lost in the liquid. Eg rice, pasta, eggs, potatoes
* Steaming: cooking food using steam from boiling water at 100 degrees celsius, little loss of nutrients. Eg seafood, eggs, vegetables, puddings

Steaming in a pressure cooker: more efficient- pressure builds up- the boiling temperature of liquid increases- allows food to be cooked quickly at high temperature eg dry beans, tough cuts of meat

* Simmering: cooking food just below 100 degrees celsius- small bubbles rise to the surface and break gently, uses convection eg fruit, leafy vegetables
* Stewing: slower than simmering, uses conduction and convection- used to soften tough cuts of meat, hard fruits, beans, and lentils
* Braising: uses less liquid, food cooked for hours, uses convection and conduction eg large cuts of meat, poultry, carrots, potatoes
* Hot-fat cooking
* Dry-frying: cooking food in its own oil without added oil- food heated- fat melts and runs out- food cooked in its own fat. Uses conduction eg bacon, peanuts
* Stir-frying: food moved around by stirring. Method of cooking small pieces of food quickly in a small amount of oil at high heat
* Sauteing: food is tossed. Method of cooking small pieces of food quickly in a small amount of oil at high heat eg prawns, mushrooms, vegetables
* Deep-frying: cooking food by immersing it completely in hot oil (180-205 degrees celsius), uses convection. The coating prevents food from falling apart, prevents loss of flavor, juices, and nutrients, the food absorbs a lot of oil during cooking. Eg doughnuts, fritters
* Shallow-frying: cooking food by partially submerging it in hot oil covering the base of a frying pan, uses conduction and convection. Food has to be turned over to ensure both sides are cooked. Eg cutlets, eggs, fish
* Others
* Microwave: cooking food using microwaves (EM waves). Invisible microwaves penetrate into food- water molecules vibrate and collide with each other- causes friction- produces heat- food cooked by heat generated by water molecules. (5-7.5cm) does not destroy many nutrients + prevents the rapid growth of bacteria. Yam or potatoes need to be pierced- prevent food from exploding due to buildup of pressure. Unable to brown the surface of the food. No metal- reflects microwaves
* Thermal-cooking: cooking food slowly for a long time, does not require an external heat source. Food placed in an inner pot- heated on the stove for a short time- transferred to an insulated outer pot- sealed tightly with a cover which prevents heat loss-allows food to cook slowly + unsupervised
* Slow-cooking: requires heat supply from an electric source to cook the food

**Chapter 15: *The science behind food preparation and cooking***

* Reactions caused by heat
* Caramelization: the heating of sugar at high temperature to produce a concentrated, light brown syrup with a nutty flavor and sweet aroma AKA caramel- desirable brown color
* Gelatinization: involves the heating of starch in liquid- starch granules absorb the liquid, swell and burst- releases starch into surrounding liquid- liquid thickens. Gelatinized food- easy to digest
* Gelation: a gelatinized substance turns into a gel when cooled.

\*Gel: a semi-rigid substance made up of liquid molecules trapped within a long and thin network of carbohydrate molecules

* Dextrinization: starch molecules are broken down by dry heat, acid or enzymes- become dextrins, brown substances with a toasted flavor and pleasant aroma
* Maillard browning: reaction involving cooking food with protein and sugars in dry heat at high temperature. Protein denature and react with sugars- forms brown substances which give pleasant flavor and aroma to food
* Denaturation: structure of protein molecule is disrupted- bonds break- molecule becomes looser and less compact. Is irreversible. Denatured food is more digestible
* Coagulation: proteins change from liquid to a solid-state due to heat, acid, or pressure. AKA the clumping of denatured protein molecules
* The melting point of fat: the temperature at which solid fat melts to become a liquid- depends on fatty acid used
* The smoking point of fat: the temperature at which smoke is produced by the continuous heating of fat- fat breaks down into glycerol and free fatty acids- forms unpleasant-smelling smoke
* Reactions caused by agitation
* Foaming: the process of incorporating air bubbles in food such as an egg white by vigorously beating it to create foam. Protein molecules denature + coagulate- traps air within protein molecules- produces foam. Is reversible

\*Foam: a dispersion of gas in a liquid

* Emulsion: formed by mixing 2 immiscible liquids together through vigorous shaking, usually unstable as they will separate into distinct layers if the emulsion is left to stand.

1. Oil-in-water: made up of tiny droplets of oil distributed throughout the water phase. Eg mayonnaise, milk
2. Water-in-oil: made up of tiny droplets of water distributed throughout the oil phase. Eg butter, margarine

* Reactions caused by oxygen
* Enzymatic browning: the reaction between enzymes in food and oxygen- results in a brown discoloration on the exposed surface of the food. Enzymes in internal tissues react with oxygen in the air. Eg bananas, apples
* Rancidity: when fats, in the presence of oxygen, are chemically broken down into glycerol and free fatty acids- causes the formation of undesirable flavors and odors. Eg butter, nuts, potato chips, cakes
* Key ingredients in cakes
* Sugar: 1.adds sweetness + causes the surface of cakes to turn brown due to caramelization and Maillard browning- gives cakes a pleasant aroma. 2.makes cakes moist and tender: sugar fights with gluten for water, resulting in less gluten formed. 3.enables cakes to last longer
* Fats: 1.needed to aerate the mixture to give volume and lightness to the cake. 2.gives cakes a melt-in-the-mouth effect-makes cakes tender. 3.enables cakes to last longer
* Wheat flour: contains proteins glutenin and gliadin- forms gluten when mixed with water. Low protein flour gives cakes a fine and even texture

\*Gluten: an elastic substance which coagulates during baking, thus giving structure to baked products

* Eggs: 1.trap air during mixing to help increase the volume of the cake. 2.egg proteins coagulate with gluten to form the structure of the cake. 3.egg yolk contains lecithin (an emulsifier) which binds liquids and fats together- produces a fine texture. 4.adds color and flavor- contributes to appearance and taste.
* Liquid: 1.binds ingredients together to form a smooth mixture. 2.needed to form gluten + gelatinize starch granules. 3.liquid changes to steam while baking which allows the cake to rise
* Raising agents

1. Chemical leaveners: produce carbon dioxide when they react with liquids present eg baking soda, baking powder
2. Air, steam from water, carbon dioxide

* Methods of cake making:
* Rubbing in: fat is rubbed and distributed evenly into a flour mixture. Should be rubbed quickly with fingertips to prevent fat from melting. Eg rock bun
* Whisking: no fat used. Sugar and egg whites are whisked to incorporate air- white and fluffy mixture. Flour is then sifted and folded in gently to prevent knocking out air. Eg swiss roll, sponge cake
* Creaming: fat and sugar are beaten together to dissolve sugar and incorporate air- light and creamy mixture. Eg marble cake, banana cake
* One-stage: all ingredients are added at once. Air incorporated during mixing and by the action of chemical leaveners
* Changes that occur to cakes during baking
* Heat causes air in batter to increase in volume and expand- gluten stretches- cake rises- gluten and egg proteins coagulate upon reaching a certain temperature- forms structure. Starch granules gelatinize- fat melts and is absorbed by gelatinized starch granules- moist and tender cake.
* Maillard browning and caramelization
* Common faults in cakes
* Cake with sunken fruit: insufficient drying of fruit, adding too much liquid, removing the cake from oven before it is fully baked
* Cracked cake: oven temperature too high, using a cake tin that is too small, cake placed on a high shelf in the oven
* Sunken cake: too much liquid, sugar, raising agents, oven temperature too low, opening oven door too early, removing the cake from oven before it is fully baked
* Methods of biscuit making
* Rubbing in eg cheese biscuit
* Creaming eg chocolate biscuits
* Whisking eg sponge fingers

Biscuits do not require a raising agent or too much liquid so that it can have a dry and crisp texture

* Common faults in biscuits
* Hard and dry biscuits: adding too much flour, oven temperature too high, baking for too long
* Irregular shapes and sizes: too much air in the mixture, not mixing ingredients properly, adding too much liquid.
* Key ingredients in pastries
* Salt: adds flavor + strengthens gluten formed
* Wheat flour (usually plain flour): gluten in flour coagulates during baking- structure. Starch granules gelatinize + absorb melted fat- gives the pastry a short and flaky texture. Dextrinization occurs- golden brown color
* Raising agent: air incorporated by sifting flour, lifting hands above the bowl when rubbing fat into flour, folding and rolling pastry dough
* Water: bings ingredients together + allows coagulation of gluten and gelatinization of starch. Coldwater is used to prevent fat from melting
* Lemon juice: optional, added to make gluten more elastic + helps in the formation of thin layers
* Fats: give a moist texture and rich flavor

1. Butter: better flavor and shortness
2. Margarine: gives color and flavor, but makes pastry hard
3. Lard: gives short texture to pastry but makes pastry less flavourful

* Types of pastry
* Rough puff: a multi-layered flaky pastry eg croissants and chicken pie. The proportion of fat to flour = ⅔ - ¾. The dough turns: thin layers created by alternating layers of dough and fat, involves a series of folding, rolling, and rotating of dough.
* Shortcrust: multi-purpose pastry that has a crumbly and short texture. The proportion of fat to flour = ½. eg fruit tartlets, quiches
* Changes which occur to pastries during baking
* Heat causes air in pastry to increase in volume and expand- gluten stretches and coagulates- forms structure.
* Starch granules gelatinise + absorb melted fat
* If the oven temperature is too low: melted fat runs out before starch granules can gelatinize- makes pastry heavy and greasy.
* Common faults in pastries
* Uneven rising: uneven distribution of fat, not following correct steps when making dough, not relaxing dough sufficiently
* Shrunken pastry: handling the dough too much, not relaxing dough sufficiently
* Tough and hard: adding too much liquid, handling the dough too much, oven temperature too low, using too much flour when rolling out the dough, not relaxing dough sufficiently
* Key ingredients in batters
* Flour, egg, liquid, salt, butter
* Air: incorporated by beating the mixture until smooth
* Batters should be used as soon as possible: prevent air bubbles from bursting
* Reasons for using batters
* Coat and prevent food from breaking eg fish
* Prevent the loss of nutrients due to the intense heat of frying food eg banana fritter
* To make sweet and savory food eg pancakes, crepes
* Types of batters
* Thin: eg pancakes
* Thick: used for coating
* Changes that occur to batters during cooking
* Thin: heat causes proteins to coagulate- forms structure. Starch granules gelatinise- makes the texture of batter soft- air and liquid change to steam and escapes- the cooked batter is soft and airy.
* Thick: trapped air and steam cause the batter to rise during heating. Maillard browning occurs due to the reaction of starch with proteins
* Reasons for using sauces
* Improve flavor eg pasta, steamed vegetables
* Add color and improve appearance eg tofu, fish
* To counteract the richness of food such as mint sauce with roasted lamb
* Types of sauces
* Roux: made from equal quantities of cooked flour and fat. Fat is melted before the flour is mixed in- stirred constantly to prevent burning. Light roux used for bechamel sauce, dark roux used for brown sauces
* Blended: thickened with starch eg corn starch. The liquid is heated before starch is stirred into it

**Chapter 16: *Sensory evaluation***

* Why is a sensory evaluation conducted
* To develop new food products
* To improve on existing food products by modifying and changing ingredients
* To monitor quality control so that standard specifications of food are met
* To compare food products that are similar to competitor brands
* Criteria: appearance, flavor, taste, smell, sound
* Types of sensory tests
* Preference test: used to obtain information about people’s likes and dislikes of a product

1. Ranking test: testers are required to rank samples of similar food products according to which sample they like the most
2. Rating test: similar food products are evaluated based on their degree of like or dislike

* Discriminative: used for objective comparison of specific sensory characteristics of different products

1. Ranking test: esters are required to evaluate samples of similar food products based on a particular characteristic
2. Rating test: similar food products are evaluated based on their common characteristics (multiple)

* Triangle test: conducted to find out if there is a detectable difference between two similar food products: Testers are required to identify which food sample is different and describe the differences detected
* Ways to present results
* Table
* Pie chart
* Graph
* Star diagram
* How a sensory evaluation is conducted

1. Decide on the type of sensory test to use
2. Select testers

* Good mix of healthy males and females
* Between 20-50 people

1. Prepare response sheets

* Ensure instructions are clear + enough space for testers to write

1. Prepare food samples

* Same amount and size of each food sample
* Labeled with 3 digit codes
* Use identical serving utensils
* A glass of water provided to clear the palate

1. Ensure proper conditions for testing

* Test are should be quiet and free from distractions
* Testing should be done a few hours before or after lunch
* Testing booths should be provided to isolate testers and prevent any discussion
* Testers should be given an identical set of samples to test, a glass of water, and response sheets

1. Conduct the sensory test

* Give testers ample time to do the test
* No communication should be allowed- so as not to influence their choice

1. Collate and evaluate results
2. Decide on a plan of action

**Chapter 17: *Keeping food safe***

Common last topic

**Chapter 18: *Convenience food***

Common last topic

**Chapter 19: *Food preservation***

Common last topic

**Glossary**

* HBP: High blood pressure/hypertension
* CHD: Coronary heart disease
* HBV: High biological value
* RBC: Red blood cells
* NSP: Non-starch polysaccharides
* RDA: Recommended daily intake/ recommended dietary allowance
* LDL: Low-density lipoprotein
* LBV: Low biological value
* HTST: High-temperature short time
* UHT: Ultra-high temperature
* TVP: Textured vegetable protein
* DNA: Deoxyribonucleic acid
* EM: electromagnetic