



Physical Education Notes Unit 5

BY @THUNDERSTUDY

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TOPIC 1 — Food and Nutrition: Introduction

Nutrition is the science of how the body takes in, digests, absorbs, and uses food to maintain health, growth, and performance. **Food** is any substance consumed to provide nutritional support. For athletes, optimal nutrition is the foundation of peak performance, recovery, and injury prevention.

Classification of Nutrients:

Category	Nutrients Included	Primary Function
Macronutrients	Carbohydrates, Proteins, Fats	Provide energy and structural building blocks
Micronutrients	Vitamins, Minerals	Regulate body processes; needed in small amounts
Water	Water (H ₂ O)	Transport, temperature regulation, metabolic reactions
Roughage/Fibre	Dietary fibre (cellulose)	Aids digestion, prevents constipation, reduces cholesterol

TOPIC 2 — Macronutrients

A. Carbohydrates — The Primary Fuel

- **Definition:** Organic compounds of Carbon, Hydrogen, and Oxygen. Primary and preferred energy source for the body and brain.
- **Energy Value:** 4 kcal per gram.
- **Types:** Simple (sugars — glucose, fructose, sucrose) | Complex (starch, glycogen) | Dietary Fibre.
- **Role in Sport:** Stored as GLYCOGEN in muscles and liver. Depleted during exercise. Carbohydrate loading before endurance events maximises glycogen stores.
- **RDA for Athletes:** 5–10 g/kg body weight/day depending on training intensity.
- **Sources:** Rice, wheat, bread, pasta, potatoes, oats, fruits, vegetables, legumes.
- **Deficiency:** Fatigue, hypoglycaemia, muscle weakness, impaired brain function.
- **Excess:** Stored as fat, obesity, type 2 diabetes risk.

B. Proteins — The Building Blocks

- **Definition:** Complex molecules made of amino acids. Essential for growth, repair, and maintenance of body tissues.
- **Energy Value:** 4 kcal per gram (secondary energy source).
- **Types:** Complete proteins (all 9 essential amino acids — animal sources) | Incomplete (plant sources — missing some essential AAs).
- **Essential Amino Acids (9):** Leucine, Isoleucine, Valine, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan, Histidine. Cannot be synthesised by body — must come from diet.
- **Role in Sport:** Muscle repair after training (muscle protein synthesis), enzyme production, immune function, oxygen transport (haemoglobin is a protein).

- **RDA for Athletes:** Endurance: 1.2–1.4 g/kg/day | Strength/Power: 1.6–2.2 g/kg/day.
- **Sources:** Eggs, chicken, fish, milk, cheese, dal, soya, quinoa, nuts.
- **Deficiency:** Muscle wasting (sarcopenia), poor immunity, slow wound healing, oedema.

C. Fats (Lipids) — Concentrated Energy Store

- **Definition:** Organic compounds of fatty acids and glycerol. Most concentrated energy source.
- **Energy Value:** 9 kcal per gram — highest of all macronutrients.
- **Types:** Saturated (solid at room temp, animal sources — raise LDL) | Unsaturated (MUFA, PUFA — liquid at room temp, plant/fish sources — cardioprotective) | Trans fats (processed foods — most harmful).
- **Essential Fatty Acids:** Linoleic acid (Omega-6) and Alpha-linolenic acid (Omega-3) — must come from diet. Omega-3 is anti-inflammatory — critical for athletes.
- **Role in Sport:** Primary fuel for low-intensity prolonged exercise (>60% VO₂ max); fat-soluble vitamin (A,D,E,K) absorption; cell membrane structure; hormone production.
- **RDA:** 20–35% of total caloric intake. Athletes may need slightly higher unsaturated fat intake.
- **Sources:** Nuts, seeds, avocado, olive oil, fish (omega-3), ghee (saturated).
- **Deficiency:** Fat-soluble vitamin deficiency, hormonal imbalances, poor cell membrane function.

Macronutrient Quick Comparison

Nutrient	Energy (kcal/g)	Primary Role	Best Sports Sources	Deficiency Sign
Carbohydrates	4 kcal/g	Immediate energy, glycogen fuel	Rice, oats, fruits, bread	Fatigue, muscle weakness
Proteins	4 kcal/g	Muscle repair, enzymes, immunity	Eggs, dal, chicken, soya	Muscle wasting, poor immunity
Fats	9 kcal/g	Long-duration fuel, hormone production	Nuts, fish, olive oil, ghee	Hormonal imbalance, vitamin deficiency

TOPIC 3 — Micronutrients: Vitamins & Minerals

Micronutrients are required in **small quantities** but are **essential** for normal physiological functions. They do not provide energy directly but regulate all metabolic processes.

A. Vitamins

Vitamin	Type	Key Functions	Sources	Deficiency Disease
A (Retinol)	Fat-soluble	Vision, skin health, immunity, epithelial tissue	Carrots, milk, liver, egg yolk	Night blindness, Xerophthalmia
B1 (Thiamine)	Water-soluble	Carbohydrate metabolism, nerve function	Whole grains, legumes, nuts	Beriberi
B2 (Riboflavin)	Water-soluble	Energy metabolism, growth, red blood cells	Milk, eggs, leafy vegetables	Angular stomatitis, glossitis
B3 (Niacin)	Water-soluble	Energy production, DNA repair, skin	Meat, fish, peanuts, mushrooms	Pellagra (3Ds: Dermatitis, Diarrhoea, Dementia)
B6 (Pyridoxine)	Water-soluble	Protein metabolism, neurotransmitter synthesis	Banana, chicken, fish, potatoes	Anaemia, peripheral neuropathy
B9 (Folic Acid)	Water-soluble	DNA synthesis, red blood cell formation, foetal development	Green leafy vegetables, legumes, citrus	Megaloblastic anaemia, Neural tube defects
B12 (Cobalamin)	Water-soluble	Nerve function, DNA synthesis, RBC formation	Meat, fish, dairy, eggs	Pernicious anaemia, nerve damage
C (Ascorbic Acid)	Water-soluble	Collagen synthesis, antioxidant, iron absorption, immunity	Citrus fruits, guava, amla, peppers	Scurvy
D (Calciferol)	Fat-soluble	Calcium absorption, bone health, immune function	Sunlight, fish liver oil, fortified milk	Rickets (children), Osteomalacia (adults)
E (Tocopherol)	Fat-soluble	Antioxidant, cell membrane protection, immune support	Nuts, seeds, vegetable oils, avocado	Haemolytic anaemia, neuropathy
K (Phylloquinone)	Fat-soluble	Blood clotting (coagulation), bone metabolism	Green leafy veg, broccoli, fermented foods	Excessive bleeding, poor bone health

B. Minerals

Mineral	Key Functions	Sources	Deficiency
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Calcium (Ca)	Bone/teeth formation, muscle contraction, nerve impulse, blood clotting	Milk, cheese, ragi, sesame, broccoli	Osteoporosis, tetany, rickets
Iron (Fe)	Haemoglobin (O ₂ transport), myoglobin, enzyme function, energy production	Red meat, spinach, dal, jaggery, fortified cereals	Iron-deficiency anaemia, fatigue
Phosphorus (P)	Bone/teeth structure (hydroxyapatite), ATP energy production, cell membranes	Dairy, meat, eggs, nuts, whole grains	Bone pain, weakness, rickets
Magnesium (Mg)	300+ enzyme reactions, muscle/nerve function, blood sugar, protein synthesis	Nuts, seeds, dark chocolate, green leafy veg	Muscle cramps, fatigue, tremors
Potassium (K)	Fluid balance, nerve impulse, muscle contraction, heart rhythm	Banana, potato, orange juice, yogurt	Hypokalaemia — muscle cramps, weakness, arrhythmia
Sodium (Na)	Fluid balance, nerve/muscle function, blood pressure regulation	Table salt, processed foods, cheese	Hyponatraemia — confusion, muscle cramps, seizures
Zinc (Zn)	Immune function, wound healing, protein synthesis, taste/smell	Meat, shellfish, legumes, pumpkin seeds	Poor wound healing, immune deficiency, growth retardation
Iodine (I)	Thyroid hormone (thyroxine) synthesis, metabolic rate regulation	Iodised salt, seafood, dairy	Goitre, hypothyroidism, cretinism

- **Key for Athletes — Iron:** Female athletes especially prone to iron deficiency anaemia due to menstrual losses. Regular monitoring recommended.
- **Key for Athletes — Calcium + Vit D:** Critical for bone density. Stress fractures common in athletes with low calcium/Vit D.
- **Key for Athletes — Sodium + Potassium:** Lost in sweat during exercise. Electrolyte imbalance causes cramps and impaired performance.
- **Key for Athletes — Magnesium:** Lost in sweat; essential for muscle function and energy production (ATP synthesis).

TOPIC 4 — Balanced Diet

Balanced Diet: A diet that provides all essential nutrients in the right proportions to maintain health, support growth, and enable optimal physical performance. It includes all food groups in recommended amounts.

ICMR Recommended Daily Allowances (RDA) for Adults:

- **Carbohydrates:** 55–65% of total calories | Complex carbs preferred over simple sugars.
- **Proteins:** 10–15% of total calories | 0.8–1 g/kg/day for sedentary; 1.2–2.2 g/kg for athletes.
- **Fats:** 20–30% of total calories | Unsaturated fats preferred; limit saturated and trans fats.
- **Fibre:** 25–35 g/day | Prevents constipation, heart disease, diabetes.
- **Water:** 2–3 litres/day (more for athletes) | Essential for all metabolic reactions.
- **Vitamins & Minerals:** Vary by age, sex, and activity level — ensured through variety.

Food Groups (My Plate / Indian Diet Pyramid):

Food Group	Key Nutrients	Recommended Servings	Examples
Cereals/Grains	Carbohydrates, B vitamins, fibre	6–11 servings/day	Rice, wheat, oats, millets
Vegetables	Vitamins, minerals, fibre, antioxidants	3–5 servings/day	Spinach, carrots, broccoli
Fruits	Vitamins C/A, fibre, natural sugars	2–4 servings/day	Apple, banana, citrus, guava
Dairy/Alternatives	Calcium, protein, Vit D, B12	2–3 servings/day	Milk, curd, paneer, cheese
Protein Foods	Protein, iron, zinc, B vitamins	2–3 servings/day	Dal, eggs, chicken, fish, soya
Fats/Oils	Essential fatty acids, Vit A/D/E/K	Use sparingly	Olive oil, nuts, ghee, seeds
Water	Hydration, all metabolic functions	8–10 glasses/day	Water, coconut water, lassi

TOPIC 5 — Importance of Diet in Sports: Pre, During & Post Competition

PRE-COMPETITION DIET (3–4 hours before)

Goal: Maximise glycogen stores, ensure hydration, prevent gastrointestinal discomfort.

Composition: HIGH carbohydrates (60–70%) | MODERATE protein | LOW fat and fibre (to avoid GI distress).

Timing: Large meal 3–4 hours before; light snack 30–60 minutes before (easily digestible).

Carbohydrate Loading: 3–7 days before endurance events — gradually increase carb intake to maximise glycogen stores. Can increase glycogen by 20–40%.

Avoid: High fat foods, high fibre foods, unfamiliar foods, excessive protein close to event.

Pre-event snack examples: Banana, sports drink, rice with light dal, toast with jam.

Hydration: 400–600 ml of water/sports drink 2–3 hours before; 200–300 ml 15–30 minutes before.

DURING COMPETITION DIET

Goal: Maintain blood glucose levels, prevent dehydration, delay fatigue.

Duration < 60 min: Water is sufficient. No significant nutrition needed.

Duration 60–90 min: Sports drinks (6–8% carbohydrate solution) every 15–20 minutes.

Duration > 90 min: 30–60 g carbohydrates per hour (sports gels, drinks, bananas).

Electrolytes: Sodium and potassium crucial to replace sweat losses and prevent hyponatraemia.

Hydration Rate: 150–200 ml every 15–20 minutes. Weigh before/after — 1 kg loss = ~1 litre fluid deficit.

AVOID: Solid foods high in fat/protein during competition — slow gastric emptying, GI distress.

POST-COMPETITION DIET (Recovery Nutrition)

Goal: Replenish glycogen stores, repair muscle damage, restore hydration.

Timing (Critical Window): The '30-minute window' — consuming carbs + protein within 30 minutes of exercise is optimal for glycogen resynthesis and muscle repair.

Composition: 1–1.2 g/kg carbohydrates + 0.3–0.4 g/kg protein within 30–60 minutes.

Carbohydrate to Protein Ratio: 3:1 or 4:1 (carb:protein) for optimal recovery.

Ideal Post-Event Foods: Chocolate milk, curd with fruit, rice with dal and vegetables, protein shake with banana.

Hydration: 150% of fluid lost (i.e., drink 1.5 litres for every 1 kg body weight lost).

Anti-inflammatory foods: Turmeric, ginger, omega-3 rich fish to reduce exercise-induced inflammation.

Sports Nutrition Timing Summary

Phase	Timing	Key Nutrients	Amount
Pre-competition	3–4 hrs before	High carb, moderate protein, low fat	Full meal
Pre-competition snack	30–60 min before	Simple carbs, easily digestible	Light snack 200–300 kcal
During (< 60 min)	As needed	Water only	150–200 ml/15–20 min
During (> 60 min)	Every 15–20 min	Carbs 30–60 g/hr + electrolytes	Sports drink/gel
Post (Recovery window)	Within 30 min	Carb + protein (3:1 ratio)	1–1.2 g/kg carb + 0.3 g/kg protein
Post (Full recovery meal)	2 hrs after	Balanced meal with all macros	Normal meal

TOPIC 6 — Food Adulteration and Awareness

Food Adulteration: The process of adding inferior, harmful, or foreign substances to food, or removing valuable components from it, to increase bulk, weight, appearance, or profitability — thereby reducing quality and potentially causing harm.

Common Food Adulterants:

Food Item	Common Adulterant	Health Hazard	Detection Test
Milk	Water, starch, detergent, urea	Kidney damage, nutritional deficiency	Lactometer test; iodine for starch
Turmeric powder	Metanil yellow (lead chromate)	Carcinogenic, liver/kidney damage	Add HCl — turns pink if adulterated
Chilli powder	Brick powder, artificial colours (Sudan dye)	Carcinogenic, GI irritation	Add water — brick settles; colour bleeds
Mustard seeds	Argemone seeds (look-alike)	Epidemic dropsy — cardiac failure	Press seed — yellow = mustard; white = argemone
Honey	Jaggery, sugar syrup, glucose	Blood sugar spike, reduces medicinal value	Burn test — pure honey burns; adulterated splutters
Pepper	Papaya seeds, dried berries	GI issues, nutrient dilution	Float in alcohol — real pepper sinks
Vanaspati/Ghee	Mashed potatoes, animal fats	Heart disease, nutrient imbalance	Baudouin test (red-violet colour = vanaspati)
Green vegetables	Copper sulphate, malachite green	Copper toxicity, carcinogenic	Rub on white paper — artificial colour leaves mark
Atta/Flour	Chalk powder, stone powder	GI damage, tooth damage	Add HCl — effervescence if chalk present

FSSAI — Food Safety Regulator:

- **FSSAI** = Food Safety and Standards Authority of India — established under FSSAI Act 2006.
- Regulates manufacture, storage, distribution, sale, and import of food to ensure safety.
- **Food Safety Mitra:** FSSAI scheme to help small food businesses get compliant.
- **'Eat Right India'** campaign by FSSAI — promoting safe, nutritious, and sustainable food.
- **AGMARK:** Quality certification for agricultural products — ensures purity standards.
- **ISI Mark (BIS):** Quality standard for packaged food products.
- Reading food labels: Check for FSSAI license number, ingredients list, nutritional information, expiry date.
- **Consumer Awareness Tips:** Buy from trusted sources; check FSSAI/AGMARK/ISI marks; inspect packaging for tampering; wash fruits/vegetables before consuming; avoid artificially coloured/overly bright-looking foods.
- **Performance Enhancing Drugs (Doping):** Athletes must be aware that some supplements may contain banned substances — always check WADA (World Anti-Doping Agency) prohibited list before consumption.

TOPIC 7 — Postural Deformities and Corrective Measures

Good Posture: The proper alignment of body parts — spine, limbs, and head — in relation to each other when standing, sitting, or moving. Deformities develop due to weak muscles, poor habits, nutritional deficiencies, or injury.

◆ Knock Knees (Genu Valgum)

Description: Knees angled INWARD, touching when standing with feet apart. Gap between ankles when standing.

Causes: Calcium/Vit D deficiency, obesity, rickets, weak quadriceps, flat feet, injury.

Corrective Measures:

- Butterfly exercise (sit, soles together, flap knees like butterfly — strengthens inner thigh).
- Squat exercises with feet shoulder-width apart.
- Side-lying leg raises to strengthen hip abductors.
- Straight leg raising exercises.
- Walk with feet pointing slightly outward.
- Wear corrective shoes/orthotics. Medical: bracing or surgery in severe cases.

◆ Bow Legs (Genu Varum)

Description: Knees angled OUTWARD — gap between knees when standing with feet together. Opposite of knock knees.

Causes: Rickets (Vit D deficiency), Blount's disease, injury, normal in toddlers (usually corrects by age 3).

Corrective Measures:

- Pawanuktasana (wind-relieving pose) — pull knees to chest.
- Chakrasana / wheel pose to stretch knee area.
- Suryanamaskar — especially Ashwa Sanchalanasana.
- Horse riding stance exercises.
- Wear corrective insoles. Medical: bracing or corrective surgery if severe.

◆ Flat Feet (Pes Planus)

Description: Absence of normal arch in the foot — entire sole touches the ground. May cause overpronation.

Causes: Genetic (familial), weak intrinsic foot muscles, obesity, injury to posterior tibial tendon, prolonged standing.

Corrective Measures:

- Towel scrunching exercise with toes.
- Heel raises / calf raises to strengthen arch muscles.
- Walking on heels and then on tiptoes alternately.
- Marble pick-up exercise with toes.
- Arch support orthotics/insoles. Barefoot walking on natural surfaces.
- Swimming (water supports body, allows foot muscle exercise).

◆ Scoliosis (Lateral Spinal Curvature)

Description: Abnormal LATERAL (sideways) S-shape or C-shape curvature of the spine — not present in normal spine.

Causes: Idiopathic (unknown — most common, often adolescent onset), congenital, neuromuscular conditions.

Corrective Measures:

- Trikonasana (triangle pose) — stretches and strengthens spinal muscles.
- Cat-Cow stretches (Marjaryasana-Bitilasana) — mobilises spine.
- Side bends and trunk rotation exercises.
- Swimming — especially backstroke.
- Hanging from bars — gravity helps decompress spine.
- Medical: Bracing (Milwaukee brace) for curves 25–40 degrees; surgery (spinal fusion) for >40 degrees.

◆ **Kyphosis (Hunchback / Rounded Upper Back)**

Description: Excessive outward (posterior) curvature of the THORACIC spine — 'rounded back' or hunchback appearance.

Causes: Poor posture (prolonged sitting/screen time), weak back muscles, osteoporosis, Scheuermann's disease.

Corrective Measures:

- Bhujangasana (cobra pose) — strengthens back extensors, opens chest.
- Shalabhasana (locust pose) — strengthens entire posterior chain.
- Cat-Cow stretches for spinal mobility.
- Chest stretches and doorway stretches to open pectoral muscles.
- Rowing exercises — strengthen rhomboids and middle trapezius.
- Ergonomic corrections — chair height, screen height, pillow support.

◆ **Lordosis (Swayback / Excessive Lumbar Curve)**

Description: Excessive INWARD (anterior) curvature of the LUMBAR spine — 'swayback' appearance with prominent buttocks.

Causes: Weak core/abdominal muscles, tight hip flexors and lower back, obesity, pregnancy, high heels.

Corrective Measures:

- Core strengthening — planks, pelvic tilts, abdominal crunches.
- Hip flexor stretches (low lunge — Ashwa Sanchalanasana).
- Hamstring stretches to reduce anterior pelvic tilt.
- Tadasana (mountain pose) — trains proper spinal alignment.
- Avoid prolonged wearing of high heels.
- Swimming to decompress lumbar spine.

TOPIC 8 — Common Sports Injuries: Causes & Management

Sports injuries occur due to **acute trauma** (sudden force/impact) or **overuse** (repetitive stress over time). Proper first aid, management, and rehabilitation are critical for safe return to sport.

RICE / PRICE Protocol — First Aid for Soft Tissue Injuries

- **P** = Protection: Protect area from further injury (splint, padding, crutches).
- **R** = Rest: Stop activity immediately. Rest injured part for 24–48 hours.
- **I** = Ice: Apply ice pack wrapped in cloth for 15–20 minutes every 2–3 hours for 48–72 hours. Reduces swelling and pain.
- **C** = Compression: Apply elastic bandage to reduce swelling. Not too tight — check circulation.
- **E** = Elevation: Raise injured limb above heart level to reduce blood pooling and swelling.

★ SPRAIN

Definition: Stretching or tearing of a LIGAMENT (bone to bone connective tissue) at a joint.

Causes: Sudden twisting/rolling of joint, fall, direct blow to joint. Common at ankle, knee, wrist.

Grades/Symptoms: Grade I: Microscopic tears, mild pain/swelling. Grade II: Partial tear, moderate. Grade III: Complete tear — severe instability.

Management: PRICE protocol; anti-inflammatory medication (NSAIDs); physiotherapy after 48–72 hours; bracing; Grade III may need surgery.

★ STRAIN

Definition: Stretching or tearing of a MUSCLE or TENDON (muscle to bone). Often called a 'pulled muscle'.

Causes: Overstretching, sudden contraction, overuse, inadequate warm-up. Common in hamstrings, calves, lower back.

Grades/Symptoms: Grade I: Mild overstretching. Grade II: Partial tear — significant pain. Grade III: Complete rupture.

Management: PRICE protocol; gentle stretching after acute phase; physiotherapy; progressive return to sport.

★ CONTUSION (Bruise)

Definition: Blunt force trauma causing bleeding into soft tissue (muscle, skin) WITHOUT breaking the skin.

Causes: Direct impact/blow from opponent, equipment, or surface. Common in contact sports.

Grades/Symptoms: Localised pain, swelling, discolouration (black-blue bruise), tenderness on touch.

Management: PRICE protocol; protect from further impact; gentle compression; usually resolves in 1–2 weeks.

★ ABRASION (Graze/Road Rash)

Definition: Superficial wound where skin is scraped/rubbed off — outermost skin layers removed.

Causes: Falling on rough surface, sliding tackles, friction with floor/ground.

Grades/Symptoms: Superficial bleeding, raw wound surface, pain, potential for infection if not cleaned.

Management: Clean thoroughly with antiseptic; remove dirt/debris; apply antibiotic cream; cover with sterile dressing; watch for signs of infection.

★ DISLOCATION

Definition: Displacement of a bone from its NORMAL POSITION in a joint — bone forced out of socket.

Causes: High-impact collision, fall, extreme force on joint. Common at shoulder, finger, patella, hip.

Grades/Symptoms: Severe deformity/abnormal appearance, intense pain, inability to move joint, swelling.

Management: DO NOT attempt to reduce (put back) yourself — risk of nerve/vessel damage. Immobilise, apply ice, transport to hospital IMMEDIATELY. Medical reduction under anaesthesia.

TOPIC 9 — Types of Fractures

Fracture: A complete or partial break in the continuity of a bone. Occurs when force exceeds bone's strength. **General Signs:** Pain, swelling, deformity, loss of function, crepitus (grating sound), tenderness at fracture site.

First Aid for Fractures: RISC

- **R = Rest:** Immobilise the fracture site — do not move unnecessarily.
- **I = Immobilise:** Splint the fracture in position found. Include joints above and below fracture.
- **S = Shock Prevention:** Keep warm, reassure, monitor breathing, raise legs if no spinal injury.
- **C = Call for help:** Emergency services/hospital transport. Never attempt bone realignment.

◆ Transverse Fracture

Definition: Break runs HORIZONTALLY/PERPENDICULAR across the bone shaft at right angles.

Mechanism/Causes: Direct blow, blunt trauma perpendicular to bone (e.g., direct kick to shin).

Key Features: Clean break — relatively stable. Often treated with casting. Good healing prognosis.

Management: Immobilise with splint. Hospital: plaster of Paris cast or internal fixation with metal plate/screws.

◆ Oblique Fracture

Definition: Break runs at an ANGLE (diagonal) across the bone — not perpendicular or horizontal.

Mechanism/Causes: Combined force — rotational + compressive stress. Common in skiing, football leg tackles.

Key Features: Diagonal break line — may be unstable and tend to shorten as muscles pull ends.

Management: Immobilise. Hospital: often needs surgical fixation (ORIF — open reduction internal fixation) due to instability.

◆ Comminuted Fracture

Definition: Bone breaks into THREE OR MORE fragments/pieces — shattered bone.

Mechanism/Causes: High-energy trauma — car accidents, high-impact falls, crush injuries.

Key Features: Severe pain, significant swelling, deformity, multiple bone pieces visible on X-ray.

Management: Requires surgery (ORIF with plates, screws, or external fixators). Long rehabilitation. Blood loss risk.

◆ Impacted Fracture

Definition: One bone fragment is DRIVEN INTO ANOTHER — telescoping/compression fracture. The fragments are locked together.

Mechanism/Causes: Axial compressive force — falling on outstretched hand, landing heavily. Common in distal radius, femoral neck.

Key Features: May be less mobile than other fractures. Less obvious deformity. Risk of shortening.

Management: May be treated conservatively (casting) if stable, or surgically if displaced. Common in elderly with osteoporosis.

◆ Greenstick Fracture

Definition: INCOMPLETE fracture where bone bends and cracks on ONE SIDE ONLY — like a young/green stick bending without snapping.

Mechanism/Causes: Bending force applied to bone. OCCURS PRIMARILY IN CHILDREN because their bones are more flexible and porous.

Key Features: Partial break — bone bent but not completely separated. Less severe than complete fracture.

Management: Often treated with casting alone. Good healing due to active periosteum in children. Complete immobilisation needed.

All Fracture Types — Quick Reference

Fracture Type	Direction of Break	Key Feature	Who/When
Transverse	Perpendicular (horizontal)	Clean break across bone	Direct blow to shaft
Oblique	Diagonal/angled	Slanted break line, may shorten	Rotational + compression force
Comminuted	Multiple fragments	3+ pieces — shattered bone	High-energy trauma, adults
Impacted	Telescoping (one into other)	Fragments compressed together	Axial compression, elderly
Greenstick	Incomplete — one side only	Bone bends, doesn't break through	CHILDREN only — flexible bones

QUICK REVISION — Unit V At a Glance

Topic	Key Points for CUET
Macronutrients	Carbs=4kcal/g, Protein=4kcal/g, Fat=9kcal/g; Carbs primary fuel, Protein repairs muscle, Fat long-duration fuel
Vitamins	Fat-soluble: A,D,E,K; Water-soluble: B-complex, C; Key: Vit C=Scurvy, Vit D=Rickets, B12=Pernicious anaemia
Minerals	Ca=Osteoporosis, Fe=Anaemia, I=Goitre, K+Na=Electrolytes; Mg=ATP synthesis
Pre-competition	3-4 hrs before; High carb, low fat/fibre; Carbohydrate loading for endurance events
During competition	<60 min: water only; >60 min: 30-60g carb/hr + electrolytes
Post-competition	30-min recovery window; 3:1 carb:protein ratio; 150% fluid replacement
Food Adulteration	FSSAI Act 2006; Turmeric=Metanil yellow; Milk=water/detergent; Mustard=Argemone seeds
Postural Deformities	Knock knees (inward), Bow legs (outward), Flat feet, Scoliosis (lateral), Kyphosis (upper back), Lordosis (lower back)
Soft Tissue Injuries	Sprain=ligament, Strain=muscle/tendon, Contusion=blunt trauma bruise, Abrasion=skin scrape, Dislocation=bone out of joint
PRICE Protocol	Protection, Rest, Ice, Compression, Elevation — for soft tissue injuries
Fractures	Transverse=perpendicular, Oblique=diagonal, Comminuted=3+ pieces, Impacted=telescoping, Greenstick=children/incomplete

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UNIT V — PRACTICE MCQ BANK

50 Questions | Hard Level | CUET / Class 12

10 Tricky MCQs | 30 Standard MCQs | 3 Match the Following | 7 Additional
Complete Answer Key + Detailed Explanations

Join Telegram: t.me/thunderstudy_official | By Wondermayank

SECTION I — TRICKY MCQs (Q.1 – Q.10)

Both options may appear correct — choose the MOST physiologically accurate answer.

Q.1. [TRICKY] Carbohydrates and proteins both yield 4 kcal/g, yet carbohydrates are considered the 'preferred' fuel for athletes. The MOST accurate physiological reason is:

- (a) Carbohydrates are cheaper and more widely available than protein sources
- (b) Carbohydrates can be metabolised both aerobically AND anaerobically, providing faster ATP during high-intensity bursts; proteins cannot
- (c) Proteins cause more muscle damage when used as fuel compared to carbohydrates
- (d) Carbohydrates produce less carbon dioxide as a by-product than proteins

Q.2. [TRICKY] A Greenstick Fracture is described as 'incomplete'. Which statement MOST accurately explains why it is incomplete?

- (a) Because it occurs only in the metaphysis (growth plate) region of bone
- (b) Because the bone bends and cracks on the tension side only, while the compression side remains intact due to the higher organic content and elasticity of children's bones
- (c) Because medical treatment was applied before the fracture could complete
- (d) Because only the periosteum is damaged without any cortical bone involvement

Q.3. [TRICKY] The '30-minute recovery window' after exercise is considered critical because:

- (a) Muscles can only absorb protein during the first 30 minutes post-exercise
- (b) Glycogen synthase enzyme activity and muscle cell membrane permeability to glucose are highest immediately post-exercise, making glycogen resynthesis fastest in this window
- (c) Blood flow to muscles decreases sharply after 30 minutes, preventing nutrient delivery
- (d) Cortisol levels peak exactly at 30 minutes post-exercise and must be countered with food

Q.4. [TRICKY] A Sprain and a Strain both involve 'stretching or tearing of connective tissue'. The key anatomical difference is:

- (a) Sprain affects upper body; strain affects lower body
- (b) Sprain involves LIGAMENTS (bone-to-bone); Strain involves MUSCLES or TENDONS (muscle-to-bone)
- (c) Sprain is always more severe than strain; strain is always minor
- (d) Sprain occurs only at joints; strain occurs only in muscle bellies, never at tendons

Q.5. [TRICKY] Scoliosis is defined as a LATERAL spinal curvature. Which of the following BEST distinguishes it from normal spinal curves?

- (a) Normal spine has no curves; scoliosis creates the first curves in the spine
- (b) Normal spine has anterior-posterior (sagittal plane) curves; scoliosis creates an abnormal FRONTAL PLANE (lateral/sideways) curve
- (c) Scoliosis affects only the thoracic spine; other curvatures affect only the lumbar spine
- (d) Normal spinal curves are congenital; scoliosis is always acquired through poor posture

Q.6. [TRICKY] Omega-3 fatty acids are particularly important for athletes because they are:

- (a) A direct source of ATP during aerobic exercise
- (b) Anti-inflammatory and help reduce exercise-induced muscle inflammation and joint stiffness
- (c) The primary component of muscle protein synthesis after training
- (d) Water-soluble and therefore rapidly absorbed without digestive delay

Q.7. [TRICKY] A dislocated shoulder is brought to you during a sports event. The CORRECT immediate management is:

- (a) Attempt to relocate the shoulder by pulling the arm gently and rotating it back into socket
- (b) Apply ice to reduce swelling, immobilise arm in a sling in position found, and transport immediately to hospital
- (c) Apply heat pad to relax surrounding muscles, then attempt gentle range-of-motion movement

(d) Strap the shoulder firmly with elastic bandage across both shoulders and allow athlete to continue playing

Q.8. [TRICKY] Kyphosis and Lordosis both affect the SPINE but differ in location and direction. Which pair is CORRECT?

- (a) Kyphosis = excessive lumbar inward curve; Lordosis = excessive thoracic outward curve
 - (b) Kyphosis = excessive THORACIC outward (posterior) curve (hunchback); Lordosis = excessive LUMBAR inward (anterior) curve (swayback)
 - (c) Both Kyphosis and Lordosis refer to lateral spinal curves in different regions
 - (d) Kyphosis = congenital; Lordosis = always acquired through poor posture
-

Q.9. [TRICKY] Metanil yellow found as an adulterant in turmeric is particularly dangerous because it:

- (a) Simply dilutes the nutritional value without causing any direct health harm
 - (b) Is a non-permitted synthetic azo dye classified as carcinogenic, causing liver and kidney damage
 - (c) Causes only temporary allergic reactions in sensitive individuals
 - (d) Is a natural yellow pigment approved by FSSAI in small quantities
-

Q.10. [TRICKY] An athlete training for a marathon (42 km) should practice 'Carbohydrate Loading'. The physiological goal is:

- (a) To increase total body weight through water retention for better momentum
 - (b) To maximise skeletal muscle and liver glycogen stores beyond normal resting levels, delaying the point of glycogen depletion ('hitting the wall')
 - (c) To switch the body to exclusively fat metabolism to spare muscle protein
 - (d) To reduce lactate production during the event by increasing carbohydrate stores
-

SECTION II — STANDARD MCQs (Q.11 – Q.40)

Q.11. Which nutrient provides the HIGHEST energy per gram?

- (a) Carbohydrates (4 kcal/g)
- (b) Proteins (4 kcal/g)
- (c) Fats (9 kcal/g)
- (d) Fibre (2 kcal/g)

Q.12. The deficiency of Vitamin C causes which disease?

- (a) Rickets
- (b) Scurvy
- (c) Pellagra
- (d) Beriberi

Q.13. Which of the following is the BEST example of a Complete Protein food?

- (a) White rice
- (b) Egg
- (c) Wheat bread
- (d) Apple

Q.14. The RICE/PRICE protocol is used for:

- (a) Fracture management in hospital settings
- (b) Soft tissue injury first aid (sprain, strain, contusion)
- (c) Management of cardiac arrest on the sports field
- (d) Post-surgery rehabilitation protocol

Q.15. An impacted fracture is best described as:

- (a) A spiral break caused by twisting force
- (b) One bone fragment driven into another, locked together
- (c) A fracture with three or more bone fragments
- (d) An incomplete fracture in children

Q.16. Mineral IODINE is essential for the synthesis of which hormone?

- (a) Insulin
- (b) Cortisol
- (c) Thyroxine (T4/T3)
- (d) Adrenaline

Q.17. Which postural deformity involves an INWARD curvature of the knees — knees touching when feet are apart?

- (a) Bow Legs (Genu Varum)
- (b) Flat Feet (Pes Planus)
- (c) Knock Knees (Genu Valgum)
- (d) Lordosis

Q.18. The recovery carbohydrate to protein ratio recommended post-exercise is:

- (a) 1:1
- (b) 2:1
- (c) 3:1 or 4:1
- (d) 5:1

Q.19. Which of the following is a characteristic ONLY of Comminuted Fractures?

- (a) Bone breaks diagonally at an angle

- (b) Bone breaks into 3 or more fragments
 - (c) Break is perpendicular to the bone shaft
 - (d) Only occurs in children due to soft bones
-

Q.20. Which food item is commonly adulterated with ARGEMONE seeds?

- (a) Turmeric powder
 - (b) Mustard seeds
 - (c) Milk
 - (d) Honey
-

SECTION II — STANDARD MCQs (Continued)

Q.21. Fat-soluble vitamins are stored in the body. Which group correctly identifies ALL fat-soluble vitamins?

- (a) A, B, D, E
- (b) A, D, E, K
- (c) A, C, D, K
- (d) B-complex, C, D, E

Q.22. An abrasion differs from a laceration in that:

- (a) An abrasion is deeper and requires suturing
- (b) An abrasion is a superficial wound where skin is scraped off; a laceration is a deeper cut/tear through skin
- (c) Abrasions occur only from sharp objects; lacerations from rough surfaces
- (d) An abrasion always causes internal bleeding; a laceration does not

Q.23. Calcium deficiency in adults primarily causes which condition?

- (a) Rickets
- (b) Scurvy
- (c) Osteoporosis
- (d) Pellagra

Q.24. During exercise lasting MORE THAN 90 minutes, how many grams of carbohydrate per hour should be consumed?

- (a) 10–20 g/hr
- (b) 30–60 g/hr
- (c) 80–100 g/hr
- (d) 120+ g/hr

Q.25. The FSSAI Act that establishes food safety standards in India was enacted in which year?

- (a) 1954
- (b) 1968
- (c) 2006
- (d) 2014

Q.26. Butterfly exercise (sitting with soles together and flapping knees) is a corrective exercise for:

- (a) Kyphosis
- (b) Knock Knees
- (c) Scoliosis
- (d) Flat Feet

Q.27. Which fracture is described as occurring ONLY IN CHILDREN and not in adults?

- (a) Comminuted fracture
- (b) Transverse fracture
- (c) Oblique fracture
- (d) Greenstick fracture

Q.28. Iron deficiency anaemia impairs athletic performance PRIMARILY by:

- (a) Reducing glycogen stores in the liver
- (b) Reducing haemoglobin levels, which decreases oxygen-carrying capacity of blood to working muscles
- (c) Causing joint pain that limits range of motion
- (d) Reducing testosterone levels, causing muscle weakness

Q.29. A contusion is different from a sprain because:

- (a) A contusion is caused by a twisting injury; a sprain by direct impact
 - (b) A contusion involves soft tissue damage from BLUNT FORCE without skin break; a sprain involves ligament stretching/tearing
 - (c) A contusion always requires surgical management; a sprain does not
 - (d) A contusion only affects bone; a sprain only affects muscle
-

Q.30. For PRE-COMPETITION nutrition, which food is MOST appropriate 30–60 minutes before a race?

- (a) A large meal of rice, dal, and vegetable curry
 - (b) A high-fat breakfast like puri and aloo sabzi
 - (c) A banana or sports drink (easily digestible simple carbohydrate)
 - (d) A protein shake with 40g whey protein
-

SECTION II — STANDARD MCQs (Continued)

Q.31. Oblique fracture is caused by which type of force?

- (a) Direct blow perpendicular to the bone
- (b) Extreme pulling force along the bone length
- (c) Combined rotational and compressive force creating a diagonal break
- (d) Bending force on a child's flexible bone

Q.32. Which mineral is primarily responsible for ATP energy production in cells?

- (a) Calcium
- (b) Iron
- (c) Magnesium
- (d) Zinc

Q.33. The FSSAI certification marks that consumers should look for on packaged food include:

- (a) ISO mark and HACCP certification
- (b) FSSAI license number, AGMARK (for agricultural products), ISI mark
- (c) WHO certification and Codex Alimentarius mark
- (d) EU food safety mark and FDA approval

Q.34. Which vitamin is produced by the body when SKIN IS EXPOSED TO SUNLIGHT?

- (a) Vitamin A
- (b) Vitamin C
- (c) Vitamin D
- (d) Vitamin K

Q.35. Post-exercise hydration guideline states that for every 1 kg of body weight LOST during exercise, the athlete should drink:

- (a) 500 ml of fluid
- (b) 1000 ml (1 litre) exactly
- (c) 1500 ml (150% of fluid lost)
- (d) 2000 ml

Q.36. Scoliosis can be treated with a 'Milwaukee brace' when the Cobb angle (curve measurement) is:

- (a) Less than 10 degrees
- (b) 10–25 degrees (mild)
- (c) 25–40 degrees (moderate)
- (d) More than 50 degrees

Q.37. The term 'Dislocation' specifically means:

- (a) Stretching of a muscle beyond its normal range
- (b) Partial or complete displacement of a bone from its normal articulation in a joint
- (c) A crack in the bone surface without complete separation
- (d) Inflammation of a tendon due to overuse

Q.38. Essential Fatty Acids (EFAs) MUST come from diet because:

- (a) The body can make them but only during childhood
- (b) The body CANNOT synthesise them due to lack of specific desaturase enzymes
- (c) They are too large to be manufactured in body cells
- (d) They are only found in animal products which must be consumed daily

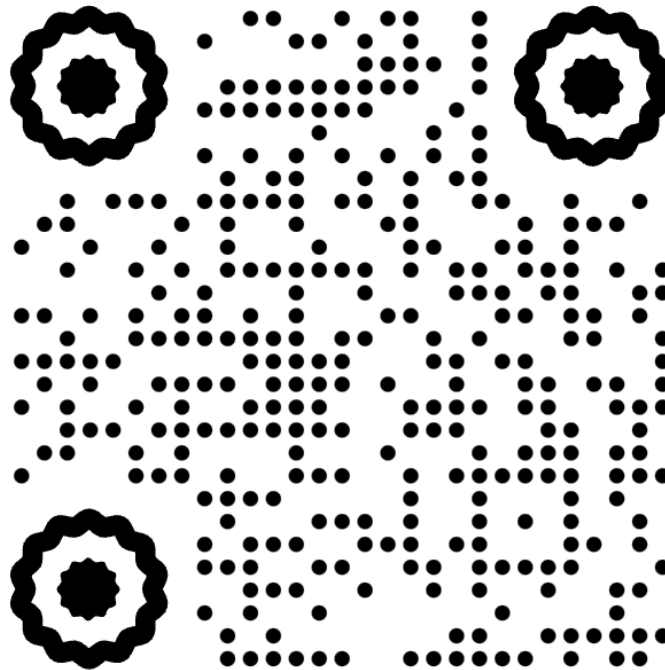
Q.39. Correct first aid for a SUSPECTED FRACTURE involves:

- (a) Attempting to straighten the limb to its natural position before splinting

- (b) Immobilising the fracture in the POSITION FOUND, including joints above and below the fracture site
 - (c) Applying a tight tourniquet above the fracture to prevent swelling
 - (d) Encouraging the athlete to walk on it to determine if it is broken or just a sprain
-

Q.40. Vitamin B12 deficiency causes PERNICIOUS ANAEMIA. Why does this differ from iron-deficiency anaemia?

- (a) It does not affect red blood cells — only causes neurological symptoms
 - (b) It causes MEGALOBLASTIC anaemia — abnormally large, immature RBCs that cannot function properly
 - (c) It reduces haemoglobin's ability to bind oxygen without changing RBC size
 - (d) It only occurs in people who eat meat and is prevented by vegetarian diet
-



Free CBT Mock Test For All

SECTION III — MATCH THE FOLLOWING (Q.41 – Q.43)

Match each item in Column A with the correct item from Column B.

Q.41. MATCH THE FOLLOWING — Vitamins and their Deficiency Diseases: Column A: 1. Vitamin C 2. Vitamin D 3. Vitamin B3 (Niacin) 4. Vitamin B1 (Thiamine) Column B: P. Beriberi Q. Pellagra (3Ds) R. Scurvy S. Rickets

- (a) 1-S, 2-R, 3-P, 4-Q
- (b) 1-R, 2-S, 3-Q, 4-P
- (c) 1-P, 2-Q, 3-R, 4-S
- (d) 1-Q, 2-P, 3-S, 4-R

Q.42. MATCH THE FOLLOWING — Sports Injuries and Structures Affected: Column A: 1. Sprain 2. Strain 3. Contusion 4. Dislocation Column B: P. Bone displaced from joint Q. Muscle or Tendon R. Soft tissue bruise (no skin break) S. Ligament

- (a) 1-Q, 2-S, 3-P, 4-R
- (b) 1-P, 2-R, 3-Q, 4-S
- (c) 1-S, 2-Q, 3-R, 4-P
- (d) 1-R, 2-P, 3-S, 4-Q

Q.43. MATCH THE FOLLOWING — Fracture Types and their Key Features: Column A: 1. Greenstick 2. Comminuted 3. Oblique 4. Transverse Column B: P. Perpendicular break across bone shaft Q. Diagonal/angled break line R. 3+ bone fragments — shattered S. Incomplete — bends on one side, children only

- (a) 1-P, 2-Q, 3-R, 4-S
- (b) 1-S, 2-R, 3-Q, 4-P
- (c) 1-R, 2-P, 3-S, 4-Q
- (d) 1-Q, 2-S, 3-P, 4-R

SECTION IV — ADDITIONAL MCQs (Q.44 – Q.50)

Q.44. The '9 Essential Amino Acids' are called essential because:

- (a) They are needed in the highest quantities among all amino acids
 - (b) They cannot be synthesised by the human body and must be obtained from diet
 - (c) They are only found in animal protein sources
 - (d) They form the structural backbone of all human proteins
-

Q.45. Which exercise is specifically recommended for FLAT FEET correction?

- (a) Butterfly exercise
 - (b) Towel scrunching and marble pick-up with toes
 - (c) Cat-cow stretch
 - (d) Plank exercise
-

Q.46. Epidemic Dropsy is caused by contamination of which food with Argemone seeds?

- (a) Cooking oil / Mustard oil
 - (b) Wheat flour
 - (c) Milk
 - (d) Chilli powder
-

Q.47. Carbohydrate Loading is MOST beneficial for which type of athlete?

- (a) A 100m sprint athlete (10 seconds duration)
 - (b) A powerlifter (explosive 3-second effort)
 - (c) A marathon runner (42 km — >2 hours duration)
 - (d) A gymnast (90-second routine)
-

Q.48. Which of the following is NOT included in the PRICE protocol for injury first aid?

- (a) Protection
 - (b) Rest
 - (c) Heat application
 - (d) Elevation
-

Q.49. Lordosis is most commonly associated with weakness in which muscle group?

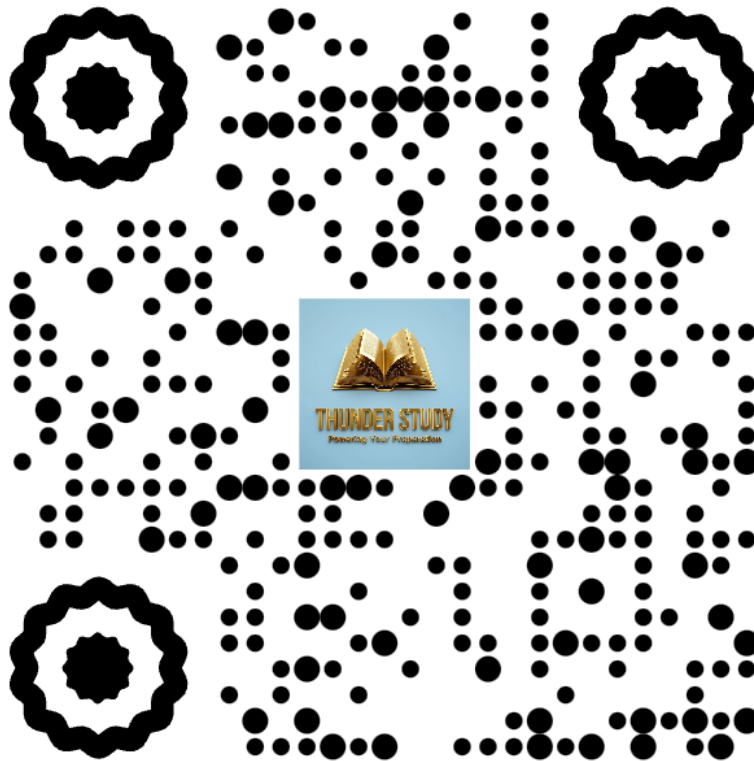
- (a) Hamstrings and calf muscles
 - (b) Core/abdominal muscles and tight hip flexors
 - (c) Shoulder and upper back muscles
 - (d) Knee extensors (quadriceps)
-

Q.50. Which of the following BEST describes a Balanced Diet?

- (a) A diet that contains only proteins and carbohydrates in equal measure
 - (b) A diet that provides all essential nutrients in the right proportions to maintain health and support physical activity
 - (c) A diet that has equal caloric contribution from each of the three macronutrients
 - (d) A diet that eliminates all processed and refined foods completely
-

ANSWER KEY — Quick Reference

Q.	Ans	Q.	Ans	Q.	Ans	Q.	Ans	Q.	Ans
Q.1	(B)	Q.2	(B)	Q.3	(B)	Q.4	(B)	Q.5	(B)
Q.6	(B)	Q.7	(B)	Q.8	(B)	Q.9	(B)	Q.10	(B)
Q.11	(C)	Q.12	(B)	Q.13	(B)	Q.14	(B)	Q.15	(B)
Q.16	(C)	Q.17	(C)	Q.18	(C)	Q.19	(B)	Q.20	(B)
Q.21	(B)	Q.22	(B)	Q.23	(C)	Q.24	(B)	Q.25	(C)
Q.26	(B)	Q.27	(D)	Q.28	(B)	Q.29	(B)	Q.30	(C)
Q.31	(C)	Q.32	(C)	Q.33	(B)	Q.34	(C)	Q.35	(C)
Q.36	(C)	Q.37	(B)	Q.38	(B)	Q.39	(B)	Q.40	(B)
Q.41	(B)	Q.42	(C)	Q.43	(B)	Q.44	(B)	Q.45	(B)
Q.46	(A)	Q.47	(C)	Q.48	(C)	Q.49	(B)	Q.50	(B)



DETAILED ANSWER EXPLANATIONS

WHY the correct answer is right AND why each wrong option is incorrect.

— TRICKY MCQs —

Q.1 — Correct: (B)

Wrong: (a) Carbohydrates are cheaper and more widely available than protein sources

CORRECT: (b) Carbohydrates can be metabolised both aerobically AND anaerobically, providing faster ATP during high-intensity bursts; proteins cannot

Wrong: (c) Proteins cause more muscle damage when used as fuel compared to carbohydrates

Wrong: (d) Carbohydrates produce less carbon dioxide as a by-product than proteins

Explanation: Although both yield 4 kcal/g, CARBOHYDRATES can be metabolised through both AEROBIC (oxidative phosphorylation) AND ANAEROBIC (glycolysis → lactate) pathways. This dual-pathway flexibility allows carbs to rapidly supply ATP during high-intensity exercise when oxygen delivery is limited. PROTEIN can only be metabolised aerobically and requires complex deamination processes. Option (a) is economic, not physiological. Option (c) — protein catabolism does cause metabolic stress but this is not the PRIMARY reason for carb preference. Option (d) is incorrect — carbs actually produce MORE CO₂ per O₂ consumed (RQ=1.0) than fats (RQ=0.7).

Q.2 — Correct: (B)

Wrong: (a) Because it occurs only in the metaphysis (growth plate) region of bone

CORRECT: (b) Because the bone bends and cracks on the tension side only, while the compression side remains intact due to the higher organic content and elasticity of children's bones

Wrong: (c) Because medical treatment was applied before the fracture could complete

Wrong: (d) Because only the periosteum is damaged without any cortical bone involvement

Explanation: Greenstick fractures are incomplete because children's bones have a higher ratio of ORGANIC material (collagen) to inorganic mineral, making them more ELASTIC/FLEXIBLE than adult bones. When a bending force is applied, the TENSION side cracks while the COMPRESSION side (under compression) remains intact — like a green stick from a living tree that bends and cracks without snapping through. Option (a) is incorrect — growth plate injuries are Salter-Harris fractures, not greenstick. Option (c) is a non-scientific option. Option (d) is wrong — the cortical bone IS involved (it cracks on one side).

Q.3 — Correct: (B)

Wrong: (a) Muscles can only absorb protein during the first 30 minutes post-exercise

CORRECT: (b) Glycogen synthase enzyme activity and muscle cell membrane permeability to glucose are highest immediately post-exercise, making glycogen resynthesis fastest in this window

Wrong: (c) Blood flow to muscles decreases sharply after 30 minutes, preventing nutrient delivery

Wrong: (d) Cortisol levels peak exactly at 30 minutes post-exercise and must be countered with food

Explanation: The physiological basis of the recovery window: post-exercise, GLYCOGEN SYNTHASE (enzyme that synthesises glycogen from glucose) is maximally activated, AND muscle cell GLUT-4 transporters are at the cell membrane (insulin-independent glucose uptake is elevated). This creates a window of maximal glycogen resynthesis rate. Option (a) is partly true (protein synthesis is elevated) but incomplete and overstated. Option (c) is incorrect — blood flow remains elevated post-exercise. Option (d) — cortisol does rise during exercise but this specific 30-minute cortisol peak claim is inaccurate.

Q.4 — Correct: (B)

Wrong: (a) Sprain affects upper body; strain affects lower body

CORRECT: (b) Sprain involves LIGAMENTS (bone-to-bone); Strain involves MUSCLES or TENDONS (muscle-to-bone)

Wrong: (c) Sprain is always more severe than strain; strain is always minor

Wrong: (d) Sprain occurs only at joints; strain occurs only in muscle bellies, never at tendons

Explanation: The anatomical distinction is precise and frequently confused: SPRAIN = injury to LIGAMENT (connects bone to bone at a joint). STRAIN = injury to MUSCLE or TENDON (connects muscle to bone). Both have three grades of severity. Option (a) is anatomically incorrect — both can occur anywhere in the body. Option (c) is wrong — Grade III strain (complete muscle

rupture) is MORE severe than Grade I sprain. Option (d) partially correct about joints for sprains, but strains CAN occur at the musculotendinous junction or within the tendon itself (tendinopathy).

Q.5 — Correct: (B)

Wrong: (a) Normal spine has no curves; scoliosis creates the first curves in the spine

CORRECT: (b) Normal spine has anterior-posterior (sagittal plane) curves; scoliosis creates an abnormal FRONTAL PLANE (lateral/sideways) curve

Wrong: (c) Scoliosis affects only the thoracic spine; other curvatures affect only the lumbar spine

Wrong: (d) Normal spinal curves are congenital; scoliosis is always acquired through poor posture

Explanation: The normal spine has curves only in the SAGITTAL PLANE (front-to-back): lordosis (cervical and lumbar) and kyphosis (thoracic and sacral). These are NORMAL. SCOLIOSIS is an abnormal curvature in the FRONTAL/CORONAL PLANE (side-to-side), which does NOT exist in a normal spine. Option (a) is completely wrong — normal spine has multiple physiological sagittal curves. Option (c) is incorrect — scoliosis can occur at any spinal level. Option (d) is wrong — most scoliosis is idiopathic (unknown cause), not always postural.

Q.6 — Correct: (B)

Wrong: (a) A direct source of ATP during aerobic exercise

CORRECT: (b) Anti-inflammatory and help reduce exercise-induced muscle inflammation and joint stiffness

Wrong: (c) The primary component of muscle protein synthesis after training

Wrong: (d) Water-soluble and therefore rapidly absorbed without digestive delay

Explanation: Omega-3 fatty acids (EPA and DHA) are ANTI-INFLAMMATORY — they reduce production of pro-inflammatory eicosanoids (prostaglandins, leukotrienes) from arachidonic acid. This is critical for athletes because intense exercise creates significant DOMS (delayed onset muscle soreness) and joint inflammation. Option (a) — fats provide ATP aerobically but are not 'direct' ATP. Option (c) — protein (amino acids), not fatty acids, are muscle building blocks. Option (d) — fats are FAT-SOLUBLE (not water-soluble), requiring bile for digestion; water-soluble vitamins are B and C.

Q.7 — Correct: (B)

Wrong: (a) Attempt to relocate the shoulder by pulling the arm gently and rotating it back into socket

CORRECT: (b) Apply ice to reduce swelling, immobilise arm in a sling in position found, and transport immediately to hospital

Wrong: (c) Apply heat pad to relax surrounding muscles, then attempt gentle range-of-motion movement

Wrong: (d) Strap the shoulder firmly with elastic bandage across both shoulders and allow athlete to continue playing

Explanation: The PRICE protocol applies. NEVER attempt to reduce (relocate) a dislocation yourself — the risk of damage to brachial plexus (nerve bundle), axillary nerve, and axillary artery is extremely high with amateur attempts. CORRECT action: STOP activity, apply ICE, IMMOBILISE in the position found (usually arm held across chest), and transport to hospital for X-ray confirmation and reduction under anaesthesia/sedation by a doctor. Option (a) is DANGEROUS. Option (c) — heat increases bleeding/swelling in acute phase. Option (d) — allowing continuation is contraindicated.

Q.8 — Correct: (B)

Wrong: (a) Kyphosis = excessive lumbar inward curve; Lordosis = excessive thoracic outward curve

CORRECT: (b) Kyphosis = excessive THORACIC outward (posterior) curve (hunchback); Lordosis = excessive LUMBAR inward (anterior) curve (swayback)

Wrong: (c) Both Kyphosis and Lordosis refer to lateral spinal curves in different regions

Wrong: (d) Kyphosis = congenital; Lordosis = always acquired through poor posture

Explanation: Precise definitions: KYPHOSIS = excessive outward/posterior curve of the THORACIC spine (upper/mid back) — creates a 'hunchback' or 'rounded back' appearance. LORDOSIS = excessive inward/anterior curve of the LUMBAR spine (lower back) — creates a 'swayback' or 'hollow back' with prominent buttocks. Option (a) REVERSES the two definitions — the most common examination trap. Option (c) — lateral curve is SCOLIOSIS, not kyphosis/lordosis. Option (d) — both can be congenital or acquired.

Q.9 — Correct: (B)

Wrong: (a) Simply dilutes the nutritional value without causing any direct health harm

CORRECT: (b) Is a non-permitted synthetic azo dye classified as carcinogenic, causing liver and kidney damage

Wrong: (c) Causes only temporary allergic reactions in sensitive individuals

Wrong: (d) Is a natural yellow pigment approved by FSSAI in small quantities

Explanation: Metanil yellow (para-aminoazobenzene-sulphonic acid) is an INDUSTRIAL DYE — a non-food-grade azo compound that is BANNED by FSSAI. Research shows it is CARCINOGENIC (cancer-causing), mutagenic, and causes liver and kidney toxicity. Lead chromate (another adulterant used in turmeric) is also neurotoxic. Option (a) — it causes direct harm. Option (c) — effects are not merely allergic — they are systemic. Option (d) — it is NOT approved by FSSAI and is not natural.

Q.10 — Correct: (B)

Wrong: (a) To increase total body weight through water retention for better momentum

CORRECT: (b) To maximise skeletal muscle and liver glycogen stores beyond normal resting levels, delaying the point of glycogen depletion ('hitting the wall')

Wrong: (c) To switch the body to exclusively fat metabolism to spare muscle protein

Wrong: (d) To reduce lactate production during the event by increasing carbohydrate stores

Explanation: CARBOHYDRATE LOADING (glycogen supercompensation) is a strategy where athletes first deplete glycogen (through training) then consume very high carbohydrate diets (8–10 g/kg/day for 3–7 days before event). This leads to SUPERCOMPENSATION — glycogen stores 20–40% higher than normal. For a 42 km marathon, athletes typically 'hit the wall' at ~30 km when glycogen runs out and the body switches to slower fat metabolism. Higher starting glycogen delays this critical transition point. Option (a) — the water retention is a real side effect (glycogen binds 3g water per gram) but is NOT the goal. Option (c) — carb loading does NOT cause exclusive fat metabolism. Option (d) — lactate is related to intensity, not carbohydrate stores.

— STANDARD MCQs —

Q.11 — Correct: (C)

Wrong: (a) Carbohydrates (4 kcal/g)

Wrong: (b) Proteins (4 kcal/g)

CORRECT: (c) Fats (9 kcal/g)

Wrong: (d) Fibre (2 kcal/g)

Explanation: Fats (lipids) provide 9 kcal per gram — more than double the energy of carbohydrates and proteins (4 kcal/g each). This is because fats are more reduced (more C-H bonds) and require more oxygen to metabolise, releasing more energy. Dietary fibre yields approximately 1.5–2 kcal/g (partial fermentation in colon).

Q.12 — Correct: (B)

Wrong: (a) Rickets

CORRECT: (b) Scurvy

Wrong: (c) Pellagra

Wrong: (d) Beriberi

Explanation: Vitamin C (Ascorbic Acid) deficiency causes SCURVY — characterised by bleeding gums, poor wound healing, fatigue, and petechial haemorrhages. Rickets = Vit D deficiency; Pellagra = Niacin (B3) deficiency; Beriberi = Thiamine (B1) deficiency.

Q.13 — Correct: (B)

Wrong: (a) White rice

CORRECT: (b) Egg

Wrong: (c) Wheat bread

Wrong: (d) Apple

Explanation: A Complete Protein contains ALL 9 essential amino acids in adequate proportions. Egg is the 'gold standard' complete protein (biological value ~100). Other complete proteins: meat, fish, milk, soya. Rice and wheat are incomplete (missing/low in some essential amino acids). Apple is primarily carbohydrate.

Q.14 — Correct: (B)

Wrong: (a) Fracture management in hospital settings

CORRECT: (b) Soft tissue injury first aid (sprain, strain, contusion)

Wrong: (c) Management of cardiac arrest on the sports field

Wrong: (d) Post-surgery rehabilitation protocol

Explanation: PRICE (Protection, Rest, Ice, Compression, Elevation) is the standard first-aid protocol for SOFT TISSUE injuries — sprains, strains, contusions — in the first 48–72 hours after injury. It reduces pain, swelling, and secondary tissue damage. Fractures need immobilisation and hospital management.

Q.15 — Correct: (B)

Wrong: (a) A spiral break caused by twisting force

CORRECT: (b) One bone fragment driven into another, locked together

Wrong: (c) A fracture with three or more bone fragments

Wrong: (d) An incomplete fracture in children

Explanation: IMPACTED fracture = the bone ends are forced/driven into each other (telescoped), locking the fragments together. This typically occurs from AXIAL compressive force (e.g., falling on outstretched hand compresses distal radius into itself). Common in elderly with osteoporosis. Option (c) = Comminuted. Option (d) = Greenstick.

Q.16 — Correct: (C)

Wrong: (a) Insulin

Wrong: (b) Cortisol

CORRECT: (c) Thyroxine (T4/T3)

Wrong: (d) Adrenaline

Explanation: IODINE is a structural component of THYROID HORMONES — Thyroxine (T4, contains 4 iodine atoms) and Triiodothyronine (T3, contains 3 iodine atoms). These hormones regulate metabolic rate. Iodine deficiency causes GOITRE (enlarged thyroid gland as it tries to compensate for low hormone production).

Q.17 — Correct: (C)

Wrong: (a) Bow Legs (Genu Varum)

Wrong: (b) Flat Feet (Pes Planus)

CORRECT: (c) Knock Knees (Genu Valgum)

Wrong: (d) Lordosis

Explanation: KNOCK KNEES (Genu Valgum) = knees angle INWARD, touching each other when standing with feet apart. There is a gap between the ankles. BOW LEGS (Genu Varum) = OPPOSITE — knees angle outward, gap between knees when feet together. These two deformities are commonly confused in exams.

Q.18 — Correct: (C)

Wrong: (a) 1:1

Wrong: (b) 2:1

CORRECT: (c) 3:1 or 4:1

Wrong: (d) 5:1

Explanation: Post-exercise recovery nutrition recommendation: 3:1 to 4:1 CARBOHYDRATE:PROTEIN ratio. High carbs replenish glycogen stores; protein triggers muscle protein synthesis. Chocolate milk naturally provides approximately a 3:1–4:1 ratio and is often cited as an ideal recovery drink. Amount: 1–1.2 g carb/kg + 0.3–0.4 g protein/kg body weight.

Q.19 — Correct: (B)

Wrong: (a) Bone breaks diagonally at an angle

CORRECT: (b) Bone breaks into 3 or more fragments

Wrong: (c) Break is perpendicular to the bone shaft

Wrong: (d) Only occurs in children due to soft bones

Explanation: COMMUNUTED fracture = bone shatters into THREE OR MORE pieces/fragments. This is the defining characteristic. Option (a) = Oblique fracture. Option (c) = Transverse fracture. Option (d) = Greenstick fracture pattern (incomplete) is for children, not comminuted (which requires high-energy trauma, more common in adults).

Q.20 — Correct: (B)

Wrong: (a) Turmeric powder

CORRECT: (b) Mustard seeds

Wrong: (c) Milk

Wrong: (d) Honey

Explanation: MUSTARD SEEDS are commonly adulterated with ARGEMONE SEEDS (*Argemone mexicana*) — they look similar to mustard but are toxic. Argemone seeds contain sanguinarine alkaloid which causes EPIDEMIC DROPSY — characterised by swelling of legs and heart failure. The detection test: pressing the seed — mustard is yellow inside, argemone is white.

Q.21 — Correct: (B)

Wrong: (a) A, B, D, E

CORRECT: (b) A, D, E, K

Wrong: (c) A, C, D, K

Wrong: (d) B-complex, C, D, E

Explanation: Fat-soluble vitamins: A, D, E, K — remembered by mnemonic 'ADEK'. They are stored in adipose tissue and liver and can accumulate to toxic levels with excess supplementation. ALL B vitamins and Vitamin C are WATER-SOLUBLE — excess is excreted in urine.

Q.22 — Correct: (B)

Wrong: (a) An abrasion is deeper and requires suturing

CORRECT: (b) An abrasion is a superficial wound where skin is scraped off; a laceration is a deeper cut/tear through skin

Wrong: (c) Abrasions occur only from sharp objects; lacerations from rough surfaces

Wrong: (d) An abrasion always causes internal bleeding; a laceration does not

Explanation: ABRASION = superficial wound — skin is scraped off by friction/rough surface (road rash, carpet burn). Outermost epidermal layers removed. LACERATION = a cut or tear that goes deeper through the dermis, may require sutures. Abrasions do NOT typically require suturing — cleaned, antiseptic, dressed. Options (c) and (d) incorrectly reverse the mechanisms and effects.

Q.23 — Correct: (C)

Wrong: (a) Rickets

Wrong: (b) Scurvy

CORRECT: (c) Osteoporosis

Wrong: (d) Pellagra

Explanation: In ADULTS, calcium deficiency (especially combined with Vit D deficiency) causes OSTEOPOROSIS — reduced bone mineral density, making bones porous and fragile. Rickets is calcium/Vit D deficiency in CHILDREN (soft/bent bones). Scurvy = Vit C deficiency. Pellagra = Niacin (B3) deficiency.

Q.24 — Correct: (B)

Wrong: (a) 10–20 g/hr

CORRECT: (b) 30–60 g/hr

Wrong: (c) 80–100 g/hr

Wrong: (d) 120+ g/hr

Explanation: Current sports nutrition guidelines recommend 30–60 g of carbohydrates per hour during prolonged exercise (>60–90 minutes). This is typically achieved through sports drinks, gels, or easily digestible foods. More than 60 g/hr may cause gastrointestinal distress; multiple carbohydrate types (glucose + fructose) can increase absorption to 90 g/hr in elite athletes with trained guts.

Q.25 — Correct: (C)

Wrong: (a) 1954

Wrong: (b) 1968

CORRECT: (c) 2006

Wrong: (d) 2014

Explanation: FSSAI = Food Safety and Standards Authority of India was established under the FOOD SAFETY AND STANDARDS ACT, 2006. This replaced the older Prevention of Food Adulteration Act (PFA) 1954. FSSAI regulates manufacture, storage, distribution, sale, and import of food to ensure quality and safety.

Q.26 — Correct: (B)

Wrong: (a) Kyphosis

CORRECT: (b) Knock Knees

Wrong: (c) Scoliosis

Wrong: (d) Flat Feet

Explanation: The butterfly exercise (Baddha Konasana / butterfly stretch) specifically targets the HIP ADDUCTOR muscles and inner thigh strengthening — directly addressing the muscular imbalance in KNOCK KNEES (Genu Valgum). For knock knees, hip abductor and external rotator strengthening is also needed. Kyphosis = back extension exercises; Scoliosis = lateral trunk stretching; Flat feet = intrinsic foot exercises.

Q.27 — Correct: (D)

Wrong: (a) Comminuted fracture

Wrong: (b) Transverse fracture

Wrong: (c) Oblique fracture

CORRECT: (d) Greenstick fracture

Explanation: GREENSTICK fracture occurs EXCLUSIVELY in children because their bones are more flexible and porous (higher organic/collagen content relative to mineral content). The bone bends and cracks incompletely on the tension side — like a green stick. Adult bones are more brittle and fracture completely. Comminuted, transverse, and oblique fractures can occur in any age group.

Q.28 — Correct: (B)

Wrong: (a) Reducing glycogen stores in the liver

CORRECT: (b) Reducing haemoglobin levels, which decreases oxygen-carrying capacity of blood to working muscles

Wrong: (c) Causing joint pain that limits range of motion

Wrong: (d) Reducing testosterone levels, causing muscle weakness

Explanation: Iron is a core component of HAEMOGLOBIN (in red blood cells) and MYOGLOBIN (in muscle). Iron deficiency reduces haemoglobin production → less oxygen transported to working muscles → reduced aerobic capacity (VO₂ max), faster fatigue, impaired endurance performance. This is why female endurance athletes (with menstrual blood loss) are especially vulnerable to iron deficiency.

Q.29 — Correct: (B)

Wrong: (a) A contusion is caused by a twisting injury; a sprain by direct impact

CORRECT: (b) A contusion involves soft tissue damage from BLUNT FORCE without skin break; a sprain involves ligament stretching/tearing

Wrong: (c) A contusion always requires surgical management; a sprain does not

Wrong: (d) A contusion only affects bone; a sprain only affects muscle

Explanation: CONTUSION = blunt force trauma causing bleeding into soft tissue (muscle, subcutaneous tissue) WITHOUT breaking the skin. Visible as a bruise/discolouration. SPRAIN = injury to LIGAMENT at a joint due to abnormal joint movement (twist/wrench), not typically direct blunt force. Options (a), (c), (d) all incorrectly describe or reverse the mechanisms.

Q.30 — Correct: (C)

Wrong: (a) A large meal of rice, dal, and vegetable curry

Wrong: (b) A high-fat breakfast like puri and aloo sabzi

CORRECT: (c) A banana or sports drink (easily digestible simple carbohydrate)

Wrong: (d) A protein shake with 40g whey protein

Explanation: 30–60 MINUTES before competition: need EASILY DIGESTIBLE, SIMPLE CARBOHYDRATES that rapidly raise blood glucose without causing GI distress. A banana (provides ~25g quickly available carbohydrate) or sports drink is ideal. Option (a) — large heavy meal would cause discomfort and blood diversion to digestion. Option (b) — HIGH FAT slows gastric

emptying significantly. Option (d) — high protein close to event causes GI stress and provides no immediate energy.

Q.31 — Correct: (C)

Wrong: (a) Direct blow perpendicular to the bone

Wrong: (b) Extreme pulling force along the bone length

CORRECT: (c) Combined rotational and compressive force creating a diagonal break

Wrong: (d) Bending force on a child's flexible bone

Explanation: OBLIQUE fracture = diagonal break line, caused by combined ROTATIONAL + COMPRESSIVE (axial) forces. The bone twists and compresses simultaneously, creating a diagonal fracture line. Common in skiing (twisted ankle in boot), football, and other rotational sports. Option (a) = typically causes Transverse fracture. Option (d) = Greenstick fracture mechanism.

Q.32 — Correct: (C)

Wrong: (a) Calcium

Wrong: (b) Iron

CORRECT: (c) Magnesium

Wrong: (d) Zinc

Explanation: MAGNESIUM (Mg²⁺) is a required cofactor for ATP synthesis — specifically, it forms a complex with ATP (Mg-ATP) that is the actual biologically active form of ATP used by all ATPase enzymes. Magnesium is involved in over 300 enzymatic reactions including all those producing or using ATP. Athletes lose significant magnesium in sweat. Iron is for haemoglobin. Calcium is for bone/muscle contraction. Zinc is for immune function and protein synthesis.

Q.33 — Correct: (B)

Wrong: (a) ISO mark and HACCP certification

CORRECT: (b) FSSAI license number, AGMARK (for agricultural products), ISI mark

Wrong: (c) WHO certification and Codex Alimentarius mark

Wrong: (d) EU food safety mark and FDA approval

Explanation: For INDIAN consumers, key food safety marks are: FSSAI LICENSE NUMBER (14-digit number on all packaged food), AGMARK (Agricultural Mark — quality certification for farm produce), ISI MARK (Bureau of Indian Standards — for packaged food products). WHO certification and EU marks are international; ISO/HACCP are process certifications not typically visible to consumers.

Q.34 — Correct: (C)

Wrong: (a) Vitamin A

Wrong: (b) Vitamin C

CORRECT: (c) Vitamin D

Wrong: (d) Vitamin K

Explanation: VITAMIN D (Calciferol) is unique — the body synthesises it when ultraviolet B (UVB) radiation from sunlight hits the skin and converts 7-dehydrocholesterol to pre-Vitamin D₃, which is then activated in the liver and kidney. This is why Vitamin D is called the 'sunshine vitamin'. Deficiency is common in people with low sun exposure (indoor work, dark skin, high-latitude regions).

Q.35 — Correct: (C)

Wrong: (a) 500 ml of fluid

Wrong: (b) 1000 ml (1 litre) exactly

CORRECT: (c) 1500 ml (150% of fluid lost)

Wrong: (d) 2000 ml

Explanation: Sports nutrition guidelines recommend drinking 150% of the fluid deficit — i.e., 1500 ml per 1 kg weight lost. The reason for 150% (not 100%) is that some of the fluid will be lost in urine production stimulated by rehydration. Body weight before and after exercise is the most practical measure of fluid loss (1 kg weight loss = approximately 1 litre fluid deficit).

Q.36 — Correct: (C)

Wrong: (a) Less than 10 degrees

Wrong: (b) 10–25 degrees (mild)

CORRECT: (c) 25–40 degrees (moderate)

Wrong: (d) More than 50 degrees

Explanation: Scoliosis management by Cobb angle: <10 degrees = observation only; 10–25 degrees = physiotherapy/exercise; 25–40 degrees = BRACING (Milwaukee brace or Boston brace) to prevent further progression; >40–50 degrees = SURGERY (spinal fusion). Bracing is most effective during growth spurts in adolescents. It cannot correct existing curves but prevents worsening.

Q.37 — Correct: (B)

Wrong: (a) Stretching of a muscle beyond its normal range

CORRECT: (b) Partial or complete displacement of a bone from its normal articulation in a joint

Wrong: (c) A crack in the bone surface without complete separation

Wrong: (d) Inflammation of a tendon due to overuse

Explanation: DISLOCATION = bone is partially (subluxation) or completely displaced from its normal position in the joint cavity. The joint surfaces are no longer in contact as they should be. Most common dislocations in sport: shoulder (glenohumeral), finger (interphalangeal), patella (kneecap). Option (c) = stress fracture or incomplete fracture. Option (d) = tendinitis/tendinopathy.

Q.38 — Correct: (B)

Wrong: (a) The body can make them but only during childhood

CORRECT: (b) The body CANNOT synthesise them due to lack of specific desaturase enzymes

Wrong: (c) They are too large to be manufactured in body cells

Wrong: (d) They are only found in animal products which must be consumed daily

Explanation: EFAs (Omega-6: Linoleic acid, Omega-3: Alpha-linolenic acid) are ESSENTIAL because humans lack the specific DESATURASE ENZYMES needed to introduce double bonds at the omega-3 and omega-6 positions of the carbon chain. These must therefore come from dietary sources. Option (a) — not age-dependent. Option (c) — molecular size is not the reason. Option (d) — plant sources (flaxseed, walnuts, hemp) provide ALA (Omega-3).

Q.39 — Correct: (B)

Wrong: (a) Attempting to straighten the limb to its natural position before splinting

CORRECT: (b) Immobilising the fracture in the POSITION FOUND, including joints above and below the fracture site

Wrong: (c) Applying a tight tourniquet above the fracture to prevent swelling

Wrong: (d) Encouraging the athlete to walk on it to determine if it is broken or just a sprain

Explanation: GOLD STANDARD for fracture first aid: DO NOT move or manipulate the fracture. IMMOBILISE IN POSITION FOUND — a splint should include the joint ABOVE and BELOW the fracture to prevent movement at the fracture site. Option (a) — straightening a fractured limb can cause severe additional damage (nerves, vessels). Option (c) — tourniquet is not appropriate for fractures (unless arterial bleeding). Option (d) — weight bearing on a fracture risks displacement and further damage.

Q.40 — Correct: (B)

Wrong: (a) It does not affect red blood cells — only causes neurological symptoms

CORRECT: (b) It causes MEGALOBLASTIC anaemia — abnormally large, immature RBCs that cannot function properly

Wrong: (c) It reduces haemoglobin's ability to bind oxygen without changing RBC size

Wrong: (d) It only occurs in people who eat meat and is prevented by vegetarian diet

Explanation: B12 deficiency causes MEGALOBLASTIC (Pernicious) ANAEMIA — large, abnormal, immature red blood cells (megaloblasts) that fail to divide properly during maturation. They are too big and fragile to function. IRON deficiency anaemia = small (microcytic), pale (hypochromic) RBCs. The difference is the cell size: B12 deficiency = large cells; Iron deficiency = small cells. B12 deficiency ALSO causes neurological symptoms (subacute combined degeneration). Option (d) is REVERSED — vegetarians are MORE at risk as B12 is almost exclusively in animal products.

— MATCH THE FOLLOWING —

Q.41 — Correct: (B)

Wrong: (a) 1-S, 2-R, 3-P, 4-Q

CORRECT: (b) 1-R, 2-S, 3-Q, 4-P

Wrong: (c) 1-P, 2-Q, 3-R, 4-S

Wrong: (d) 1-Q, 2-P, 3-S, 4-R

Explanation: Vitamin C (1) = R (Scurvy — bleeding gums, poor wound healing); Vitamin D (2) = S (Rickets in children — soft bent bones, Osteomalacia in adults); Vitamin B3 Niacin (3) = Q (Pellagra — the 3Ds: Dermatitis, Diarrhoea, Dementia); Vitamin B1 Thiamine (4) = P (Beriberi — peripheral neuropathy, wet or dry type). Option (a) reverses Scurvy and Rickets. These are foundational vitamin-disease pairings.

Q.42 — Correct: (C)

Wrong: (a) 1-Q, 2-S, 3-P, 4-R

Wrong: (b) 1-P, 2-R, 3-Q, 4-S

CORRECT: (c) 1-S, 2-Q, 3-R, 4-P

Wrong: (d) 1-R, 2-P, 3-S, 4-Q

Explanation: Sprain (1) = S (Ligament — stretching/tearing of bone-to-bone connective tissue); Strain (2) = Q (Muscle or Tendon — stretching/tearing of muscle-to-bone structure); Contusion (3) = R (Soft tissue bruise from blunt force — no skin break); Dislocation (4) = P (Bone displaced out of its normal joint position). Sprain vs Strain is the most commonly confused pair — S for Sprain/S for ligament; St for Strain/St for stretch.

Q.43 — Correct: (B)

Wrong: (a) 1-P, 2-Q, 3-R, 4-S

CORRECT: (b) 1-S, 2-R, 3-Q, 4-P

Wrong: (c) 1-R, 2-P, 3-S, 4-Q

Wrong: (d) 1-Q, 2-S, 3-P, 4-R

Explanation: Greenstick (1) = S (incomplete, bends on one side, children only — most distinctive feature); Comminuted (2) = R (3 or more fragments — shattered from high-energy trauma); Oblique (3) = Q (diagonal/angled break from rotational + compression forces); Transverse (4) = P (perpendicular break from direct blow). All four fracture types and their features are standard CUET examination material.

— ADDITIONAL MCQs —

Q.44 — Correct: (B)

Wrong: (a) They are needed in the highest quantities among all amino acids

CORRECT: (b) They cannot be synthesised by the human body and must be obtained from diet

Wrong: (c) They are only found in animal protein sources

Wrong: (d) They form the structural backbone of all human proteins

Explanation: ESSENTIAL amino acids = those that the human body CANNOT synthesise in adequate amounts due to lack of biosynthetic pathways. There are 9: Leucine, Isoleucine, Valine (BCAAs), Lysine, Methionine, Phenylalanine, Threonine, Tryptophan, Histidine. They MUST come from food. Non-essential amino acids CAN be synthesised by the body from other compounds.

Q.45 — Correct: (B)

Wrong: (a) Butterfly exercise

CORRECT: (b) Towel scrunching and marble pick-up with toes

Wrong: (c) Cat-cow stretch

Wrong: (d) Plank exercise

Explanation: FLAT FEET (Pes Planus) — the fallen arch needs to be restored through INTRINSIC FOOT MUSCLE strengthening. Towel scrunching (curling toes to scrunch a towel toward you) and marble pick-up (picking marbles with toes) specifically activate and strengthen the intrinsic foot muscles that support the arch. Butterfly = knock knees; Cat-cow = spinal

mobility; Plank = core strength.

Q.46 — Correct: (A)

CORRECT: (a) Cooking oil / Mustard oil

Wrong: (b) Wheat flour

Wrong: (c) Milk

Wrong: (d) Chilli powder

Explanation: EPIDEMIC DROPSY (sanguinarine toxicity) most commonly occurs when MUSTARD OIL is adulterated with ARGEMONE OIL (extracted from argemone seeds). Sanguinarine alkaloid in argemone inhibits oxidative enzymes, causing peripheral oedema (swelling), cardiac failure, and death. Several outbreaks have occurred in India. The seeds visually resemble mustard and are mixed in to increase bulk.

Q.47 — Correct: (C)

Wrong: (a) A 100m sprint athlete (10 seconds duration)

Wrong: (b) A powerlifter (explosive 3-second effort)

CORRECT: (c) A marathon runner (42 km — >2 hours duration)

Wrong: (d) A gymnast (90-second routine)

Explanation: Carbohydrate loading is ONLY beneficial for ENDURANCE events lasting MORE THAN 90 minutes. Glycogen depletion is not a limiting factor in short-duration high-intensity events (sprint, powerlifting, gymnastics) as they rely on ATP-PCr and anaerobic glycolysis systems. For a 42 km marathon (2–4+ hours), glycogen stores are the critical limiting factor — carb loading directly delays fatigue.

Q.48 — Correct: (C)

Wrong: (a) Protection

Wrong: (b) Rest

CORRECT: (c) Heat application

Wrong: (d) Elevation

Explanation: PRICE = Protection, Rest, Ice, Compression, Elevation. HEAT is NOT part of PRICE. In fact, HEAT is CONTRAINDICATED in the ACUTE phase (first 48–72 hours) of injury because it increases vasodilation and bleeding, worsening swelling and inflammation. HEAT is only used in the SUBACUTE phase (after 72 hours) or for chronic injuries/muscle stiffness. ICE is the correct acute-phase modality.

Q.49 — Correct: (B)

Wrong: (a) Hamstrings and calf muscles

CORRECT: (b) Core/abdominal muscles and tight hip flexors

Wrong: (c) Shoulder and upper back muscles

Wrong: (d) Knee extensors (quadriceps)

Explanation: LORDOSIS (excessive lumbar inward curve) is most commonly caused by WEAK CORE/ABDOMINAL muscles combined with TIGHT HIP FLEXORS. Weak abs fail to maintain anterior pelvic tilt control; tight hip flexors (iliopsoas, rectus femoris) pull the pelvis anteriorly (forward), increasing lumbar arch. Corrective exercises target core strengthening (planks) and hip flexor stretching (lunge stretches).

Q.50 — Correct: (B)

Wrong: (a) A diet that contains only proteins and carbohydrates in equal measure

CORRECT: (b) A diet that provides all essential nutrients in the right proportions to maintain health and support physical activity

Wrong: (c) A diet that has equal caloric contribution from each of the three macronutrients

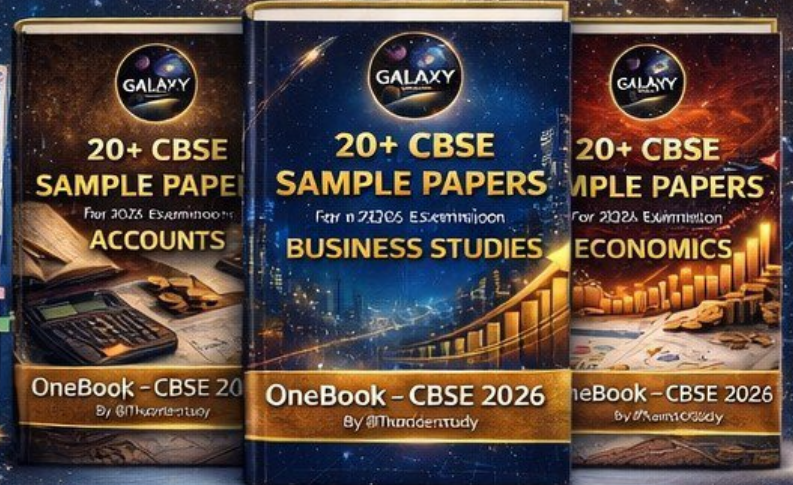
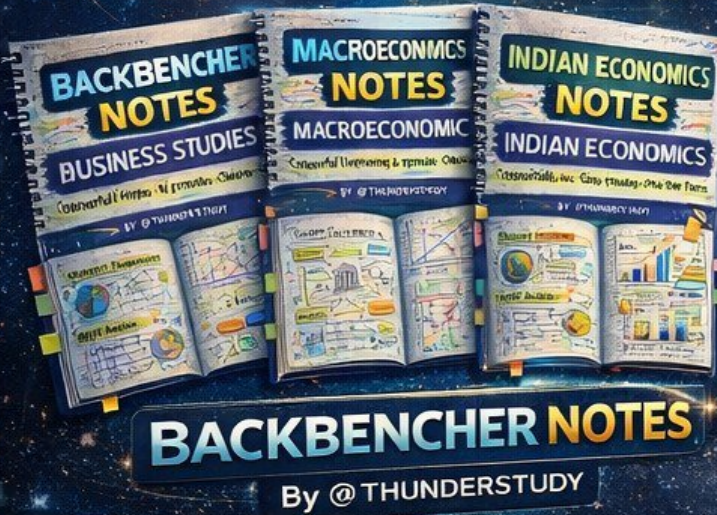
Wrong: (d) A diet that eliminates all processed and refined foods completely

Explanation: A BALANCED DIET contains ALL essential nutrients (carbohydrates, proteins, fats, vitamins, minerals, water, fibre) in the RIGHT PROPORTIONS for the individual's age, sex, and activity level. It is based on recommended guidelines (ICMR): 55–65% carbs, 10–15% protein, 20–30% fat, adequate vitamins, minerals, water, and fibre. It is not equal macros (option c), not just two nutrients (option a), and not about elimination (option d).

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