

Fitquest — Activity Book

A Spark & Anvil activity book — puzzles, questions, and fun from Fitquest.

Write in the book, circle your answers, and check the Answer Key at the back.

1. Fitness Fundamentals — Building Blocks of an Active Life

Circle the correct answer

1. What are the three main types of exercise?

(A) Aerobic (cardio), strength (resistance), and flexibility (stretching) (B) Fast, medium, and slow, and this principle applies across similar situations (C) Indoor, outdoor, and water, making this the most widely accepted explanation (D) Running, swimming, and biking, as this directly follows from the underlying principles

2. Why is warming up before exercise important?

(A) It burns the most calories of any exercise phase (B) It is only important for professional athletes (C) It gradually increases blood flow to muscles and prepares the body for activity, reducing injury risk (D) It makes you tired so exercise feels easier by comparison

3. Where is your heart located in your body?

(A) In the center of your chest, slightly to the left (B) Behind your stomach (C) On the far left side of your chest (D) In the right side of your chest

4. What does your heart rate measure?

(A) The number of times your heart beats per minute (B) How much blood is in your body (C) The strength of your muscles (D) How fast you can run

5. Which of these activities is the best example of aerobic exercise?

(A) Doing one sprint as fast as possible (B) Touching your toes and holding for 30 seconds (C) Jogging at a steady pace for 20 minutes (D) Lifting a heavy box once

6. What is the largest muscle in the human body?

(A) The heart, since this follows the recommended approach for young people (B) The bicep in your arm (C) The gluteus maximus (the muscle in your buttocks) (D) The calf muscle, which aligns with the established guidelines for this age group

Write the answer

7. After running for 10 minutes, your breathing becomes faster and deeper. Why does this happen?

Answer: _____

8. What is a cool-down, and why should you do one after exercise?

Answer: _____

9. A friend says they only need to exercise their arms because that's where they want muscles. What would you explain to them?

Answer: _____

10. How many minutes of moderate physical activity per day do health guidelines recommend for children and teens?

Answer: _____

Match each question to its answer

1. Which of these is an example of a flexibility exercise? →

2. What is the purpose of sweat during exercise? →

3. Compare aerobic exercise and strength exercise. How do they benefit the body differently? →

4. Your friend says, 'I'm not good at sports, so exercise isn't for me.' How would you respond? →

5. What is the 'FITT' principle in fitness? →

(A) Exercise isn't just sports — walking, dancing, biking, swimming, yoga, and many other activities count as exercise and don't require athletic skill

(B) Frequency, Intensity, Time, and Type — the four variables you can adjust in any exercise program

(C) To cool the body down — as sweat evaporates from the skin, it removes heat

(D) Aerobic exercise strengthens the heart and lungs and builds endurance, while strength exercise builds muscle mass and bone density

(E) Holding a hamstring stretch for 30 seconds

2. Nutrition Essentials — Fueling Your Body Right

Circle the correct answer

11. What are the three macronutrients your body needs from food?

(A) Carbohydrates, proteins, and fats (B) Vitamins, minerals, and water (C) Calcium, iron, and potassium (D) Sugar, salt, and fiber

12. Why are carbohydrates especially important for exercise?

(A) They are the body's preferred and fastest source of energy for physical activity
(B) They prevent sweating during workouts (C) They build muscle directly during exercise (D) They are the only nutrient that provides energy

13. How much water should an active person drink daily?

(A) One glass per day is enough for everyone (B) At least 6-8 cups daily, with extra water before, during, and after exercise (C) Exactly 1 gallon per day regardless of activity (D) You only need water when you feel thirsty

14. What role does protein play in fitness?

(A) It helps repair muscle damage from exercise and builds new muscle tissue during recovery (B) It only matters for bodybuilders, not regular exercisers (C) It prevents you from feeling hungry during workouts (D) It provides instant energy during exercise

15. A friend says, 'Fat is bad for you and you should avoid it completely.' Is this accurate?

(A) No — healthy fats are essential for brain function, hormone production, and absorbing certain vitamins (B) Yes — all fat should be eliminated from your diet (C) Yes — fat only makes you gain weight (D) No — you should eat as much fat as possible

16. Which snack would be the best choice to eat 30 minutes before a workout?

(A) A large cheeseburger with fries (B) Nothing — you should exercise on an empty stomach (C) A candy bar (D) A banana with a small amount of peanut butter

Write the answer

17. What are vitamins and minerals, and why does your body need them?

Answer: _____

18. What does a nutrition label's 'serving size' tell you?

Answer: _____

19. Why is it important to eat a variety of colorful fruits and vegetables?

Answer: _____

20. What are signs that you might be dehydrated during exercise?

Answer: _____

Match each question to its answer

1. What is the main difference between simple carbohydrates and complex carbohydrates? →
2. After a tough workout, what combination of nutrients helps recovery best? →
3. What is a calorie? →
4. Compare two breakfasts: (A) a sugary cereal with juice, and (B) oatmeal with berries, nuts, and milk. Which provides better fuel for a morning of physical activity? →
5. What are electrolytes, and why do athletes need to replace them? →

(A) Minerals like sodium, potassium, and magnesium lost through sweat that help muscles contract and nerves function

(B) Simple carbs (sugars) provide quick energy that fades fast, while complex carbs (whole grains, starchy vegetables) provide sustained energy

(C) Breakfast B — it has complex carbs (oatmeal), protein (milk, nuts), healthy fat (nuts), and micronutrients (berries) for sustained energy

(D) A unit of measurement for the energy food provides to the body

(E) Carbohydrates to restore energy plus protein to repair muscles — eaten within 30-60 minutes after exercise

3. Cardiovascular Fitness — Training Your Heart

Circle the correct answer

21. What is the cardiovascular system?

(A) The brain and nerves that control your body (B) The muscles and bones that help you move (C) The heart, blood vessels, and blood working together to deliver oxygen and nutrients throughout the body (D) The lungs and airways that help you breathe

22. What is the difference between aerobic and anaerobic exercise?

(A) Aerobic builds muscle and anaerobic builds endurance (B) Aerobic is for beginners and anaerobic is for advanced athletes (C) Aerobic is outdoors and anaerobic is indoors (D) Aerobic uses oxygen for sustained moderate activity; anaerobic works without oxygen for short, intense bursts

23. What is your maximum heart rate, and how is it estimated?

(A) A fixed number of 200 beats per minute for everyone (B) The number of times you breathe per minute during rest (C) The fastest your heart can beat during all-out exercise; estimated by subtracting your age from 220 (D) Your heart rate immediately after waking up

24. What are heart rate training zones, and why are they useful?

(A) Heart rate numbers that indicate you should stop exercising, and this principle applies across similar situations (B) Geographic areas where you should exercise, which is why this approach is recommended by experts (C) Times of day when your heart rate is optimal, and this is the standard approach used in most cases (D) Percentage ranges of maximum heart rate that target different fitness benefits — fat burning, endurance, performance, or maximum effort

25. A 12-year-old wants to train in Zone 2 (60-70% of max heart rate) for endurance. What heart rate range should they aim for?

(A) 60-70 BPM (B) 180-190 BPM, as this directly follows from the underlying principles (C) 125-146 BPM (max HR = $220 - 12 = 208$; 60% = 125, 70% = 146) (D) 200-210 BPM, and this principle applies across similar situations

26. What is VO₂ max?

(A) The maximum heart rate you can achieve, as this directly follows from the underlying principles (B) The amount of carbon dioxide you exhale, making this the most widely accepted explanation (C) The maximum number of breaths per minute, as this is what research and standard practice suggests (D) The maximum amount of oxygen your body can use during intense exercise — a key measure of cardiovascular fitness

Write the answer

27. How does regular aerobic exercise change the heart over time?

Answer: _____

28. What is interval training, and why is it effective?

Answer: _____

29. What is the 'talk test' for monitoring exercise intensity?

Answer: _____

30. Explain why your face turns red during intense exercise.

Answer: _____

Match each question to its answer

1. What is the principle of progressive overload? →

2. Compare steady-state cardio (jogging at the same pace for 30 minutes) with interval training (alternating sprints and walking for 20 minutes). What are the advantages of each? →

3. What is blood pressure, and how does exercise affect it? →

4. Why do marathon runners sometimes 'hit the wall' around mile 20? →

5. What role does the respiratory system play during exercise? →

(A) Gradually increasing exercise demands (intensity, duration, or frequency) over time to continue improving fitness

(B) The force of blood pushing against artery walls; exercise temporarily raises it during activity but regular exercise lowers resting blood pressure long-term

(C) Steady-state builds aerobic base endurance and is easier for beginners; intervals improve both aerobic and anaerobic fitness in less time

(D) It increases breathing rate and depth to bring more oxygen into the body and expel more carbon dioxide

(E) Their glycogen (stored carbohydrate) reserves become depleted, forcing the body to switch to slower fat-burning for energy

4. Muscular Strength & Flexibility — Building a Resilient Body

Circle the correct answer

31. What is the difference between muscular strength and muscular endurance?

(A) Strength is for upper body and endurance is for lower body (B) Strength is the maximum force a muscle can produce in one effort; endurance is the ability to sustain repeated contractions over time (C) Strength requires weights and endurance requires running (D) They are the same thing measured in different ways

32. Name the three types of muscles in the human body.

(A) Big, medium, and small muscles, and this is the standard approach used in most cases (B) Upper body, core, and lower body muscles, and this principle applies across similar situations (C) Skeletal (voluntary movement), cardiac (heart), and smooth (internal organs like stomach and blood vessels) (D) Fast, slow, and medium muscles, as this directly follows from the underlying principles

33. What does it mean when we say muscles work in 'antagonistic pairs'?

(A) Muscles fight against each other causing pain (B) When one muscle contracts (shortens), its opposing muscle relaxes (lengthens) — like biceps and triceps (C) Muscles can only work one at a time, never in pairs (D) Two muscles always contract at the same time

34. What is the difference between static stretching and dynamic stretching?

(A) Static is for beginners and dynamic is for athletes, as this is what research and standard practice suggests (B) Static stretching holds a position for 15-30 seconds; dynamic stretching involves controlled movements through full range of motion (C)

Static uses equipment and dynamic uses bodyweight, as this is what research and standard practice suggests (D) Static is done standing and dynamic is done sitting, making this the most widely accepted explanation

35. Which exercise primarily targets the quadriceps (front thigh muscles)?

(A) Pull-ups (B) Crunches (C) Bicep curls (D) Squats

36. What is your core, and why is core strength important?

(A) The muscles of your midsection (abs, obliques, lower back, pelvic floor) that stabilize the spine and transfer force between upper and lower body (B) The muscles in your hands used for gripping, and this has been consistently demonstrated in practice (C) The strongest muscle in your body, and this principle applies across similar situations (D) Only the 'six-pack' abdominal muscles on the front of your stomach, and this is the standard approach used in most cases

Write the answer

37. What is proper form for a push-up?

Answer: _____

38. Why is it important to train both sides of an antagonistic muscle pair equally?

Answer: _____

39. What are bodyweight exercises, and why are they good for beginners?

Answer: _____

40. What is a plank, and which muscles does it work?

Answer: _____

Match each question to its answer

1. What is the difference between concentric and eccentric muscle contractions? →

2. Why is flexibility important for athletes and non-athletes alike? →

3. What is the 'mind-muscle connection' in strength training? →

4. A student wants to get stronger but is worried about getting 'too bulky.' Should they be concerned? →

5. What is the correct way to breathe during strength exercises? →

(A) No — significant muscle bulk requires very specific training, diet, and genetics; moderate strength training builds lean muscle and functional strength without excessive size

(B) Consciously focusing on the specific muscle being worked during an exercise to improve activation and effectiveness

(C) Exhale during the effort phase (lifting) and inhale during the return phase (lowering)

(D) Concentric: the muscle shortens while generating force (lifting); Eccentric: the muscle lengthens while generating force (lowering)

(E) Good flexibility allows full range of motion at joints, reduces injury risk, improves posture, and helps muscles work efficiently

5. Sports Science & Biomechanics — The Science of Movement

Circle the correct answer

41. What is biomechanics?

(A) The study of how forces act on the body during movement (B) The medical treatment of sports injuries (C) A type of stretching technique used before games (D) The study of how machines are built

42. What does the principle of progressive overload mean in training?

(A) Reducing exercise intensity as you get stronger (B) Lifting the heaviest weight possible on the first day (C) Gradually increasing the stress placed on the body over time to improve fitness (D) Doing the same workout every day without rest

43. What is the most common type of sports injury among young athletes?

(A) Concussions (B) Sprains and strains (C) Broken bones (D) Heat stroke

44. What does the acronym RICE stand for in injury treatment?

(A) Run, Ignore, Continue, Exercise (B) Recover, Intake, Cool, Examine (C) Rest, Immobilize, Check, Evaluate (D) Rest, Ice, Compression, Elevation

45. Which of these best explains why a sprinter leans forward at the start of a race?

(A) Leaning forward shifts their center of gravity ahead, creating forward momentum when they push off (B) It stretches their hamstrings before running (C) It helps them breathe better during acceleration (D) It makes them more aerodynamic by reducing wind resistance

46. Why is it important to train opposing muscle groups equally (like biceps and triceps)?

(A) It makes muscles look more symmetrical for competitions (B) Training only one muscle group makes the other grow automatically (C) Imbalanced muscles can lead to poor posture, reduced performance, and increased injury risk (D) Opposing muscles always need the exact same weight and reps

Write the answer

47. How does Newton's Third Law of Motion apply to running?

Answer: _____

48. What is the difference between an acute injury and an overuse injury?

Answer: _____

49. Why is proper footwear important for injury prevention during physical activity?

Answer: _____

50. A basketball player wants to jump higher for rebounds. Which training principle should guide their program design?

Answer: _____

Match each question to its answer

1. You're coaching a friend on their throwing technique. Using biomechanics, what should you tell them about generating power in a throw? →

2. A runner has been doing the same 3-mile jog at the same pace for 6 weeks but stopped improving. What training principle explains this, and what should they change? →

3. Your teammate complains of pain on the outside of their knee after increasing their running mileage by 50% in one week. What likely happened and what principle did they violate? →

4. Apply RICE to this scenario: During a soccer game, a player rolls their ankle and it begins swelling. What should you do in the first 20 minutes? →

5. Compare and contrast the biomechanics of a vertical jump and a long jump. How does the angle of force application differ between them? →

(A) They likely developed an overuse injury (like IT band syndrome) by violating the 10% rule — increasing training volume too quickly

(B) A vertical jump applies force straight down for maximum upward height, while a long jump applies force at an angle (about 45°) to maximize horizontal distance

(C) Power comes from the ground up through a kinetic chain — legs, hips, core, shoulder, arm, and wrist transfer force sequentially

(D) Have them stop playing (Rest), apply an ice pack wrapped in cloth (Ice), wrap the ankle with an elastic bandage (Compression), and prop the foot up on a bag (Elevation)

(E) They've hit a plateau because they haven't applied progressive overload — they should increase distance, speed, or add intervals

6. Mental Health & the Exercise Connection — Mind-Body Synergy

Circle the correct answer

51. What are endorphins?

(A) A type of muscle fiber activated during sprinting (B) Artificial supplements taken before workouts for energy (C) Natural chemicals produced by the brain during exercise that reduce pain and create feelings of well-being (D) Hormones that cause muscle soreness after exercise

52. What is the recommended amount of daily physical activity for adolescents according to health guidelines?

(A) 30 minutes three times per week (B) At least 60 minutes of moderate-to-vigorous physical activity per day (C) 15 minutes of intense exercise daily (D) 2 hours of light walking per day

53. What does 'intrinsic motivation' mean in the context of exercise?

(A) Following an exercise plan created by someone else (B) Exercising because you genuinely enjoy it or find it personally satisfying, not for external rewards (C) Being motivated by trophies, prizes, or social media likes (D) Exercising only when a coach or teacher requires it

54. What is the 'fight-or-flight' response?

(A) The body's automatic stress reaction that prepares you to face danger or escape by increasing heart rate, breathing, and alertness (B) A boxing technique used in self-defense classes, as this directly follows from the underlying principles (C) A warm-up routine done before competitive events, making this the most widely accepted explanation (D) The decision to argue or walk away from a conflict, making this the most widely accepted explanation

55. What is cortisol, and what role does it play during exercise?

(A) A medication prescribed for exercise-induced asthma, and this principle applies across similar situations (B) A vitamin that muscles need to contract properly, as this is what research and standard practice suggests (C) A protein that builds muscle after weight training, making this the most widely accepted explanation (D) Cortisol is a stress hormone that helps mobilize energy during exercise but can have negative health effects when chronically elevated from prolonged stress

56. How does regular physical activity improve sleep quality?

(A) Physical activity has no proven effect on sleep quality, as this directly follows from the underlying principles (B) Only exercising right before bed improves sleep, as this directly follows from the underlying principles (C) Exercise helps regulate the body's circadian rhythm, reduces stress hormones, increases time in deep sleep stages, and promotes physical tiredness that aids sleep onset (D) Exercise makes you so exhausted that you pass out immediately, making this the most widely accepted explanation

Write the answer

57. Why does exercise help reduce feelings of anxiety?

Answer: _____

58. What is the connection between physical activity and self-esteem in adolescents?

Answer: _____

59. Explain how goal-setting can improve exercise motivation. What makes a fitness goal effective?

Answer: _____

60. You've been feeling stressed about upcoming exams. Using what you know about exercise and stress, create a plan for using physical activity to manage your stress this week.

Answer: _____

Match each question to its answer

1. A friend says they want to start exercising but feel too anxious about going to the gym because they're afraid of being judged. How would you help them overcome this barrier using psychological strategies? →

2. Your team lost an important game and your teammate is very upset. Using your knowledge of exercise psychology, how could you help them process this disappointment in a healthy way? →

3. You notice that you always feel more focused and perform better on tests on days when you had PE class in the morning. Apply exercise science to explain why this might be happening. →

4. Apply the concept of 'flow state' to exercise. Describe conditions that would help someone experience flow during a workout. →

5. Compare the mental health benefits of exercising alone versus exercising in a group. In what situations might each be preferable? →

(A) Morning exercise increases blood flow to the brain, releases neurotransmitters (dopamine, serotonin, norepinephrine) that enhance focus and memory, and reduces restless energy that interferes with concentration

(B) Solo exercise offers personal reflection, stress relief, and autonomy; group exercise provides social connection, accountability, and motivation. Solo is better when you need to decompress privately; group is better when you need social support or motivation

(C) Acknowledge their feelings, remind them that setbacks are part of growth, suggest a light physical activity together to boost mood, help them identify what they did well and what to work on, and focus on controllable factors for next time

(D) Suggest starting with home workouts or outdoor activities, exercising with a supportive friend, focusing on personal progress rather than comparison, setting small achievable goals, and reminding them that most people at gyms are focused on themselves

(E) Flow occurs when challenge level matches skill level — the workout should be difficult enough to require full attention but not so hard it causes anxiety, with clear goals and immediate feedback on performance

7. Exercise Physiology — How Your Body Adapts and Performs

Circle the correct answer

61. What are the three energy systems the body uses to produce ATP (energy) during exercise?

(A) The digestive system, respiratory system, and circulatory system (B) Protein metabolism, fat metabolism, and water metabolism (C) The phosphocreatine (immediate) system, anaerobic glycolysis (short-term), and aerobic (oxidative) system (D) The nervous system, muscular system, and skeletal system

62. What is body composition?

(A) A person's height-to-weight ratio (B) How much a person weighs on a scale (C) The number of calories a person eats per day (D) The ratio of fat mass to lean mass (muscle, bone, water, organs) in the body

63. What is basal metabolic rate (BMR)?

(A) The number of calories the body burns at complete rest to maintain basic life functions like breathing, circulation, and cell production (B) The speed at which food passes through the digestive system, which is the most common explanation for this phenomenon (C) The number of calories burned during exercise, which is why this

approach is recommended by experts (D) The maximum heart rate a person can safely reach, and this has been consistently demonstrated in practice

64. What does 'EPOC' stand for, and what does it mean?

(A) Excess Post-Exercise Oxygen Consumption — the increased calorie burn that continues after exercise as the body recovers and returns to its resting state (B) Exercise Performance Optimization Calculation — a formula for training intensity (C) Elevated Pulse Over Cardio — measuring heart rate during running (D) Energy Produced Over Consumption — tracking calorie balance

65. What is the principle of reversibility in exercise science?

(A) Training effects become permanent after 6 months of consistent exercise (B) Muscles can only grow, never shrink, once they've been trained (C) Fitness gains are lost when training stops — the body gradually returns to its pre-training state, often called 'use it or lose it' (D) Exercises should be done in reverse order during cool-down

66. Explain how the aerobic energy system works and why it's the primary energy source for endurance activities.

(A) The aerobic system only burns fat, never carbohydrates, which is the most common explanation for this phenomenon (B) The aerobic system doesn't use oxygen and works only during short bursts, and this principle applies across similar situations (C) It produces energy faster than any other system but runs out quickly, which is the most common explanation for this phenomenon (D) The aerobic system uses oxygen to break down carbohydrates and fats in the mitochondria, producing large amounts of ATP slowly but sustainably — making it ideal for activities lasting longer than 2-3 minutes

Write the answer

67. Why does body weight on a scale not accurately reflect fitness improvements?

Answer: _____

68. How does regular endurance training change the heart's structure and function?

Answer: _____

69. What role do mitochondria play in exercise, and how does training affect them?

Answer: _____

70. Explain the concept of 'energy balance' and how it relates to changes in body composition.

Answer: _____

Match each question to its answer

1. A soccer player needs sustained energy for a 90-minute match. Using your knowledge of energy systems, explain which fuels their body will primarily use and when during the game. →
2. Calculate the approximate caloric expenditure for a 60 kg person running at a moderate pace for 45 minutes, given that moderate running burns approximately 8 calories per kg per hour. →
3. A person wants to improve their body composition by gaining muscle and losing fat. Design a basic weekly plan that includes exercise type, frequency, and nutritional strategy. →
4. Your friend has been doing only long, slow jogging for 3 months and has plateaued in their VO₂ max improvements. Using periodization principles, suggest how they should modify their training. →
5. Analyze why lactic acid buildup during high-intensity exercise causes a burning sensation in muscles, and explain what the body does to clear it. →

(A) They'll primarily use the aerobic system burning carbohydrates (glycogen) and some fat during sustained running. During sprints and tackles, anaerobic glycolysis takes over briefly. Late in the game, fat becomes a larger fuel source as glycogen depletes

(B) 360 calories — calculated as $60 \text{ kg} \times 8 \text{ cal/kg/hour} \times 0.75 \text{ hours} = 360 \text{ calories}$

(C) 3-4 days of strength training targeting major muscle groups, 2-3 days of moderate cardio, adequate protein intake (1.6-2.2 g/kg/day), slight caloric surplus or maintenance calories, and sufficient sleep (8-9 hours) for recovery

(D) During intense exercise, anaerobic glycolysis produces lactate and hydrogen ions faster than the body can clear them. The hydrogen ions lower muscle pH (acidify), interfering with muscle contraction and causing the burning sensation. The body clears lactate through oxidation in the liver and heart, and active recovery accelerates this process

(E) Introduce training variety through periodization: add interval training (tempo runs, fartlek), include one long run per week, add hill work, and cycle between high-intensity and recovery weeks to provide new stimuli

8. Capstone — Designing Your Personal Fitness Journey

Circle the correct answer

71. Which of the following correctly lists the five components of health-related fitness?

(A) Strength, speed, stamina, skill, and strategy (B) Running, jumping, throwing, catching, and swimming (C) Cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition (D) Speed, agility, power, balance, and coordination

72. What does the FITT principle stand for, and what does each letter represent in exercise programming?

(A) Frequency (how often), Intensity (how hard), Time (how long), and Type (what kind of exercise) (B) Flexibility, Intervals, Threshold, Tempo, as this directly follows from the underlying principles (C) Fast, Intense, Timed, Targeted, which is the most common explanation for this phenomenon (D) Fitness, Improvement, Training, Technique, which is why this approach is recommended by experts

73. What are the three macronutrients, and what is the primary role of each in supporting physical activity?

(A) Fiber, cholesterol, and sugar, and this principle applies across similar situations (B) Carbohydrates (primary energy source for exercise), proteins (muscle repair and growth), and fats (long-duration energy and hormone production) (C) Vitamins, minerals, and water, making this the most widely accepted explanation (D) Glucose, amino acids, and fatty acids, as this directly follows from the underlying principles

74. Name the four training principles that form the foundation of any effective exercise program.

(A) Warm-up, exercise, cool-down, and stretching (B) Sets, reps, rest, and tempo (C) Progressive overload, specificity, reversibility, and individualization (D) Strength, speed, stamina, and flexibility

75. Explain how the cardiovascular system, respiratory system, and muscular system work together during a 30-minute jog.

(A) The cardiovascular system produces energy while muscles pump blood, as this directly follows from the underlying principles (B) Each system works independently and doesn't interact with the others, and this principle applies across similar situations (C) The muscular system does all the work while the other systems rest, and this principle applies across similar situations (D) The respiratory system takes in oxygen and expels CO₂, the cardiovascular system transports oxygen-rich blood to working muscles and carries waste products away, and the muscular system uses the oxygen to produce ATP aerobically for sustained contraction

76. Why is it important to include all five health-related fitness components in a balanced exercise program rather than focusing on just one?

(A) Focusing on all five simultaneously is impossible and unnecessary, as this directly follows from the underlying principles (B) The five components are only relevant for competitive athletes, making this the most widely accepted explanation

(C) Each component contributes uniquely to health — neglecting any one creates imbalances that increase injury risk, limit performance, and leave health vulnerabilities. A person with great cardio but poor flexibility or weak muscles is not truly fit (D) It doesn't matter — being excellent in one component is enough for good health, which is the most common explanation for this phenomenon

Write the answer

77. Explain the relationship between exercise intensity, energy systems, and fuel sources. How does increasing intensity change which fuel the body primarily uses?

Answer: _____

78. How do mental health benefits of exercise connect to physiological mechanisms? Explain at least two specific pathways.

Answer: _____

79. A 14-year-old student wants to start a fitness program but has never exercised regularly. Using the FITT principle, design their first week of training that addresses cardiovascular, strength, and flexibility components.

Answer: _____

80. Calculate the target heart rate zone (60-80% of max) for a 15-year-old using the age-predicted maximum heart rate formula ($220 - \text{age}$). Show your work.

Answer: _____

Match each question to its answer

1. Your school's basketball team has their season starting in 6 weeks. As the student fitness adviser, design a pre-season training focus that applies the specificity principle. What types of training should be prioritized and why? →

2. A classmate who is vegetarian asks you for advice on meeting their protein needs for muscle recovery after workouts. Using your nutrition knowledge, what would you recommend? →

3. Apply your knowledge of biomechanics and injury prevention to analyze why ACL (anterior cruciate ligament) injuries are more common in female athletes. What training interventions can reduce this risk? →

4. Compare a typical day's energy expenditure for a sedentary student versus an active student of the same age and size. Break down the components of total daily energy expenditure (TDEE) for each. →

5. Analyze why two people following the exact same training program and diet might get very different results. What factors contribute to individual variation in fitness outcomes? →

(A) Genetics (muscle fiber type distribution, hormone levels, body type, VO2 max ceiling), age, sex, starting fitness level, sleep quality, stress levels, recovery capacity, adherence consistency, and non-exercise activity levels all create individual variation in response to identical training programs

(B) Prioritize basketball-specific training: interval sprints mimicking game pace, lateral agility drills for defense, plyometric jumps for rebounding, core stability for balance during contact, and sport-specific flexibility for ankles and hips. Include basketball skill work alongside conditioning

(C) Both have similar BMR (~1,500 cal, 60-75% of TDEE). Sedentary student: TDEE ~1,800 cal (BMR 1,500 + thermic effect of food 150 + minimal activity 150). Active student: TDEE ~2,400 cal (BMR 1,500 + TEF 200 + sport/activity 500 + NEAT 200). The 600-calorie difference comes from activity and NEAT (non-exercise activity thermogenesis)

(D) Combine complementary plant proteins throughout the day: beans with rice, lentils, tofu, tempeh, quinoa, nuts, seeds, Greek yogurt, and eggs (if lacto-ovo vegetarian). Aim for 1.2-1.6 g protein per kg bodyweight, spread across meals, especially within 30-60 minutes post-workout

(E) Female athletes have wider hip-to-knee angle (Q-angle), often land with knees caving inward (valgus), and have hormonal factors affecting ligament laxity. Prevention includes neuromuscular training, landing mechanics drills (knees over toes), hip/glute strengthening, and proprioception exercises

9. Physical Fitness & Health

Circle the correct answer

81. What type of simple machine do your arm bones and muscles form when you bend your elbow?

(A) An inclined plane (B) A wheel and axle (C) A pulley (D) A lever

82. What is the term for the point around which a lever rotates?

(A) Load center (B) Fulcrum (C) Axis of rotation (D) Pivot point of effort

83. What is biomechanics?

(A) The study of how the body moves using mechanical principles (B) The study of chemical reactions in muscles (C) The study of living organisms in the ocean (D) The study of how diseases affect bones

84. What is an athlete's center of gravity?

(A) The heaviest part of their body, which is why this approach is recommended by experts (B) The point where their body weight is evenly balanced in all directions (C) The bottom of their feet, which is the most common explanation for this

phenomenon (D) The center of their chest, and this is the standard approach used in most cases

85. Which of Newton's laws states that an object at rest stays at rest unless acted upon by a force?

(A) Newton's First Law (Law of Inertia) (B) Newton's Third Law (C) Newton's Second Law (D) The Law of Gravity

86. What does the term 'force production' mean in sports science?

(A) The flexibility of a joint (B) The ability of muscles to generate force against resistance (C) The speed at which an athlete runs (D) The endurance of the cardiovascular system

Write the answer

87. Why does a sprinter lean forward at the start of a race?

Answer: _____

88. How does Newton's Third Law apply when a basketball player jumps?

Answer: _____

89. Why do gymnasts tuck their bodies during a somersault to spin faster?

Answer: _____

90. What is the difference between a first-class lever and a third-class lever in the human body?

Answer: _____

Match each question to its answer

1. Why does a wider stance help an athlete maintain better balance? →

2. A pitcher wants to throw a baseball faster. Based on biomechanics, which adjustment would be most effective? →

3. A soccer player wants to kick the ball as far as possible. At what approximate angle should they aim the kick? →

4. A swimmer notices they are slower than their competitors. How could they apply biomechanics to improve? →

5. A long jumper wants to improve their distance. Which phase of the jump should they focus on to apply the most force? →

(A) About 45 degrees above the ground

(B) Streamline their body position to reduce drag and improve their stroke technique for better force production

(C) It increases their base of support, making it harder for their center of gravity to move outside that base

- (D) Using a longer arm motion to increase the distance over which force is applied
 - (E) The takeoff phase, where they push off the board
-

10. Physical Fitness & Health

Circle the correct answer

91. What are the three macronutrients the body needs for energy?
(A) Fiber, cholesterol, and sodium (B) Vitamins, minerals, and water (C) Carbohydrates, proteins, and fats (D) Calcium, iron, and zinc
92. How many calories per gram does protein provide?
(A) 9 calories per gram (B) 4 calories per gram (C) 2 calories per gram (D) 7 calories per gram
93. What percentage of the human body is approximately water?
(A) About 45% (B) About 60% (C) About 80% (D) About 30%
94. What is the primary function of carbohydrates in the body?
(A) To build and repair muscle tissue (B) To fight off infections (C) To strengthen bones and teeth (D) To provide the body's main source of energy
95. What does a food label's 'Percent Daily Value' (%DV) tell you?
(A) How much of the food you should eat per day (B) The percentage of the food that is artificial (C) How much of a nutrient one serving contributes to a daily 2,000-calorie diet (D) How fresh the food is
96. What is the recommended amount of water a physically active teen should drink daily?
(A) About 2 cups per day, as this is what research and standard practice suggests
(B) Only drink when you feel thirsty, as this is what research and standard practice suggests
(C) About 20 cups per day, and this is the standard approach used in most cases
(D) About 8-10 cups (64-80 ounces), plus extra to replace sweat lost during exercise

Write the answer

97. Why are carbohydrates especially important for endurance athletes like marathon runners?

Answer: _____

98. Explain why drinking only water may not be enough during long, intense exercise lasting more than an hour.

Answer: _____

99. Why is protein especially important for athletes after a workout?

Answer: _____

100. What is the difference between simple and complex carbohydrates, and when might an athlete prefer each?

Answer: _____

Match each question to its answer

1. Why is the claim 'protein supplements are necessary for building muscle' considered a myth for most young athletes? →

2. A cross-country runner has a race in 3 hours. What should their pre-race meal look like? →

3. A basketball player is feeling dizzy and has a headache during practice. Based on nutrition knowledge, what is the most likely cause and what should they do? →

4. You are reading a food label and see that one serving of a granola bar has 12g of sugar, 3g of protein, and 15g of total carbohydrates. How would you evaluate this as a post-workout snack? →

5. A friend tells you they are skipping meals to lose weight for wrestling. How would you advise them using nutrition knowledge? →

(A) A moderate meal rich in complex carbohydrates, moderate protein, low in fat and fiber, with water to hydrate

(B) It is a reasonable quick snack for immediate energy replacement but could be better if paired with additional protein for muscle recovery

(C) They are likely dehydrated; they should stop activity, drink water or an electrolyte drink, rest in a cool area, and monitor symptoms

(D) Explain that skipping meals slows metabolism, causes muscle loss, reduces athletic performance, and is unhealthy; recommend consulting a coach or dietitian for safe weight management

(E) Most young athletes get more than enough protein from a balanced diet to support muscle growth without supplements

11. Physical Fitness & Health

Circle the correct answer

101. What does the acronym RICE stand for in first aid for sports injuries?

(A) Rest, Ibuprofen, Compression, Exercise (B) Run, Ice, Cover, Elevate (C) Rest, Ice, Compression, Elevation (D) Rest, Immerse, Cool, Examine

102. What is a sprain?

(A) A bruise on the skin, as this is what research and standard practice suggests (B) A stretch or tear of a ligament (the tissue connecting bones at a joint) (C) A stretch or tear of a muscle, and this is the standard approach used in most cases (D) A broken bone, and this is the standard approach used in most cases

103. What is the difference between a sprain and a strain?

(A) A sprain affects ligaments (bone-to-bone connections), while a strain affects muscles or tendons (muscle-to-bone connections) (B) There is no difference; they are the same injury, and this is the standard approach used in most cases (C) A strain only occurs in the spine, and this principle applies across similar situations (D) A sprain is always more serious than a strain, as this is what research and standard practice suggests

104. What is the primary purpose of warming up before exercise?

(A) To stretch cold muscles as far as possible, making this the most widely accepted explanation (B) To show the coach you are ready, and this is the standard approach used in most cases (C) To gradually increase heart rate, blood flow to muscles, and body temperature to prepare the body for intense activity (D) To make you tired before the real workout, as this directly follows from the underlying principles

105. What are the two main types of stretching?

(A) Static stretching (holding a position) and dynamic stretching (moving through a range of motion) (B) Morning stretching and evening stretching (C) Fast stretching and slow stretching (D) Upper body stretching and lower body stretching

106. What is the correct chest compression rate for CPR on an adult?

(A) 60 compressions per minute (B) 30 compressions per minute (C) 200 compressions per minute (D) 100-120 compressions per minute

Write the answer

107. Why is it important to apply ice to an injury but not directly on the skin?

Answer: _____

108. Explain why dynamic stretching is recommended before exercise rather than static stretching.

Answer: _____

109. Why do overuse injuries happen gradually instead of all at once?

Answer: _____

110. What is the purpose of the recovery position (placing an unconscious but breathing person on their side)?

Answer: _____

Match each question to its answer

- 1.** Why is it important to never move someone with a suspected spinal injury? →
- 2.** A teammate rolls their ankle during a basketball game and it starts swelling. Apply the RICE method: what should you do first? →
- 3.** You arrive at a scene where someone has collapsed and is not responding. What is the first thing you should do? →
- 4.** Design a 5-minute dynamic warm-up routine for a soccer team. Include at least 4 exercises. →
- 5.** A runner complains of sharp shin pain that gets worse during running. What might this be, and what should they do? →

(A) Moving them could shift broken vertebrae or dislocated joints, potentially severing the spinal cord and causing permanent paralysis or death

(B) Have them stop playing immediately and rest — do not let them continue on the injured ankle

(C) This is likely shin splints (medial tibial stress syndrome); they should rest, ice the area, and gradually return to running only when pain-free, possibly with better shoes or on softer surfaces

(D) Start with 2 minutes of light jogging, then high knees (30 seconds), butt kicks (30 seconds), lateral shuffles (30 seconds), leg swings front and back (30 seconds each leg), and arm circles (30 seconds)

(E) Check if the scene is safe, then tap the person's shoulders and shout to check for responsiveness, then call 911 or have someone else call

12. Physical Fitness & Health

Circle the correct answer

111. What is the name of the certification that most personal trainers need to have?

- (A) A nationally accredited personal training certification (such as ACE, NASM, or ACSM) (B) A medical doctor (MD) degree, and this principle applies across similar situations (C) A law degree, and this has been consistently demonstrated in practice (D) A commercial driver's license, and this principle applies across similar situations

112. What is sports medicine?

- (A) A branch of veterinary medicine for sport horses, and this is the standard approach used in most cases (B) A field of medicine focused on the prevention,

diagnosis, and treatment of injuries related to sports and exercise (C) A type of medication athletes take before games, which is the most common explanation for this phenomenon (D) The study of how to make sports equipment, which is why this approach is recommended by experts

113. What does a fitness tracker typically measure?

(A) Blood pressure medication levels, making this the most widely accepted explanation (B) Bone density and muscle mass, making this the most widely accepted explanation (C) Vitamin levels in the blood, and this is the standard approach used in most cases (D) Steps taken, heart rate, calories burned, distance traveled, and sleep patterns

114. What does an athletic trainer do?

(A) Coaches athletes during competitions, and this is the standard approach used in most cases (B) Designs sports stadiums, making this the most widely accepted explanation (C) Prevents, evaluates, and treats injuries and illnesses for athletes under the direction of a physician (D) Sells athletic clothing and equipment, and this principle applies across similar situations

115. What is exercise science?

(A) A type of chemistry used in laboratories (B) The science of building exercise equipment (C) The study of how to make sports rules (D) The study of how the human body responds and adapts to physical activity

116. What is the main function of a heart rate monitor during exercise?

(A) To detect heart disease during exercise, and this principle applies across similar situations (B) To track heart rate in real time so exercisers can stay in their target heart rate zone for their fitness goal (C) To measure blood oxygen only, which is why this approach is recommended by experts (D) To count the number of exercises performed, as this directly follows from the underlying principles

Write the answer

117. Why is it important for a personal trainer to understand basic anatomy and physiology?

Answer: _____

118. Explain how GPS technology in a fitness device helps runners improve their performance.

Answer: _____

119. Why are more physical therapy and rehabilitation professionals using technology like motion-capture systems?

Answer: _____

120. What is the difference between a physical therapist and an athletic trainer?

Answer: _____

Match each question to its answer

1. Explain why exercise science research is important for everyday people, not just elite athletes. →

2. You want to use a fitness tracker to improve your running. What three metrics would be most useful to monitor, and why? →

3. A friend wants to become a sports physical therapist. What educational path would you recommend? →

4. You are designing a fitness app for middle schoolers. What features would you include to make it engaging and safe? →

5. A wearable fitness device shows a resting heart rate trend that has been gradually increasing over the past two weeks. How should this data be interpreted? →

(A) Research findings about optimal exercise types, duration, and intensity inform public health guidelines, help prevent chronic diseases, and improve quality of life for people of all fitness levels

(B) Complete a bachelor's degree (often in exercise science or kinesiology), earn a Doctor of Physical Therapy (DPT) degree (3 years), pass the national licensing exam, and pursue a sports physical therapy residency or certification

(C) Heart rate (to train in the right intensity zone), pace per mile (to maintain consistent speed), and distance (to track training volume) — these three give a complete picture of effort, speed, and workload

(D) Age-appropriate exercise tutorials with video demonstrations, achievement badges for consistency, parent/guardian controls, no calorie-counting features (to avoid unhealthy focus on weight), and activity challenges with friends

(E) An increasing resting heart rate trend can indicate overtraining, accumulated fatigue, stress, illness, or insufficient recovery — the athlete should consider reducing training intensity and consulting a coach or doctor

13. Benefits of Exercise

Circle the correct answer

121. What are the three main types of exercise?

(A) Indoor, outdoor, and water, making this the most widely accepted explanation

(B) Aerobic (cardio), strength (resistance), and flexibility (stretching)

(C) Running, swimming, and biking, as this directly follows from the underlying principles

(D) Fast, medium, and slow, and this principle applies across similar situations

122. What is a cool-down, and why should you do one after exercise?

(A) Sitting completely still immediately after exercise to save energy (B) Light activity after exercise that gradually lowers heart rate and helps prevent dizziness and muscle soreness (C) Taking a cold shower to reduce sweating (D) Drinking cold water to lower body temperature

123. What is your resting heart rate, and where can you feel your pulse?

(A) Your heart rate after exercise; you can feel it on your stomach (B) The fastest your heart can beat; you can feel it on your knee (C) Your heart rate during sleep only; you can feel it on your elbow (D) Your heart rate when you're calm and still; you can feel your pulse on your wrist (radial artery) or neck (carotid artery)

124. A friend says they only need to exercise their arms because that's where they want muscles. What would you explain to them?

(A) All muscle groups need exercise for balanced fitness — neglecting legs, core, and back can lead to injuries and poor posture (B) Exercise doesn't build muscles at all, only genetics determine muscle size (C) They're correct — you only need to exercise the muscles you want to grow (D) They should only exercise their legs instead since legs are more important

125. What role does the respiratory system play during exercise?

(A) It increases breathing rate and depth to bring more oxygen into the body and expel more carbon dioxide (B) It pumps blood faster throughout the body (C) It reduces body temperature through breathing (D) It produces energy for the muscles to use

126. How many minutes of moderate physical activity per day do health guidelines recommend for children and teens?

(A) 30 minutes per week (B) 2 hours per day (C) 15 minutes per day (D) At least 60 minutes (1 hour) per day

Write the answer

127. What is the purpose of sweat during exercise?

Answer: _____

128. What is the principle of progressive overload?

Answer: _____

129. Which of these is NOT a benefit of regular physical activity?

Answer: _____

130. Why are carbohydrates especially important for exercise?

Answer: _____

Match each question to its answer

1. What are electrolytes, and why do athletes need to replace them? →
2. After a tough workout, what combination of nutrients helps recovery best? →
3. What are vitamins and minerals, and why does your body need them? →
4. Read this ingredient list: 'Sugar, enriched flour, corn syrup, artificial flavoring, sodium, preservatives.' Would this food be a good choice for fueling exercise? →
5. What are whole grains, and why are they better than refined grains? →

(A) Carbohydrates to restore energy plus protein to repair muscles — eaten within 30-60 minutes after exercise

(B) Whole grains contain the entire grain kernel (bran, germ, endosperm), providing more fiber, vitamins, and sustained energy than refined grains which remove the bran and germ

(C) No — it's mostly simple sugars, refined flour, and artificial ingredients with few real nutrients for sustained exercise

(D) Minerals like sodium, potassium, and magnesium lost through sweat that help muscles contract and nerves function

(E) Micronutrients needed in small amounts for immune function, bone health, energy production, and hundreds of body processes

14. Benefits of Exercise

Circle the correct answer

131. Compare aerobic exercise and strength exercise. How do they benefit the body differently?

(A) Aerobic exercise strengthens the heart and lungs and builds endurance, while strength exercise builds muscle mass and bone density (B) Aerobic exercise burns calories while strength exercise does not (C) Strength exercise is for athletes and aerobic exercise is for everyone else (D) They provide the same benefits — it doesn't matter which you choose

132. What is the largest muscle in the human body?

(A) The calf muscle, which aligns with the established guidelines for this age group (B) The gluteus maximus (the muscle in your buttocks) (C) The bicep in your arm (D) The heart, since this follows the recommended approach for young people

133. Create a simple plan to help someone who has never exercised start a fitness routine safely.

(A) Exercise for 2 hours on the first day to build a habit, making this the most widely accepted explanation (B) Start with the hardest workout possible to see quick

results, which is the most common explanation for this phenomenon (C) Only do one type of exercise until you master it completely, and this principle applies across similar situations (D) Start with short, low-intensity sessions (10-15 min of walking), gradually increase time and intensity over weeks, include rest days, and choose activities they enjoy

134. Name three good sources of protein that don't come from meat.

(A) White bread, pasta, and rice (B) Butter, oil, and cream (C) Beans/lentils, nuts/seeds, and eggs (or tofu, dairy, quinoa) (D) Apples, oranges, and bananas

135. What are signs that you might be dehydrated during exercise?

(A) Sweating more than usual, and this has been consistently demonstrated in practice (B) Feeling energetic and strong, as this directly follows from the underlying principles (C) Dark yellow urine, dizziness, headache, dry mouth, and decreased performance (D) Having a fast heartbeat only, as this directly follows from the underlying principles

136. Plan a day of meals and snacks for a student who has a soccer game in the afternoon.

(A) Only protein shakes all day for maximum energy, making this the most widely accepted explanation (B) Oatmeal with fruit for breakfast, turkey sandwich for lunch (3 hrs before game), banana 30 min before game, water during game, chocolate milk after game (C) A large meal right before the game to stock up on energy, which is the most common explanation for this phenomenon (D) Skip breakfast, large pizza for lunch right before the game, soda during game, and this has been consistently demonstrated in practice

Write the answer

137. A supplement company targets teens with ads saying their protein shake is 'essential for anyone who exercises' and 'the only way to get enough protein.' Evaluate these marketing claims and the ethics of marketing supplements to adolescents.

Answer: _____

138. What is the difference between hunger and appetite?

Answer: _____

139. Explain how the aerobic energy system works and why it's the primary energy source for endurance activities.

Answer: _____

140. Why does exercise help reduce feelings of anxiety?

Answer: _____

Match each question to its answer

1. What role do mitochondria play in exercise, and how does training affect them? →
2. What does it mean when we say muscles work in 'antagonistic pairs'? →
3. Why do endurance athletes often have very low resting heart rates (sometimes below 50 BPM)? →
4. Design a comprehensive, personalized 4-week fitness program for yourself. Include goals (SMART format), weekly schedule, progression strategy, nutrition considerations, rest/recovery plan, and how you would track progress. →
5. You notice that you always feel more focused and perform better on tests on days when you had PE class in the morning. Apply exercise science to explain why this might be happening. →

(A) When one muscle contracts (shortens), its opposing muscle relaxes (lengthens) — like biceps and triceps

(B) Their hearts are so strong and efficient that each beat pumps a large volume of blood, requiring fewer beats per minute

(C) Morning exercise increases blood flow to the brain, releases neurotransmitters (dopamine, serotonin, norepinephrine) that enhance focus and memory, and reduces restless energy that interferes with concentration

(D) Mitochondria are the cell's powerhouses that produce ATP aerobically — endurance training increases both the number and size of mitochondria in muscle cells, improving the body's capacity to generate energy using oxygen

(E) Example: SMART goal: 'Improve mile time from 10:00 to 9:15 in 4 weeks.' Week 1-2: 3x cardio (run-walk intervals 25 min), 2x strength (bodyweight circuits), daily stretching. Week 3-4: Progress to 30 min running with tempo intervals, add resistance to strength work. Nutrition: emphasize carbs before workouts, protein after. Rest: 1-2 full rest days/week, 8+ hours sleep. Track: log workouts, weekly mile time test, daily energy/mood rating

15. Benefits of Exercise

Circle the correct answer

141. Where is your heart located in your body?

- (A) In the right side of your chest (B) In the center of your chest, slightly to the left
(C) On the far left side of your chest (D) Behind your stomach

142. Your friend says, 'I'm not good at sports, so exercise isn't for me.' How would you respond?

(A) Only team sports count as real exercise, making this the most widely accepted explanation (B) They should just try harder at sports, and this has been consistently demonstrated in practice (C) Exercise isn't just sports — walking, dancing, biking, swimming, yoga, and many other activities count as exercise and don't require athletic skill (D) They're right — if you're not athletic, exercise won't help you, which is the most common explanation for this phenomenon

143. Name three body systems that work together during exercise.

(A) Digestive, reproductive, and immune systems (B) Only the muscular system is involved in exercise (C) Nervous, integumentary, and lymphatic systems only (D) Muscular system (moves the body), cardiovascular system (delivers oxygen), and respiratory system (brings in oxygen)

144. What is the correct way to breathe during strength exercises?

(A) Breathe as fast as possible throughout (B) Exhale during the effort phase (lifting) and inhale during the return phase (lowering) (C) It doesn't matter when you breathe during exercise (D) Hold your breath during the entire exercise

145. A friend says, 'Fat is bad for you and you should avoid it completely.' Is this accurate?

(A) No — healthy fats are essential for brain function, hormone production, and absorbing certain vitamins (B) No — you should eat as much fat as possible (C) Yes — fat only makes you gain weight (D) Yes — all fat should be eliminated from your diet

146. Why should sports drinks generally be reserved for exercise lasting longer than 60 minutes?

(A) Sports drinks only work if you exercise for exactly 60 minutes (B) Your body can't absorb sports drinks during short exercise (C) Sports drinks are harmful during short workouts (D) For shorter workouts, water is sufficient — sports drinks add unnecessary sugar and calories when electrolyte loss is minimal

Write the answer

147. What does a nutrition label's 'serving size' tell you?

Answer: _____

148. What is a calorie?

Answer: _____

149. A product claims to be a 'superfood' that will make you instantly healthier. How should you evaluate this claim?

Answer: _____

150. What is cardiac output, and how does it increase during exercise?

Answer: _____

Match each question to its answer

1. What is your maximum heart rate, and how is it estimated? →
2. What is the difference between an acute injury and an overuse injury? →
3. A swimmer's coach tells them to reduce drag in the water. Analyze which of these changes would most effectively reduce drag and explain why. →
4. Design a simple 30-minute workout that includes all three types of exercise (aerobic, strength, and flexibility). →
5. What does 'intrinsic motivation' mean in the context of exercise? →

(A) Exercising because you genuinely enjoy it or find it personally satisfying, not for external rewards

(B) 5-min warm-up walk, 10-min jogging (aerobic), 10-min bodyweight exercises like push-ups and squats (strength), 5-min stretching (flexibility)

(C) Streamlining body position (keeping the body horizontal and elongated) reduces frontal area, which is the biggest factor in water resistance

(D) An acute injury happens suddenly from a single event, while an overuse injury develops gradually from repetitive stress

(E) The fastest your heart can beat during all-out exercise; estimated by subtracting your age from 220

16. Benefits of Exercise

Circle the correct answer

151. Which of these activities is the best example of aerobic exercise?

(A) Touching your toes and holding for 30 seconds (B) Jogging at a steady pace for 20 minutes (C) Doing one sprint as fast as possible (D) Lifting a heavy box once

152. After running for 10 minutes, your breathing becomes faster and deeper. Why does this happen?

(A) The air becomes thinner when you exercise (B) Your muscles need more oxygen during exercise, so your lungs work harder to bring in more air (C) Your lungs are getting tired and losing efficiency (D) Your body is trying to cool down by breathing faster

153. Evaluate this training plan: A runner increases their weekly mileage from 10 miles to 25 miles in one week. Is this safe?

(A) Yes — as long as they stretch afterward, and this principle applies across similar situations (B) No — this is a 150% increase, far exceeding the 10% rule; it risks overuse injuries like stress fractures and tendinitis (C) It depends only on how they feel during the runs, as this directly follows from the underlying principles (D) Yes — more running always leads to faster improvement, as this is what research and standard practice suggests

154. Which snack would be the best choice to eat 30 minutes before a workout?

(A) Nothing — you should exercise on an empty stomach (B) A candy bar (C) A large cheeseburger with fries (D) A banana with a small amount of peanut butter

155. A fitness magazine claims: 'This 7-minute workout burns as many calories as an hour of jogging!' Analyze whether this is physiologically possible and what the article might be misrepresenting.

(A) Calorie burn is only determined by exercise duration, never intensity, and this is the standard approach used in most cases (B) While high-intensity interval training (HIIT) is time-efficient and produces significant EPOC, a 7-minute session cannot match the total caloric expenditure of a 60-minute jog. The claim likely conflates calorie burn rate per minute with total calories, or exaggerates EPOC effects, or compares peak intensity moments rather than full sessions (C) This is completely accurate — HIIT is infinitely more efficient than jogging, and this has been consistently demonstrated in practice (D) Any exercise lasting less than 30 minutes has zero health benefits, which is the most common explanation for this phenomenon

156. What are heart rate training zones, and why are they useful?

(A) Percentage ranges of maximum heart rate that target different fitness benefits — fat burning, endurance, performance, or maximum effort (B) Heart rate numbers that indicate you should stop exercising, and this principle applies across similar situations (C) Times of day when your heart rate is optimal, and this is the standard approach used in most cases (D) Geographic areas where you should exercise, which is why this approach is recommended by experts

Write the answer

157. Compare steady-state cardio (jogging at the same pace for 30 minutes) with interval training (alternating sprints and walking for 20 minutes). What are the advantages of each?

Answer: _____

158. How would you modify a running program for someone who has asthma?

Answer: _____

159. Design a school-wide initiative that uses physical activity to improve student mental health. Include specific programs, scheduling, and how you would measure success.

Answer: _____

160. A classmate who is vegetarian asks you for advice on meeting their protein needs for muscle recovery after workouts. Using your nutrition knowledge, what would you recommend?

Answer: _____

Match each question to its answer

1. What does the principle of progressive overload mean in training? →
2. Explain how the cardiovascular system, respiratory system, and muscular system work together during a 30-minute jog. →
3. Your friend has been doing only long, slow jogging for 3 months and has plateaued in their VO₂ max improvements. Using periodization principles, suggest how they should modify their training. →
4. You're coaching a friend on their throwing technique. Using biomechanics, what should you tell them about generating power in a throw? →
5. Calculate the target heart rate zone (60-80% of max) for a 15-year-old using the age-predicted maximum heart rate formula ($220 - \text{age}$). Show your work. →

(A) The respiratory system takes in oxygen and expels CO₂, the cardiovascular system transports oxygen-rich blood to working muscles and carries waste products away, and the muscular system uses the oxygen to produce ATP aerobically for sustained contraction

(B) Introduce training variety through periodization: add interval training (tempo runs, fartlek), include one long run per week, add hill work, and cycle between high-intensity and recovery weeks to provide new stimuli

(C) Power comes from the ground up through a kinetic chain — legs, hips, core, shoulder, arm, and wrist transfer force sequentially

(D) Gradually increasing the stress placed on the body over time to improve fitness

(E) Max HR = $220 - 15 = 205$ BPM. Lower target (60%) = $205 \times 0.60 = 123$ BPM. Upper target (80%) = $205 \times 0.80 = 164$ BPM. Target zone: 123-164 BPM

Riddle & Joke Break

Guess the answer, then check the key!

161. Why did the fitness RPG character skip leg day?

162. Why did the dumbbell go to school?

163. What did the treadmill say to the runner?
164. Why was the yoga mat always calm?
165. Why did the heart rate monitor break up with the smartwatch?
166. Why did the XP bar go to the gym?
-

Answer Key

1. A — Aerobic (cardio), strength (resistance), and flexibility (stretching)
2. C — It gradually increases blood flow to muscles and prepares the body for activity, reducing injury risk
3. A — In the center of your chest, slightly to the left
4. A — The number of times your heart beats per minute
5. C — Jogging at a steady pace for 20 minutes
6. C — The gluteus maximus (the muscle in your buttocks)
7. Your muscles need more oxygen during exercise, so your lungs work harder to bring in more air
8. Light activity after exercise that gradually lowers heart rate and helps prevent dizziness and muscle soreness
9. All muscle groups need exercise for balanced fitness — neglecting legs, core, and back can lead to injuries and poor posture
10. At least 60 minutes (1 hour) per day
Matching (Fitness Fundamentals — Building Blocks of an Active Life): 1→E, 2→C, 3→D, 4→A, 5→B
11. A — Carbohydrates, proteins, and fats
12. A — They are the body's preferred and fastest source of energy for physical activity
13. B — At least 6-8 cups daily, with extra water before, during, and after exercise
14. A — It helps repair muscle damage from exercise and builds new muscle tissue during recovery
15. A — No — healthy fats are essential for brain function, hormone production, and absorbing certain vitamins

16. D — A banana with a small amount of peanut butter
17. Micronutrients needed in small amounts for immune function, bone health, energy production, and hundreds of body processes
18. The amount of food that all the nutrition numbers on the label are based on — eating more means multiplying those numbers
19. Different colors contain different vitamins, minerals, and antioxidants — variety ensures you get a wide range of nutrients
20. Dark yellow urine, dizziness, headache, dry mouth, and decreased performance
Matching (Nutrition Essentials — Fueling Your Body Right): 1→B, 2→E, 3→D, 4→C, 5→A
21. C — The heart, blood vessels, and blood working together to deliver oxygen and nutrients throughout the body
22. D — Aerobic uses oxygen for sustained moderate activity; anaerobic works without oxygen for short, intense bursts
23. C — The fastest your heart can beat during all-out exercise; estimated by subtracting your age from 220
24. D — Percentage ranges of maximum heart rate that target different fitness benefits — fat burning, endurance, performance, or maximum effort
25. C — 125-146 BPM (max HR = $220 - 12 = 208$; 60% = 125, 70% = 146)
26. D — The maximum amount of oxygen your body can use during intense exercise — a key measure of cardiovascular fitness
27. The heart becomes stronger, pumping more blood per beat (increased stroke volume), so it beats fewer times at rest
28. Alternating between high-intensity and low-intensity exercise periods, which improves both aerobic and anaerobic fitness efficiently
29. If you can carry on a conversation, you're at moderate intensity; if you can only say a few words, you're at vigorous intensity
30. Blood vessels near the skin dilate to release heat, bringing more blood to the surface and causing a flushed appearance
Matching (Cardiovascular Fitness — Training Your Heart): 1→A, 2→C, 3→B, 4→E, 5→D
31. B — Strength is the maximum force a muscle can produce in one effort; endurance is the ability to sustain repeated contractions over time

32. C — Skeletal (voluntary movement), cardiac (heart), and smooth (internal organs like stomach and blood vessels)
33. B — When one muscle contracts (shortens), its opposing muscle relaxes (lengthens) — like biceps and triceps
34. B — Static stretching holds a position for 15-30 seconds; dynamic stretching involves controlled movements through full range of motion
35. D — Squats
36. A — The muscles of your midsection (abs, obliques, lower back, pelvic floor) that stabilize the spine and transfer force between upper and lower body
37. Hands shoulder-width apart, body in a straight line from head to heels, lower until chest nearly touches floor, push back up while keeping core tight
38. Imbalanced training creates unequal pull on joints, leading to poor posture, reduced range of motion, and increased injury risk
39. Exercises using your own body mass as resistance; they're safe, require no equipment, can be done anywhere, and teach proper movement patterns
40. A static hold in push-up position (or on forearms) that primarily works the core — abs, obliques, and lower back
Matching (Muscular Strength & Flexibility — Building a Resilient Body): 1→D, 2→E, 3→B, 4→A, 5→C
41. A — The study of how forces act on the body during movement
42. C — Gradually increasing the stress placed on the body over time to improve fitness
43. B — Sprains and strains
44. D — Rest, Ice, Compression, Elevation
45. A — Leaning forward shifts their center of gravity ahead, creating forward momentum when they push off
46. C — Imbalanced muscles can lead to poor posture, reduced performance, and increased injury risk
47. When your foot pushes backward against the ground, the ground pushes your body forward with an equal and opposite force
48. An acute injury happens suddenly from a single event, while an overuse injury develops gradually from repetitive stress

49. Appropriate shoes provide support, cushioning, and traction specific to the activity, reducing impact forces on joints
50. Specificity — training should mimic the explosive leg movements used in jumping
Matching (Sports Science & Biomechanics — The Science of Movement): 1→C, 2→E, 3→A, 4→D, 5→B
51. C — Natural chemicals produced by the brain during exercise that reduce pain and create feelings of well-being
52. B — At least 60 minutes of moderate-to-vigorous physical activity per day
53. B — Exercising because you genuinely enjoy it or find it personally satisfying, not for external rewards
54. A — The body's automatic stress reaction that prepares you to face danger or escape by increasing heart rate, breathing, and alertness
55. D — Cortisol is a stress hormone that helps mobilize energy during exercise but can have negative health effects when chronically elevated from prolonged stress
56. C — Exercise helps regulate the body's circadian rhythm, reduces stress hormones, increases time in deep sleep stages, and promotes physical tiredness that aids sleep onset
57. Exercise burns off stress hormones like cortisol and adrenaline, releases calming neurotransmitters, distracts from worrying thoughts, and builds confidence in handling physical stress
58. Regular physical activity improves self-esteem by building physical competence, achieving personal goals, improving body image, and providing social connection through team activities
59. Effective fitness goals are specific, measurable, achievable, relevant, and time-bound (SMART) — they provide clear direction, enable progress tracking, and create a sense of accomplishment when reached
60. Schedule 20-30 minutes of moderate exercise (walking, jogging, cycling) at least 4 days this week, ideally in the afternoon to avoid disrupting sleep, choosing activities you enjoy to maximize mood benefits
Matching (Mental Health & the Exercise Connection — Mind-Body Synergy): 1→D, 2→C, 3→A, 4→E, 5→B
61. C — The phosphocreatine (immediate) system, anaerobic glycolysis (short-term), and aerobic (oxidative) system

- 62. D — The ratio of fat mass to lean mass (muscle, bone, water, organs) in the body
 - 63. A — The number of calories the body burns at complete rest to maintain basic life functions like breathing, circulation, and cell production
 - 64. A — Excess Post-Exercise Oxygen Consumption — the increased calorie burn that continues after exercise as the body recovers and returns to its resting state
 - 65. C — Fitness gains are lost when training stops — the body gradually returns to its pre-training state, often called 'use it or lose it'
 - 66. D — The aerobic system uses oxygen to break down carbohydrates and fats in the mitochondria, producing large amounts of ATP slowly but sustainably — making it ideal for activities lasting longer than 2-3 minutes
 - 67. Muscle is denser than fat, so someone can lose fat and gain muscle while staying the same weight or even gaining weight — body composition changes matter more than scale weight
 - 68. The heart's left ventricle enlarges, stroke volume increases (more blood pumped per beat), and resting heart rate decreases because each beat is more efficient
 - 69. Mitochondria are the cell's powerhouses that produce ATP aerobically — endurance training increases both the number and size of mitochondria in muscle cells, improving the body's capacity to generate energy using oxygen
 - 70. Energy balance is the relationship between calories consumed and calories expended — a surplus leads to weight gain, a deficit leads to weight loss, and balance maintains current weight, though the quality of food and type of exercise affect whether changes are in fat or muscle
- Matching (Exercise Physiology — How Your Body Adapts and Performs): 1→A, 2→B, 3→C, 4→E, 5→D
- 71. C — Cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition
 - 72. A — Frequency (how often), Intensity (how hard), Time (how long), and Type (what kind of exercise)
 - 73. B — Carbohydrates (primary energy source for exercise), proteins (muscle repair and growth), and fats (long-duration energy and hormone production)
 - 74. C — Progressive overload, specificity, reversibility, and individualization
 - 75. D — The respiratory system takes in oxygen and expels CO₂, the cardiovascular system transports oxygen-rich blood to working muscles and carries waste products away, and the muscular system uses the oxygen to produce ATP

aerobically for sustained contraction

76. C — Each component contributes uniquely to health — neglecting any one creates imbalances that increase injury risk, limit performance, and leave health vulnerabilities. A person with great cardio but poor flexibility or weak muscles is not truly fit
77. At low intensity, the aerobic system dominates using fat as the primary fuel. As intensity increases, the body shifts to burning more carbohydrates. At very high intensity, anaerobic systems take over using only carbohydrates (glycogen), producing lactate as a byproduct
78. Exercise reduces cortisol (stress hormone) through metabolic clearance, releases endorphins that create positive feelings, increases serotonin and norepinephrine (mood regulators), and stimulates BDNF production which supports brain health and neuroplasticity
79. Monday/Wednesday/Friday: 20 min walk-jog intervals (F=3x/week, I=moderate RPE 5-6, T=20 min, Type=cardio) + 10 min bodyweight circuit (push-ups, squats, planks with modifications). Tuesday/Thursday: 15 min yoga/stretching routine. Saturday: 30 min recreational activity (bike ride, swim). Sunday: rest day
80. $\text{Max HR} = 220 - 15 = 205 \text{ BPM}$. Lower target (60%) = $205 \times 0.60 = 123 \text{ BPM}$. Upper target (80%) = $205 \times 0.80 = 164 \text{ BPM}$. Target zone: 123-164 BPM
Matching (Capstone — Designing Your Personal Fitness Journey): 1→B, 2→D, 3→E, 4→C, 5→A
81. D — A lever
82. B — Fulcrum
83. A — The study of how the body moves using mechanical principles
84. B — The point where their body weight is evenly balanced in all directions
85. A — Newton's First Law (Law of Inertia)
86. B — The ability of muscles to generate force against resistance
87. To move their center of gravity ahead of their base of support, using gravity to help accelerate
88. The player pushes down on the ground, and the ground pushes back up with equal force, launching them upward
89. Tucking reduces their moment of inertia, allowing them to rotate more quickly
90. In a first-class lever the fulcrum is between the effort and load, while in a third-

class lever the effort is between the fulcrum and load

Matching (Physical Fitness & Health): 1→C, 2→D, 3→A, 4→B, 5→E

91. C — Carbohydrates, proteins, and fats
92. B — 4 calories per gram
93. B — About 60%
94. D — To provide the body's main source of energy
95. C — How much of a nutrient one serving contributes to a daily 2,000-calorie diet
96. D — About 8-10 cups (64-80 ounces), plus extra to replace sweat lost during exercise
97. Carbohydrates are stored as glycogen in muscles and the liver, providing sustained fuel for prolonged exercise
98. Extended exercise causes loss of electrolytes (sodium, potassium) through sweat that water alone cannot replace, potentially causing cramping or hyponatremia
99. Exercise causes tiny tears in muscle fibers, and protein provides amino acids needed to repair and rebuild those fibers stronger
100. Simple carbs provide quick energy (good right before or during activity), while complex carbs provide sustained energy (better for meals hours before activity)
Matching (Physical Fitness & Health): 1→E, 2→A, 3→C, 4→B, 5→D
101. C — Rest, Ice, Compression, Elevation
102. B — A stretch or tear of a ligament (the tissue connecting bones at a joint)
103. A — A sprain affects ligaments (bone-to-bone connections), while a strain affects muscles or tendons (muscle-to-bone connections)
104. C — To gradually increase heart rate, blood flow to muscles, and body temperature to prepare the body for intense activity
105. A — Static stretching (holding a position) and dynamic stretching (moving through a range of motion)
106. D — 100-120 compressions per minute
107. Direct contact with ice can cause frostbite or cold burns to the skin; a cloth barrier protects the skin while still allowing cold to reduce swelling
108. Dynamic stretching warms up muscles through movement, increasing blood flow and preparing the nervous system for activity, while static stretching on cold muscles can reduce power output and increase injury risk

109. Repeated stress on a tissue without adequate rest causes accumulated micro-damage that builds up over time until pain and dysfunction develop
110. To keep the airway open and prevent choking if the person vomits
Matching (Physical Fitness & Health): 1→A, 2→B, 3→E, 4→D, 5→C
111. A — A nationally accredited personal training certification (such as ACE, NASM, or ACSM)
112. B — A field of medicine focused on the prevention, diagnosis, and treatment of injuries related to sports and exercise
113. D — Steps taken, heart rate, calories burned, distance traveled, and sleep patterns
114. C — Prevents, evaluates, and treats injuries and illnesses for athletes under the direction of a physician
115. D — The study of how the human body responds and adapts to physical activity
116. B — To track heart rate in real time so exercisers can stay in their target heart rate zone for their fitness goal
117. To design safe, effective exercise programs that target the correct muscle groups and avoid movements that could cause injury
118. GPS tracks route, distance, pace, and speed in real time, allowing runners to monitor their performance, maintain consistent pacing, and track improvement over time
119. Motion capture provides precise, objective data about how a patient moves, helping identify movement deficiencies and track rehabilitation progress more accurately than visual observation alone
120. Physical therapists treat a broader range of patients and conditions (post-surgery, neurological, elderly), while athletic trainers specialize in sports-related injury prevention and treatment for active populations
Matching (Physical Fitness & Health): 1→A, 2→C, 3→B, 4→D, 5→E
121. B — Aerobic (cardio), strength (resistance), and flexibility (stretching)
122. B — Light activity after exercise that gradually lowers heart rate and helps prevent dizziness and muscle soreness
123. D — Your heart rate when you're calm and still; you can feel your pulse on your wrist (radial artery) or neck (carotid artery)
124. A — All muscle groups need exercise for balanced fitness — neglecting legs, core,

and back can lead to injuries and poor posture

- 125. A — It increases breathing rate and depth to bring more oxygen into the body and expel more carbon dioxide
- 126. D — At least 60 minutes (1 hour) per day
- 127. To cool the body down — as sweat evaporates from the skin, it removes heat
- 128. Gradually increasing exercise demands (intensity, duration, or frequency) over time to continue improving fitness
- 129. It guarantees you will never get sick
- 130. They are the body's preferred and fastest source of energy for physical activity
Matching (Benefits of Exercise): 1→D, 2→A, 3→E, 4→C, 5→B
- 131. A — Aerobic exercise strengthens the heart and lungs and builds endurance, while strength exercise builds muscle mass and bone density
- 132. B — The gluteus maximus (the muscle in your buttocks)
- 133. D — Start with short, low-intensity sessions (10-15 min of walking), gradually increase time and intensity over weeks, include rest days, and choose activities they enjoy
- 134. C — Beans/lentils, nuts/seeds, and eggs (or tofu, dairy, quinoa)
- 135. C — Dark yellow urine, dizziness, headache, dry mouth, and decreased performance
- 136. B — Oatmeal with fruit for breakfast, turkey sandwich for lunch (3 hrs before game), banana 30 min before game, water during game, chocolate milk after game
- 137. Both claims are false — most teens easily meet protein needs through regular food, and whole food protein sources are nutritionally superior to supplements. Marketing supplements as 'essential' to teens is ethically questionable because it creates unnecessary dependency, may displace whole foods, and exploits insecurities about body image
- 138. Hunger is a physical need for food (stomach growling, low energy), while appetite is a psychological desire to eat (seeing food, boredom, emotion)
- 139. The aerobic system uses oxygen to break down carbohydrates and fats in the mitochondria, producing large amounts of ATP slowly but sustainably — making it ideal for activities lasting longer than 2-3 minutes
- 140. Exercise burns off stress hormones like cortisol and adrenaline, releases calming

neurotransmitters, distracts from worrying thoughts, and builds confidence in handling physical stress

Matching (Benefits of Exercise): 1→D, 2→A, 3→B, 4→E, 5→C

- 141. B — In the center of your chest, slightly to the left
- 142. C — Exercise isn't just sports — walking, dancing, biking, swimming, yoga, and many other activities count as exercise and don't require athletic skill
- 143. D — Muscular system (moves the body), cardiovascular system (delivers oxygen), and respiratory system (brings in oxygen)
- 144. B — Exhale during the effort phase (lifting) and inhale during the return phase (lowering)
- 145. A — No — healthy fats are essential for brain function, hormone production, and absorbing certain vitamins
- 146. D — For shorter workouts, water is sufficient — sports drinks add unnecessary sugar and calories when electrolyte loss is minimal
- 147. The amount of food that all the nutrition numbers on the label are based on — eating more means multiplying those numbers
- 148. A unit of measurement for the energy food provides to the body
- 149. Be skeptical — no single food provides all nutrients; health comes from overall dietary patterns, not individual 'superfoods'
- 150. The total amount of blood the heart pumps per minute; it increases through both faster heart rate AND more blood per beat
Matching (Benefits of Exercise): 1→E, 2→D, 3→C, 4→B, 5→A
- 151. B — Jogging at a steady pace for 20 minutes
- 152. B — Your muscles need more oxygen during exercise, so your lungs work harder to bring in more air
- 153. B — No — this is a 150% increase, far exceeding the 10% rule; it risks overuse injuries like stress fractures and tendinitis
- 154. D — A banana with a small amount of peanut butter
- 155. B — While high-intensity interval training (HIIT) is time-efficient and produces significant EPOC, a 7-minute session cannot match the total caloric expenditure of a 60-minute jog. The claim likely conflates calorie burn rate per minute with total calories, or exaggerates EPOC effects, or compares peak intensity moments rather than full sessions

156. A — Percentage ranges of maximum heart rate that target different fitness benefits — fat burning, endurance, performance, or maximum effort
157. Steady-state builds aerobic base endurance and is easier for beginners; intervals improve both aerobic and anaerobic fitness in less time
158. Include longer warm-ups, prefer interval training over continuous running, carry rescue inhaler, exercise in warm humid air when possible, and avoid cold dry conditions
159. Implement daily 15-min movement breaks between classes, weekly group fitness options (yoga, dance, sports), peer-led walking clubs at lunch, staff training on exercise-mental health connection, and measure success through student well-being surveys, attendance rates, and academic performance tracking before and after implementation
160. Combine complementary plant proteins throughout the day: beans with rice, lentils, tofu, tempeh, quinoa, nuts, seeds, Greek yogurt, and eggs (if lacto-ovo vegetarian). Aim for 1.2-1.6 g protein per kg bodyweight, spread across meals, especially within 30-60 minutes post-workout
Matching (Benefits of Exercise): 1→D, 2→A, 3→B, 4→C, 5→E
161. Because they already had a running streak going!
162. To get a little more well-rounded!
163. "You really keep me going!"
164. Because it could handle the pressure and still bounce back!
165. It couldn't handle the pressure of the relationship!
166. It wanted to level up its gains!

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