S5 Physical Education Practice Paper: Fitness Testing, Energy Systems and Training Intensity, Biomechanics, Sports Nutrition and Hydration, Skill Learning, Injury Care and Sports Ethics (100 marks)

Level: S5 | Subject: Physical Education | 75 minutes | 100 marks | 24 questions | question paper

Part 1 Fitness Testing and Body Composition (16 marks)

Show all formulae, substitutions and calculation steps.

#	Question	Marks
1	A S5 boy is 1.70 m tall and weighs 65 kg. Calculate his BMI to 1 decimal place and classify it using Asian adult cut-offs.	4
2	A girl weighs 60 kg and her skinfold estimate gives 13.5 kg of fat mass. Calculate her body fat percentage to 1 decimal place and state the healthy range for women.	4
3	A man has an 84 cm waist and a 96 cm hip. Calculate his waist-to-hip ratio to 2 decimal places and decide whether he is at high risk of central obesity (male cut-off 0.90).	4
4	A woman is 1.62 m tall and weighs 72 kg. Calculate her current BMI to 1 decimal place, then find the body mass that gives a BMI of 22.0 and the mass she must lose (1 decimal place each).	4

Part 2 Energy Systems and Training Intensity (16 marks)

State the formula and the unit for every heart-rate and energy answer.

#	Question	Marks
5	A 30-year-old athlete has a resting heart rate of 60 bpm and an estimated maximum of 220 minus age. Use the Karvonen formula to find the target heart rate at 70% intensity (whole number).	4
6	The same athlete uses the percentage-of-maximum method at 80% intensity. Find the target heart rate (whole number) and explain why the two methods differ.	4
7	An athlete has a relative VO2max of 45 mL/kg/min and a body mass of 60 kg. Find the absolute VO2max in litres per minute to 1 decimal place.	4
8	A 60 kg person runs for 30 minutes at 8 METs. Using kcal = MET x 3.5 x body mass (kg) / 200 x minutes, find the total energy cost (whole number).	4

Part 3 Sports Biomechanics (17 marks)

Give units and direction for all torque, mechanical advantage and projectile answers.

#	Question	Marks
9	An athlete applies 200 N at a perpendicular distance of 0.35 m from a joint axis. Find the torque in N m and state one way to increase torque without increasing the force.	5
10	The calf muscles pull on the heel through the Achilles tendon with an effort arm of 0.05 m and a load arm of 0.15 m. Find the mechanical advantage to 2 decimal places and state the lever class and its trade-off.	4

11	A ball is kicked at 12 m/s at 45 degrees to the horizontal (ignore air resistance, g = 9.81 m/s^2). Find the horizontal and vertical components, the flight time and the range (time and range to 1 decimal place).	4
12	A 70 kg athlete pushes on the ground with 2,100 N during a jump. Find the body weight, the net force and the upward acceleration (net force and acceleration to 1 decimal place, g = 9.81 m/s^2).	4

Part 4 Sports Nutrition and Hydration (17 marks)

Use 4 kcal per gram for carbohydrate and protein in all energy calculations.

#	Question	Marks
13	An athlete has a BMR of 1,600 kcal and a physical activity level of 1.7. Find the daily total energy expenditure, then the grams of carbohydrate needed if carbohydrate supplies 60% of that energy.	5
14	An endurance athlete weighing 65 kg takes 1.6 g of protein per kilogram of body mass. Find the daily protein intake in grams and the energy it supplies in kcal.	4
15	Body mass falls by 1.2 kg during a session. Replacing 1.5 L of fluid per kilogram lost, find the recommended replacement volume in litres to 1 decimal place and how it should be taken.	4
16	An athlete loses 1.2 L of sweat over a 2-hour session with a sweat sodium concentration of 800 mg/L. Find the total sodium loss in mg and suggest one way to replace it.	4

Part 5 Skill Learning and Sports Psychology (17 marks)

Show your working; use RT = a + b x log2(n) for reaction-time items.

#	Question	Marks
17	A player has a simple reaction time of 200 ms and needs 150 ms more per additional choice (Hick law). Find the choice reaction time for 4 possible responses, in ms.	5
18	A coach splits 60 minutes of technical practice into 4 equal blocks with 5 minutes of rest between blocks. Find the length of each block and the total session time, and name the practice distribution used.	4
19	An athlete currently completes 76 repetitions per set and sets a target of 100. Find the increase needed and the percentage improvement to 1 decimal place, and name the type of goal set.	4
20	A student improves from 40 to 52 skips in 30 seconds over three weeks. Find the gain in repetitions and the percentage improvement to 1 decimal place, and give one likely cause.	4

Part 6 Injury Care, First Aid and Sports Ethics (17 marks)

Give numerical values with units for all first-aid doses and timings.

#	Question	Marks
21	A player sprains an ankle and RICE is applied. If ice is applied for 20 minutes every 2 hours, find the maximum number of ice applications in 24 hours and state what each letter of RICE stands for.	5
22	Adult CPR is performed at 30:2 with compressions at 110 per minute. Find the number of complete cycles in 2 minutes to 1 decimal place and the number of compressions actually delivered.	4

23	A player complains of headache and confusion after a blow to the head. State three principles of immediate concussion management and explain why immediate return to play is not allowed.	4
24	An athlete using EPO sees haematocrit rise from 44% to 52%. Find the rise in percentage points and explain why this is both unfair and dangerous.	4
