S3 PE Practice Paper 1 | Fitness data, target heart rate, pacing, energy cost

Junior Secondary Physical Education

S3 PE practice paper with answers: BMI and healthy weight, Karvonen heart rate zones, 800 m pacing, MET energy cost, flexibility and strength test progress.

1. BMI and healthy weight management (16 marks)

Give answers to 1 decimal place; use kcal for energy.

#	Question	Answer and marking notes
1	(a) A student is 1.6 m tall and weighs 64 kg. Find the BMI.	BMI = 64 / 1.6^2 = 64 / 2.56 = 25.0.
2	(b) If the healthy BMI limit is 22.9, find the upper limit of healthy weight.	Upper limit = 22.9 x 1.6^2 = 22.9 x 2.56 = 58.6 kg.
3	(c) Find the weight to be reduced, then the energy deficit at 7,700 kcal per kg of fat.	Reduce 64 - 58.6 = 5.4 kg; deficit = 5.4 x 7,700 = 41,580 kcal.
4	(d) If the daily deficit is 500 kcal, find the minimum days needed (round up) and state one exercise to pair with it.	41,580 / 500 = 83.16, so at least 84 days (about 12 weeks); pair with 3 to 4 sessions of 30-minute moderate aerobic exercise per week.

2. Karvonen target heart rate (18 marks)

Answer in beats per minute; show working.

#	Question	Answer and marking notes
5	(a) Estimate the maximum heart rate of a 15-year-old using 220 minus age.	MHR = 220 - 15 = 205 bpm.
6	(b) The resting heart rate is 60 bpm. Find the heart rate reserve.	HRR = 205 - 60 = 145 bpm.
7	(c) Use the Karvonen formula to find the 60% target heart rate.	Target = 60 + 0.6 x 145 = 60 + 87 = 147 bpm.
8	(d) Find the 80% target heart rate and explain why beginners should start at 60%.	80%: 60 + 0.8 x 145 = 60 + 116 = 176 bpm; beginners have lower aerobic fitness, so starting at 60% reduces injury and over-fatigue risk, then add 5% every two weeks.

3. 800 m pacing and speed (16 marks)

Give speed to 2 decimal places and km/h to 1 decimal place.

#	Question	Answer and marking notes
9	(a) A student runs 800 m in 4 minutes 00 seconds. Find the time in seconds.	4 min 00 s = 4 x 60 = 240 s.

#	Question	Answer and marking notes
10	(b) Find the average speed in m/s.	Average speed = 800 / 240 = 3.33 m/s.
11	(c) Convert the average speed to km/h.	3.33 m/s x 3.6 = 12.0 km/h.
12	(d) If the first 400 m takes 110 s and the second 400 m takes 130 s, find the second-half speed and compare.	Second-half speed = 400 / 130 = 3.08 m/s, 0.25 m/s slower than the whole run, showing a clear pacing drop.

4. MET energy cost and diet balance (18 marks)

Use kcal for energy and 2 decimal places for fat mass.

#	Question	Answer and marking notes
13	(a) Running has a MET value of 10. A student of 60 kg runs for 30 minutes. Find the energy used.	Energy = 10 x 60 x 0.5 = 300 kcal.
14	(b) A bag of crisps has 250 kcal. At the same intensity, how many minutes of running offset it?	Burn 600 kcal per hour; 250 / 600 x 60 = 25 minutes.
15	(c) If the student trains 4 times a week for 30 minutes each, find the weekly energy cost.	Weekly total = 300 x 4 = 1,200.0 kcal.
16	(d) Taking 7,700 kcal as 1 kg of fat, how many kg of fat does the weekly cost equal?	1,200.0 / 7,700 = 0.16 kg of fat.

5. Fitness tests and rate of progress (16 marks)

Give percentages to whole numbers, except the last part to 1 decimal place.

#	Question	Answer and marking notes
17	(a) Sit-and-reach improves from 20 cm to 25 cm. Find the percentage improvement.	Improvement = (25 - 20) / 20 x 100% = 25% .
18	(b) Pull-ups improve from 4 to 7. Find the percentage improvement.	Improvement = (7 - 4) / 4 x 100% = 75% .
19	(c) Standing long jump improves from 1.60 m to 1.84 m. Find the percentage improvement.	Improvement = (1.84 - 1.60) / 1.60 x 100% = 15% .
20	(d) Find the mean percentage improvement of the three tests and say which needs priority work.	Mean = (25 + 75 + 15) / 3 = 38.3%; the jump improved least (15%), so lower-limb power training should come first.

6. Hydration and exercise safety (16 marks)

Give fluid volumes in mL.

#	Question	Answer and marking notes
21	(a) Body mass falls from 60.0 kg to 59.2 kg. Find the sweat loss and the fluid needed at 1.0 to 1.5 L per kg.	Loss = 60.0 - 59.2 = 0.8 kg, i.e. 800 to 1200 mL.
22	(b) A session lasts 60 minutes and warm-up takes 15%. Find the warm-up time.	Warm-up = 60 x 15% = 9 minutes.
23	(c) On the RPE 6 to 20 scale, what intensity does 13 represent?	13 means somewhat hard, roughly 60% to 70% of maximum heart rate, i.e. moderate intensity.
24	(d) In a 2-hour session the student drinks 150 mL every 20 minutes. Find the total intake.	120 / 20 = 6 times; 6 x 150 = 900 mL.