S4 Home Economics Practice Paper 1 | energy needs, protein, food budget, food safety and family resources

Senior Secondary Home Economics

S4 Home Economics practice paper with answers: energy and protein needs, food budget, food safety temperatures, textile care and time management.

1. Basal metabolic rate and daily energy requirement (16 marks)

S4 student Yan weighs 55 kg. Estimate her basal metabolic rate (BMR) at 1 kilocalorie per kilogram per hour and assume an activity factor of 1.55. She currently takes in about 2400 kcal a day, and 1 kg of body fat is equivalent to about 7700 kcal.

#	Question	Answer and marking notes
1	(a) Calculate her basal metabolic rate (BMR).	Answer: BMR = 55 x 24 = 1320 kcal per day.
2	(b) Calculate her total daily energy expenditure (TDEE).	Answer: TDEE = 1320 x 1.55 = 2046 kcal per day.
3	(c) Calculate her daily energy surplus and the theoretical weight gain after 30 days, to two decimal places.	Answer: surplus = 2400 - 2046 = 354 kcal per day; over 30 days that is 10620 kcal; weight gain = 10620 / 7700 = 1.38 kg. The surplus equals 17.30 per cent of her daily requirement.
4	(d) State two limitations of estimating energy requirement this way.	Answer: first, using 1 kcal per kg per hour instead of a measured BMR ignores differences in age, sex, muscle mass and body temperature; second, the activity factor is only an average and ignores actual exercise time, air temperature and illness, so the estimate is only a guide.

2. Protein requirement and meal planning (17 marks)

Yan weighs 55 kg and the recommended protein intake for adolescents is 0.8 g per kg of body weight. At breakfast she ate 2 eggs (6 g protein each) and drank 250 ml of milk (8 g protein); at lunch she ate 120 g of fish containing about 20 per cent protein.

#	Question	Answer and marking notes
5	(a) Calculate her recommended daily protein intake.	Answer: requirement = 55 x 0.8 = 44 g.
6	(b) Calculate the protein supplied by breakfast and its share of the daily requirement to two decimal places.	Answer: breakfast = 2 x 6 + 8 = 20 g, which is 20 / 44 x 100 per cent = 45.45 per cent of the requirement.
7	(c) Calculate the protein in lunch and state whether breakfast and lunch together meet the daily recommendation.	Answer: lunch = 120 x 20 per cent = 24 g; together the two meals give 20 + 24 = 44 g, which is 100 per cent of the requirement, before dinner is counted.

#	Question	Answer and marking notes
8	(d) Explain what a complete protein is and give one example of combining plant foods to complement their amino acids.	Answer: a complete protein supplies all the essential amino acids in proportions close to human needs, for example eggs, milk, fish and meat. Plant foods usually lack one or two essential amino acids, since cereals are low in lysine and pulses are low in methionine, so eating rice and beans in the same meal complements them and gives a more complete protein combination.

3. Family food budget and price changes (17 marks)

A family of four spends each month: staples $900, meat $1300, vegetables and fruit $800 and others $600, against a monthly food budget of $3600. Meat prices then rise by 15 per cent while all other prices stay unchanged.

#	Question	Answer and marking notes
9	(a) Check the current total monthly food spending and state whether it exceeds the budget.	Answer: total = 900 + 1300 + 800 + 600 = $3600, which equals the $3600 budget, so nothing is overspent.
10	(b) Calculate meat as a percentage of food spending to two decimal places.	Answer: 1300 / 3600 x 100 per cent = 36.11 per cent.
11	(c) Calculate the new meat spending, the amount over budget and the percentage rise in total spending to two decimal places.	Answer: new meat spending = 1300 x 1.15 = $1495; over budget by $195; new total $3795, which is 5.42 per cent above the budget.
12	(d) Suggest two ways to absorb the overspend without reducing nutritional intake.	Answer: replace part of the fresh meat with cheaper protein such as eggs, tofu and pulses while keeping total protein the same; and buy seasonal produce at wet markets or wholesale outlets, compare unit prices and cut waste by planning menus and chilling leftovers properly, so that spending returns within the budget.

4. Food safety and temperature control (17 marks)

Bacteria multiply fastest in the danger zone between 4 degrees Celsius and 60 degrees Celsius, and a refrigerator should stay at 4 degrees Celsius or below. A pot of soup was left for 4 hours at a room temperature of 25 degrees Celsius, and reheated food must reach 75 degrees Celsius at the centre.

#	Question	Answer and marking notes
13	(a) Decide whether the room temperature lies in the danger zone and explain.	Answer: 25 degrees Celsius lies between 4 and 60, inside the danger zone, where bacteria multiply quickly and can double about every 20 minutes.
14	(b) Using the two hour rule, calculate how many hours the soup has exceeded the safe limit and state the correct action.	Answer: the safe limit is 2 hours and the soup has stood for 4 hours, so it exceeds the limit by 2 hours; food left out for more than two hours should be thrown away rather than simply reheated and treated as safe.

#	Question	Answer and marking notes
15	(c) By how many degrees must the food centre rise from refrigerator temperature to the required reheating temperature?	Answer: it must rise by 75 - 4 = 71 degrees Celsius, and boiling should be held long enough for the whole pot to heat evenly.
16	(d) State two practices that prevent cross contamination.	Answer: store raw and cooked food separately, with cooked food above raw meat and with separate chopping boards and knives; and wash hands thoroughly with soap after handling raw meat, disinfect and replace cloths and utensils regularly, and keep raw meat juices away from ready to eat food.

5. Textile properties and the cost of washing (17 marks)

A garment is 60 per cent cotton and 40 per cent polyester, and its care label says machine wash at 40 degrees Celsius. The detergent dose is 15 ml per kilogram of laundry and a 1500 ml bottle costs $45. The machine is loaded with 5 kg of laundry averaging 250 g per item.

#	Question	Answer and marking notes
17	(a) Calculate the detergent needed for this wash.	Answer: 5 x 15 = 75 ml.
18	(b) Calculate how many washes one bottle provides.	Answer: 1500 / 75 = 20 washes.
19	(c) Calculate the detergent cost per wash and per item to two decimal places.	Answer: per wash = $45 / 20 = $2.25; 5 kg is 20 items, so each item costs $2.25 / 20 = $0.11.
20	(d) State one property of cotton and one of polyester, and one precaution when washing and drying this blended garment.	Answer: cotton absorbs moisture, breathes well and feels comfortable but creases and shrinks; polyester is strong, quick drying and crease resistant but absorbs little moisture. The blend should be washed at 40 degrees Celsius or below as labelled and kept away from hot tumble drying and long exposure to strong sun, so that the cotton does not shrink and the polyester does not distort.

6. Family resources and time management (16 marks)

A family has 21 hours a week for housework: 7 hours cleaning, 8 hours cooking, 3 hours laundry and 3 hours other tasks. Buying a dishwasher would save 2 hours of cleaning each week.

#	Question	Answer and marking notes
21	(a) Check the total weekly housework hours and calculate cooking as a percentage of the total to two decimal places.	Answer: total = 7 + 8 + 3 + 3 = 21 hours, equal to the 21 hours available; cooking takes 8 / 21 x 100 per cent = 38.10 per cent.
22	(b) Calculate the weekly housework hours after buying the dishwasher and the freed time as a percentage to two decimal places.	Answer: new total = 21 - 2 = 19 hours; the freed time is 2 / 21 x 100 per cent = 9.52 per cent.

#	Question	Answer and marking notes
23	(c) Using the idea of opportunity cost, explain what the freed hours could be used for and the cost to weigh in the decision.	Answer: the 2 freed hours could go to study, family time or paid work, and those are the benefits gained; the costs include the purchase price, electricity, water and the space taken up, so the machine is only worthwhile if the value of the time saved exceeds those costs.
24	(d) Suggest two practical techniques for scheduling housework.	Answer: sort tasks by priority and length, fix weekly slots and batch similar jobs such as washing and ironing together; and share tasks among family members, run jobs in parallel such as cleaning while cooking, and plan menus and shopping lists in advance to avoid repeated trips and last minute decisions.