S4 Home Economics Practice Paper: Nutrients and Energy Calculation, Meal Planning and Energy Requirements, Food Science and Cooking, Food Safety and Preservation, Textile Fibres and Clothing Care, Family Resources and Consumption (100 marks)

Level: S4 | Subject: Home Economics | 60 minutes | 100 marks | 24 questions | answer key

Section A: Nutrients and Energy Calculation (17 marks)

Each question is worth 4-5 marks; show working and units.

#	Question	Answer	Marks
1	A 100 g pack of biscuits contains 60 g carbohydrate, 8 g protein and 20 g fat. Given that carbohydrate and protein supply 17 kJ per gram and fat supplies 37 kJ per gram, find the total energy of the pack in kJ.	Energy = 60 x 17 + 8 x 17 + 20 x 37 = 1020 + 136 + 740 = 1896 kJ (about 453 kcal).	5
2	Referring to the previous question, what percentage of the total energy comes from fat? (1 decimal place)	Energy from fat = 20 x 37 = 740 kJ; percentage = 740 / 1896 x 100 = 39.0 per cent.	4
3	A person takes in 2000 kcal per day. Using 1 kcal = 4.184 kJ, express this in kJ.	Energy = 2000 x 4.184 = 8368 kJ.	4
4	For an adolescent weighing 55 kg, the recommended daily protein intake is 0.8 g per kg of body weight. Find the recommended daily intake.	Protein = 0.8 x 55 = 44 g.	4

Section B: Meal Planning and Energy Requirements (17 marks)

Each question is worth 4-5 marks; state clearly whether the unit is kcal or kJ.

#	Question	Answer	Marks
5	A boy has a basal metabolic rate (BMR) of 1500 kcal and a physical activity factor of 1.55. Find his total energy expenditure (TEE) and convert it to kJ using 1 kcal = 4.184 kJ.	TEE = 1500 x 1.55 = 2325 kcal; in kJ = 2325 x 4.184 = 9728 kJ (to the nearest whole number).	5
6	A person is 1.62 m tall and weighs 57 kg. Calculate the BMI (1 decimal place) and state the category (below 18.5 underweight, 18.5-22.9 normal, 23-24.9 overweight, 25 or above obese).	BMI = 57 / 1.62^2 = 57 / 2.6244 = 21.7, which is in the normal range.	4
7	If daily energy intake is reduced by 500 kcal, how much energy is saved in one week? Given that 7,700 kcal equals 1 kg of fat, about how many kg of fat is lost?	One week = 500 x 7 = 3500 kcal; fat = 3500 / 7700 = 0.45 kg.	4
8	In a 2000 kcal daily diet, protein provides 15 per cent of the energy. Using 4 kcal per gram of protein, find the daily protein intake in grams.	Energy from protein = 2000 x 15 per cent = 300 kcal; protein = 300 / 4 = 75 g.	4

Section C: Food Science and Cooking (17 marks)

Each question is worth 4-5 marks; use correct food science terms.

#	Question	Answer	Marks
9	Bread is made from 500 g of strong flour with a water absorption of 60 per cent; salt is 2 per cent of the flour weight. Find the mass of water and of salt needed.	Water = 500 x 60 per cent = 300 g; salt = 500 x 2 per cent = 10 g.	5
10	Explain two examples of protein denaturation in cooking and state the temperature range at which egg white begins to set.	Example 1: heating an egg breaks the protein structure so it sets; example 2: whisking egg white unfolds the proteins and forms a foam (marinating in acid also works). Egg white begins to set at about 60-65 C (within 60-70 C).	4
11	What conditions are needed for the Maillard reaction? Why does boiled food (such as poached chicken) brown much less?	The Maillard reaction needs amino acids and reducing sugars at above about 140 C in a low moisture environment. Boiling reaches only about 100 C with plenty of water, so browning is minimal; the food must be dried and then pan-fried or roasted to brown.	4
12	Which two main products are formed when yeast ferments dough? Write the reaction and explain why the dough rises.	The products are ethanol and carbon dioxide: C6H12O6 -> 2C2H5OH + 2CO2. The CO2 bubbles are trapped by the gluten network, so the dough rises; during baking the gases expand, ethanol evaporates and a light texture forms.	4

Section D: Food Safety and Preservation (17 marks)

Each question is worth 4-5 marks; give accurate temperature and pH values.

#	Question	Answer	Marks
13	State the temperature range of the danger zone and give the safe temperatures for cold storage, hot holding and reheating.	The danger zone is 4-60 C; cold storage must be 4 C or below, hot holding 60 C or above, and reheating must bring the centre of the food to at least 75 C.	5
14	Why are foods with a pH below 4.6 much less likely to cause botulism?	Clostridium botulinum cannot grow or produce toxin at a pH below 4.6, so acid foods such as pickles and tomato sauce are lower risk; low-acid foods must be controlled by refrigeration or sterilisation.	4
15	In a fridge at 4 C, bacteria double every 30 minutes. How long does it take to grow from 10^2 to 10^6?	Number of doublings = 6 - 2 = 4; time = 4 x 30 = 120 minutes (2 hours).	4
16	A freezer is normally set at -18 C. State whether freezing kills bacteria and describe a correct way to thaw food.	Freezing only stops bacteria growing; it does not kill them, and they multiply again after thawing. Thaw in the fridge at 4 C or in a microwave and cook immediately; never leave food at room temperature for hours.	4

Section E: Textile Fibres and Clothing Care (16 marks)

Each question is worth 4 marks; relate fibre properties to care methods.

#	Question	Answer	Marks
17	Cotton has a moisture regain of about 8.5 per cent and polyester about 0.4	Cotton absorbs much more moisture, feels breathable and comfortable but dries slowly;	4

	per cent. Compare their moisture absorption, comfort and drying speed.	polyester absorbs very little, dries fast and resists creasing, but is less breathable and builds up static charge and heat.	
18	A care label gives a maximum wash temperature of 40 C. What could happen to cotton garments and to garments containing elastane if they are washed at 60 C instead?	Cotton is more likely to shrink, lose colour and crease at 60 C; elastane degrades at high temperature, losing its stretch and even breaking, so the garment becomes loose or distorted.	4
19	Household bleach contains 5 per cent sodium hypochlorite. It is diluted with 1 part bleach to 49 parts water. Find the concentration after dilution.	Dilution factor = 1 + 49 = 50; concentration = 5 per cent / 50 = 0.1 per cent (about 1,000 ppm available chlorine).	4
20	Iron settings: cotton 200 C, polyester 110 C. Why should cotton temperature not be used on polyester garments?	Polyester is a thermoplastic fibre with lower heat resistance; 200 C is close to its softening range and can shrink the fibres, leave shiny marks or melt onto the iron, causing permanent damage. Use the lower setting of 110 C with a pressing cloth.	4

Section F: Family Resources and Consumption (16 marks)

Each question is worth 4 marks; show the calculation steps.

#	Question	Answer	Marks
21	Pack A: 750 g for $18; pack B: 1 kg for $25. Comparing the price per 100 g, which is cheaper?	Pack A: 18 / 7.5 = $2.4 per 100 g; pack B: 25 / 10 = $2.5 per 100 g. Pack A is $0.10 cheaper per 100 g.	4
22	A household earns $12000 per month and spends 35 per cent of it on food. Find the monthly food spending, and the percentage of income if food spending rises to $4800.	Food spending = 12000 x 35 per cent = $4200; new share = 4800 / 12000 x 100 = 40 per cent.	4
23	An oven rated at 1.5 kW is used 2 hours a day for 30 days. Electricity costs $1.2 per kWh. Find the monthly energy use and the electricity bill.	Energy = 1.5 x 2 x 30 = 90 kWh; bill = 90 x 1.2 = $108.0.	4
24	A family throws away 2.5 kg of food each week. Find the monthly amount (4 weeks) and suggest two ways to reduce food waste.	Monthly waste = 2.5 x 4 = 10.0 kg. Method 1: buy from a shopping list in amounts you will use, avoiding bulk buying; method 2: store leftovers properly (chill or freeze) and use them in soup or fried rice, and check use-by dates regularly.	4