S3 Home Economics Practice Paper 1 | Diet energy, recipe cost, food safety, textile care and family budgeting (with answers and marking scheme)

Junior Secondary Home Economics

S3 Home Economics paper on diet energy, recipe costing, food safety, textiles, family budgeting and cooking energy, with answers and marks.

1. Dietary energy and macronutrient ratio (18 marks)

A meal contains 30 g protein, 60 g carbohydrate and 25 g fat. Protein and carbohydrate supply 4 kcal per gram; fat supplies 9 kcal per gram. Health authorities advise that fat should provide no more than 30% of total energy.

#	Question	Answer and marking notes
1	(a) Calculate the total energy of the meal in kcal, showing your working.	Answer: protein 30 x 4 = 120 kcal; carbohydrate 60 x 4 = 240 kcal; fat 25 x 9 = 225 kcal. Total = 120 + 240 + 225 = 585 kcal.
2	(b) What percentage of total energy comes from fat? Give one decimal place.	Answer: 225 / 585 x 100% = 38.5%.
3	(c) Does this meal meet the advice? If not, by how many percentage points does it exceed it?	Answer: no. It exceeds the advice by 38.5 - 30 = 8.5 percentage points; at this energy level fat should be at most 19.5 g.
4	(d) If fat is cut to 15 g, recalculate the total energy and the fat percentage, and suggest one way to use less oil.	Answer: fat energy = 15 x 9 = 135 kcal, total = 120 + 240 + 135 = 495 kcal, fat share = 135 / 495 x 100% = 27.3%, now below 30%. Method: steam, poach or bake instead of deep frying, or use a non-stick pan.

2. Recipe scaling and costing (18 marks)

A recipe for four servings needs 320 g flour, 3 eggs, 80 g butter and 200 ml milk. Unit prices: flour $0.0084 per g, eggs $2.5 each, butter $0.12 per g, milk $0.009 per ml. Six servings are required.

#	Question	Answer and marking notes
5	(a) Find the scaling factor and the flour needed for six servings.	Answer: factor = 6 / 4 = 1.5; flour = 320 x 1.5 = 480 g.
6	(b) Calculate the total material cost for six servings (two decimal places).	Answer: flour 480 x 0.0084 = $4.03; eggs 4.5 x 2.5 = $11.25; butter 120 x 0.12 = $14.40; milk 300 x 0.009 = $2.70; total $32.38.
7	(c) Find the cost per serving.	Answer: $32.38 / 6 = $5.40 per serving.
8	(d) If each serving sells for $9, find the gross margin, and state what happens to it if prices stay the same but materials cost more.	Answer: margin = (9 - 5.40) / 9 x 100% = 40.0%. If materials cost more while the price is unchanged, cost rises and the margin falls.

3. Food safety and bacterial growth (16 marks)

Bacteria multiply quickly at room temperature; the danger zone is 5 C to 60 C. In a food sample the count doubles every 20 minutes, starting at 500 per gram.

#	Question	Answer and marking notes
9	(a) State the danger temperature zone for food.	Answer: 5 C to 60 C. Bacteria multiply fastest in this range; food should be kept below 4 C or above 60 C.
10	(b) Calculate the count per gram after 120 minutes, showing your working.	Answer: 120 / 20 = 6 doublings; 500 x 2^6 = 32000.
11	(c) If the food stands for only 60 minutes, what is the count and how much lower is it than in (b), as a percentage?	Answer: 60 / 20 = 3 doublings, 500 x 2^3 = 4000; reduction = (32000 - 4000) / 32000 x 100% = 87.5%.
12	(d) Suggest two measures to prevent food poisoning.	Answer: (1) keep perishable food below 4 C and refrigerate leftovers within two hours; (2) use separate boards and knives for raw and cooked food, cook thoroughly to a core temperature above 75 C, and keep hands and utensils clean.

4. Textile fibres and clothing care (16 marks)

A cotton curtain is 150 cm long before washing and the label states a 4% shrinkage rate. The washing machine uses 0.9 kWh per wash; the family washes 4 times a week at $1.2 per kWh.

#	Question	Answer and marking notes
13	(a) Calculate the length after washing and the amount of shrinkage.	Answer: length after washing = 150 x (100 - 4)% = 144.0 cm; shrinkage = 150 - 144.0 = 6.0 cm.
14	(b) Calculate the number of washes in a year (52 weeks).	Answer: 4 washes a week x 52 weeks = 208 washes.
15	(c) Calculate the annual electricity use and cost of washing.	Answer: energy = 208 x 0.9 = 187.2 kWh; cost = 187.2 x $1.2 = $224.64.
16	(d) Compare cotton and polyester in two properties and give one care tip for cotton garments.	Answer: (1) cotton absorbs moisture and breathes well while polyester absorbs little but dries fast; (2) cotton shrinks and creases easily while polyester holds shape and resists creasing. Care tip: wash in cold water below 30 C, avoid hot drying and iron at low heat to limit shrinkage.

5. Household resource management and budgeting (16 marks)

A family earns $28000 a month. Expenses: rent $10500, food $6000, transport $1200, utilities $1800, education $3500 and others $2000.

#	Question	Answer and marking notes
17	(a) Calculate the monthly total expenses and the balance.	Answer: total = 10500 + 6000 + 1200 + 1800 + 3500 + 2000 = $25000; balance = 28000 - 25000 = $3000.

#	Question	Answer and marking notes
18	(b) Find the saving rate (balance as a percentage of income, one decimal place) and rent as a percentage of income.	Answer: saving rate = 3000 / 28000 x 100% = 10.7%; rent share = 10500 / 28000 x 100% = 37.5%.
19	(c) If the emergency fund should cover 3 months of expenses, find the target amount and how many months of saving it takes at the present balance.	Answer: target = $25000 x 3 = $75000; months needed = 75000 / 3000 = 25 months.
20	(d) Suggest two ways to improve the household finances (one to raise income, one to cut costs).	Answer: income: part-time work or turning a skill into income (tutoring, selling handmade goods). Costs: compare electricity plans, cut non-essential meals out, and transfer the monthly balance into savings or a time deposit automatically to avoid impulse spending.

6. Cooking methods, nutrients and energy (16 marks)

Spinach contains 30 mg vitamin C per 100 g. Boiling loses 60% of it while steaming loses only 25%. A rice cooker rated 0.4 kW runs for 0.5 h and an oven rated 2.0 kW runs for 1.5 h; electricity costs $1.2 per kWh.

#	Question	Answer and marking notes
21	(a) Calculate the vitamin C left in 100 g of spinach after boiling and after steaming.	Answer: boiling = 30 x (100 - 60)% = 12.0 mg; steaming = 30 x (100 - 25)% = 22.5 mg.
22	(b) What is the difference in mg, and why does steaming retain more nutrients?	Answer: difference = 22.5 - 12.0 = 10.5 mg. When steaming, the food is not immersed in water, so less water-soluble vitamin dissolves into the cooking liquid, and the heating time is shorter.
23	(c) Calculate the total electricity used by the rice cooker and the oven in kWh.	Answer: rice cooker 0.4 x 0.5 = 0.2 kWh; oven 2.0 x 1.5 = 3.0 kWh; total 3.2 kWh.
24	(d) Find the electricity cost of this cooking session and suggest one way to save cooking energy.	Answer: cost = 3.2 x $1.2 = $3.84. Saving: bake several dishes at once to fill the oven, cook with a lid to shorten heating time, or use a thermal cooker to avoid continuous heating.