S5 Health Management and Social Care Practice Paper: BMI and Waist-to-Hip Ratio, Ideal Weight and Body Fat, BMR and TDEE, Protein and Energy Conversion, Incidence and Prevalence, Relative and Attributable Risk, Drug Dosage and IV Drip Rate, Dilution, Care Staff Ratio, Home Visits, Service Coverage, Screening Sensitivity and Specificity (100 marks)

Level: S5 | Subject: Health Management and Social Care | 75 minutes | 100 marks | 24 questions | answer key

Section A — Health Indicators and Body Composition

Answer all questions. Show your working and state the units.

#	Question	Answer	Marks
1	Chan is 1.68 m tall and weighs 68.4 kg. (a) Calculate the BMI to 1 decimal place. (b) Classify the weight status using the Asian adult cut-off (BMI 23 or above means overweight).	(a) BMI = 68.4 / 1.68^2 = 24.2. (b) 24.2 is at or above 23, so the weight status is overweight.	5
2	Ms Lee has a waist of 88 cm and a hip of 104 cm. (a) Find the waist-to-hip ratio to 2 decimal places. (b) Judge the risk using the female cut-off (0.85 or above means high risk).	(a) 88 / 104 = 0.85. (b) 0.85 reaches the high risk threshold.	4
3	Taking BMI 22 as ideal, find the ideal weight for a person 1.68 m tall (to 0.1 kg) and the difference from 68.4 kg.	22 x 1.68^2 = 62.1 kg; 68.4 - 62.1 = 6.3 kg.	4
4	A person weighs 68.4 kg with 18.2 kg of fat. (a) Find the body fat percentage. (b) If lean mass stays at 50.2 kg and only fat is lost until body fat is 22%, find the target weight and the fat to be lost.	(a) 18.2 / 68.4 = 26.6%. (b) Weight = 50.2 / 0.78 = 64.4 kg; fat = 64.4 x 22% = 14.2 kg; fat to lose = 18.2 - 14.2 = 4.0 kg.	5

Section B — Energy Requirement and Nutrition

Answer all questions. Show your working and state the units.

#	Question	Answer	Marks
5	A woman aged 35, 168 cm tall, weighs 64.4 kg. Using BMR = 10W + 6.25H - 5A - 161, find her basal metabolic rate in kcal per day.	10 x 64.4 + 6.25 x 168 - 5 x 35 - 161 = 644 + 1050 - 175 - 161 = 1,358 kcal per day.	4
6	With an activity factor of 1.55, find the total daily energy expenditure (TDEE). If intake drops by 500 kcal a day, how much fat is lost in 7 days? (1 kg of fat is about 7,700 kcal)	TDEE = 1,358 x 1.55 = 2,105 kcal; deficit = 500 x 7 = 3,500 kcal; fat lost = 3,500 / 7,700 = 0.45 kg.	5
7	The protein recommendation is 1.2 g per kg of body weight for a person of 64.4 kg. (a) Find the daily protein in grams. (b) Protein gives 4 kcal per gram; find its share of the TDEE of 2,105 kcal.	(a) 1.2 x 64.4 = 77.3 g. (b) 77.3 x 4 = 309 kcal; 309 / 2,105 x 100% = 14.7%.	4
8	A drink provides 480 kJ per 100 g and 45 g is consumed. (a) Find the energy taken in, in kJ. (b) Convert it to kcal (1 kcal =	(a) 480 x 45 / 100 = 216 kJ. (b) 216 / 4.184 = 51.6 kcal.	4

	4.184 kJ).		

Section C — Epidemiological Data

Answer all questions. Show your working and state the units.

#	Question	Answer	Marks
9	A district has a population of 250,000 and 1,250 new cases in one year. Find the incidence rate per 1,000 people.	1,250 / 250,000 x 1,000 = 5.0 per 1,000 people.	4
10	In the same year the district has 8,750 existing cases. Find the prevalence rate per 1,000 and state how it differs from incidence.	8,750 / 250,000 x 1,000 = 35.0 per 1,000. Prevalence counts all existing cases including old ones; incidence counts only new cases in the period.	4
11	Of 4,000 exposed people 120 fall ill; of 6,000 unexposed people 90 fall ill. (a) Find both incidence rates per 1,000. (b) Find the relative risk. (c) Find the attributable risk and the attributable fraction.	(a) 30.0 and 15.0 per 1,000. (b) 30.0 / 15.0 = 2.0. (c) Attributable risk 15.0 per 1,000; attributable fraction 50%.	5
12	The district has 45,000 residents aged 65 or above and 1,800 deaths in a year. Find the death rate for this group per 1,000.	1,800 / 45,000 x 1,000 = 40.0 per 1,000.	4

Section D — Drug Dosage and Nursing Calculations

Answer all questions. Show your working and state the units.

#	Question	Answer	Marks
13	A drug is given at 15 mg per kg for a patient of 64.4 kg. (a) Find the total dose. (b) The syrup contains 250 mg in 5 mL; find the volume needed to 0.1 mL.	(a) 15 x 64.4 = 966 mg. (b) Concentration is 50 mg per mL; 966 / 50 = 19.3 mL.	5
14	An infusion of 500 mL must run over 4 hours with a drop factor of 20 gtt per mL. (a) Find the drip rate per minute to the nearest whole number. (b) If the rate is set at 60 gtt per minute, how many hours will it take?	(a) 500 x 20 = 10,000 drops; 10,000 / (4 x 60) = 42 gtt per minute. (b) 10,000 / 60 = 167 minutes, about 2.8 hours.	4
15	To make 500 mL of a 4% solution from a 20% solution, how much 20% solution and how much water are needed?	4% x 500 = 20 g of solute; 20 g / 20% = 100 mL; water = 500 - 100 = 400 mL.	4
16	The drug is given 966 mg twice a day for 7 days. Find the total dose of the course in grams to 0.01 g.	966 x 2 x 7 = 13,524 mg = 13.52 g.	3

Section E — Care Service Resources

Answer all questions. Show your working and state the units.

#	Question	Answer	Marks
17	A care home has 120 beds with a nurse to resident ratio of 1:20 over three shifts a day. Each nurse works 5 shifts a week. Find the number of nurses needed, rounded up.	120 / 20 = 6 per shift; 6 x 3 = 18 shifts a day; 18 x 7 = 126 shifts a week; 126 / 5 = 25.2, so 26 nurses.	5
18	Each home visit takes 1.5 hours. A social worker has 4.5 hours of direct service a day and works 21 days a month.	4.5 / 1.5 = 3 visits a day; 3 x 21 = 63 visits a month.	4

	Find the number of visits per month.		
19	A district has 4,800 older people living alone and 720 service places. Find the coverage rate.	720 / 4,800 x 100% = 15%.	4
20	A service receives 90 new applications a month and handles 75. The backlog is 450. (a) Find the monthly growth of the backlog. (b) How many months until the backlog doubles?	(a) 90 - 75 = 15 cases a month. (b) 450 / 15 = 30 months to reach 900 cases.	3

Section F — Screening and Health Statistics

Answer all questions. Show your working and state the units.

#	Question	Answer	Marks
21	Of 2,000 people screened, 200 truly have the disease and 180 of them test positive. Find the sensitivity.	180 / 200 x 100% = 90%.	4
22	The other 1,800 people do not have the disease; 216 of them test positive. Find the specificity.	(1,800 - 216) / 1,800 x 100% = 88%.	4
23	Using the two questions above, find the positive predictive value (PPV) and explain its meaning.	PPV = 180 / (180 + 216) x 100% = 45.5%, the share of positive results that are true cases.	4
24	If prevalence rises to 20% in the same 2,000 people while sensitivity stays at 90% and specificity at 88%, find the new PPV and compare.	400 cases give 360 true positives; 1,600 healthy people give 192 false positives; PPV = 360 / 552 x 100% = 65.2%, well above 45.5%.	4