1.2 Nutrition and Digestion: Test Pack

Calculator allowed · about 50 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Give three different nutrients found in food and state one role for each nutrient in the human body.

(a) Nutrient 1 and its role. **(1)**

(b) Nutrient 2 and its role. **(1)**

(c) Nutrient 3 and its role. **(1)**

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2 Match each food to the nutrient it contains most of. Write the nutrient for each food.
Nutrients: 1) Carbohydrate 2) Protein 3) Fat

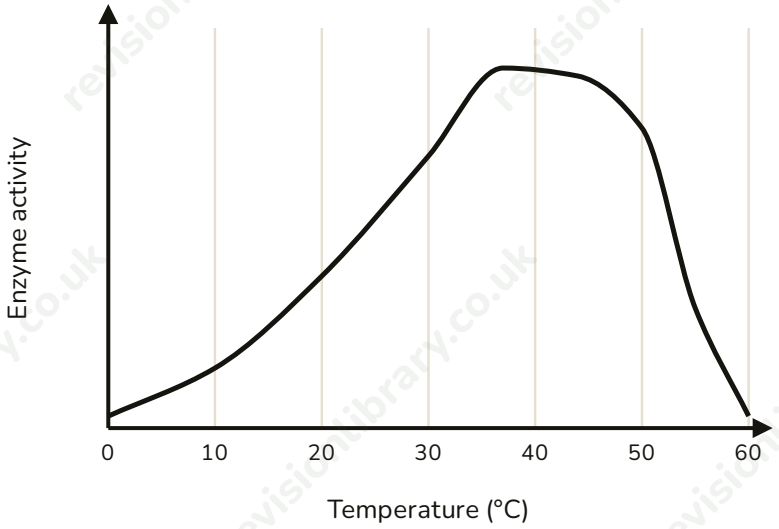
(a) Lentils **(1)**

(b) Olive oil **(1)**

(c) Bananas **(1)**

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3 The graph below shows enzyme activity against temperature for a digestive enzyme. Activity rises with temperature up to 37°C, then falls rapidly above 50°C.



(a) Explain the increase in activity up to 37°C. **(2)**

(b) Explain the rapid fall in activity above 50°C. **(2)**

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4 The table shows how long three different foods take to be digested in a simple simulated stomach test (times in minutes).

Food	Trial 1	Trial 2	Trial 3
Food A	30	28	32
Food B	45	40	50
Food C	20	22	18

(a) Calculate mean time for Food A, B and C to 1 decimal place. **(3)**

(b) Which food is digested fastest? **(1)**

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5 Explain why fibre in the diet is important even though it is not digested and does not provide nutrients.

(3)

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6 A teenager needs about 2200 kcal per day. If their lunch provides 820 kcal and their breakfast provides 420 kcal, calculate how many kilocalories they have left for the rest of the day. Show your working and explain whether a snack of 250 kcal would be sensible.

(6)

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7 State one example of a simple sugar, made of a single sugar unit, that is found in food.

(1)

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8 Practical investigation: chemical tests can be used to identify the food groups present in an unknown food sample. For each test, state the reagent(s) used and the positive result observed.

(a) Test for starch. **(2)**

(b) Test for reducing sugar. **(2)**

(c) Test for protein. **(2)**

(d) Test for fat (lipid). **(2)**

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9 Priya's meals for one day are shown below.
Breakfast: sugary cereal with whole milk
Lunch: white bread cheese sandwich, packet of crisps, chocolate bar
Dinner: sausages, chips, baked beans
Evaluate whether Priya's diet for the day is balanced. In your answer, identify what is missing or in excess, and suggest one improvement.

(4)

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10 BMI (body mass index) can be calculated using the equation: BMI = mass (kg) / [height (m)]^2. A man has a mass of 68 kg and a height of 1.60 m.
BMI categories: Underweight, BMI < 18.5; Healthy weight, BMI 18.5 to 24.9; Overweight, BMI 25.0 to 29.9; Obese, BMI ≥ 30.

(a) Calculate the man's BMI. Give your answer to 3 significant figures. **(2)**

(b) State which BMI category the man is in. **(1)**

(c) Evaluate the use of BMI as a measure of whether a person is a healthy weight. **(2)**

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Mark scheme · 1.2 Nutrition and Digestion: Test Pack

Question 1

(a) one nutrient named with one correct role (e.g. carbohydrate - provide energy) oe — **B1**

(a) Answer: **Carbohydrate - provide energy**

(b) one nutrient named with one correct role (e.g. protein - growth and repair) oe — **B1**

(b) Answer: **Protein - growth and repair**

(c) one nutrient named with one correct role (e.g. fat - energy store and insulation) oe — **B1**

(c) Answer: **Fat - energy store and insulation**

Question 2

(a) protein (cao) — **B1**

(a) Answer: **Protein**

(b) fat (cao) — **B1**

(b) Answer: **Fat**

(c) carbohydrate (cao) — **B1**

(c) Answer: **Carbohydrate**

Question 3

(a) higher temperature increases kinetic energy so more collisions between enzyme and substrate — **M1**

(a) this increases reaction rate up to the enzyme's optimum (oe) — **A1**

(a) Answer: **Rising temperature increases kinetic energy so enzyme and substrate collide more often and reactions occur faster up to the enzyme's optimum at about 37°C.**

(b) high temperature causes enzyme to denature, changing its shape — **M1**

(b) so the active site no longer fits the substrate and activity drops rapidly (oe) — **A1**

(b) Answer: **Temperatures above 50°C cause the enzyme to denature, altering its active site so the substrate cannot bind and activity falls rapidly.**

Question 4

(a) correct method for at least one mean (sum values / 3) — **M1**

(a) Food A = 30.0 min cao — **A1**

(a) Food B = 45.0 min and Food C = 20.0 min cao (either order) ft — **A1**

(a) Answer: **Food A = 30.0 min; Food B = 45.0 min; Food C = 20.0 min**

(b) Food C cao — **B1**

(b) Answer: **Food C**

Question 5

state that fibre adds bulk to the gut contents — **M1**

describe effect: helps food move through the gut and prevents constipation — **M1**

link to health: reduces risk of bowel problems and can aid healthy digestion or slow absorption of sugars — **A1**

Answer: **Fibre adds bulk to gut contents, helping food move through the intestine and preventing constipation; this supports healthy digestion and can reduce bowel problems and slow sugar absorption.**

Question 6

method: 2200 - (820 + 420) — **M1**

intermediate calculation: 820 + 420 = 1240 — **M1**

2200 - 1240 = 960 kcal remaining cao — **A1**

evaluation: compare 250 kcal to remaining 960 kcal — **M1**

conclude: 250 kcal is sensible as it leaves 710 kcal for other meals, or state it could be too high if meals planned are large — **A1**

explain nutritional advice: sensible if snack is healthy and balanced; not sensible if it is high sugar and causes exceeding energy needs — **B1**

Answer: **960 kcal remaining; a 250 kcal snack is sensible because it leaves 710 kcal for other meals, provided the snack is a healthy choice rather than high sugar.**

Question 7

glucose or fructose or galactose cao (do not accept sucrose, lactose or maltose: these are double sugars) — **B1**

Answer: **Glucose**

Question 8

(a) add iodine solution (in potassium iodide) directly to the sample — **B1**

(a) positive result: colour changes from browny-orange to blue-black — **B1**

(a) Answer: **Add iodine solution: a colour change from browny-orange to blue-black shows starch is present.**

(b) add Benedict's solution and heat in a gently boiling water bath — **B1**

(b) positive result: colour changes from blue to orange/brick-red (precipitate) — **B1**

(b) Answer: **Add Benedict's solution and heat in a water bath: a colour change from blue to brick-red shows a reducing sugar is present.**

(c) add sodium hydroxide solution, then a few drops of dilute copper sulfate solution (Biuret test), do not heat — **B1**

(c) positive result: colour changes from blue to purple/lilac — **B1**

(c) Answer: **Add sodium hydroxide then dilute copper sulfate solution: a colour change from blue to purple/lilac shows protein is present.**

(d) add ethanol to the sample, shake, then pour the mixture into water — **B1**

(d) positive result: a cloudy white emulsion forms — **B1**

(d) Answer: **Add ethanol, shake, then pour into water: a cloudy white emulsion shows fat is present.**

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Question 9

identifies the diet is not balanced, with a supporting reason	**B1**
identifies a food group/nutrient that is lacking, e.g. little or no fruit/vegetables, so low in fibre and vitamin C	**B1**
identifies an excess, e.g. high in fat and/or sugar and/or salt from crisps, chocolate and sausages	**B1**
gives a valid, specific improvement, e.g. swap the crisps or chocolate bar for a piece of fruit, or add a portion of vegetables at dinner	**B1**

Answer: **The diet is not balanced: it lacks fruit and vegetables (so is low in fibre and vitamin C) and has too much fat, sugar and salt; Priya could improve it by swapping the crisps or chocolate bar for a piece of fruit.**

Question 10

(a) $68 / 1.60^2$	**M1**
(a) 26.6 (awrt 26.6)	**A1**

(a) Answer: **26.6**

(b) overweight (ft from (a))	**B1**

(b) Answer: **Overweight**

(c) BMI does not distinguish between mass due to muscle and mass due to fat, so very muscular/athletic people may be wrongly classed as overweight or obese	**B1**
(c) BMI does not show where fat is distributed on the body (e.g. around the waist/organs), which also affects health risk	**B1**

(c) Answer: **BMI is a limited measure because it cannot tell muscle mass from fat mass, and it does not show where on the body any fat is stored, both of which affect actual health risk.**

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