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PRACTICE QUESTIONS

Sharjah Health Authority (SHA)

BICTH

Biochemistry Exam

EDITION

Original Demo

QUESTIONS

15

ISSUED

October 14, 2026

Before you begin

What this is

15 practice questions for Sharjah Health Authority (SHA) BICTH , each with its answer key and an explanation. Answer a question before you read its key - the explanation is worth more once you have committed.

If something looks wrong

Send us three things and we will check it:

- the exam code, BICTH
- the question number
- the email address on your order

Write to **support@mometrix.net**. We reply within one business day.

Licence

Original Mometrix demo. This free sample contains fewer questions than the full paid edition.

QUESTION 1

SINGLE CHOICE

Which enzyme catalyzes the rate-limiting, hormonally regulated step of hepatic gluconeogenesis from pyruvate?

- ☐ A Pyruvate carboxylase
- ☐ B Phosphoenolpyruvate carboxykinase (PEPCK)
- ☒ C Fructose-1,6-bisphosphatase
- ☐ D Glucose-6-phosphatase

ANSWER C

WHY Although pyruvate carboxylase, PEPCK, fructose-1,6-bisphosphatase, and glucose-6-phosphatase are all gluconeogenic enzymes, the major hormonally regulated, rate-controlling step that bypasses the phosphofructokinase-1 reaction is catalyzed by fructose-1,6-bisphosphatase. PEPCK is also tightly regulated transcriptionally, but the canonical rate-limiting step in the pathway is fructose-1,6-bisphosphatase.

QUESTION 2

MULTIPLE CHOICE

Which of the following laboratory findings are most consistent with hepatocellular injury rather than purely cholestatic disease? (Choose two.)

- ☒ A Markedly elevated alanine aminotransferase (ALT) and aspartate aminotransferase (AST) in plasma
- ☐ B Elevated plasma alkaline phosphatase of hepatic origin with relatively normal ALT/AST
- ☐ C Elevated plasma γ -glutamyltransferase (GGT) and 5'-nucleotidase
- ☒ D Elevated plasma aminotransferases together with increased plasma total bile acids and bilirubin

ANSWER A - D

WHY Hepatocellular injury releases transaminases (ALT, AST) into plasma, so markedly elevated ALT/AST point to hepatocyte damage. Concurrent elevation of bile acids and bilirubin indicates the liver's excretory function is also compromised, which fits mixed hepatocellular injury (e.g., viral hepatitis). In contrast, a predominantly cholestatic pattern shows elevated alkaline phosphatase, GGT, and 5'-nucleotidase with relatively normal transaminases; this points to impaired bile flow rather than hepatocyte destruction.

QUESTION 3

SINGLE CHOICE

Which mitochondrial complex directly transfers electrons from ubiquinol (QH₂) to cytochrome c?

- ☐ A Complex I (NADH-ubiquinone oxidoreductase)
- ☐ B Complex II (succinate-ubiquinone oxidoreductase)
- ☒ C Complex III (ubiquinol-cytochrome c oxidoreductase)
- ☐ D Complex IV (cytochrome c oxidase)

ANSWER C

WHY Complex III accepts electrons from reduced ubiquinol (QH₂) at the Q_o site, passes them through the Q cycle via cytochrome b and the Rieske iron-sulfur protein, and reduces cytochrome c - the only soluble electron carrier that shuttles electrons between complexes. Complex IV then transfers electrons from cytochrome c to molecular oxygen, forming water.

QUESTION 4

SINGLE CHOICE

Which pair of enzymes correctly describes the two consecutive reactions that convert the amino group of most amino acids into a form that enters the urea cycle?

- ☐ A Glutamate dehydrogenase and carbamoyl phosphate synthetase I
- ☐ B Aspartate aminotransferase and argininosuccinate synthetase
- ☐ C Alanine aminotransferase and arginase
- ☒ D Aminotransferases (transaminases) and glutamate dehydrogenase

ANSWER D

WHY Most amino acids first transfer their α-amino group to α-ketoglutarate via aminotransferases (producing glutamate). Glutamate then undergoes oxidative deamination by glutamate dehydrogenase, releasing free NH₄⁺ that is incorporated into carbamoyl phosphate by CPS-I and ultimately enters the urea cycle. Options A, B, and C each pair one correct enzyme with one that does not perform the nitrogen-collection step in question.

QUESTION 5

MULTIPLE CHOICE

Which of the following B-vitamins function as precursors for coenzymes involved in the transfer or handling of one-carbon (C1) units? (Choose two.)

- ☒ **A** Folate (vitamin B9)
- ☒ **B** Vitamin B12 (cobalamin)
- ☐ **C** Niacin (vitamin B3)
- ☐ **D** Biotin (vitamin B7)

ANSWER A • B

WHY Tetrahydrofolate carries one-carbon units at several oxidation levels (methyl, methylene, formyl, formimino), and methylcobalamin is the cofactor for methionine synthase, which regenerates methionine from homocysteine and also supports the folate cycle. Niacin gives NAD⁺/NADP⁺ for two-electron (hydride) transfers, and biotin is a carboxylation cofactor, not a one-carbon carrier.

QUESTION 6

SINGLE CHOICE

Which mitochondrial complex directly transfers electrons from ubiquinol (QH₂) to cytochrome c?

- ☐ **A** Complex I
- ☐ **B** Complex II
- ☒ **C** Complex III
- ☐ **D** Complex IV

ANSWER C

WHY Complex III, also called cytochrome bc₁ complex, oxidizes ubiquinol and transfers the resulting electrons through the cytochrome c pathway.

QUESTION 7

SINGLE CHOICE

How many NADH molecules are generated per acetyl-CoA that enters a single turn of the citric acid (Krebs) cycle?

- ☐ A One
- ☐ B Two
- ☒ C Three
- ☐ D Four

ANSWER C

WHY Per acetyl-CoA, the TCA cycle produces 3 NADH (at isocitrate dehydrogenase, α -ketoglutarate dehydrogenase, and malate dehydrogenase), 1 FADH₂ (at succinate dehydrogenase), and 1 GTP/ATP (at succinyl-CoA synthetase). NADH and FADH₂ then feed oxidative phosphorylation.

QUESTION 8

SINGLE CHOICE

Deficiency of thiamine (vitamin B1) most directly impairs which enzymatic reaction?

- ☐ A Isocitrate dehydrogenase
- ☒ B Pyruvate dehydrogenase
- ☐ C Succinate dehydrogenase
- ☐ D Malate dehydrogenase

ANSWER B

WHY Thiamine pyrophosphate is an essential coenzyme for pyruvate dehydrogenase, which converts pyruvate to acetyl-CoA.

QUESTION 9

SINGLE CHOICE

In a single turn of the citric acid (Krebs) cycle, how many molecules of CO₂ are released by the two decarboxylation reactions (isocitrate → α-ketoglutarate and α-ketoglutarate → succinyl-CoA)?

☐ A 1☒ B 2☐ C 3☐ D 4**ANSWER B**

WHY One turn of the cycle produces two molecules of CO₂ (one each at the isocitrate dehydrogenase and α-ketoglutarate dehydrogenase steps).

QUESTION 10

SINGLE CHOICE

In a single turn of the citric acid (Krebs) cycle, how many molecules of CO₂ are released by the two decarboxylation reactions?

☐ A 1☒ B 2☐ C 3☐ D 4**ANSWER B**

WHY One turn of the cycle releases two molecules of CO₂: one at the isocitrate dehydrogenase step (isocitrate → α-ketoglutarate) and one at the α-ketoglutarate dehydrogenase step (α-ketoglutarate → succinyl-CoA). All other carbons of acetyl-CoA plus the existing oxaloacetate are recovered in the four-carbon product oxaloacetate, ready to accept another acetyl group.

QUESTION 11

SINGLE CHOICE

Porphyria cutanea tarda (PCT) is caused by deficiency of which heme biosynthesis enzyme, leading to accumulation of uroporphyrinogen III?

- ☐ A ALA synthase
- ☐ B Porphobilinogen deaminase (hydroxymethylbilane synthase)
- ☒ C Uroporphyrinogen decarboxylase
- ☐ D Ferrochelatase

ANSWER C

WHY PCT results from deficiency of uroporphyrinogen decarboxylase (UROD), which normally converts uroporphyrinogen III to coproporphyrinogen III. Blockage leads to accumulation of uroporphyrinogen/uroporphyrin, producing photosensitivity and blistering skin lesions. ALA synthase deficiency causes sideroblastic anemia; PBG deaminase deficiency causes acute intermittent porphyria; ferrochelatase deficiency causes erythropoietic protoporphyria.

QUESTION 12

MULTIPLE CHOICE

Which of the following correctly match a B-vitamin with its active coenzyme form? (Choose two.)

- ☒ A Riboflavin (B2) → FAD and FMN
- ☐ B Pyridoxine (B6) → thiamine pyrophosphate (TPP)
- ☒ C Niacin (B3) → NAD⁺ and NADP⁺
- ☐ D Pantothenic acid (B5) → coenzyme Q10 (ubiquinone)

ANSWER A - C

WHY Riboflavin (B2) is the precursor of the flavin coenzymes FAD and FMN, which carry two-electron/two-proton equivalents in oxidation-reduction reactions. Niacin (B3) is the precursor of NAD⁺ and NADP⁺, which carry hydride ions. Pyridoxine (B6) gives pyridoxal phosphate (PLP), not TPP (that is from thiamine/B1). Pantothenic acid (B5) is the precursor of coenzyme A and the phosphopantetheine arm of acyl carrier protein, not coenzyme Q10.

QUESTION 13

SINGLE CHOICE

Long-chain fatty acyl-CoA molecules are transported from the cytosol into the mitochondrial matrix for β -oxidation. Which of the following correctly describes this shuttle?

- ☐ A Acyl-CoA crosses directly through porin channels in the outer mitochondrial membrane.
- ☒ B Carnitine palmitoyltransferase I (CPT-I) on the outer mitochondrial membrane converts acyl-CoA to acylcarnitine, which is translocated by carnitine-acylcarnitine translocase; CPT-II on the inner membrane regenerates acyl-CoA.
- ☐ C Acyl-CoA is hydrolyzed to free fatty acid, which diffuses across both mitochondrial membranes, then re-esterified inside the matrix.
- ☐ D Citrate carries acyl groups from the cytosol to the matrix via the tricarboxylate carrier.

ANSWER B

WHY The carnitine shuttle uses CPT-I (outer membrane, inhibited by malonyl-CoA), carnitine-acylcarnitine translocase (inner membrane antiporter), and CPT-II (inner membrane, facing matrix) to deliver acyl-CoA into the matrix.

QUESTION 14

SINGLE CHOICE

A patient is admitted 4 days after the onset of classic central chest pain. Which cardiac biomarker is now most useful to confirm the diagnosis of acute myocardial infarction, given the time elapsed since symptom onset?

- ☐ A Creatine kinase-MB (CK-MB)
- ☐ B Aspartate aminotransferase (AST)
- ☒ C Troponin I or T (cTnI/cTnT)
- ☐ D Myoglobin

ANSWER C

WHY Cardiac troponins (cTnI, cTnT) rise within 3-6 hours, peak at ~24 hours, and remain elevated for 7-10 days, making them the biomarker of choice for diagnosing MI both acutely and several days after the event. CK-MB peaks at ~24 hours and returns to baseline by 48-72 hours, so it is unreliable at day 4. Myoglobin rises early (2-4 h) but is non-specific and short-lived. AST is non-specific and has been largely superseded by troponins.

QUESTION 15

SINGLE CHOICE

Which combination of serum enzyme changes is most characteristic of hepatocellular (rather than cholestatic or muscular) injury?

- ☒ A Marked elevation of alanine aminotransferase (ALT) and aspartate aminotransferase (AST), with ALT typically > AST
- ☐ B Isolated marked elevation of alkaline phosphatase (ALP) and γ -glutamyltransferase (GGT)
- ☐ C Marked elevation of creatine kinase (CK) with normal transaminases
- ☐ D Marked elevation of amylase and lipase

ANSWER A

WHY Hepatocellular injury is characterized by leakage of cytosolic and mitochondrial hepatocyte enzymes, especially ALT (a cytosolic enzyme highly specific for liver) and AST. ALT usually exceeds AST in pure hepatocellular injury; the reverse (AST > ALT) suggests alcoholic hepatitis. Option B describes cholestasis, option C describes skeletal muscle injury, and option D describes acute pancreatitis.