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Level: HL IB in Biology
Subject: Biology
Topic: IB HL Biology
Type: Mark Scheme

All International Baccalaureate IB Topic Questions HL Biology

BIOLOGY

HL - IB

Key skills

Answer 1

The correct answer is C because thyroxin increases the metabolic rate, which supports a higher rate of protein synthesis and generates more heat.

A is incorrect as thyroxin will not only increase the rate of protein synthesis, but also the generation of body heat.

B is incorrect as adipose tissue is not a metabolically active region.

D is incorrect as adipose tissue is not a metabolically active region and thyroxin does not decrease appetite.

Answer 2

The correct answer is B because Type I diabetes is most common amongst young children due to the destruction of the beta cells in the islets of Langerhans.

A is incorrect as Type I diabetes is due to insufficient levels of insulin in the body, not due to a failure to respond to the hormone.

C & D are incorrect as Type II diabetes are prevalent amongst older people, not young children.

Answer 3

The correct answer is D because glucagon, which is secreted by the alpha cells, is the hormone responsible for increasing the breakdown of glycogen to glucose by the liver.

A is incorrect as insulin will increase the conversion of glucose to glycogen in the liver.

B is incorrect as the alpha cells secrete glucagon.

C is incorrect as a meal high in carbohydrates would stimulate the secretion of insulin, which would increase the conversion of glucose to glycogen.

Answer 4

The correct answer is B.

Remember that osmolarity is a measure of the number of solute particles present in a solution, so a cell with higher osmolarity than its surroundings has a higher solute concentration and will therefore take on water.

Answer 5

The correct answer is D.

The diameter difference between the afferent and efferent arterioles means that blood flows into the glomerulus faster than it can flow out; this generates high blood pressure inside the glomerulus, forcing small molecules into the Bowman's capsule. Large molecules are unable to pass through the basement membrane, so are kept out of the filtrate. The other statements are biologically accurate, but do not describe features that aid ultrafiltration.

Answer 6

The correct answer is C.

D is very similar to the correct answer, but structure 4 labels the lumen, or the inside, of the Bowman's capsule, and not the inside of the proximal convoluted tubule.

Answer 7

The correct answer is B.

Small molecules pass through the capillary endothelium, basement membrane, and podocyte layer during ultrafiltration to form the glomerular filtrate, so we would expect the concentrations of urea, sodium ions, and glucose to remain the same, or similar to that of the blood plasma. Large molecules do not fit through the barriers, so protein concentration should be zero, or close to zero, in a healthy individual.

Answer 8

The correct answer is A.

The high osmolarity in the medulla, generated by the ions pumped out of the ascending limb, leads to water leaving the descending limb by osmosis.

The descending limb has few transport proteins, so is relatively impermeable to ions.

While it is correct that water is reabsorbed into the vasa recta, this statement does not explain why water leaves the loop of Henle by osmosis.

Answer 9

The correct answer is C.

Animals that live in dry environments often have a very long loop of Henlé as this allows them to generate very concentrated urine and therefore conserve water. A long loop of Henlé enables the generation of a very steep concentration gradient across the medulla and therefore the reabsorption of almost all water by osmosis. Note that whilst some of the other statements may be true, only statement C specifically explains the concentrating ability of the kidney.

Answer 10

The correct answer is A.

ADH is released into the blood in response to low blood water content. It increases the number of aquaporins in the cells lining the collecting duct, increasing the permeability of the collecting duct to water and leading to increased water reabsorption.

Note that while C and D would also both lead to increased water reabsorption, we would not expect these features to vary significantly between two humans, and neither would these features explain the differences shown in the image.