

APOLLO

Homeostasis

HL

Biology

First assessment 2025

7 questions | questions

30. How is blood glucose regulated?

	Deviation of blood glucose level from normal	Hormone secreted by pancreas	Effect
A.	higher	glucagon	muscles break down glycogen into glucose
B.	higher	insulin	small intestine slows glucose absorption
C.	lower	glucagon	liver converts glycogen to glucose
D.	lower	insulin	kidney reabsorbs more glucose

Turn over

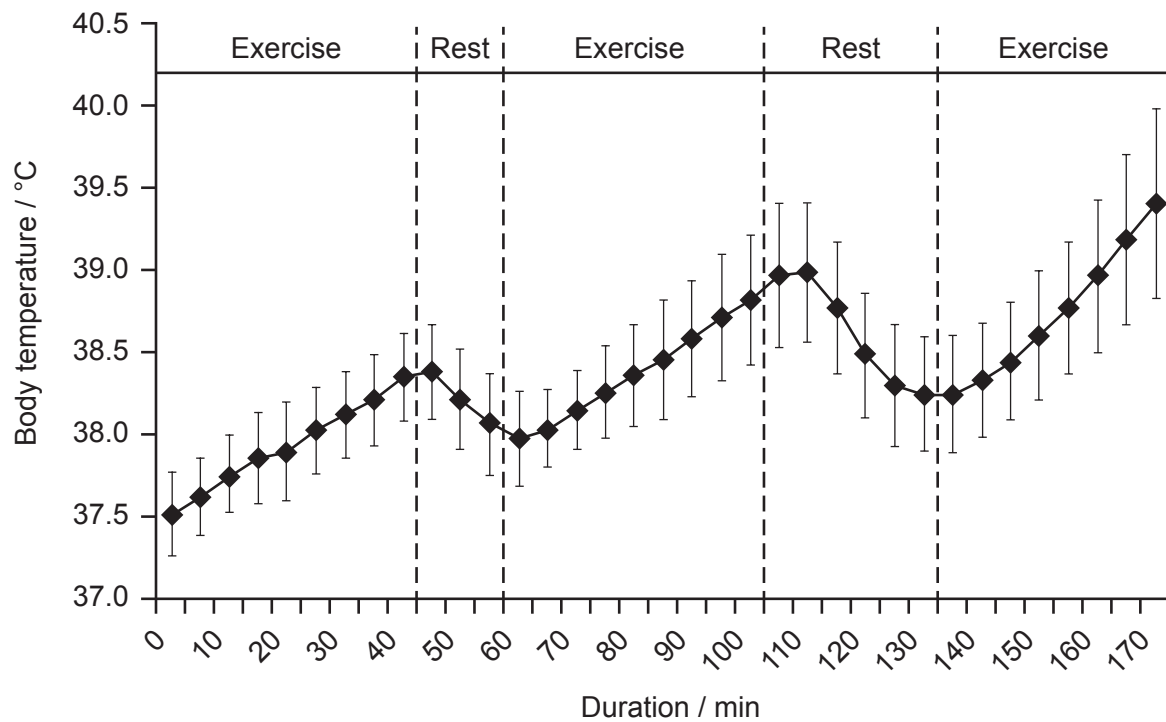
- 32.** What is a reason for the changes in blood flow during exercise?
- A. Increased blood flow to the kidneys removes waste products from exercise.
 - B. Blood flow to the brain decreases so that blood is diverted to the kidneys.
 - C. Increased blood flow to the skin removes heat.
 - D. Increased blood flow to the digestive system provides more glucose to muscles.

Section B

Answer **two** questions. One additional mark is available for the construction of your answers for each question. Answers must be written within the answer boxes provided.

8. Water has unique properties and is needed by all living organisms to survive. Without water, life on Earth as we know it would not exist.
- (a) Outline how the cohesive properties of water benefit living organisms. [4]
- (b) Describe how the melting of ice and changes in ocean currents can lead to ecological changes. [4]
- (c) Explain the hormonal control of osmoregulation in the kidney by negative feedback. [7]

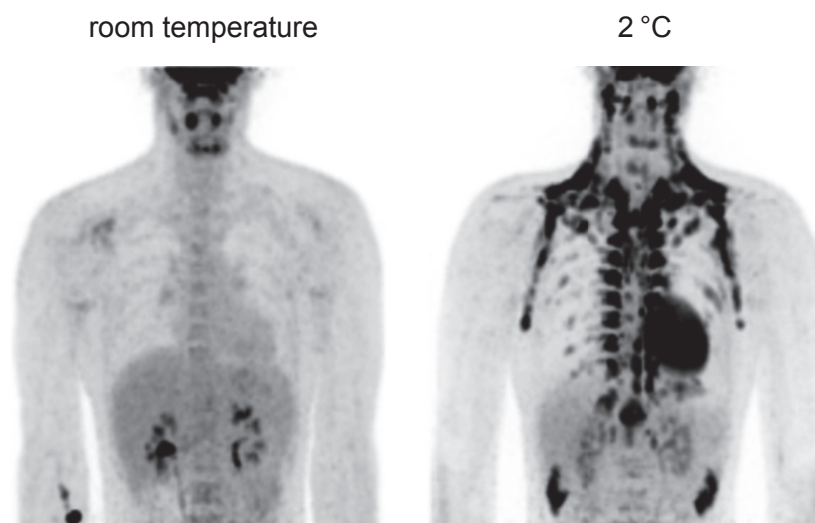
32. These results were obtained by measuring the body temperature of people exercising on a hot and humid day.



What mechanism could result in the changes seen during rest periods?

- A. Shivering
- B. Uncoupled respiration in brown adipose tissue
- C. Vasodilation in the skin
- D. Hair erection

31. The dark areas in the PET/CT scanning images show the activity of brown adipose tissue in an adult human at room temperature (20 °C) and 2 °C.



How does brown adipose tissue contribute to regulating body temperature at 2 °C?

- A. It provides adenosine triphosphate (ATP) for muscle contraction when shivering.
- B. It further insulates the body so that internal heat is not lost.
- C. It turns into thick layers of white adipose tissue to prevent hypothermia.
- D. It breaks down fat to generate heat but not ATP.

Turn over

Section B

Answer **two** questions. One additional mark is available for the construction of your answers for each question. Answers must be written within the answer boxes provided.

9. Living organisms have mechanisms for preventing or reducing change.
- (a) Explain how mutation is avoided during DNA replication. [4]
 - (b) Describe the mechanisms used to keep blood glucose levels within narrow limits in humans. [7]
 - (c) Explain the need for isotonic conditions in human blood plasma and tissue fluid. [4]



Turn over

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References:

- 1.a and b** Adamczak, S.K., Holser, R.R., Costa, D.P., Berens McCabe, E.J. and Wells, R.S., 2021. Body Composition of Common Bottlenose Dolphins in Sarasota Bay, Florida. *Front. Mar. Sci.* 8:615773. <https://doi.org/10.3389/fmars.2021.615773>. Source adapted.
- 1.c** Adamczak, S.K., McHuron, E.A., Christiansen, F., Dunkin, R., McMahon, C.R., Noren, S., Pirotta, E., Rosen, D., Sumich, J. and Costa, D.P., 2023. *Conserv. Physiol.* 11(1): coad035. <https://doi.org/10.1093/conphys/coad035>. Reference redacted. Source adapted.
- 1.e** Ballesteros, F.J., Martinez, V.J., Luque, B., Lacasa, L., Valor, E. and Moya, A., 2018. On the thermodynamic origin of metabolic scaling. *Scientific Reports* 8(1): 1448. Source adapted.
- 4.** Keramidas, K., Diaz Vazquez, A., Weitzel, M., Vandyck, T., Tamba, M., Tchung-Ming, S., Soria-Ramirez, A., Krause, J., Van Dingenen, R., Chai, Q., Fu, S. and Wen, X. Global Energy and Climate Outlook 2019: Electrification for the low carbon transition, Luxembourg: Publications Office of the European Union, 2020, ISBN 978-92-76-15065-7, doi:10.2760/350805, JRC119619.
- 6.** Mischke, E., 2023. *Sunset on Bell Pass in The Majestic McDowell Mountains*. [image online] Available at: <https://www.gettyimages.co.uk/detail/photo/sunset-on-bell-pass-in-the-majestic-mcdowell-royalty-free-image/1469510156?phrase=Sonoran+Desert&adppopup=true> [Accessed 11 October 2024]. Source adapted.



30. How would the body respond to a rise above normal body temperature?

	Type of feedback	Response
A.	positive	increased secretion from sweat glands
B.	positive	spread limbs to increase surface area
C.	negative	vasodilation of skin blood vessels
D.	negative	shivering