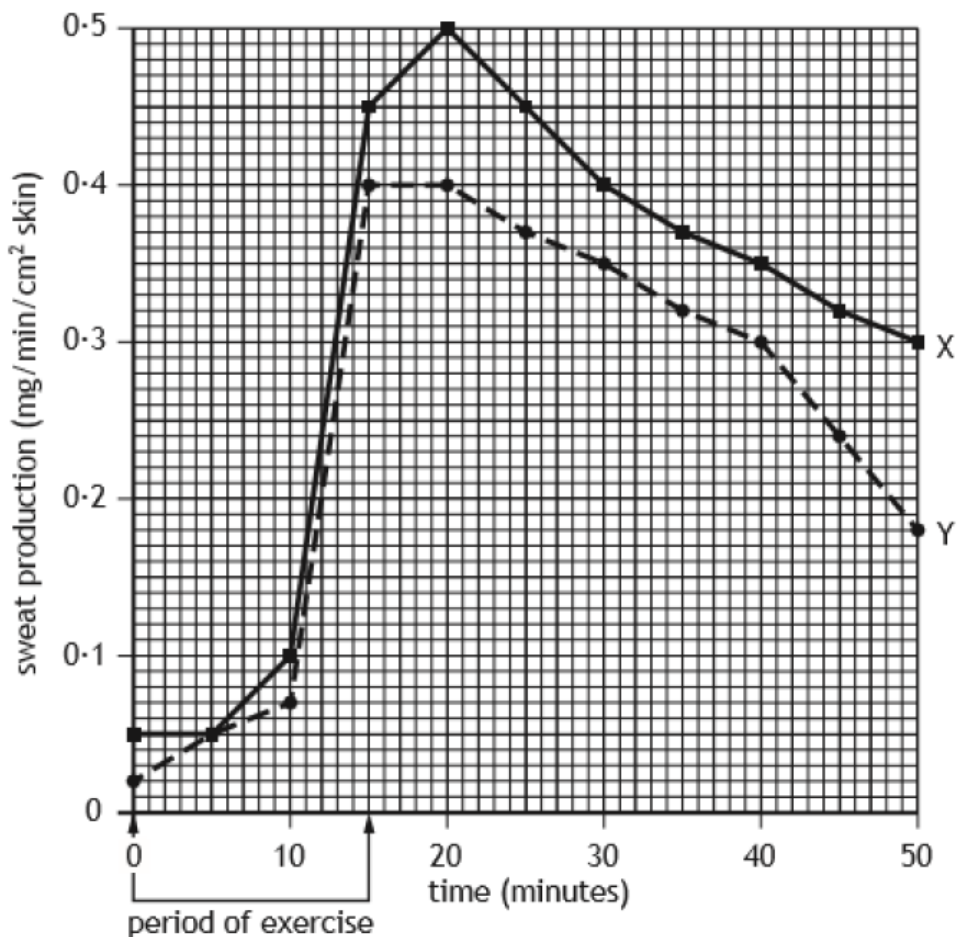


1. When salmon migrate from freshwater into seawater, changes in concentration of their surroundings are detected and the activity of the ion pumps in the salmon gills increases. The activity of the ion pumps decrease when the salmon migrate back to freshwater. Which line in the table below shows the description of the salmon and the control of its ion pumps?

	<i>Description of salmon</i>	<i>Control of ion pumps</i>
A	conformer	by negative feedback
B	conformer	behavioural
C	regulator	by negative feedback
D	regulator	behavioural

1

2. The rate of sweat production of two individuals, X and Y, was measured during and after a period of exercise. The results are shown in the graph below.



2 continued

Which of the following conclusions can be drawn from the graph?

- A** The rate of sweat production of individual X is always greater than individual Y.
- B** Individuals X and Y both reach their maximum sweat production at 20 minutes.
- C** Individual X starts increasing sweat production sooner than individual Y.
- D** The greatest difference in sweat production by individuals X and Y is at 50 minutes.

1

3. The following list describes changes which take place during temperature regulation in mammals.

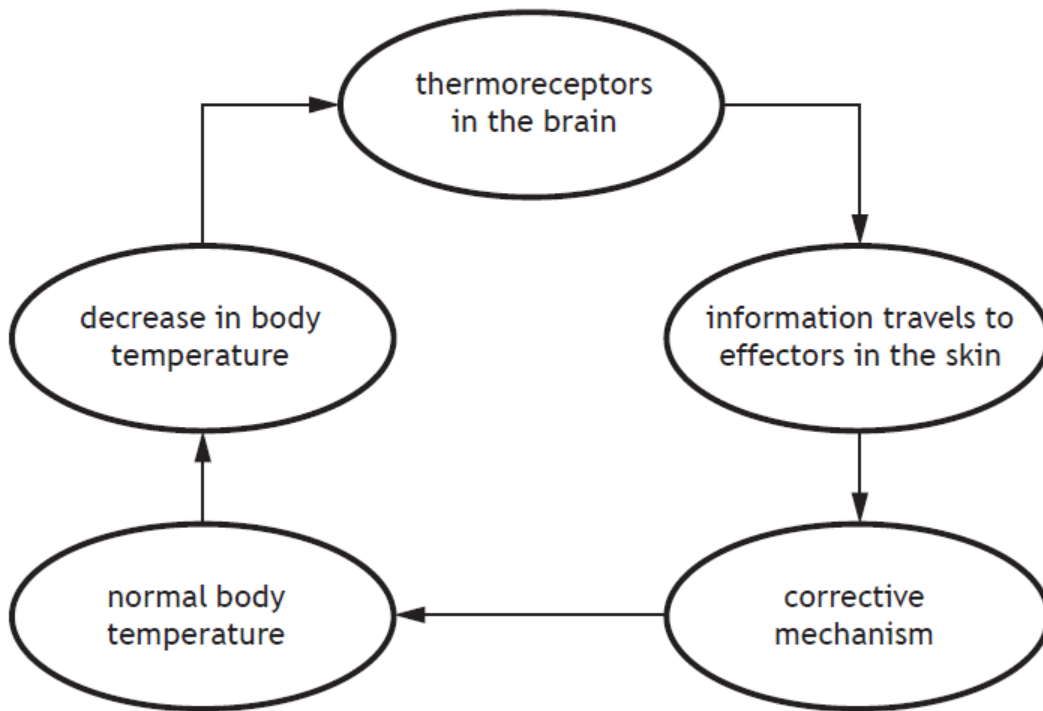
- 1 Vasodilation
- 2 Vasoconstriction
- 3 Contraction of hair erector muscles
- 4 Relaxation of hair erector muscles

Which of these changes takes place in response to a decrease in body temperature?

- A** 1 and 3 only
- B** 1 and 4 only
- C** 2 and 3 only
- D** 2 and 4 only

1

4. The diagram illustrates thermoregulation in mammals following a decrease in body temperature.



- (a) (i) Name the type of control used in thermoregulation as shown in the diagram. 1

- (ii) Name the part of the brain in which thermoreceptors are found. 1

- (iii) State how information travels to the effectors in the skin. 1

- (b) Effectors in the skin include muscles in the walls of blood vessels.

- (i) Describe the response of these effectors to a decrease in body temperature. 1

- (ii) Explain how this response would help return body temperature to normal.

1

- (c) Explain why it is important for a mammal to regulate its body temperature.

1

5. *Daphnia* (*Daphnia pulex*) is a species of water flea that lives in fresh water. An investigation was carried out into the effect of water temperature on the heart rate of one *Daphnia*. The results are shown in the table.

<i>Water temperature</i> (°C)	<i>Heart rate</i> (beats per minute)
2	175
7	184
12	194
17	207
22	219

- (a) Calculate the average increase in heart rate per °C between 2 °C and 22 °C.

1

Space for calculation

_____ beats per minute per °C

(b) Daphnia is a conformer. Use evidence from the table to confirm this statement. 1

(c) Explain how an increased water temperature would result in a higher metabolic rate in Daphnia. 2

(d) State the type of response shown by conformers to maintain an optimum metabolic rate. 1

6. Sea bass are saltwater fish that can regulate their internal salt concentration. They have specialised cells in their gills with protein pumps in the membrane. These pumps actively transport excess salt from their bodies.

(a) The specialised cells have many mitochondria.
Explain why this is necessary.

1

(b) Many animal species regulate their body temperature.
Explain the importance of regulating body temperature.

1

(c) Compare regulators and conformers in terms of their ecological niches.

1