1.22 Hormonal Coordination and Homeostasis: 30-minute Pack

AQA 8464 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A horticulturalist tested the effect of gibberellin concentration on the percentage of seeds that germinated within two weeks.

Gibberellin concentration (mg/l)	Seeds germinated (%)
0	12
10	46
20	78
30	80

(a) Describe the trend shown by the data. **(2)**

(b) Calculate the increase in the percentage of seeds germinated between a gibberellin concentration of 0 mg/l and 20 mg/l. **(1)**

(c) Give one commercial use of gibberellins in agriculture or horticulture, other than promoting seed germination. **(1)**

(d) Name the plant hormone that is used commercially to ripen fruit, such as bananas, during transport and storage, and explain why this is useful to food retailers. **(2)**

(Total for Question 1 is 6 marks)

© Revision Library | revisionlibrary.co.uk

2 Higher tier only. The kidneys and the hormone ADH (antidiuretic hormone) control the water content of the blood.

(a) Name the gland that releases ADH. **(1)**

(b) State what happens to the concentration of ADH released into the blood when a person becomes dehydrated. **(1)**

(c) Explain the effect of this increase in ADH concentration on the kidneys, and on the volume and concentration of the urine produced. **(4)**

(Total for Question 2 is 6 marks)

© Revision Library | revisionlibrary.co.uk

3 The table shows the average daily volumes of water gained and lost by an adult, in cm^3.

Water gained	Volume (cm^3)
From food	750
From drinks	1500
From respiration (metabolic water)	250

Water lost	Volume (cm^3)
In urine	1400
Through the skin (sweating)	450
In faeces	150
Via exhaled air	not recorded

(a) Calculate the total volume of water gained per day. **(1)**

.....

(b) The volumes of water gained and lost by the body are normally balanced. Calculate the volume of water lost via exhaled air each day. **(2)**

.....

(c) Suggest what would happen to the volume of urine produced on a hot day, if a person sweats more but drinks the same volume of water as usual. **(2)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 3 is 5 marks)

© Revision Library | revisionlibrary.co.uk

4 Higher tier only. If a person's kidneys fail, urea and excess ions build up in their blood. One treatment is dialysis, using a dialysis machine.

(a) Explain why a person with kidney failure may need treatment such as dialysis. **(1)**

(b) During dialysis, a person's blood passes on one side of a partially permeable membrane, next to dialysis fluid that contains no urea and normal, safe concentrations of glucose and ions. Explain, in terms of diffusion, how urea moves out of the blood and into the dialysis fluid. **(3)**

(Total for Question 4 is 4 marks)

---

5 A family planning clinic gives patients the following information to help them choose a method of contraception.

Combined pill: taken daily; over 99% effective with perfect use, about 91% effective with typical use; does not protect against sexually transmitted infections (STIs); some users report side effects such as mood changes or headaches; fertility usually returns quickly after stopping.

Male condom: used during intercourse; about 98% effective with perfect use, about 82% effective with typical use; the only common method that also protects against most STIs; no hormonal side effects; effectiveness depends on being used correctly every time.

Compare the combined contraceptive pill with the male condom as methods of contraception, and evaluate which might be more suitable for a couple who are also concerned about the risk of catching an STI.

(Total for Question 5 is 6 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 1.22 Hormonal Coordination and Homeostasis: 30-minute Pack

Question 1

(a) as gibberellin concentration increases, the percentage of seeds that germinate increases, oe **B1**

(a) reference to data, e.g. from 12% at 0 mg/l up to 80% at 30 mg/l, and the increase becomes smaller between 20 and 30 mg/l (levelling off), oe **B1**

(a) Answer: As gibberellin concentration increases, the percentage of seeds that germinate increases, from 12% at 0 mg/l up to 80% at 30 mg/l, although the increase becomes smaller between 20 mg/l and 30 mg/l, suggesting the effect is levelling off.

(b) 66 percentage points (78 - 12), cao **B1**

(b) Answer: 66 percentage points

(c) e.g. to promote flowering, to produce seedless fruit, or to make fruit grow larger, oe **B1**

(c) Answer: For example, to promote flowering, to produce seedless fruit, or to make fruit grow larger.

(d) ethene **B1**

(d) fruit can be picked and transported while still unripe and firmer/less easily damaged, then ripened using ethene closer to when it will be sold, reducing spoilage/wastage, oe **B1**

(d) Answer: Ethene. Fruit can be picked and transported while still unripe and firmer, less easily damaged, then ripened using ethene closer to when it will be sold, reducing spoilage and wastage.

Question 2

(a) pituitary gland **B1**

(a) Answer: The pituitary gland.

(b) it increases, oe **B1**

(b) Answer: It increases.

(c) ADH makes the kidney tubules (nephrons) more permeable to water, oe **B1**

(c) so more water is reabsorbed back into the blood from the kidney tubules, oe **B1**

(c) this means a smaller volume of urine is produced, oe **B1**

(c) and the urine produced is more concentrated, oe **B1**

(c) Answer: The increase in ADH concentration makes the kidney tubules more permeable to water, so more water is reabsorbed back into the blood. This means a smaller volume of more concentrated urine is produced.

Question 3

(a) 2500 cm^3 (750 + 1500 + 250), cao **B1**

(a) Answer: 2500 cm^3

(b) 2500 - (1400 + 450 + 150) **M1**

(b) 500 cm^3 cao **A1**

(b) Answer: 500 cm^3

(c) more water is lost from the body via sweating, so there is less water available in the blood, oe **B1**

(c) a smaller volume of more concentrated urine will be produced, as the kidneys conserve water, oe **B1**

(c) Answer: More water is lost from the body via sweating, leaving less water available in the blood, so a smaller volume of more concentrated urine will be produced as the kidneys conserve water.

Question 4

(a) their kidneys can no longer remove urea (and excess water and ions) from the blood, which would otherwise build up to dangerous/toxic levels, oe **B1**

(a) Answer: Their kidneys can no longer remove urea, and excess water and ions, from the blood, which would otherwise build up to dangerous, toxic levels.

(b) there is a much higher concentration of urea in the blood than in the dialysis fluid (a concentration gradient exists), oe **B1**

(b) urea molecules are small enough to diffuse through the partially permeable membrane, oe **B1**

(b) urea diffuses (moves) from the blood, where it is in high concentration, into the dialysis fluid, where it is in low concentration, down the concentration gradient, oe **B1**

(b) Answer: There is a much higher concentration of urea in the blood than in the dialysis fluid. Urea molecules are small enough to diffuse through the partially permeable membrane, so urea diffuses from the blood, where it is in high concentration, into the dialysis fluid, where it is in low concentration, down the concentration gradient.

© Revision Library | revisionlibrary.co.uk

Question 5

Level 1 Basic, isolated statement(s) about one method or one piece of data, with little or no comparison or evaluation. The answer may be a simple list. **1-2**

Level 2 Some accurate comparison of the two methods' effectiveness and/or protection against STIs, but the evaluation is incomplete, one-sided, or not always clearly linked to the couple's situation. **3-4**

Level 3 A clear, logically structured comparison of both methods, covering effectiveness and STI protection, leading to a well-reasoned evaluation that directly addresses the couple's concern about STIs, using the data given. **5-6**

Indicative content:

- The combined pill is more effective at preventing pregnancy than the male condom, both with perfect use (over 99% vs about 98%) and, more noticeably, with typical/everyday use (about 91% vs about 82%)
- However, the combined pill provides no protection at all against sexually transmitted infections
- The male condom is the only one of the two methods that also protects against most STIs
- The combined pill can cause hormonal side effects, such as mood changes or headaches, that the condom does not
- The condom's effectiveness depends heavily on being used correctly every time, which is why its typical-use effectiveness is noticeably lower than its perfect-use effectiveness
- Because this couple are specifically concerned about STI risk, the male condom would be more suitable for them, despite being somewhat less effective at preventing pregnancy, since the pill offers no STI protection at all
- A balanced answer might suggest using both methods together (dual protection), gaining the pill's higher contraceptive effectiveness alongside the condom's STI protection

© Revision Library | revisionlibrary.co.uk