Pearson Edexcel

Additional Assessment Materials
Summer 2021

Pearson Edexcel GCSE in Biology (1BI0)
Higher

Resource Set Topic 7: Animal coordination

Questions

(Public release version)

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Additional Assessment Materials, Summer 2021

General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

1 Blood is filtered in the kidney to remove unwanted substances.

Figure 1 shows part of a nephron.

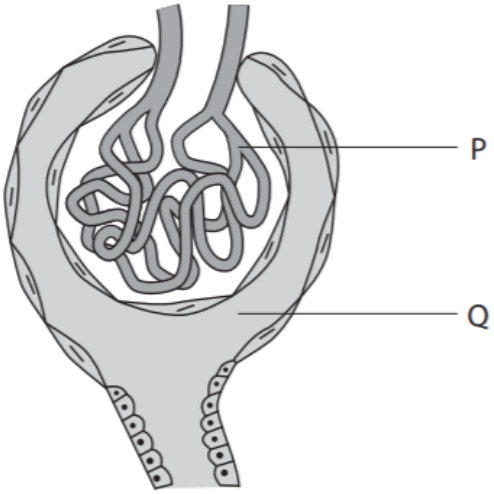


Figure 1

(a) Name the structures labelled P and Q.

(2)

P glomerulus

Q Bowman's capsule

(c) State the name of the hormone that regulates the water content of the blood.

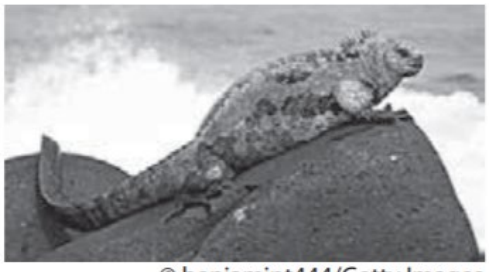
(1)

vasopressin / ADH

6 (a) Iguanas are lizards.

Some species of iguana live on hot islands in the Pacific Ocean and use the environment to regulate their body temperature.

Figure 11 shows an iguana on a rock in the sunshine.



© benjamint444/Getty Images

Figure 11

A marine biologist measured the oxygen consumption of an iguana at different temperatures.

Figure 12 shows the results.

body temperature of the iguana in °C	oxygen consumption in cm^3 per gram per hour
20	0.4
25	0.8
30	1.1
35	1.4

Figure 12

(i) Describe how the body temperature of the iguana affects its oxygen consumption.

(1)

Oxygen consumption increases as body temperature increase

(ii) Explain why the body temperature of the iguana affects its oxygen consumption.

(3)

At higher body temperatures, metabolic rate increases. More oxygen is consumed as respiration rate increases.

(iii) Iguanas do not have sweat glands.

When an iguana is too hot, it pants by opening its mouth to cool down.

Explain how this behaviour helps to cool the iguana down.

(2)

Heat is lost as water evaporates and is lost when the iguana pants, so the body temperature decreases.

(b) (i) Where in the human brain is the thermoregulatory centre?

(1)

- ☒ **A** cerebellum
- ☒ **B** cerebral cortex
- ☒ **C** hypothalamus
- ☒ **D** pituitary gland

(ii) Explain the role of vasodilation in thermoregulation.

(4)

Arterioles near the surface of the skin dilate so more blood flows nearer to the surface of the skin and there is more heat loss.

Thus vasodilation acts to cool the body down

9 (a) Figure 17 shows the concentration of the hormones oestrogen and progesterone in the blood of women of different ages.

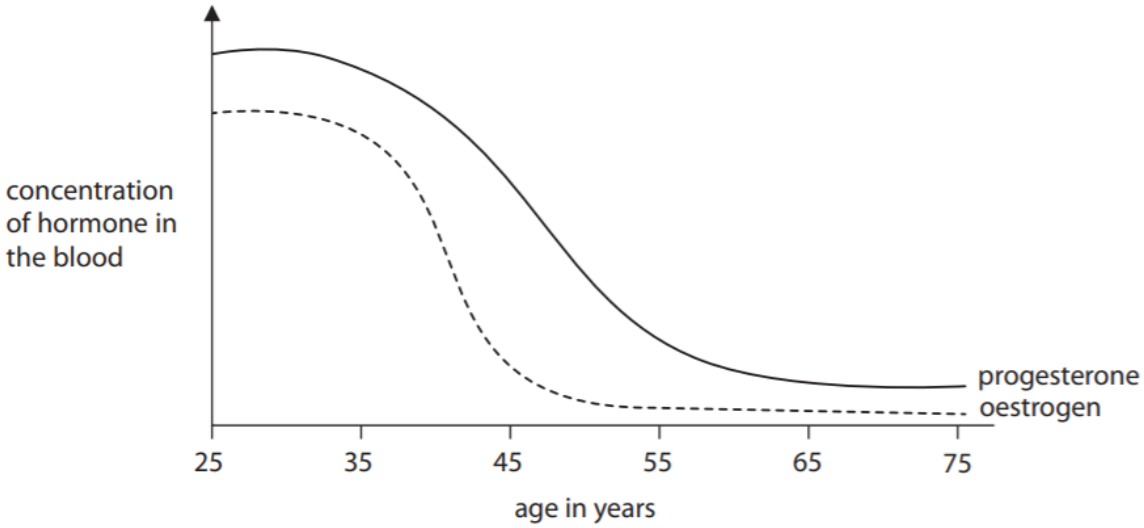


Figure 17

(i) Use information from Figure 17 to explain why women over the age of 50 are less likely to ovulate.

(2)

Women over the age of 50 have low levels of oestrogen, so there be no luteinizing hormone released and no ovulation.

(ii) Use information from Figure 17 to explain why women are less likely to menstruate after the age of 60.

(2)

There is a low level of oestrogen which prevents the uterus wall lining to thicken, so no lining will be lost.

(iii) Explain how clomifene therapy may increase the chance of a woman over the age of 50 becoming pregnant.

(2)

It blocks the negative feedback of oestrogen on LH, so more LH is released in a surge, which leads to ovulation

(iv) The hormone progesterone is produced by the

(1)

- ☒ **A** corpus luteum
- ☐ **B** pituitary
- ☐ **C** thyroid
- ☐ **D** uterus

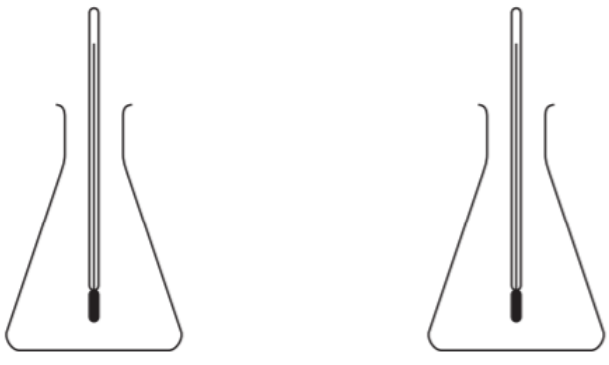
(b) Explain how the release of adrenalin can result in the improved performance of an athlete.

(4)

Adrenaline increases the heart rate so there is an increase in the blood flow and more oxygen is delivered to the muscles. The rate of respiration can increase as more oxygen is available, and more energy is released for the muscles to use.

4 A student was investigating the effect of sweating.

The student set up two conical flasks each with a thermometer as shown in Figure 5.



flask 1 flask 2

Figure 5

Flask 1 was covered in wet tissue paper.

Flask 2 was covered with dry tissue paper.

Hot water was added to each of the flasks.

The temperature of the water in each flask was recorded every minute for 10 minutes.

(a) State **two** variables that would need to be controlled in this investigation.

(2)

1 volume of hot water

2 size of flash

(b) The results of this investigation are shown in Figure 6.

time in minutes	flask 1 (wet tissue paper) temperature in °C	flask 2 (dry tissue paper) temperature in °C
1	98	98
2	82	91
3	71	84
4	60	76
5	50	69
6	39	61
7	31	56
8	22	49
9	22	42
10	22	37

Figure 6

(i) Calculate the rate of temperature change in flask 1 from 1 to 8 minutes.

(2)

$$\frac{98-22}{8-1} = \frac{76}{7}$$
$$= 10.857$$
$$\simeq 10.9$$

10.9 °C per minute

(ii) Compare the trends shown in the data for flask 1 and flask 2.

(2)

There is a decreasing trend in temperature in both flasks, but the rate of temperature change is greater in flask 1.

(c) Explain how sweating helps to cool the body.

(2)

Heat is lost to the environment when the sweat evaporates from the skin surface.

(d) Which part of the brain controls internal body temperature?

(1)

- ☒ **A** cerebellum
- ☒ **B** medulla oblongata
- ☒ **C** hypothalamus
- ☒ **D** pituitary gland

(e) Explain why it is important to control the internal temperature of the human body.

(2)

Many reactions in the human body are controlled by enzymes and enzymes are sensitive to temperature. It is important to maintain the internal temperature near the optimal temperature of the enzymes so metabolic reaction can take place normally.

6 (a) A person had symptoms including difficulty passing urine, aching in the lower abdomen, constant thirst and fainting.

A sample of their urine was tested.
The results are shown in Figure 8.

test	result	acceptable range
Glucose	200 mg per dl	0 to 130 mg per dl
Albumin (protein)	16 mg per dl	0 to 3 mg per dl
pH	3	5 to 7
Leukocytes (white blood cells)	40	2 to 5

Figure 8

(i) A doctor analysed the results and asked the person to have further tests for type 2 diabetes.

Give a reason why the doctor came to this conclusion.

(1)

The concentration of glucose in the urine is much higher than the acceptable range.

(ii) Explain why the doctor also concluded that the person had a kidney infection.

(2)

The number of leukocytes are much higher than the acceptable range and leukocytes are involved in fighting infections

(c) Describe the route taken by urine from the kidney until it leaves the body.

(3)

Urine travels through the ureters to the bladder where it is stored, and excreted through the urethra.

(d) Urine contains urea.

State how urea is formed in the human body.

(2)

Excess amino acids are broken down in the liver in deamination to give urea, which is released into the hepatic vein and filtered out in the kidney.

7 (a) (i) Women with the condition known as polycystic ovary syndrome (PCOS) do not ovulate regularly.

Women with PCOS can be treated using clomifene therapy.

Clomifene therapy stimulates the production of FSH.

Name the endocrine gland that produces FSH.

(1)

anterior pituitary gland

(ii) During this therapy, a woman takes a clomifene tablet each day for the first five days of her menstrual cycle.

Describe the changes that would happen inside the ovaries during the first five days of this treatment.

(2)

The FSH released will cause an egg to mature in the follicle.

The egg will be released when there is a surge in LH.

(iii) Which hormone causes ovulation?

(1)

- [x] **A** LH
- [ ] **B** FSH
- [ ] **C** testosterone
- [ ] **D** progesterone

(iv) During clomifene therapy, the woman has a blood test on day 20 of the menstrual cycle.

The blood test shows a high level of progesterone.

Explain the cause of this high level of progesterone on day 20 of the menstrual cycle.

(2)

when the woman becomes pregnant, progesterone remains high so that the uterus lining can be maintained

(b) Hormones are also used as a method of contraception.

Explain why taking high levels of oestrogen and progesterone in the combined contraceptive pill reduces the chance of pregnancy.

(2)

Oestrogen and progesterone inhibit the secretion of LH & FSH, which are needed for ovulation.

(c) The female population of Britain is 32.6 million.

The percentage of this population taking the combined contraceptive pill is 13.2%.

The combined pill is 98.8% effective.

Calculate the maximum number of females taking the combined contraceptive pill who could become pregnant.

(3)

$32.6 \times 13.2\% \times (100 - 98.8)\%$

$= 0.0516384$ million

$= 5163.84$

≈ 51638

51638

9 (a) Hyperthyroidism is caused by an overactive thyroid gland.

Figure 14 shows a person with a normal thyroid gland and a person with hyperthyroidism.

normal hyperthyroidism

Figure 14

(i) State **one** effect of hyperthyroidism on the thyroid gland.

(1)

enlargement of thyroid gland

(ii) The thyroid gland is part of the

(1)

☒ **A** circulatory system

☒ **B** digestive system

☒ **C** endocrine system

☒ **D** urinary system

(b) Explain how negative feedback, involving the thyroid gland, controls metabolic rate.

(4)

The thyroid gland secretes thyroxine which controls the basal metabolic rate. When thyroxine level is low, the hypothalamus release thyrotropin releasing hormone (TRH), which stimulates the anterior pituitary to release thyroid stimulating hormone (TSH). The thyroid gland responds to TSH and secrete thyroxine. When thyroxine level in the blood returns back to normal, the release of TRH and TSH are inhibited, so less thyroxine is released.

*(c) Explain how hormones control the menstrual cycle.

(6)

The pituitary gland secretes follicle stimulating hormone (FSH) which stimulates the maturation of a follicle in the ovaries. when the egg is mature, oestrogen is released, causing the thickening of the uterine endometrium and inhibition of FSH. when the level of oestrogen reaches a high enough level, luteinising hormone (LH) is released from the pituitary gland. This causes ovulation. The empty follicle forms corpus luteum which release oestrogen and progesterone, which inhibits FSH and LH secretion. Progesterone also maintains the lining of the uterus. If fertilisation does not occur, the corpus luteum dies and progesterone stops being secreted so the uterus lining is shed and menstruation occurs.

10. *(b) The nephrons in the kidney remove unwanted substances from the blood.

Figure 16 shows the structure of a nephron.

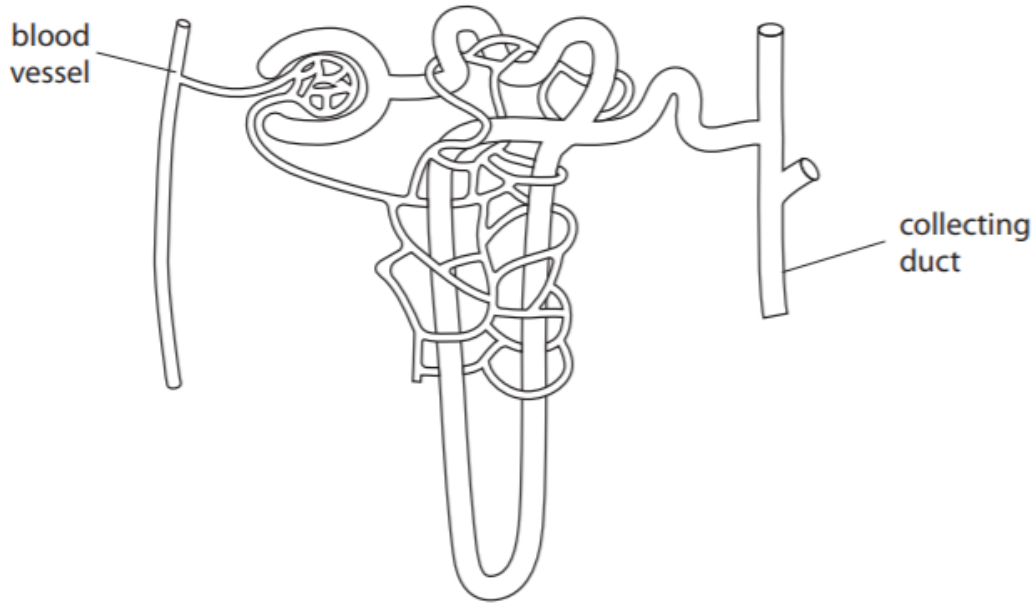


Figure 16

Explain how substances are exchanged between the blood entering the nephron and the filtrate leaving the collecting duct.

Include reference to named structures of the nephron in your answer.

(6)

Blood carrying waste products arrive at the kidney through the blood vessel. The blood in the glomerulus is under high pressure as the afferent arteriole has a larger lumen than the efferent arteriole. This causes the blood to undergo ultrafiltration. Smaller molecules such as urea, glucose, ions and water which can squeeze through the capillary walls are filtered out and pass into the nephron tubule. The larger molecules such as proteins remain in the blood. Glucose, some ions and some water are then selectively absorbed from the glomerular filtrate back into the bloodstream. The remaing waste products and water continue to travel down the nephron tubule and excess water is reabsorbed in the collecting duct.

TOTAL = 73 MARKS