IGCSE Cambridge Topical Past Papers

SCIENCE COORDINATE

0654 | Paper 4

2017 — 2023

COORDINATE SCIENCE 0654

TOPICAL PAST PAPER WORKSHEETS

2017 - 2023 | Questions + Mark scheme

AVAILABLE PAPERS

P2	P4	P6
1680 Questions	525 Questions	260 Questions

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TOPICS	P2	P4	P6
BIOLOGY	546	183	86
CHEMISTRY	587	173	88
PHYSICS	546	168	86

1 – (0654/43_Summer_2018_Q13) – *B9. Coordination And Response, B1. Characteristics Of Living Organisms*

A student investigates the response of a plant shoot to light.

The student shines light onto one side of the shoot for five days.

(a) Fig. 13.1 shows a diagram of the student's observations.

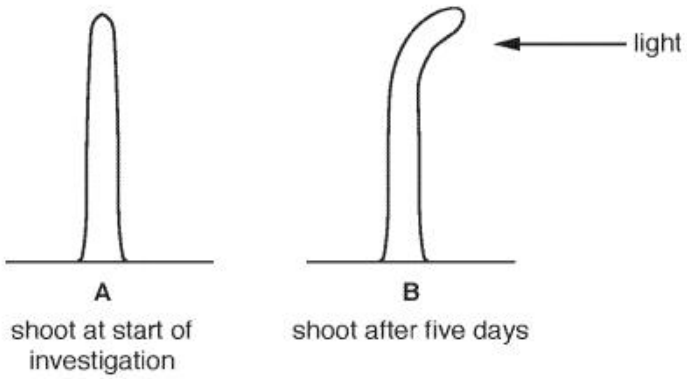

Fig. 13.1

(i) State the name of the hormone that causes the response seen in Fig. 13.1.

.....[1]

(ii) Explain how the hormone in your answer to **(a)(i)** causes the shoot to bend towards the light.

.....

.....

.....[2]

(b) The student repeats the investigation with the shoot shown in Fig. 13.2.

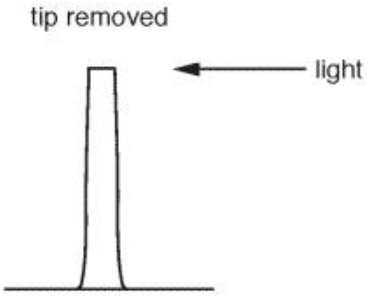

Fig. 13.2

Predict **and** explain the results observed after five days.

.....

.....

.....[2]

(c) **(i)** The response of a shoot to light is an example of sensitivity, one of the characteristics of living organisms.

Use words from the list to define the term *sensitivity*.

Each word may be used once, more than once or not at all.

atmosphere **environment** **hormones** **proteins**

soil **responses** **water**

Sensitivity is the ability to detect or sense changes in the .....

and to make ..... . [2]

(ii) Circle **one** other characteristic of all living organisms.

breathing **eating** **growth**

meiosis **talking** **sleeping**

[1]

2 – (0654/43_Winter_2019_Q1) – *B8. Gas Exchange And Respiration, B1. Characteristics Of Living Organisms*

(a) Respiration releases energy. It can occur aerobically or anaerobically.

(i) State the balanced chemical equation for aerobic respiration.

..... [2]

(ii) Name the product of anaerobic respiration in muscles.

..... [1]

(iii) Name the two products of anaerobic respiration in yeast.

1 .....

2 .....
[2]

(b) Respiration is one of the characteristics of living organisms.

State two **other** characteristics of living organisms.

1 .....

2 .....
[2]

[Total: 7]

3 – (0654/41_Summer_2020_Q10) – *B9. Coordination And Response, B1. Characteristics Of Living Organisms, B5. Plant Nutrition*

(a) Plant shoots respond to stimuli such as light.

Fig. 10.1 shows the growth response of a shoot to light.

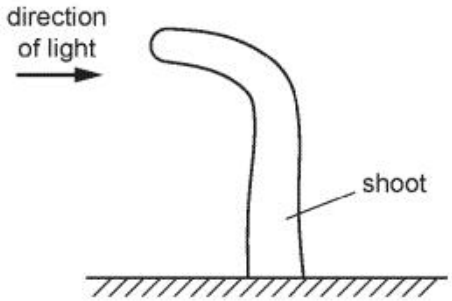

Fig. 10.1

(i) Name the response shown in Fig. 10.1.

..... [1]

(ii) Draw an **X** on Fig. 10.1 to show the area with the greatest cell elongation. [1]

(iii) Name the hormone that controls cell elongation.

..... [1]

(b) Fig. 10.2 shows a plant shoot with the tip removed.

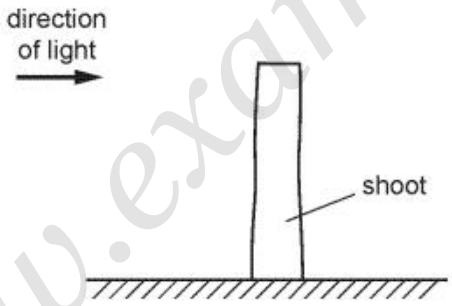

Fig. 10.2

State why the shoot in Fig. 10.2 did **not** bend.

.....

..... [1]

(c) Explain why plants need magnesium ions for photosynthesis and healthy growth.

Use ideas about energy in your answer.

.....

.....

.....

.....

.....

..... [3]

(d) Growth is one of the characteristics of living things.

(i) Complete the definition of the term *growth*.

Growth is a ..... increase in size and dry .....

by an increase in cell number or cell size or both. [2]

(ii) State the name of two other characteristics of living things.

1 .....

2 .....

[2]

[Total: 11]

4 – (0654/42_Winter_2020_Q10) – *B9. Coordination And Response, B1. Characteristics Of Living Organisms*

(a) The temperature of a person's skin is recorded in different environmental temperatures.

Fig. 10.1 shows the **two** parts of the skin where the readings are taken.

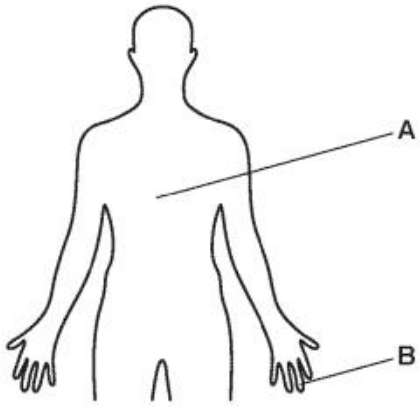

Fig. 10.1

Table 10.1 shows the results.

Table 10.1

part of body	temperature of the skin / °C		
	cold environment (15 °C)	warm environment (27 °C)	hot environment (47 °C)
A	30.1	34.4	35.8
B	23.7	33.8	36.7

(i) Describe how the skin responds to **cold** temperatures in order to maintain a constant internal body temperature.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest why the temperature range of the skin on part **A** is less than on part **B**.

.....

.....

.....

..... [2]

(b) Body temperature is controlled to keep it within set limits.

Name the term used to describe this.

..... [1]

(c) Temperature control of the body shows that humans have sensitivity to their environment.

Define *sensitivity*.

.....

.....

.....

..... [2]

[Total: 8]

5 - (0654/41_Summer_2022_Q10) - *B9. Coordination And Response, B1. Characteristics Of Living Organisms*

The control of blood glucose concentration is an involuntary action by the body.

(a) Place ticks (✓) in the boxes to show **two** other involuntary actions.

coughing	
cycling	
reading	
sneezing	
talking	

[2]

(b) State the characteristic of living things that is defined as the ability to respond to a stimulus.

..... [1]

(c) Fig. 10.1 is a graph that shows the blood glucose concentration after eating a meal.

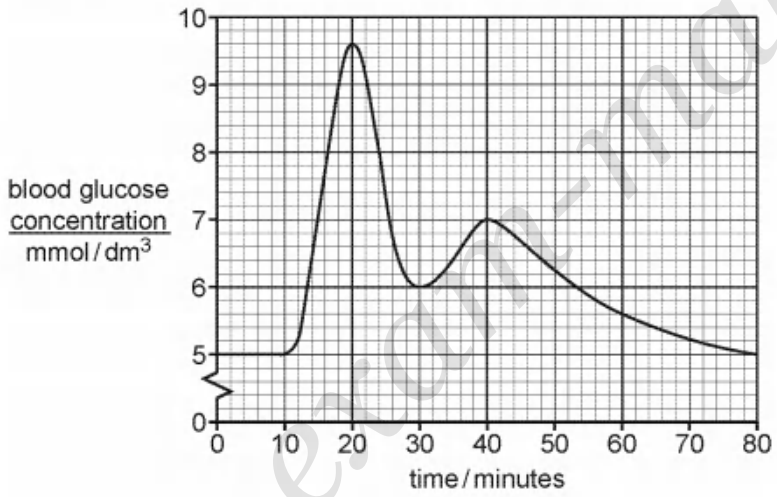

Fig. 10.1

(i) Calculate the length of time it takes for the blood glucose concentration to return to its starting concentration from its maximum.

..... minutes [1]

(ii) Explain the results between **20–30 minutes** in Fig. 10.1.

.....

.....

.....

.....

..... [3]

(iii) State the type of response shown by the control of blood glucose concentration.

..... [1]

(d) State the names of two hormones that can increase the blood glucose concentration.

1 .....

2 .....

[2]

ANSWERS

1 – (0654/43_Summer_2018_Q13) – *B9. Coordination And Response, B1. Characteristics Of Living Organisms*

(a)(i)	auxin ;	1
(a)(ii)	(auxin) accumulates on shady side ; causes cell elongation ; faster growth on shady side ;	max 2
(b)	no growth / no change ; auxin produced in tip (of shoot) ;	2
(c)(i)	environment ; responses ;	2
(c)(ii)	growth circled ;	1

2 – (0654/43_Winter_2019_Q1) – *B8. Gas Exchange And Respiration, B1. Characteristics Of Living Organisms*

(a)(i)	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ correct LHS ; correct RHS ;	2
(a)(ii)	lactic acid ;	1
(a)(iii)	alcohol ; carbon dioxide ;	2
(b)	*any two from* movement ; reproduction ; sensitivity ; growth ; excretion ; nutrition ; **max 2**	2

3 – (0654/41_Summer_2020_Q10) – *B9. Coordination And Response, B1. Characteristics Of Living Organisms, B5. Plant Nutrition*

(a)(i)	phototropism ;	1
(a)(ii)	**X** drawn on the upper side of the shoot bend ;	1
(a)(iii)	auxin ;	1
(b)	auxin / hormone / chemical, produced at the shoot tip ;	1
(c)	magnesium ions required to make chlorophyll ; chlorophyll absorbs light energy (and converts this to chemical energy) ; (chemical) energy used to synthesise, carbohydrates or glucose / carbohydrates or glucose are used to make proteins (for growth) ;	3
(d)(i)	permanent ; mass ;	2
(d)(ii)	any two from: movement reproduction sensitivity excretion nutrition respiration ;;	2

4 – (0654/42_Winter_2020_Q10) – *B9. Coordination And Response, B1. Characteristics Of Living Organisms*

(a)(i)	ref to vasoconstriction ; arterioles narrow ; blood flow to, surface capillaries / skin surface, reduced ; less heat lost by radiation ; hair stands on end ; AVP ; **max 3**	3
(a)(ii)	part A covers vital organs ; a suitable temperature is required for body / AW to function ; ref to enzymes ; AVP ;	2
(b)	homeostasis ;	1
(c)	ability to detect, stimuli / changes to the environment / surroundings ; and respond ;	2

5 – (0654/41_Summer_2022_Q10) – *B9. Coordination And Response, B1. Characteristics Of Living Organisms*

(a)	coughing ticked ; sneezing ticked ;	2
(b)	sensitivity ;	1
(c)(i)	60 (minutes) ;	1

(c)(ii)	*any three from:* increase in blood glucose concentration is detected by pancreas ; insulin released ; glucose converted to glycogen ; glycogen stored in liver ; **Max 3**	3
(c)(iii)	negative feedback / homeostasis ;	1
(d)	glucagon ; adrenaline ; AVP ;	2

6 – (0654/43_Summer_2023_Q10) – *B8. Gas Exchange And Respiration, B1. Characteristics Of Living Organisms, B2. Cells*

(a)(i)	0.50 ;	1
(a)(ii)	not enough oxygen (for aerobic respiration) ; ref to anaerobic respiration ; increasing lactic acid (reduces the pH) ;	3
(b)(i)	(an action by,) an organism / part of an organism ; (causing a) change of, position / place ;	2
(b)(ii)	white blood (cell) ; ciliated (cell) ; palisade (mesophyll cell) ;	3

1 – (0654/42_Winter_2017_Q1) – *B2. Cells, B7. Transport*

(a)(i)	oxygen transport ;	1
(a)(ii)	no nucleus ; biconcave shape ; **A** large surface area (contains) haemoglobin ;	max 1
(b)	*Accept any **two** of the following:* plasma platelets white blood cells ;	1
(c)(i)	water leaves the red blood cell ; by osmosis ; water moves, from high to low water potential / down a water potential gradient ;	3
(c)(ii)	red blood cell swells / bursts ; due to water entering the red blood cell ;	2

2 – (0654/43_Winter_2017_Q13) – *B2. Cells, B7. Transport*

(a)	elongated / long ; increased surface area (for absorption) ;	2
(b)	ref to osmosis ; movement of water from high water potential to low water potential / down a water potential gradient ; across, partially permeable membrane / cell membrane ;	max 2
(c)	transpiration / water loss / evaporation from leaf ; reduces water potential at top of plant ; (causes) movement of water up xylem ; ref to cohesion of molecules ; down water potential gradient ;	max 3
(d)	less transpiration / water loss / evaporation ; less / slower movement of water ;	2

3 – (0654/43_Winter_2018_Q10) – *B2. Cells, B5. Plant Nutrition*

(a)(i)	water moves in to plant cell ; correct ref to osmosis ; solution is less concentrated / more dilute than plant cell / ; (water moves) from high to low water potential / dilute to concentrated ; causing is to swell / become turgid / AW ;	max 4
(a)(ii)	(animal cell) bursts ; lack of cell wall ;	2
(b)(i)	$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ left-hand side correct ; right-hand side correct ;	2
(b)(ii)	presence of chlorophyll / chloroplasts ;	1

4 – (0654/41_Summer_2019_Q7) – *B2. Cells*

(a)(i)	0.1 (cm/min) ;	1
(a)(ii)	as temperature decreases rate of diffusion decreases ;	1
(a)(iii)	concentration of red dye ;	1
(b)	concentration of red dye is higher outside the agar cube ; (movement is) from high to low concentration / down a concentration gradient ; by random motion of dye particles ;	max 2
(c)	carbon dioxide ;	1