Behaviour (Option C3): Eduqas A Level Biology Exam Questions by Topic

20 questions · 33 marks · about 40 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · A level Component 3 · Autumn 2020 · Q10(a)(i) · 1 mark

10. Many animals exhibit simple forms of innate behaviour.

(a) (i) Explain what is meant by innate behaviour. [1]

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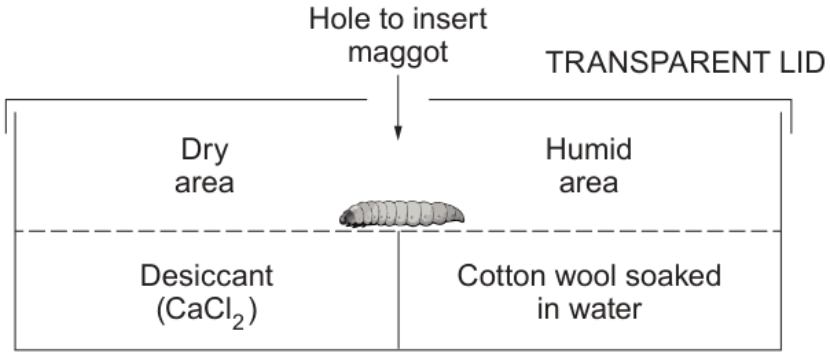
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Question 2 · information from earlier in the question

Blowflies *(Calliphora spp)* are insects that lay eggs on recently dead animals. Eggs hatch into larvae called maggots that feed inside the dead animal.

A student investigated the effect of humidity on the movement of maggots. The apparatus is shown in **image 10.1**.

Image 10.1



The student set up a choice chamber as shown in **image 10.1**.

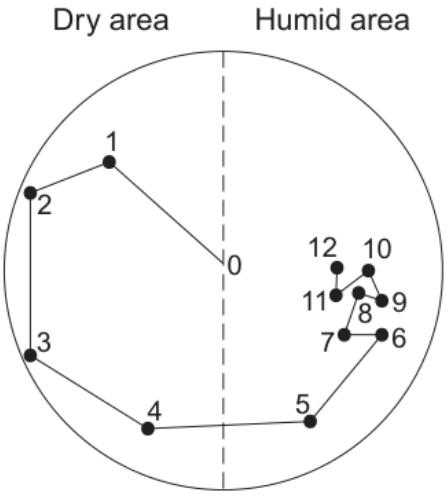
- The base was separated into two compartments.
- Cotton wool soaked with water was placed in one compartment and calcium chloride granules were placed in the other ($CaCl_2$ is a desiccant or drying agent).
- A grid was placed above the compartments and the lid replaced.
- The air above each compartment became humid or dry depending on the content of the compartment.
- One maggot selected randomly from a large sample group, was placed carefully in the centre of the grid through a hole in the lid.
- At 10 second intervals, the position of the head of the maggot was marked by a numbered dot on the transparent lid.

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Question 2 · A level Component 3 · Autumn 2020 · Q10(a)(iii) · 2 marks

After 2 minutes, the student removed the maggot then joined the dots on the lid. The pathway of the maggot over 2 minutes showing its position at 10 second intervals is shown in **image 10.2**.

Image 10.2.



The procedure was repeated several times using a different maggot each time.

(iii) Identify the type of innate behaviour shown by the maggot in this experiment and describe **one** feature of the pattern of movement that supports your conclusion. [2]

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Question 3 · A level Component 3 · Autumn 2020 · Q10(a)(iv) · 2 marks

(iv) Suggest how this behaviour would be an advantage to the maggot in its natural environment. [2]

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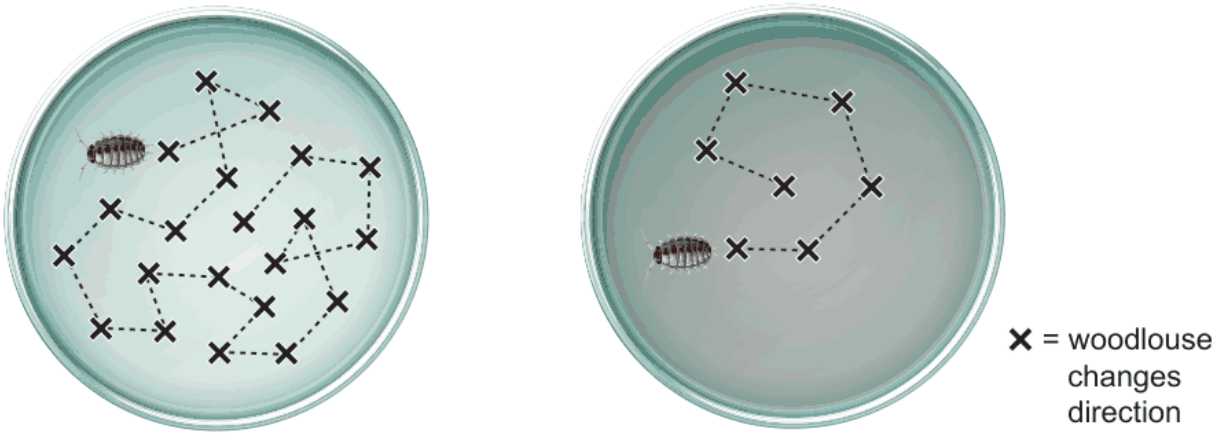
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Question 4 · A level Component 3 · June 2023 · Q9(c)(i) · 1 mark

(c) Woodlice are common invertebrates which are often found under rotting wood in damp locations in gardens and woodland.

Image 9.4 shows an investigation into innate behaviour in woodlice.
Five woodlice were placed in separate Petri dishes on pieces of filter paper. Each Petri dish was exposed to varying levels of light intensity. The distance travelled by each woodlouse in 20 seconds was recorded. This distance was used to calculate the speed of movement.

Image 9.4



(i) State the type of innate behaviour shown by the woodlice in this investigation. [1]

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Question 5 · information from earlier in the question

The results of this investigation are shown in **Table 9.5**.

Table 9.5

Light intensity / au	Speed of woodlice / mm s^{-1}					Mean speed / mm s^{-1}
	Woodlouse 1	Woodlouse 2	Woodlouse 3	Woodlouse 4	Woodlouse 5	
2	1.0	1.0	1.2	0.9	1.3	1.1
4	4.4	5.1	4.1	4.3	4.2	.....
6	5.6	5.4	5.2	5.6	5.2	5.4
8	6.7	6.4	6.3	6.9	6.7	6.6
10	6.8	6.0	7.2	6.8	7.0	6.8

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Question 5 · A level Component 3 · June 2023 · Q9(c)(iv) · 1 mark

(iv) Explain how this type of behaviour would benefit woodlice in their natural habitat. [1]

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Question 6 · A level Component 3 · June 2022 · Q9(a)(ii)I · 1 mark

Termites exhibit an innate directional response to light. Wingless termites show a negative response (move away from light) whereas winged termites show a positive response to the same stimulus.

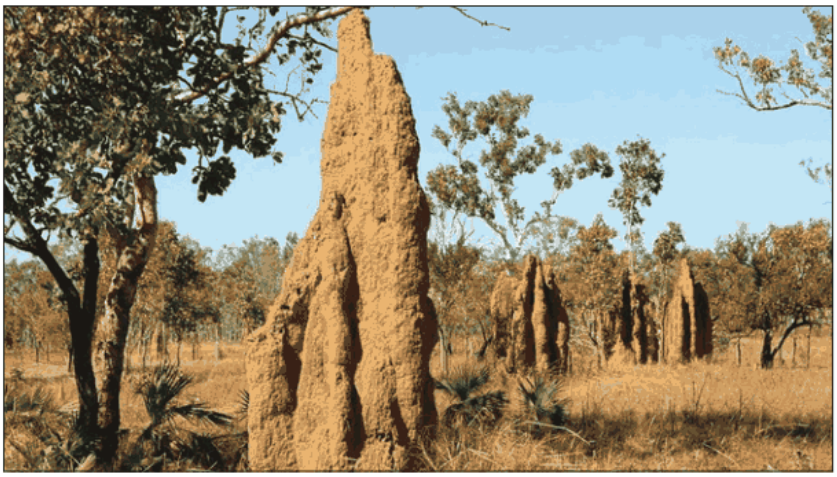
(ii) I. State the specific name of this type of innate response. [1]

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9. (a) Some termite species live in eusocial colonies inside large termite mounds **(Image 9.1)** that they construct from wood pulp glued with saliva.

Image 9.1

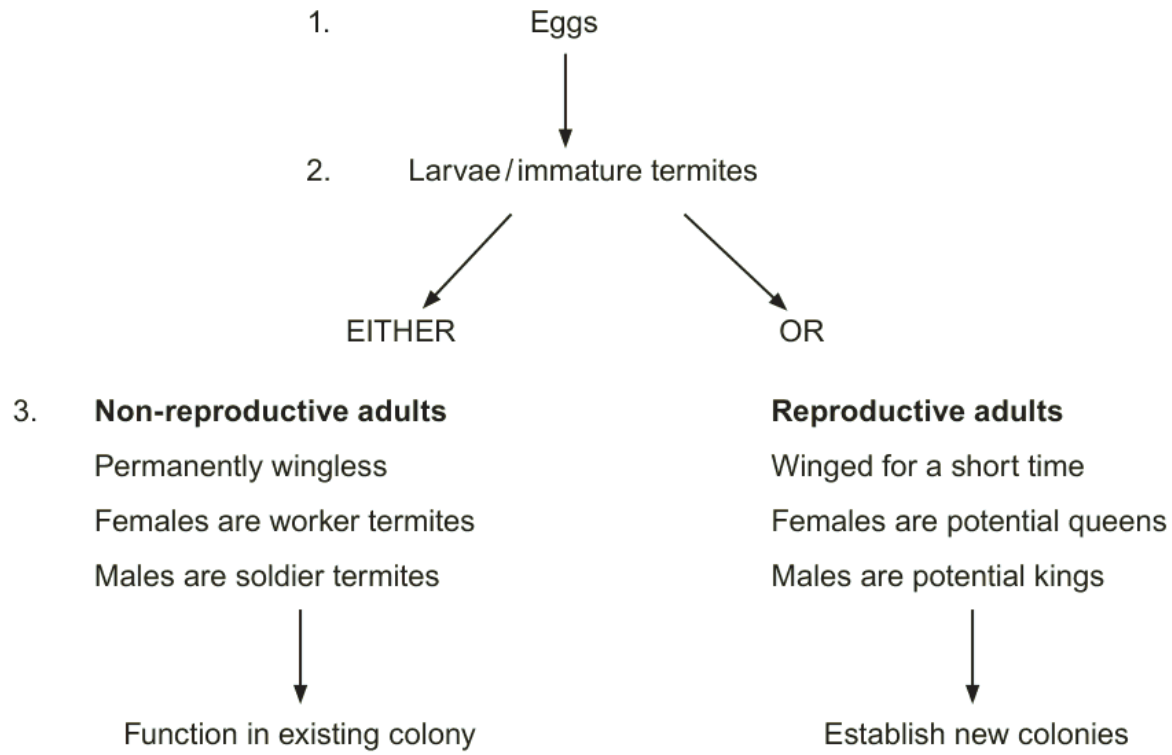


Termites feed on dead wood and organic material growing within the termite mound.

The flow chart in **Image 9.2** summarises the life stages of termites.

Image 9.2

A single queen lays many eggs fertilised by sperm from a single king.



Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 7 · A level Component 3 · June 2022 · Q9(a)(ii)II · 3 marks

II. Suggest the advantage **to the colony** of the responses to light shown by wingless and winged adult individuals during the life cycle of termites. [3]

Question 8 · A level Component 3 · Autumn 2021 · Q9(c)(i) · 2 marks

(c) African elephants *(Loxodonta africana)* exhibit a type of society known as fission–fusion. Most of the time adult females and young elephants live together in a herd separate from adult males (fission stage). Adult males join a herd temporarily for the purpose of mating (fusion stage).

The presence of large tusks in one male elephant may stimulate aggressive behaviour in another male elephant.

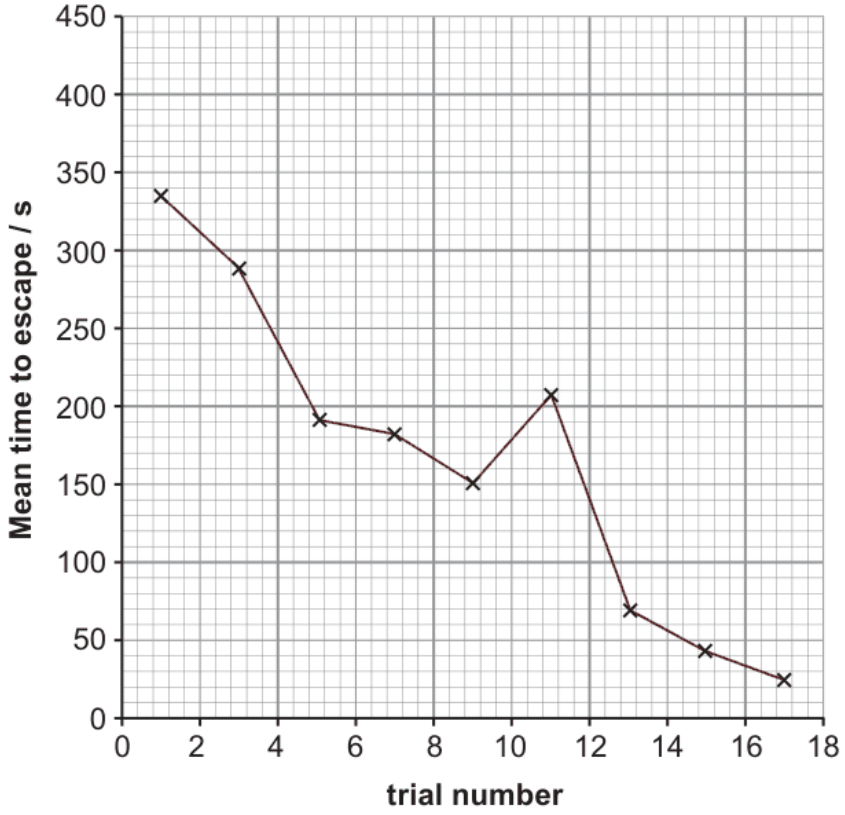
Large tusks are considered to be an example of a sign stimulus.

(i) Explain what is meant by the term 'sign stimulus' and state the name given to the type or pattern of behaviour that is the result of this type of stimulus. [2]

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Question 9 · information from earlier in the question

(c) In order to better understand learning in animals, researchers presented spotted hyenas *(Crocuta crocuta)* with a problem-solving task. Hyenas were placed in a puzzle box and were encouraged to escape to reach food placed outside. Researchers timed how long it took the hyenas to escape. The experiment was repeated several times.



Question 9 · A level Component 3 · June 2017 · Q9(c)(ii) · 2 marks

(ii) State and explain the type of behaviour exhibited by the hyenas. [2]

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Question 10 · A level Component 3 · June 2017 · Q9(c)(iii) · 1 mark

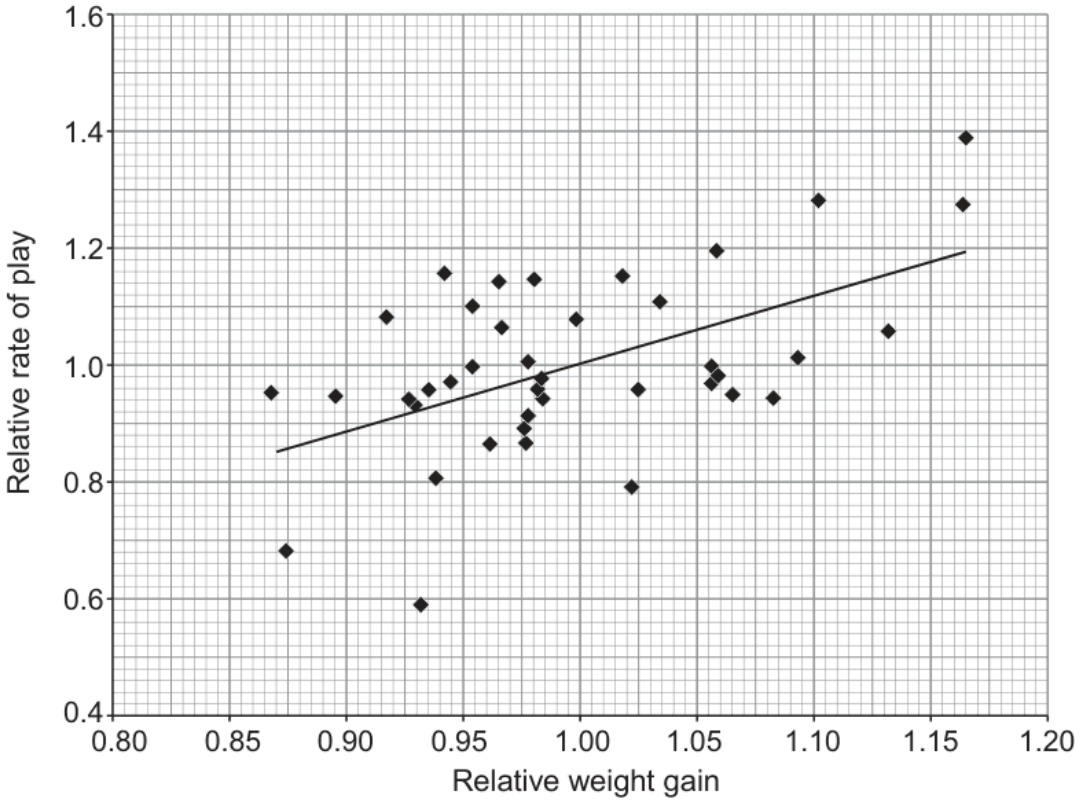
(iii) Explain why the time taken to escape from the box decreases. [1]

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(d) A study of 39 wild meerkats in South Africa investigated whether engaging in play behaviour was more likely in individuals in a better nutritional state. The meerkats were habituated to close observation and handling, they were individually marked and regularly weighed. The researchers observed play in the early morning. They calculated the mean play rates for the young meerkats and compared the individual play rates to the mean. The results are shown in the scatter graph below.



(i) What is the advantage to the study of using meerkats 'habituated' to close observation and handling? [1]

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Question 12 · A level Component 3 · June 2022 · Q9(c)(i) · 1 mark

(c) Chimpanzee social structure allows individuals to learn from others.

Some chimpanzees learn to use sticks as tools to collect termites from inside a mound, as shown in **Image 9.6**. After inserting a stick and waiting, the chimpanzee extracts the stick and eats the termites that have walked onto it.

Image 9.6



(i) Suggest which form of learning behaviour enables many chimpanzees in this group to acquire the skill shown in **Image 9.6**. [1]

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Question 13 · A level Component 3 · June 2019 · Q10(e) · 1 mark

(e) Different groups of chimpanzees obtain food in a variety of ways. One group of chimpanzees was observed trapping colobus monkeys in order to eat them. Other groups use tools to get food; the way they do this varies from group to group. This is an example of social learning.
Explain the advantages of social learning to the different groups of chimpanzees. [1]

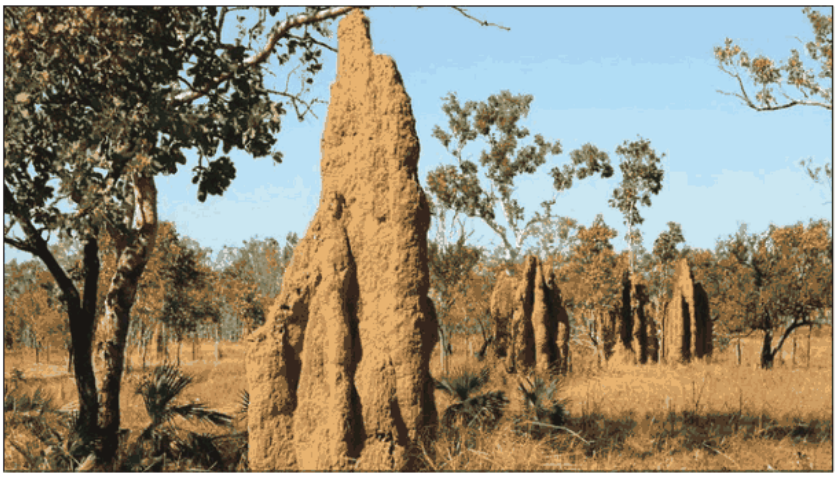
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Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

9. (a) Some termite species live in eusocial colonies inside large termite mounds **(Image 9.1)** that they construct from wood pulp glued with saliva.

Image 9.1

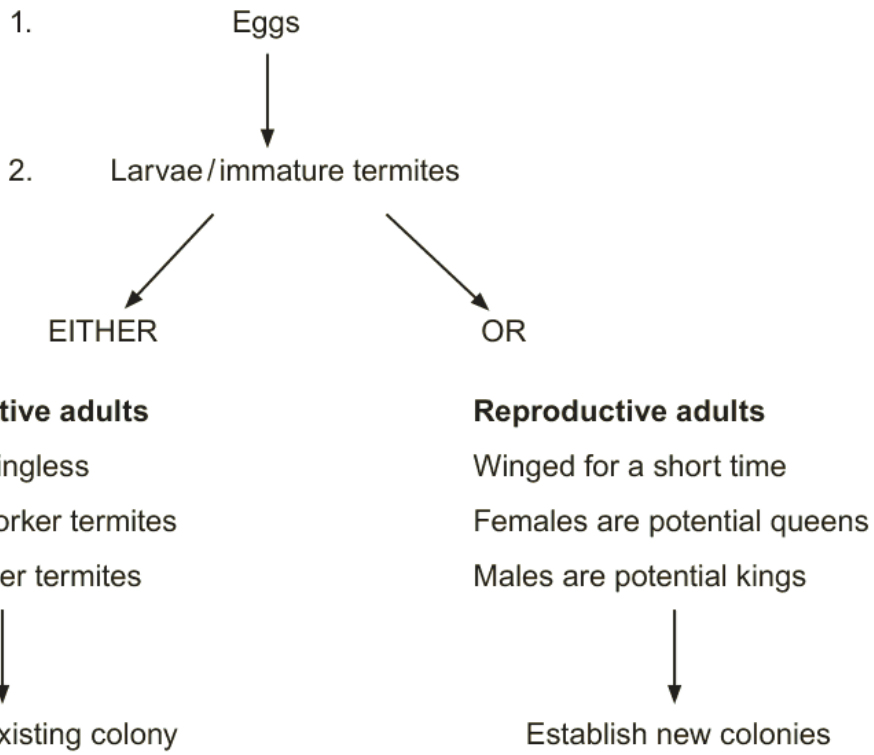


Termites feed on dead wood and organic material growing within the termite mound.

The flow chart in **Image 9.2** summarises the life stages of termites.

Image 9.2

A single queen lays many eggs fertilised by sperm from a single king.

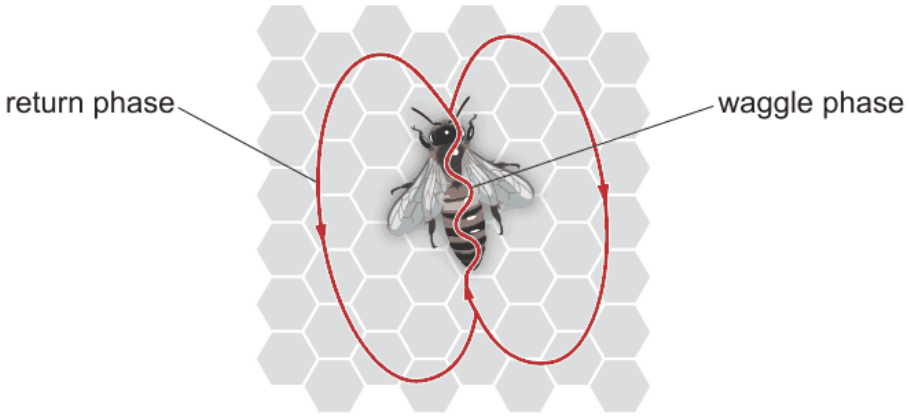


(i) One feature of a eusocial colony is division of labour.
Describe what is meant by division of labour and suggest **one** role that worker termites may carry out that would contribute to the survival of the colony. [2]

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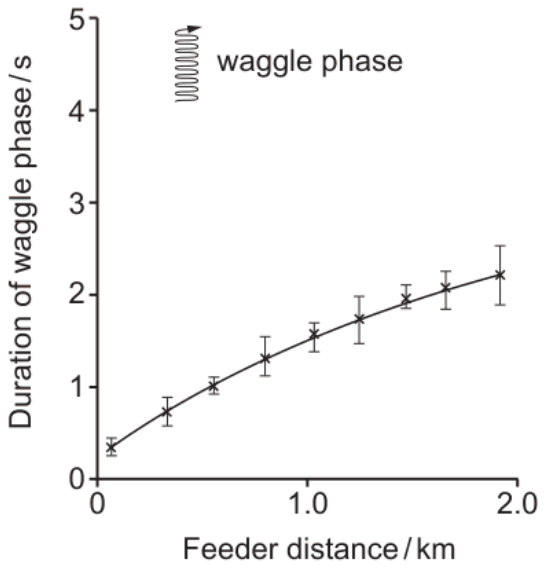
(c) Honeybees live in dense groups called colonies. The bees display a range of innate behaviour patterns which help them to communicate within the colony. On returning to their colonies, worker honeybees perform a waggle dance many times to communicate to other bees the distance and direction of a food source from the hive. The dance is made up of two phases, the waggle phase and the return phase. This is shown in **Image 9.4**.

Image 9.4

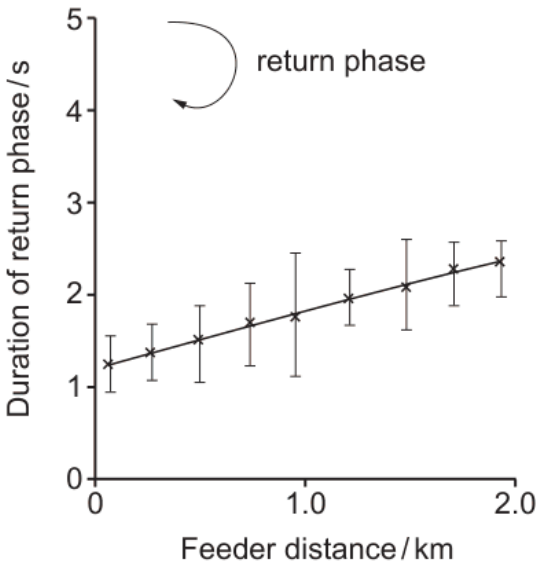


A group of researchers studied the relationship between the duration of the two phases of the waggle dance to the distance of artificial feeders from the hive. The artificial feeders contained a sugar solution and were all the same colour. The results they obtained are shown in **Graph 9.5A** and **Graph 9.5B**.

Graph 9.5A



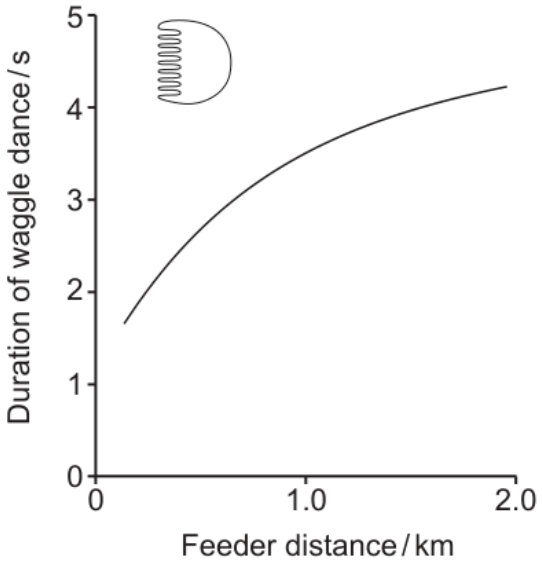
Graph 9.5B



Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Graph 9.6 shows data from **Graphs 9.5A** and **B** combined.

Graph 9.6



(iii) State the general relationship shown in **Graph 9.6** and suggest the benefit of this relationship to the bee colony. [3]

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Question 16 · A level Component 3 · June 2018 · Q10(c)(i) · 2 marks

(c) Meerkats, *Suricata suricatta*, live in social groups called mobs, of 5-30 individuals. They inhabit open dry land such as the Kalahari desert. Meerkats share parental care responsibilities. Each mob has a dominant alpha male and dominant alpha female. These are usually the only individuals who produce offspring. This social structure is referred to as a dominance hierarchy.



(i) What are the advantages, to the meerkat colony, of this dominance hierarchy? [2]

Question 17 · A level Component 3 · June 2022 · Q9(b)(i) · 1 mark

(b) Chimpanzees *(Pan troglodytes)* belong to an order of mammals called primates. They exhibit social behaviour within a linear social group known as a dominance hierarchy.

(i) Explain **one** advantage of a dominance hierarchy to a group of chimpanzees. [1]

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Question 18 · A level Component 3 · June 2018 · Q10(c)(ii) · 1 mark

(ii) There is little difference between the size of males and females in meerkats. In other mammals, however, such as African lions, *Panthera leo*, the male is much larger than the female. Explain the reason for the large size of the male lions. [1]

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Question 19 · A level Component 3 · Autumn 2021 · Q9(c)(ii) · 2 marks

(ii) Larger tusks place male elephants at a social advantage.

Describe **two** ways by which male elephants gain social advantage from having larger tusks. [2]

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Question 20 · information from earlier in the question

(d) Black grouse are ground nesting birds found on moorland. Incubation of the eggs and care of the young is carried out by the female. Several black grouse males perform elaborate displays before groups of females in a ritual known as a lek. The male birds compete for the attention of the female birds.

Image 9.5 shows a female (left) and male (right) black grouse.

Image 9.5



Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 20 · A level Component 3 · June 2024 · Q9(d)(ii) · 3 marks

(ii) Use all the information provided to identify the **two** types of selection that have resulted in sexual dimorphism in black grouse. Explain each answer. [3]

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Mark schemes

Question 1 · A level Component 3 · Autumn 2020 · Q10(a)(i) · 1 mark

10	*(a)*	(i)	Behaviour that doesn't need to be learned/ a response that is inherited/ Accept instinctive Reject 'inborn'	1	1

Question 2 · A level Component 3 · Autumn 2020 · Q10(a)(iii) · 2 marks

(iii)	Kinesis (1) Rate/speed of movement higher in dry area/lower in humid area/ Non directional movement/ Frequency of turning/change of direction higher in humid/lower in dry area (1)	1	1	2

Question 3 · A level Component 3 · Autumn 2020 · Q10(a)(iv) · 2 marks

(iv)	Maintains its position in a higher humidity/ less likely to move out of humid conditions/ more likely to move out of low humidity/dry conditions (1) Inside a dead animal will be damp/high humidity (1) (inside a dead animal will be damp/humid SO more likely to stay there = 2 marks)	1	1	2

Question 4 · A level Component 3 · June 2023 · Q9(c)(i) · 1 mark

(c)	(i)	Kinesis (1)	1	1

Question 5 · A level Component 3 · June 2023 · Q9(c)(iv) · 1 mark

(iv)	In bright areas, the woodlice move faster, increasing chances of finding darker areas as these are more favourable/ escape from predators/ owtte (1)	1	1	

Question 6 · A level Component 3 · June 2022 · Q9(a)(ii)I · 1 mark

	(ii)	I	Phototaxis	1	1	

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Question 7 · A level Component 3 · June 2022 · Q9(a)(ii)II · 3 marks

		II	**Any three (×1) from** Wingless termites (move away from light) remain within the termite colony (1) Where they carry out their roles/ named role within colony (1) Winged termites (move toward light) fly away from colony/can disperse before reproducing/produce a colony elsewhere. (1) Reducing competition (1)		3	3	

Question 8 · A level Component 3 · Autumn 2021 · Q9(c)(i) · 2 marks

(c)	(i)	Stimulus produces an innate response in a different individual/ activates nerve pathways that do not involve decision making. (1) Stereotypical behaviour/fixed action pattern. (1)	2	2

Question 9 · A level Component 3 · June 2017 · Q9(c)(ii) · 2 marks

	(ii)		Operant conditioning (1) hyenas rewarded with food/ learning associated with a {reward/ reinforcement/ food} (1)	2		2

Question 10 · A level Component 3 · June 2017 · Q9(c)(iii) · 1 mark

(iii)	(In successive trials the hyena would) learn that escaping would have favourable consequences /{learn/ remember} the route/ learn how to escape/ positive reinforcement	1	1	

Question 11 · A level Component 3 · June 2018 · Q10(d)(i) · 1 mark

(d)	(i)	They are used to being handled and show natural behaviour	1	1	

Question 12 · A level Component 3 · June 2022 · Q9(c)(i) · 1 mark

(c)	(i)	Imitation		1	1	

Question 13 · A level Component 3 · June 2019 · Q10(e) · 1 mark

(e)	allows them to {adapt to/ access available food} in different environments they are in/ owtte	1	1

Question 14 · A level Component 3 · June 2022 · Q9(a)(i) · 2 marks

9	(a)	(i)	Specialised/different groups/castes perform different tasks (eq) (1) (worker termites) care for young/larvae OR collect food OR build the termite mound OR make the environment/specific example inside the termite mound suitable for colony (1)	1	1	2

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Question 15 · A level Component 3 · June 2025 · Q9(c)(iii) · 3 marks

(iii)	The greater the distance to the feeder, the longer the duration of the waggle dance (1) **Any two (x1) from** Other worker bees can learn how far to fly to the food source (1) Food source can be located more {quickly /efficiently} (1) More food for the colony (1)	

	1	2	3		

Question 16 · A level Component 3 · June 2018 · Q10(c)(i) · 2 marks

(c)	(i)	Reduces aggression (1) Dominant males and females have {stronger/fitter} offspring, improving the survival/ advantageous alleles passed (1)	1 1	2

Question 17 · A level Component 3 · June 2022 · Q9(b)(i) · 1 mark

(b)	(i)		**Any one (×1) from** Decreases the amount of aggression/fighting is less likely/is a last resort. (1) Dominant animals have greater access to resources so more likely to survive to reproduce/dominant animals more likely to mate and reproduce. (1)	1	1	

Question 18 · A level Component 3 · June 2018 · Q10(c)(ii) · 1 mark

(ii)	Males fight for sexual access to females/ Sexual selection has favoured evolution of larger males.	1	1

Question 19 · A level Component 3 · Autumn 2021 · Q9(c)(ii) · 2 marks

(ii)	More likely to overcome other males in aggressive disputes/become dominant to other males so more likely to mate with females. (1) Females select males with larger tusks so females more likely to mate with males that have larger tusks/sexual selection of males with larger tusks. (1) MP 1 Needs to be clear male dominance leads to mating. MP 2 Needs to be clear female selection leads to mating.	2	2

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Question 20 · A level Component 3 · June 2024 · Q9(d)(ii) · 3 marks

	(ii)		Females - natural selection + male – sexual selection (1) Females need to be camouflaged to increase chance of survival of young (1) Males need to increase chance of {breeding / passing on of advantageous alleles} (1)			3	3			

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