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Further guidance

B3 Life on Earth – Foundation Workbook answers

1	a	<p>Competitor – another organism using the same resources</p> <p>DNA – the chemical that carries genetic information</p> <p>Environment – the surroundings (earth, air, water, and other living things)</p> <p>Evolution – the development of new species from simpler forms, over time</p> <p>Extinct – all individuals of the species have died out</p> <p>Species – a group of organisms that can breed to produce fertile offspring</p> <p>Variation – differences between living organisms</p>
	b	Missing words: similarities, fossils, extinct, evidence, simple, DNA, evolutionary
	c	Fossils, genes
	d	Movement, respiration, sensitivity, growth, reproduction, excretion, require nutrition
	e	For example: colour, size (any genetic or environmental examples of variation)
	f	<ul style="list-style-type: none"> Genetic variation – red flower/yellow flower, fine hairy roots/long tap root Environmental variation – wilted leaves/vigorous leaves, holes in some leaves/complete leaves Genetic variations
2	a	5, 4, 2, 3, 1
	b	<ul style="list-style-type: none"> The wild primulas showed variation of flower colour. The plant breeder selected pink primulas. They then took these plants and bred them together. The breeder selected offspring with deep pink flowers. Over several generations the breeder got primulas with red flowers.
	c	Head lice
	d	Headlice are no longer killed by some poisons that previously killed them (they have become resistant).
	e	A few headlice were able to survive the poison. They bred and their offspring inherited the genes for resisting the poison. Non-resistant headlice died out. Eventually all the headlice in the population were resistant.
3	a	Missing word: DNA
	b	Missing words: copy, 3500 million, Solar System, theory, conditions
	c	The evidence for where life started on Earth has been interpreted differently by different people. At the present time there isn't enough evidence to disprove either theory.
	d	For example: destruction of habitats, hunting, competition, disease
	e	Conditions on Earth changed in the past. Some living things had characteristics which helped them survive these changes. Other living things became extinct.
	f	... different species

Further guidance

4	a		Receptor cells in skin → effector cells in muscle															
	b	i	Light, moisture															
		ii	Most maggots move away from the light and dry area.															
		iii	Dark places are likely to offer more protection from predators. Wet places will prevent them drying out.															
	c	i	From left to right: receptor cell, neuron, effector cell															
		ii	For example: temperature receptors in the fingertips, neurons from the fingers to the CNS, muscles in the arm															
	d		Missing words: electrical, fast, short															
	e		Brain, spinal cord															
	f	i	Arrows from left to middle, and middle to right															
		ii	For example: Adrenal gland produces adrenaline. Adrenaline circulates around the body. Adrenaline quickens heart and breathing rates.															
	g		Missing words: chemical, long															
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5	a		Individuals within a species vary. Using more data will be more reliable.															
	b		Hominids with bigger brains survived better than those with smaller brains.															
	c		Hominid species with bigger brains were better equipped to survive changes in their environment. Species with smaller brains could not do this.															
	d		<i>Homo sapiens</i> used their larger brains to solve problems so they could survive. They communicated better, so they worked together to help them survive.															
	e		(Left) common ancestor, (middle) early hominids, (right) modern humans															
6	a		Data – facts collected together Evidence – facts tending to support or disprove an explanation Explanation – a way of accounting for some facts Observation – a measurement, or experimental record															
	b	i	B															

Further guidance

		ii	Human feet are more similar to gorilla feet than to chimpanzee feet.
	c		No – the DNA evidence would suggest that we have more in common with chimpanzees.
	d	i	Darwin's explanation – 'evolution of life on Earth could have happened through characteristics that were inherited and a process of natural selection'
		ii	An observation that is accounted for by this explanation – 'members of a single species showed considerable variation' / 'members of one species are in competition for food and space'
		iii	Darwin was able to account for all his observations with an explanation that linked these observations in a way that no one had thought of before ('if some members of a species were better suited to survive they would have more offspring').
		iv	Mendel provided data that was the evidence needed to describe how characteristics were inherited.
		v	Darwin's explanations went against the Bible, which said that all life on Earth was created in six days. The church played a powerful role in society in Darwin's time, and people did not want to go against the strong views of some clergy by agreeing with him.
7	a		Endangered – at risk of becoming extinct Habitat – the place where an organism naturally lives Predator – an animal that kills other animals (its prey) for food
	b	i	Vegetation
		ii	Both depend on lemmings for their food.
		iii	If the vegetation changed in a way that was disadvantageous to lemmings, then the number of lemmings would fall and there would be increased competition between the other species in the food web.
		iv	There would be more lemmings for the other species (foxes, weasels and snowy owl), so their numbers would increase.
		v	If the wolves ate lemmings, there would be fewer lemmings to go around, so the numbers of some species in the food web would decrease. Also, a wolf may feed off some of the other animals (e.g. weasels) so their numbers would decrease further.
	c		Disease New species, which may be a competitor or a predator.
8	a		In a random selection, the sites are chosen with no bias or organised method of selection.
	b		By using a standard procedure, the scientists were able to compare like with like. This would make their results more reliable, as it would eliminate other factors that may affect the results.
	c		Variation within a hedge could be wide, so by sampling a long section and averaging the results the scientists could get a better estimate of species found in the hedge.
	d		Collect data on all the species present in many different hedges. Use local records to determine where possible how long each hedge has been there. Compare the distribution of species in hedges of different ages. Is there a correlation between age of hedge and number of different species present?

Further guidance

9	a	The number of different species of plant living in hedges has decreased, as has the number of dormice.
	b	Machine cutting is indiscriminate - it damages and destroys all species of plants living in the hedge. If this is done annually, plants do not get a chance to establish so fewer species survive. Dormice feed of the fruits, nuts and seeds of these plants, so fewer plants leads to less food for dormice, so their numbers decrease.
	c	The more species of plants in a hedge there are, the more variety of food there will be for the dormice.
	d	If machine cutting is inevitable, then cut less often to give time for plant species to establish in the hedge. Otherwise cut by hand for more careful trimming.
10	a	Sustainable – does not lead to a reduction of natural resources for the future Direct effect – an immediate straightforward effect Indirect effect – a roundabout effect, not directly connected to the cause Biodiversity – the variety of living organisms present
	b	Threats caused by direct human activity: <ul style="list-style-type: none"> • hunted for shell, meat, and eggs • caught and drowned in fishing nets Threats caused by indirect human activity: <ul style="list-style-type: none"> • egg-laying beaches disrupted (It could be argued that 'caught and drowned in fishing nets' is indirect because it was not the direct purpose of the activity.)
	c	They are at risk of extinction.
	d	Extinctions caused by direct human activity: <ul style="list-style-type: none"> • great auk • passenger pigeon Extinctions caused by indirect human activity: <ul style="list-style-type: none"> • large blue butterfly • dodo Students may come up with other valid examples.
11		<ul style="list-style-type: none"> • Future foods: we need to maintain a wide variety of plant and animal species so that if one should become extinct there are others still available as food and within food chains/webs. If cultivated crops or farm animals become susceptible to particular disease, then we will need other wild varieties to breed them with to try and develop varieties which are not susceptible to disease. • Future fuels: an alternative to fossils fuels (which will run out) are biofuels, produced from plants of various species. We need to maintain a variety of plant species, so that should one die out there are others to replace it as a source of biofuel. • Future fibres: when oil runs out, so will synthetic fibres. So we need to maintain varied plant and animal species that will provide fibres with varied properties (e.g. cotton, silk). • Future medicines: many plants have medicinal properties, so a reduction in plant species would deprive future generations of natural remedies and useful plant extracts.

Further guidance

B3 Life on Earth – Higher Workbook answers

1	a	<p>Competitor – another organism using the same resources</p> <p>DNA – the chemical that carries genetic information</p> <p>Environment – the surroundings (earth, air, water, and other living things)</p> <p>Evolution – the development of new species from simpler forms, over time</p> <p>Extinct – all individuals of the species have died out</p> <p>Species – a group of organisms that can breed to produce fertile offspring</p> <p>Variation – differences between living organisms</p>
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	c	Head lice
	d	Headlice are no longer killed by some poisons that previously killed them (they have become resistant).
	e	A few headlice were able to survive the poison. This variation in headlice was produced by mutation. The resistant headlice bred and their offspring inherited the genes for resisting the poison. Non-resistant headlice died out. Eventually all the headlice in the population were resistant.
3	a	Missing word: DNA
	b	Missing words: copy, 3500 million, Solar System, theory, conditions
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	e	Conditions on Earth changed in the past. Some living things had characteristics which helped them survive these changes. Other living things became extinct.
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Further guidance

4	a	<p>From left to right: receptor cell, neuron, effector cell</p> <p>For example: temperature receptors in the fingertips, neurons from the fingers to the CNS, muscles in the hand and arm</p> <p><Note: artwork error to be corrected at reprint – the diagram of the effector cell should be a muscle cell></p>																
	b	i	Light, moisture															
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	f		Missing words: feedback, nerve cells, sweating, nervous system, constant															
	g		Insulin is one hormone which keeps the level of glucose in blood constant.															
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7	a	i	They would be better camouflaged on darker trunks from predation by birds.
		ii	A change in the gene controlling moth colour. (A change in the DNA code).
		iii	The mutated gene would be passed on at fertilisation during sexual reproduction.
	b		<ul style="list-style-type: none"> • Mutations produce variation in the population. • A change in the environment means that some individuals may no longer be able to survive in the new conditions. • Natural selection means that individuals with characteristics that enable them to survive better will be more successful and reproduce, passing on their genes to their offspring. • Over many generations the genes that produce successful characteristics will be more common in the population than genes that produce less successful characteristics.
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