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WORKSHEET

Life Science 12

Week 15

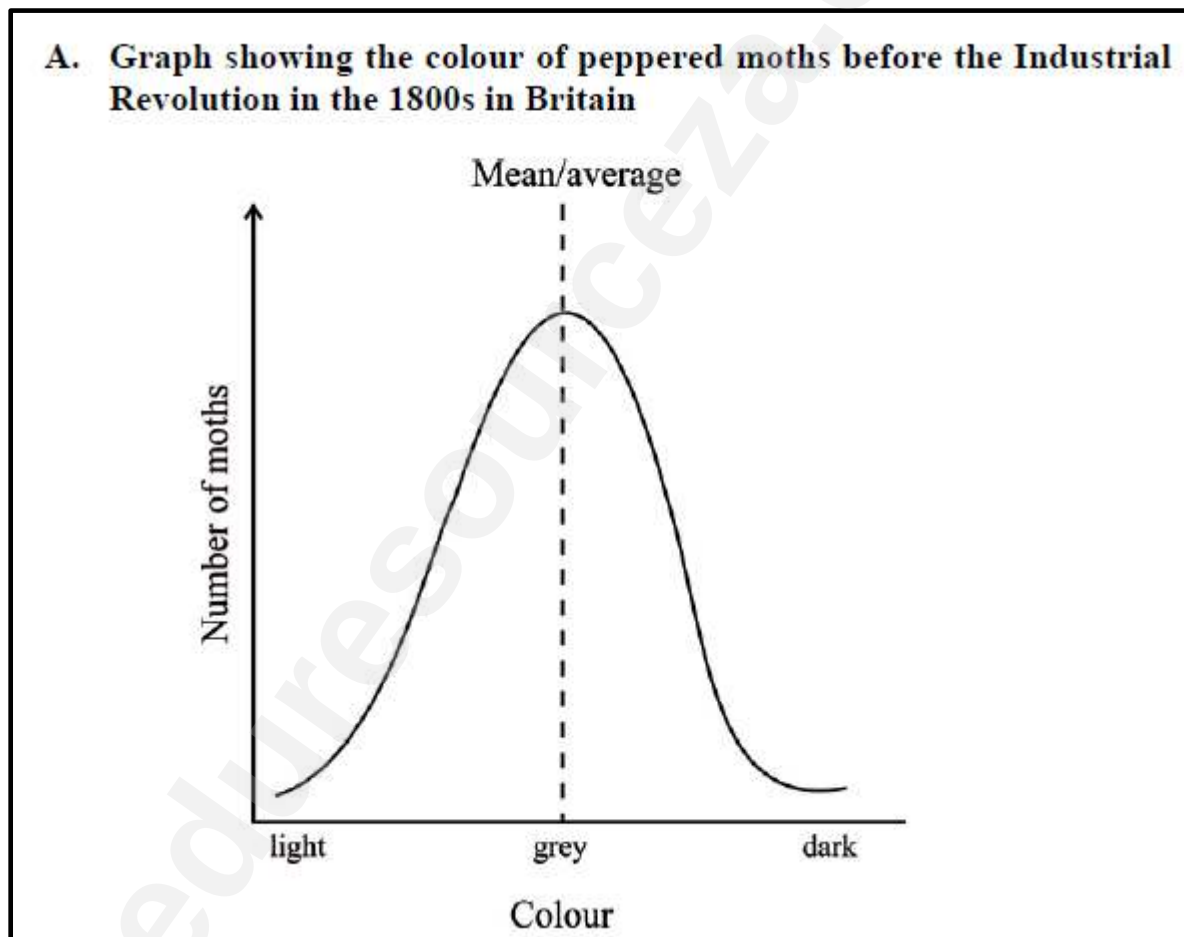
Once your work has been uploaded, I will choose a few questions at random, and it will be for marks.

Lesson 1-4

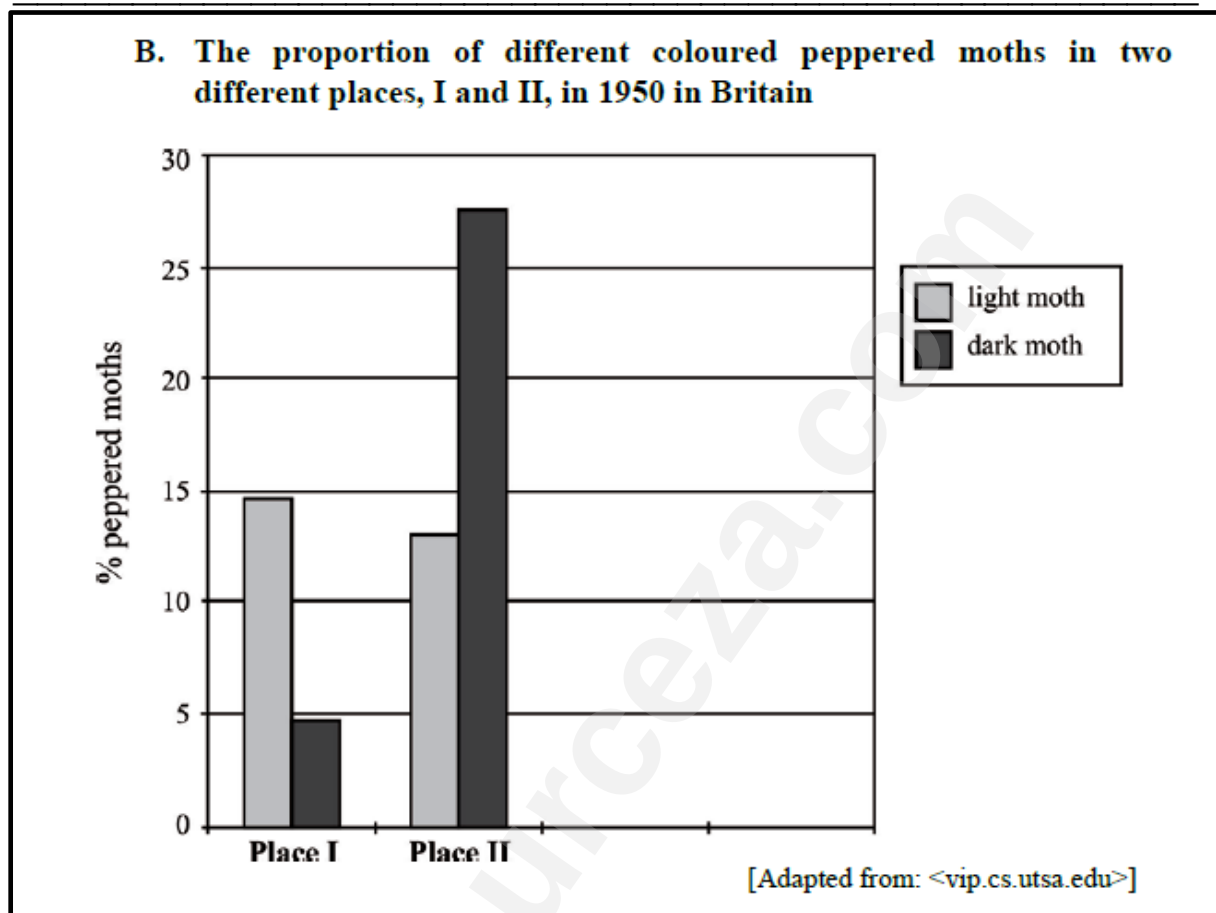
Question 1 [12]

{Adapted from: IEB Paper 1, 2013}

The theory of natural selection was used to explain the observed variation in the colour of peppered moths in Britain. Use the graph below and on page 3 to help you answer the questions that follow.



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1. What was the most common phenotype of the peppered moth before the Industrial Revolution in Britain? (1)
2. What is the cause of the different phenotypes of these moths? (2)
3. Use the information in the bar graph B to answer these questions.
 - (a) Which place has the greater percentage of dark moths? (1)
 - (b) Is Place I likely to be an industrial area or open countryside? Give a reason for your answer. (3)
4. 'Natural selection can be bad news for humans.'
Discuss the validity of this statement by referring to the development of antibiotic resistance in bacteria. (5)

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Question 2 [6]

{Adapted from: IEB Paper 1, 2015}

Study the text and table below and answer the questions that follow:

In a particular species of rat, there are three possible fur colours. This species is found in a desert area with mostly light brown sand and a few scattered plants. These rats are preyed upon by birds of prey in the area.



[Source: <<http://swegizmo.deviantart.com>>]

The table below describes the rats that live in the area in terms of various characteristics.

Characteristics of each female rat	Colour of Fur		
	Light Brown	Black	White
Average running speed (cm/s)	6	7	8
Total number of babies produced per female	11	5	2
Average age at death (months)	8	5	4

- Which colour rats could be considered the 'fittest' in terms of natural selection? Explain your answer. (3)
- Which colour rats are most likely to become extinct? (1)
- What was the most significant threat to the survival of these rats? Explain how you arrived at your answer. (2)

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Question 3 [13]

{Adapted from: IEB Paper 1, 2015}

Read the extract and answer the questions that follow



Birds called thrushes eat snails when insects are in short supply. To get at the snail, the thrushes break open the shell. They do this by hitting the snail against a stone called an anvil. Counting the shells near an anvil gives a good indication of the snails that thrushes eat. One particular snail species that is eaten is *Cepaea normalis*. The snail

shells can have different colours. They can be pink, beige, brown, red or yellow; these are **unbanded shells**. Shells can also have dark stripes on them and then the shells are described as being **banded**. The colour of the shells as well as the pattern of stripes provides **camouflage**. Thrushes will not be able to see banded shells easily against a striped background, such as grasses on sand dunes, because the shells will be well camouflaged.

- Some students did an investigation of the numbers of shell remains of *Cepaea normalis* near anvils.
- The students did the investigation in two areas, one in a wood having many dead leaves on the ground, i.e. where the background was fairly evenly coloured.
- The other area was between grasses growing on a sand dune.

The students made the following hypothesis:

There will be more banded shells near anvils in the evenly-coloured background area and there will be more unbanded shells near anvils in between grasses on the dune.

The results of the investigation in one area are shown below.

Table showing the number of snails collected in the woodland area.

Snails: <i>Cepaea</i>	Number of snails			
	Banded	Unbanded	Total	% banded
Shell remains from anvils in the woodland area	486	377	863	56.0

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1. How many more banded snails were collected than unbanded? (1)
2. Why did the thrushes eat more banded snails than unbanded ones in the woodland area? (2)
3. Which shell had the unfavourable variation in the woodland area? (1)
4. Do the results shown above support the hypothesis the students made? Explain your answer. (3)
5. How could the students have worked in the two areas to ensure that their results were valid, i.e. that the results could be compared? Explain **three** ways. $3 \times 2 = (6)$

Question 4 [9]

{Adapted from: IEB Paper 1, 2015}

Tay-Sachs is a fatal genetic disease in which the brain and nerve cells begin to degenerate about six months after birth. A sufferer usually dies before the age of five. Many South African Jewish people are descended from emigrants from Eastern Europe where the recessive gene for this disease (Tay-Sachs) originated. About 1 in 25 South African Jews now carry this gene.

1. Define 'inbreeding'. (2)
2. Give THREE effects of inbreeding on a population. (3)
3. Using the example above, explain how this gene increased in frequency in the South African Jewish population. (4)

Question 5 [11]

{Adapted from: Mind Action Series}

1. How would Darwin have explained the fact that over the years the necks of giraffes have been getting longer? How would Lamarck have explained it? (4)
 2. The following sentences describe a process but the steps are out of order. Write down the numbers to indicate the proper sequence of the process and then name the biological process. (7)
- 1 Those offspring with differences that adapt them better to the environment will be more likely to survive and reproduce.
 - 2 Over time, this process gradually leads to entirely new types of life.
 - 3 This means that more offspring in the next generation will have the helpful difference.
 - 4 This process is responsible for the many diverse life forms in the world today.
 - 5 Offspring differ from their parents in minor random ways.
 - 6 These differences accumulate and make populations change.

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Question 6 [6]

{Adapted from: IEB Paper 1, 2021}

Complete the table below by selecting the words listed in bold and writing them in the corresponding block in the table.

Slow		Fast		Human	
Environment		Decrease in variation		Increase in variation	
		Natural selection		Artificial selection	
1.	Cause of change				
2.	Rate of change				
3.	Variation				

(6)

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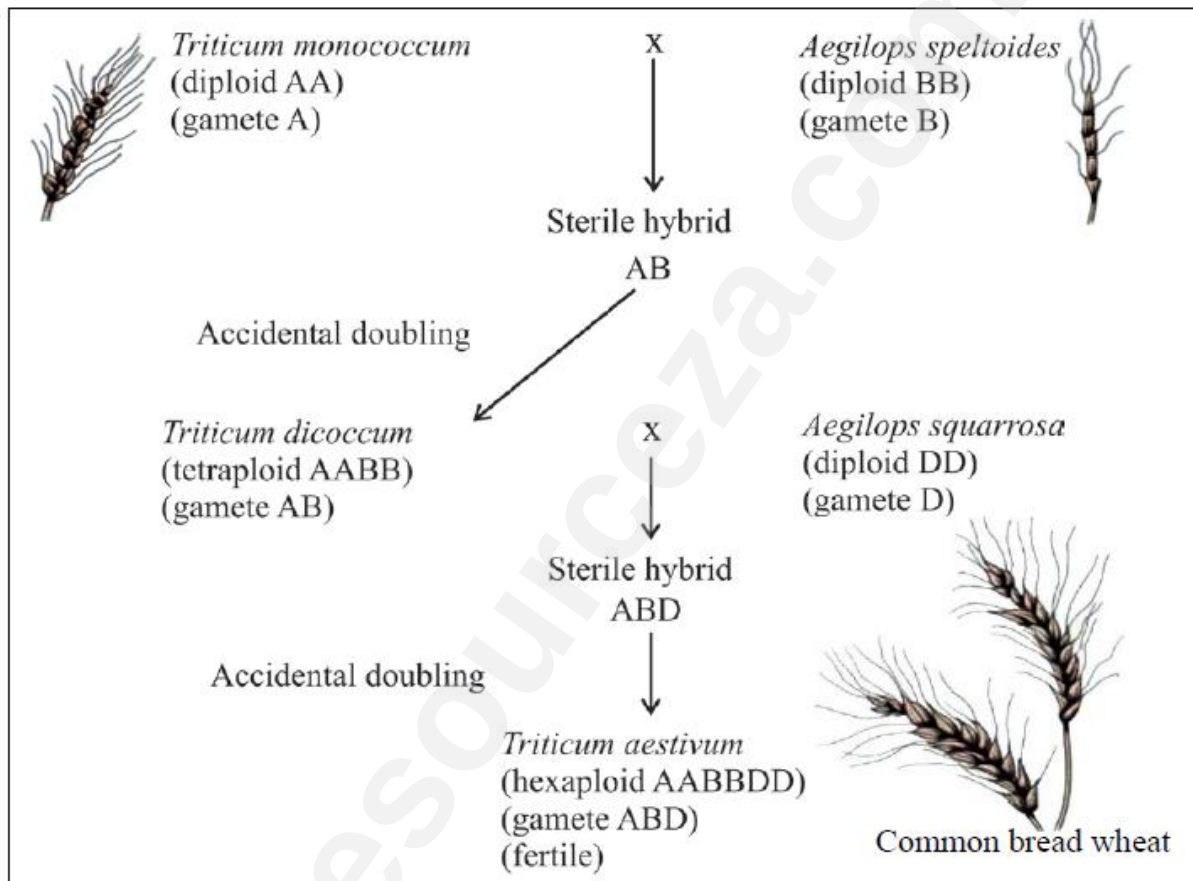
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Question 7 [3]

{Adapted from: IEB: Paper 1, 2012}

The diagram below shows how common bread wheat was formed from the natural hybridisation of related species of grasses. Diagrams are drawn to scale.



[www.ibri.org]

1. Discuss ONE specific example of artificial selection in animals that is useful to humans. (3)

[Total: 60 Marks]