Biodiversity – 2021/20 GCE Biology A Component 02

1. Nov/2021/Paper_H420/02/No.12

   Brassica rapa is a plant that occurs in wild-type and dwarf varieties.

   A student investigated the growth of *B. rapa*.

   Seeds of both varieties were planted and the heights of stems were measured 20 days after planting.

   The results are shown below.

Variety	Height after 20 days (cm)						Mean
	Individual plants						
	1	2	3	4	5	6	
Wild-type	90.7	94.5	87.4	82.7	92.0	91.5	89.8
Dwarf	6.5	8.0	7.4	7.8	8.3	7.8	7.8

   Which of the following correctly explains the student's results?

   A   variation in height between varieties is continuous and polygenic

   B   variation in height between varieties is discontinuous and controlled by one or two genes

   C   variation in height within varieties is continuous and controlled only by one or two genes

   D   variation in height within varieties is discontinuous and polygenic

   Your answer ☐ [1]

2. Nov/2021/Paper_H420/02/No.13

   Moving North from a large solitary tree in the school field, some students studied changes in plant species. They laid a tape measure due North from the base of the tree trunk and dropped a quadrat at 1 m intervals for 15 m.

   Which of the following correctly describes the students' sampling method?

   A   arbitrary

   B   random

   C   stratified

   D   systematic

   Your answer ☐ [1]

3. Nov/2021/Paper_H420/02/No.14

Which of the following best defines the term species richness?

    A   the distribution of species over an area

    B   the number of species in an area

    C   the relative abundance of each species in an area

    D   the relative number of individuals of a species in an area

Your answer [   ] **[1]**

4. Nov/2021/Paper_H420/02/No.15

Biodiversity can be considered at different levels.

An area of woodland habitat has a high Simpson's Index of Diversity.

Which of the following describes an area with a high Simpson's Index of Diversity?

    A   the area has a high genetic biodiversity

    B   the area has a high habitat biodiversity

    C   the area has a high species biodiversity

    D   the area is high in all levels of biodiversity

Your answer [   ] **[1]**

5. Nov/2021/Paper_H420/02/No.17

Heather is a plant with a woody stem that grows on upland areas of the UK such as the North York Moors. These areas are often described as heather moorland.

Heather moorland is a habitat that is relatively common in the UK but rare elsewhere in the world.

The diagram shows an example of biomass transfer in a heather moorland ecosystem.

| heather | → 6% | red grouse | → 13% | hen harrier |
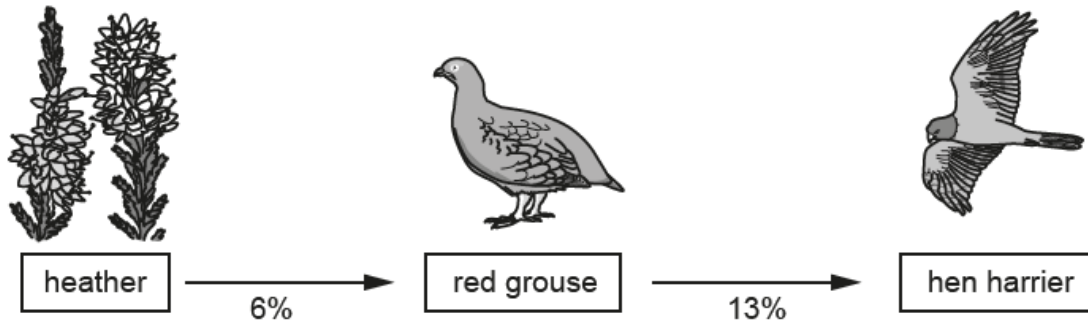
The numbers below the arrows represent the percentage of biomass transferred to the species shown in the next trophic level.

(a) Sunlight that can potentially be used in photosynthesis by green plants such as heather is called photosynthetically active radiation (PAR).

(i) In one year, 8.94×10^9 kJ m^{-2} of PAR fell on an area of heather moorland.

The heather plants then converted 9.08×10^7 kJ m^{-2} of this energy into biomass.

Calculate the energy in the PAR that the heather did **not** convert into biomass.

Energy = ... kJ m^{-2} **[2]**

(ii) Scientists were able to estimate the increase in biomass in heather plants in one year.

Suggest how the increase in biomass over time in a plant such as heather could be determined experimentally.

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.... **[1]**

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