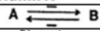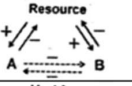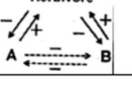1. A population grows according to the logistic growth equation, Where dN/dt is the rate of population growth, r is the intrinsic rate of increase, N is population size and K is the carrying 'capacity of the environment. According to this equation, population growth rate is maximum at
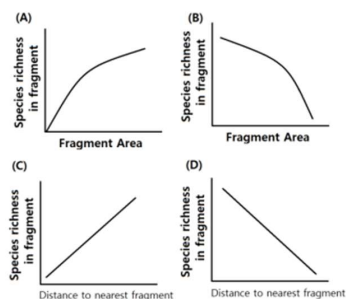
$$\frac{dN}{dt} = rN(1 - \frac{N}{K})$$

    a) K/4
    b) K/2
    c) K
    d) 2K

2. Given below in Column A are schematic representations of three types of pairwise species interactions and the name of some interactions are in Column B

Column A		Column B
A	A ⇌ B	(i) Apparent competition
B	Shared Resource $+\!/\!\!/\!\!-$ $+\!\!\searrow\!\!-$ A ⤙⤚ B	(ii) Interference competition
C	Herbivore $-\!/\!\!/\!\!+$ $-\!\!\searrow\!\!+$ A ⤙⤚ B	(iii) Direct amensalism
		(iv) Exploitation competition

    a) A - (iii); B - (ii); C - (iv)
    b) A -(iv); B -(ii); C - (iii)
    c) A - (ii); B -(iv); C -(i)
    d) A - (iii); B - (i); C - (ii)

3. Competition for mates and variance in fitness is higher among females than among males in which of the following animal mating systems?
    a) Monogamy
    b) Polygyny
    c) Polyandry
    d) Sequential monogamy

4. Which one of the following will have the least impact on allele frequencies in small populations?
    a) Inbreeding
    b) Random mating
    c) Genetic drift
    d) Outbreeding

5. Forest fragments in an agricultural landscape can be viewed as islands of habitat in an ocean of non-habitat.

MacArthur and Wilson's island biogeography model can be used to predict patterns of species richness in these forest fragments which are represented ill the graphs below.
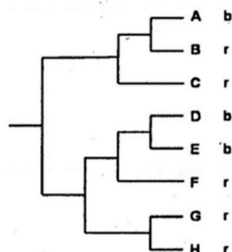

a) A and C
b) A and D
c) B and C
d) B and D

6. Following table shows attributes of selected species A, B, C and D:

Attributes	Species			
	A	B	C	D
Dispersal ability	High	Low	High	Low
r Selected	Yes	Yes	No	No
Predominant reproduction mode	Asexual	Sexual	Asexual	Sexual
Competitive ability	High	Low	High	Low

Based on the above information, which of the focolonization.st likely to become invasive if climate matches between its site of origin and site of colonization?
a) Species A and D
b) Species A only
c) Species D only
d) Species B and C

7. The phylogenetic tree below shows evolutionary relationships among 8 species. Males of these species are either blue (b) or red (r) in color, the color being indicated next to each species name.

Based on the principle of parsimony, which of the following statements best represents, the evolution of male body colour in this set of species?
a) The most recent common ancestor of all 8 species was blue; red evolved independently 5 times.
b) The most recent common ancestor of all 8 species was blue; red evolved independently 4 times.
c) The most recent common ancestor of all 8 species was red; blue evolved independently 3 times.
d) The most recent common ancestor of all 8 species was red; blue evolved independently 2 times.

8. Beak shape in birds has evolved in response to their diet. The table listing bird species and food type is given below:

	BIRD SPECIES		FOOD TYPE
i	Barn swallow	A	Fruits
ii	Great hornbill	B	Insects
iii	House sparrow	C	Nectar
iv	Purple sunbird	D	Seeds

Match the bird species shown above to their main food resource.
a) i-D; ii-A; iii-C; iv-B
b) i-B; ii-D; iii-A; iv-C
c) i-C; ii-B; iii-D; iv-A
d) i-B; -ii-A; iii-D; iv-C

JUN-2018

1. A general increase in the average body mass of animal population within a species with latitude is known as
a) Allen's rule
b) Bergmann's rule
c) Allee effect
d) Hamilton's rule

2. Ruderal species arc those which are found in the environments with
a) low disturbance, high competition
b) high disturbance, low competition
c) low disturbance, low competition
d) high disturbance, high competition

3. The table given below represents the types of intercellular transport in "Column I" in land plants and their transport pathways in "Column II" Which one of the following combinations matches column I correctly with column II

	I	II
A	Apoplastic	Via interconnecting plasmodesmata
B	Symplastic	Via the water filled spaces of the cell wall matrices and lumen of xylem trachearv elements
C	Transcellular Transport	Via the vacuole transport across the tonoplast followed by exit across the plasma membrane before regaining entry to the adjacent cell through the plasma membrane.

a) A-i, B-ii, C-iii
b) A-ii, B-i, C-iii
c) A-iii, B-ii, C-i
d) A-i, B-iii, c-ii

4. Altruism describes a behavior performed by animals that may be disadvantageous to self while benefiting others. Which one of the following statements is INCORRECT about altruism?
a) It is the net gain of direct fitness when sociality is facultative.
b) It is under positive selection via indirect fitness benefits that exceed direct fitness costs.
c) It generates indirect benefit by enhancing survivorship of kin.

d) It is favored when rb - c > 0 where c is fitness cost to altruist, b is fitness benefit to recipient; and r is genetic relatedness.

5. Following are key points about the effect of genetic drift:
   A. Genetic drift is significant in small populations.
   B. Genetic drift can cause allele frequencies to change in a predirected way.
   C. Genetic drift can lead to a loss of genetic variation within populations.
   D. Genetic drift can cause harmful alleles to become fixed.
   Which one of the following combinations of the above statements are true?
   a) A and B only
   b) A and C only
   c) A, B and C
   d) A, C and D

6. The following table contains some of the generalizations of evolutionary biology: Which of the following is correct match between Column I and II?

Column I		Column-II	
A	Copes Rule	i	Population lineages tend to increase in body size over evolutionary time
B	Dollo's Rule	ii	There is constant probability of extinction in family of related organism.
C	Ockham;s Principle	Iii	Complex charcters,once lost,are not regained.
D	Van Valen's Law	iv	Accept the simplest theory that works

   a) A - (i), B - (ii), C - (iv), D - (iii)
   b) A - (i), B - (iii), C - (iv), D - (ii)
   c) A - (ii), B - (iii), C - (i), D - (iv)
   d) A - (iv), B - (iii), C - (i), D - (ii)