

## QUESTIONSHEET 1

The table below compares the processes of mitosis and meiosis. If a feature is correct place a tick (✓) in the appropriate box and if the feature is incorrect place a cross (X) in the appropriate box.

FEATURE	MITOSIS	MEIOSIS
Involves two successive nuclear divisions		
Does not occur in a haploid cell		
Involves synapsis forming bivalents		
Involves chiasmata formation		
Leads to random assortment of chromatids		
Leads to random assortment of chromosomes		
Occurs during gamete formation in a mammal		
Daughter nuclei have identical genetic content		
DNA replicates before cell division commences		
Involves two chromosomal replications		

[10]

Briefly explain three ways in which meiosis gives rise to genetic variation.

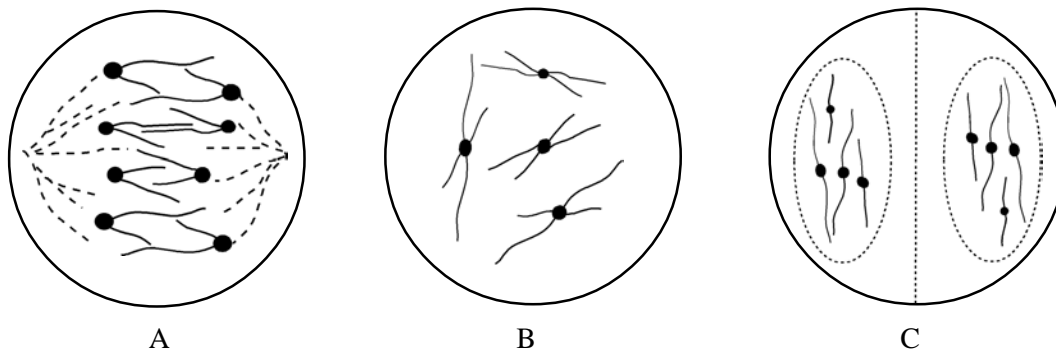
1: .....  
.....  
.....  
.....  
..... [3]

2: .....  
.....  
.....  
.....  
..... [3]

3: .....  
.....  
.....  
.....  
..... [3]

QUESTIONSHEET 3

Diagrams A, B and C show three stages of mitosis in cells from the same flowering plant.



(a) Write down the letters in the correct sequence and name stages A, B and C.

..... [2]

(b) How would the structure and arrangement of chromosomes seen in diagram A differ from those seen in the corresponding stage of the first meiotic division?

Structure:

..... [2]

Arrangement:

..... [2]

(c) In this flowering plant how many chromosomes would be present in:

(i) a male nucleus of a pollen grain.

..... [1]

(ii) a nucleus of an apical meristem cell.

..... [1]

(iii) a nucleus of the endosperm.

..... [1]

QUESTIONSHEET 4

Distinguish between each of the following pairs.

(a) Cytokinesis in animals and cytokinesis in plants.

.....  
.....  
.....  
.....

[4]

(b) Centromere and centriole.

.....  
.....  
.....

[4]

(c) Synapsis and chiasmata formation.

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.....  
.....  
.....

[4]

QUESTIONSHEET 5

Explain what is meant by each of the following statements.

(a) DNA replicates by semi-conservative replication.

.....  
.....  
.....  
.....

[4]

(b) Chiasmata disrupt linkage groups.

.....  
.....  
.....  
.....

[4]

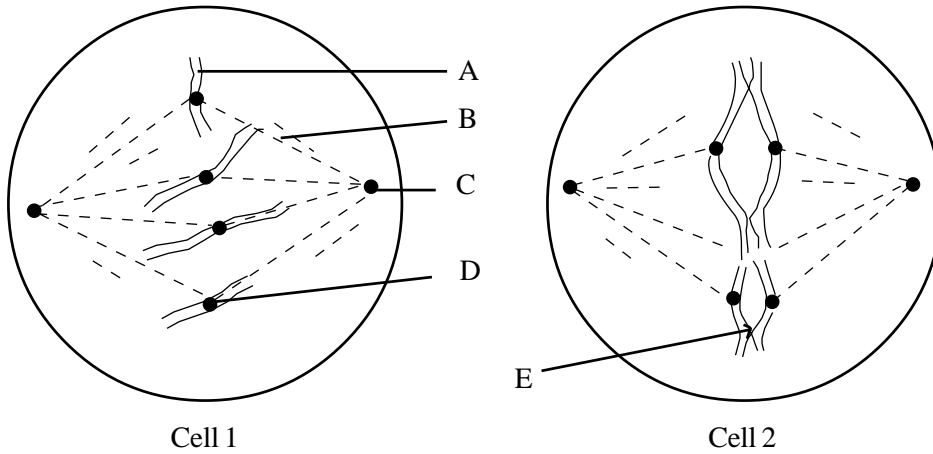
(c) Meiosis compensates for fertilisation.

.....  
.....  
.....

[2]

QUESTIONSHEET 6

The diagrams below show two cells from the same animal in the process of cell division.



(a) Name the structures labelled A to E.

A: ..... B: .....  
 C: ..... D: .....  
 E: ..... [5]

(b)(i) What type of cell division is occurring in cell 1?

..... [1]

(ii) What phase of cell division is occurring in cell 1?

..... [1]

(iii) What type of cell division is occurring in cell 2?

..... [1]

(iv) What phase of cell division is occurring in cell 2?

..... [1]

(c) In which of the above cells is random assortment occurring and what is its significance?

Cell: .....

Significance: .....

.....

..... [3]

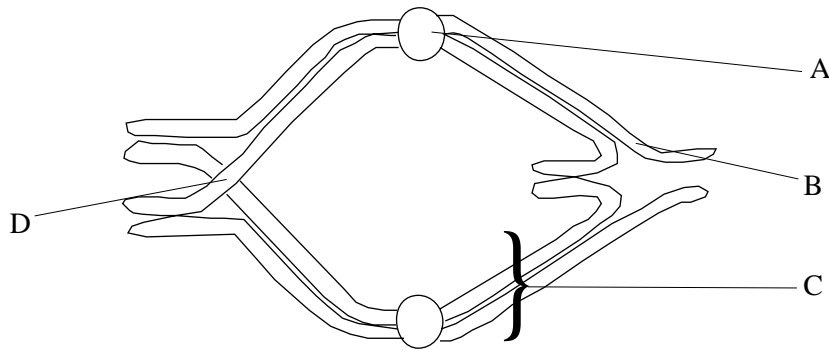
(d) What is the significance of structure E?

.....

.....

[2]

The diagram below shows a bivalent from the process of cell division.



(a)(i) What is a bivalent?

..... [1]

(ii) In what type of cell division do bivalents form and at what stage?

Type: .....

Stage: .....

[2]

(iii) What is the process of bivalent formation called?

..... [1]

(b) Name structures A to D.

A: ..... [1]

B: ..... [1]

C: ..... [1]

D: ..... [1]

(c) At what stage of cell division is the bivalent shown above? Give your reasons.

Stage: .....

Reasons: .....

..... [3]

Variation between living organisms of a species may be shown in either discontinuous or continuous form. The phenotypes or characteristics of organisms are a result of the interactions of genetic factors and environmental factors.

(a) (i) Explain the meaning of the term ‘discontinuous variation’ and give two examples to illustrate your answer.

.....  
.....  
.....

Examples: .....

.....

[4]

(ii) Explain the meaning of the term ‘continuous variation’ and give two examples to illustrate your answer.

.....  
.....  
.....

Examples: .....

.....

[4]

(b) Explain the genetic origin of these two types of variation.

.....  
.....  
.....  
.....  
.....  
.....

[5]



QUESTIONSHEET 9

Variation within a species arises largely from the processes of meiosis and fertilisation. The amount of variation arising from fertilisation is enhanced by outbreeding.

(a) How does variation arise from the process of meiosis?

.....  
.....  
.....

[3]

(b) How does variation arise from the process of fertilisation?

.....  
.....

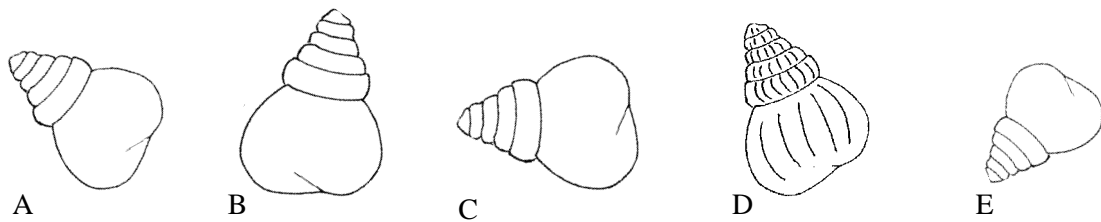
[2]

(c) How does outbreeding increase variation?

.....  
.....  
.....  
.....

[2]

(d) The drawings show five shells, A to E, that belong to a particular species of periwinkle. The shells are all from adult, full grown animals.



(i) State a shell feature that shows continuous variation.

..... [1]

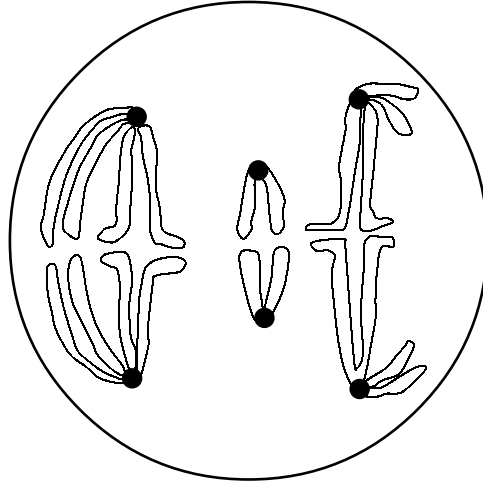
(ii) Which shell shows discontinuous variation?

..... [1]

(iii) What is the discontinuous feature?

..... [1]

The diagram below shows the metaphase 1 stage of meiosis in a cell where the diploid number is six ( $2n = 6$ ).



(a) In the space below, draw a diagram to show the appearance of the same cell in metaphase of mitosis.

[3]

(b) In the space below draw a diagram to show the appearance of the same cell in anaphase 1 of meiosis.  
Label two structures which are visible only when a cell is undergoing meiosis and mitosis.

[5]

(a) State two differences between the process of mitosis and the process of meiosis.

1. .... [1]

2. .... [1]

(b) State three ways in which meiosis gives rise to genetic variation.

1. .... [1]

2. .... [1]

3. .... [1]

(c) Explain why if two organisms heterozygous for one pair of alleles are crossed, the probable ratio of offspring phenotypes is 3:1.

..... [3]

**A2.8****MEIOSIS AND VARIATION****QUESTIONSHEET 12***Do not  
write in  
margin*

The following table refers to the processes of mitosis and meiosis. If a feature is correct put a tick (✓) in the appropriate box and if the feature is incorrect put a cross (✗) in the appropriate box.

Feature	Mitosis	Meiosis 1	Meiosis 2
Occurs during gametogenesis			
DNA replicates before prophase			
Bivalents form during prophase			
Chiasmata are formed			
Chromatids randomly assort during anaphase			

TOTAL / 5