

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Mark Schemes

Q1.

- (i) idea of rise and fall;
peak and trough later than those of larvae / idea of time lag;
(allow correct line drawn on the graph)

2

- (ii) reduction in leaf area / size decreases photosynthesis;
less food reserves available for production of new needles;
OR
feeding larvae damage more growing points;
takes time for tree to recover / less growing time for needles;

2

[4]

Q2.

- (a) gene located on X / Y / one sex chromosome;
(allow gene on X or Y chromosome, not X and Y)

1

- (b) (i) black;

1

- (ii) $X^G X^g$;

(lose this mark if the wrong genotype is given for the female in (iii))
(must show X chromosomes to gain the mark)

1

correct parent gametes

(X^g and Y from male, X^G and X^g from female);

correct offspring genotypes ($X^g X^g$, $X^G X^g$, $X^G Y$, $X^g Y$);

correct link of offspring genotypes with phenotypes;

$X^g X^g$ black female

$X^G X^g$ tortoiseshell female

$X^G Y$ ginger male

$X^g Y$ black male

(correct gametes, offspring genotypes and link with phenotypes based
on incorrect parent genotype = 3 marks)

3

- (c) $X^G Y dd$;
correct male kitten genotypes ($X^g Y Dd$ and $X^g Y dd$);
correct link of kitten genotypes with phenotypes;
(ignore female kittens)

$X^g Y Dd$ black

$X^g Y dd$ grey

(correct kitten genotypes and phenotypes based on incorrect parent
genotype = 2 marks)

3

[9]

Q3.

(a) 6;

1

- (i) chromosomes are arranged in (homologous) pairs / bivalents;
crossing over / chiasma present / exchange of genetic information;
bivalents arranged independently;

2 max

- (ii) separation / splitting / pulling apart of homologous chromosomes /
pairs of chromosomes;
(must give indication that one chromosome moves to each side)
(must be in the context of meiosis – not chromatid movements and not
chromosomes separate)

pulled at centromere / by spindle / fibres;

2

- (c) (i) the short arm of both chromosomes labelled on the middle
homologous pair;
*(**B** and **b** must be labelled on separate chromosomes)*

1

- (ii) 8 = 2 marks;
working showing genotypes with 1 allele from each pair
(for example, **B C D**) = 1 mark

2

[8]