

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

Q1.

- (a) (i) Only seen in males / not in females;

1

- (ii) Unaffected parents / mother $\rightarrow$ child with M.D. /
(1 $\times$ 2 $\rightarrow$ 5 / (3 $\times$ 4 $\rightarrow$ 11 / 8 ($\times$ 9) $\rightarrow$ 13;

1

- (b) 5 = X^dY

$$6 = X^DY$$

$$7 = X^DX^d \text{ AND } X^DX^D$$

$$8 = X^DX^d,;$$

All 4 correct = 2 marks

2 or 3 correct = 1 mark

max 2

- (c) $\frac{1}{4}$ / 0.25 / 25% / 1:3 / 1 in 4; (NOT '1:4')

1

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Q2.

- (a) Mutation / (spontaneous) change in a gene / change in DNA;

1

- (b) (i) Correct answer: 0 / 6;; 2 marks
OR

Use of 56 and $\frac{176}{2}$ or 88 / 56 $\times$ 2 or 112 and 176; 1 mark

max 2

- (ii) 64;

1

- (c) (i) Correct answer = 42%;;; (only if $q^2 = 0.49$) 3 marks
OR 0.42;; 2 marks
OR

$p + q = 1 / p^2 + 2pq + q^2 = 1 / p = 1 - 0.7 / q^2 = 0.49 / q = 0.7$;

Answer = $2pq$ / use of appropriate numbers; 2 marks

max 3

- (ii) 1. Parental genotypes correct: both $W^R W^S$
(ACCEPT 'RS')

AND

W^S (ACCEPT 'S') / gamete from each parent;

2. $W^S W^S$ (ACCEPT 'SS') / offspring formed and identified as susceptible;

If different symbols:

– defined : max 2 marks

– not defined max 1 mark (= pt.2)

2

- (iii) 1. Description: decrease + rate of decrease slows with time;

Explanation: Any **three** from:

2. Resistant rats / rats with W^R allele survive
OR susceptible / $W^S W^S$ rats killed

3. (more likely) to pass on W^R allele to offspring / less likely to pass on W^S /
higher proportion of next generation has W^R allele / lower proportion has W^S ;

4. Chance of mating with $W^S W^S$ is reduced / $W^S W^S$ becomes rare;

5. Rate of selection against W^S slows because W^S allele is in heterozygotes;

max 4

- (iv) No selective advantage / All genotypes equally fertile;
Large population;
Random mating; (IGNORE 'random fertilisation')
No mutation;
No emigration / immigration;

max 2

[15]