

Name of the Student: _____

Max. Marks : 25 Marks

Time : 25 Minutes

Mark Schemes

Q1.

- (a) Correct answer: 1.25;
Ignore working

OR (if wrong answer)

$$\frac{\text{measurement in } \mu\text{m}}{40000} / \frac{\text{measurement in mm}}{40} = 1 \text{ mark}$$

125 but wrong order of magnitude = 1 mark

2

- (ii) **C** has myosin / thick (and actin / thin) filaments;

OR

A has only actin / thin (/ no myosin / no thick) filaments;

1 max

- (b) When contracted:

Thick & thin filaments/myosin & actin overlap more;

Interaction between myosin heads & actin / cross-links form;

Movement of myosin head;

Thin filaments / actin moved along thick filaments / myosin;

Movement of thin filaments / actin pulls Z-lines closer together;

Displacement of tropomyosin to allow interaction;

Role of Ca^{2+} ;

Role of ATP;

*Allow ref. to 'sliding filament mechanism' /
described if no other marks awarded*

4 max

- (c) (i) 8 has DMD but 3 and 4 do not / 12 has DMD but 6 and 7 do not / neither parent has the condition but their child has;
Allow parents 3 and 4 give 8, parents 6 and 7 give 12

(ii) 4 **AND** 7;

1

(iii) Parental genotypes: 6 = $X^D Y$ AND 7 = $X^D X^d$

AND

Gametes correct for candidate's P genotypes – e.g.

X^D and Y + X^D and X^d ;

Offspring genotypes correctly derived from gametes e.g.

$X^D X^D$ + $X^D X^d$ + $X^D Y$ + $X^d Y$;

Male offspring with MD correctly identified: $X^d Y$;

Probability = 0.25 / correct for candidates offsprings genotypes;

Accept $\frac{1}{4}$ / 1 in 4 / 1:3 / 25%

NOT '3:1' / '1:4'

4

(d) (i) No gene fragment **G**;

1

(ii) Only one copy of gene fragment **F**;

Male has only one X-chromosome / is XY
(c.f. female has two / is XX);

2

(iii) 10 has only one copy of gene fragment **G**;

10 has only one normal X-chromosome / has one abnormal /
has only one normal allele / has one X^d / is $X^D X^d$ / is heterozygous;

11 has two normal X-chromosomes / has 2 normal alleles /
is $X^D X^D$ / has not got X^d / has 2 copies of (F and) G;

3

(e) (i) To prevent rejection / prevent antibody production vs. injected cells /
injected cells have (foreign) antigen (on surface);

1

(ii) Shows effect of cells / not just effect of injection / not just effect of
salt solution;

1

(iii) Only one person tested so far – need more to see if similar results /
need more to see if reliable;

Need to assess if new (dystrophin positive) muscle fibres are
functional / if muscle becomes functional;

Can't tell how widespread effect is in the muscle / sample taken
near injection site;

Need to test for harmful side effects;

Need to test if successful for other mutations of dystrophin gene;

Need to assess permanence / longevity of result/insufficient time allowed in investigation;

(In this patient) only small response / %;

Further sensible suggestion;

4 max

[25]