17. Inheritance

17.1 Chromosomes, genes and proteins

Paper 3 and 4

Marking Scheme

Q1.

(a)	length of DNA ; that codes for a protein ;	2	

Q2.

(c)	female will be XX (and male is XY)(chromosomes) / sex chromosomes will ,be the same / look the same ;	1	

Q3.

(a)	<table><tr><td></td><td></td><td>male parent chromosomes</td><td></td></tr><tr><td></td><td></td><td>X</td><td>Y</td></tr><tr><td rowspan="2">female parent chromosomes</td><td>X</td><td>XX</td><td>XY</td></tr><tr><td>X ;</td><td>XX</td><td>XY ;</td></tr></table>	2	MP1 correct female parent chromosome MP2 four correct offspring ecf MP2 from incorrect MP1
(b)	50 circled ;	1	
(c)	nucleus ;	1	

Q4.

(a)	chromosome ; gene ; phenotype ; inheritance ;	4	
(b)(i)	46 / 23 pairs ;	1	
(b)(ii)	there are two **X** chromosomes present / no **Y** chromosome / has only **X** chromosomes / is **XX** / is not **XY** ;	1	
(b)(iii)	47 chromosomes / an extra chromosome / three number 21(chromosomes) ;	1	

Q5.

(c)(i)	DNA ; information ; genes ;	3	
(c)(ii)	X and Y ;	1	
(c)(iii)	ref. to tail / flagellum ; ref. to enzymes ; AVP ;; e.g. mitochondria / streamlined shape / haploid nucleus	2	**A** acrosome

Q6.

(d)(i)	allele ;	1	
(d)(ii)	X^aY ;	1	

Q7.

(d)(i)	*any two from:* sequence of bases in, gene / DNA / mRNA, determines sequence of amino acids ; sequence of amino acids determines shape of receptor proteins ;	2	
(d)(ii)	move / carry, (named) molecules / ions, across membrane(s) / into *or* out of cells ; by active transport / using energy from respiration ; movement against concentration gradient / from low to high concentration ;	2	

Q8.

(a)(i)	**X** – nucleus ; **Y** – mRNA ; **Z** – ribosome ;	3	
(a)(ii)	sequence / order, of bases in, mRNA / DNA / gene ;	1	
(a)(iii)	(the sequence of amino acids) determines the shape of the, protein / receptor ; complementary / specific, shape is required for the receptor molecule to, bind / attach / fit, to neurotransmitter ;	2	
(b)	not all genes are, expressed / switched on / activated / AW ; cells only produce the (specific) proteins they need / AW ;	2	
(c)	*either* an alternative form of a gene ;	1	

Q9.

(a)(i)	**T** ;	1	
(a)(ii)	**C** and **G** ;	1	
(b)	**1** store of, genetic information / genetic make-up / genes / AW ; **2** DNA / genes / alleles / genetic information / base sequence, codes for / makes, (named) proteins ; **3** sequence of bases in DNA codes for sequence of, amino acids ; **4** transfer of information to daughter cells (during mitosis) ; **5** DNA copied as mRNA ; **6** AVP ;	2	

Q10.

(a)	a version of a gene ;	1	
(b)	change in base (sequence of DNA) ; DNA / gene / base sequence, codes for, protein / enzyme ; *ref. to* mRNA ; different (sequence of) amino acids in, protein / polypeptide / enzyme ; (mutant / changed) enzyme / active site, has different, shape / structure ; (active site / enzyme) not complementary to substrate / enzyme-substrate complexes cannot form / substrate will not fit into *or* bind ;	3	