Genetic variation

Mark scheme

1. (a) (i) gametes correct   1
                allow by implication from line diagram only need on X from female

                offspring genotype correctly derived   1
                    on suitable diagram

	X	**X**
X	XX	XX
Y	XY	XY

or

	X
X	XX
Y	XY

  (ii) 1:1 **or** 50% **or** ½ **or** 0.5 **or** 1 in 2 **or** 1 out of 2 **or** 50 : 50   1
                *do **not** accept 50/50*
                accept 'equal' (probability)

  (b) Y chromosome needed for male child   1

        only male has the Y **or** wives had only X (chromosomes)   1
        or sex determined by the sperm

                                                                                                                    [5]

2. (a) any **two** from:
                accept other logical / reasonable ideas

•   other scientists not aware of his work

•   chromosomes / DNA / genes not seen / discovered / known
        *do **not** accept there was no interest in genetics*

•   other theories accepted at the time

•   not considered to be a scientist / not eminent / respected   2
        allow 'he was just / only a monk'

  (b) (i) random selection   1
                accept a method of achieving random selection
                eg "take a handful"
                if number given, minimum 20

  (ii) any **one** from:

•   1:1 / one to one

•   19:21   1
        accept any ratio to give correct answer, eg "50:50"
        *do **not** accept 21:19 unqualified*

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| | | (iii) | A + a as gametes from 1st parent | 1 |

            (iii)   A + a as gametes from 1st parent   1

                    a + a as gametes from 2nd parent   1
                        allow a alone

                    (offspring / 2nd generation) Aa aa   1
                        offspring must be derived from correct gametes

                    correct identification of yellow (Aa)   1
                        other symbols correctly used can gain full marks

       or   green (aa) (if both given, both must be correct)
                     ignore references to previous generations
                     *if no other marks awarded, both correct parental genotypes given gains **1** mark*

                    examples of award of first three marks
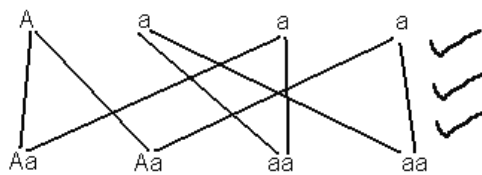
                                                                         [8]

3.   (i)   DNA   (*accept* RNA)   1
                   for one mark

    (ii)   DNA carries <u>coded</u> information which controls the order of amino acids   3
           in proteins
                   for 1 mark each

                                                                 [4]

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