Question number	Answer	Notes	Marks
1 (a)	purple; (all) offspring are purple / no white;		2
(b)	separate from other flowers / pollen / insects / wind / cover with bag / separate room; transfer pollen by man / brush / eq;		2
(c) (i)	Ff Ff; F f F f; FF and Ff (and Ff) and ff; (allow homozygous dominant / heterozygous / homozygous recessive) purple (purple purple) and white;	allow all marking points in Punnett square allow other letters eg Pp or PW for heterozygote if parents wrong allow ecf	4
(ii)	4.5:1 / 9:2 / 18:4 / 36:8;	4.5 alone = 0	1
(iii)	role of chance / probability / random (fertilisation); small numbers / eq; more purple pollen involved in fertilisation / eq;		2

Question number	Answer		Marks
1 (d)	more purple pollen / less white pollen / eq; carried to other (purple) flowers; purple flowers (more likely to) reproduce / eq; allele for purple in passed on in seeds/offspring; more purple flowers; less white flowers; continues over generations / eq;		5
		Total	16

Question number	Answer	Notes	Marks
2	DNA; nucleus; chromosomes; thymine / T; guanine / G; mutation;		6

TOTAL 6 MARKS

Question number	Answer	Notes	Marks
3 (a)	90 / tube 3 at 30 °C; tube at 25 °C / tube at different temperature / miscounted / human error / different food / fertility / fecundity / eq;	wrong anomalous result = 0 for question ignore other numbers different	2
(b) (i)	10 male and 12 female;		1
(ii)	tube 4 at 35°C;		1
(c)	repeated / described replication / eq; similar numbers / similar pattern / eq;	similar results in all tubes = 2 five tubes had similar results = 2	2
(d)	less at 16 °C / less at lower temperatures / idea of increase / eq; optimum at 25 °C / more at 25 °C; less at 30 °C / 35 °C / less at higher temperatures / idea of decrease / eq; none at 45 °C / eq; enzymes;		max 3

TOTAL 9 MARKS

Question number	Answer	Notes	Marks
4 (a)	1. male / father; 2. male is XY / heterogametic / sperm are X or Y;	 allow sperm are X and Y allow converse	 Max 2
(b)	1. produces four cells / has two cell divisions; 2. produces haploid cells; 3. halves the chromosome number; 4. produces genetic variation / cells not genetically identical / eq; 5. produces gametes / sex cells / involved in sexual reproduction / eq; 6. takes place in gonads / ovaries / testes / sex organs;	allow converse for mitosis 3. gnore 23 chromosomes	 Max 4

Total 6 marks

Question number	Answer	Notes	Marks
5	1. the colder the place the bigger the mouse; 2. variation; 3. (due to) mutation; 4. bigger mice survive / survival / survival of the fittest / not killed and reproduce / breed / eq; 5. less heat loss / keep warm / insulation; 6. small(er) surface area to volume ratio; 7. pass on allele / gene;	Mp1 ignore fatter Mp5 allow if in context of fur / fat Allow converse for small mice	5 max

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>6 (a)</td><td>
<table>
<tr><th>description</th><th>number of people who fit the description</th></tr>
<tr><td>male</td><td>7</td></tr>
<tr><td>female with Huntington’s disease</td><td>2 / two;</td></tr>
<tr><td>homozygous recessive</td><td>11 / eleven;</td></tr>
<tr><td>heterozygous</td><td>4 / four;</td></tr>
<tr><td>homozygous dominant</td><td>0 / zero / none;</td></tr>
</table>
</td><td></td><td>4</td></tr>
<tr><td>(b)</td><td>1. A parent XY and B parent XX;
2. gametes X and X and X and Y;
3. offspring half XY and male and half XX and female;</td><td>correct Punnett square = 3
use of other letters allow max 1 for correct gametes and correct offspring</td><td>3</td></tr>
</table>

(Total for Question 5 = 7 marks)