ANSWERS

(1)

a) asexual
b) sexual
c) gene
d) 46
e) 23
f) recessive
g) sexual
h) Dominance
i) heterozygous / hybrid
j) homozygous / purebred

($\frac{1}{2}$ each)

5

(2)

red = R (dominant)
silver = r (recessive)

male = silver = rr ($\frac{1}{2}$), female = heterozygous = Rr ($\frac{1}{2}$)

	r	r
R	Rr	Rr
r	rr	rr

(1)

50% red, heterozygous Rr ($\frac{1}{2}$)
50% silver, homozygous rr ($\frac{1}{2}$)

(3)

brown eyes = dominant = B
blue eyes = recessive = b

man = blue eyes = bb, female = brown eyes = BB or Bb

children = 2 x brown eyes = BB or Bb
1 x blue eyes = bb

(a) Father = bb ($\frac{1}{2}$) Mother = Heterozygous ($\frac{1}{2}$)
Bb
(Not asked to explain this)

(b)

	b	b
B	Bb	Bb
b	bb	bb

(1)

blue eyes photype = 50% ($\frac{1}{2}$)

Chance next child will have blue eyes = 50%. (1)

4

Father = AB blood type = AB genotype (½)

Mother = O blood type = oo genotype (½)

	A	B
o	Ao	Bo
o	Ao	Bo

(1)

50% Ao, A type blood
50% Bo, B type blood.

/3

Child could be type A blood or type B blood – an equal chance of both (50%) – (1)

5

(a) Alkaptonuria is caused by a recessive allele (½), individuals 4 & 5 are affected – but neither of their parents are (1 & 2). (½) If the disease was caused by a dominant allele, the disease would be expressed in the parents as they have the allele causing the disease (1)

(b) 1 = Aa – unaffected & has dominant allele – see above answer, has one recessive allele, passed this onto individuals 4 & 5 who are affected (1)

- 4 = aa (½) – affected by a recessive trait.

10 = Aa – unaffected as one or more dominant allele. Passed on recessive allele to 13 as heterozygous (1)

11 = Aa – same as above. (½)

/5

(6) Sex linked — XX v XY

Colour vision is recessive ie, "Normal" vision = V

Dad = colour blind = X_vY — (½)

Mum = Carrier = X_VX_v heterozygous (½)

	X_v	Y
X_V	X_VX_v	X_VY
X_v	X_vX_v	X_vY

(1)

(a) Boy — 2 possibilities X_VY (normal vision) or X_vY (colour blind)

∴ 50% (½) chance of being colour blind (1)

1/4

(b) Girl — 2 possibilities X_VX_v (Normal vision) or X_vX_v (Colour blind)

∴ 50% chance of being colour blind (1)

(7) Dihybrid cross.

Fur colour — white = recessive, brown = dominant } ASSUMPTION* determined from Q.

Fur/hair appearance — straight = recessive, curly = dominant } given in Q.

*ALL offspring are brown ∴ very unlikely white is dominant

parent 1 White, straight haired g.pig = bb ss — both recessive traits

parent 2 Brown, curly haired = BB Ss or Bb Ss — not SS

SCENARIO 1 assume this is the case as ALL offspring are brown

Scenario 2

some offspring are ss

SCENARIO 1

PARENT 1:

Parent 2:

	bS	bS	bS	bS
BS	BbSS	BbSS	BbSS	BbSS
BS	BbSS	BbSS	BbSS	BbSS
BS	BbSS	BbSS	BbSS	BbSS
BS	BbSS	BbSS	BbSS	BbSS

offspring all have brown hair - Bb (heterozygous)

with curly hair heterozygous Ss

with straight hair SS

∴ offspring genotypes are - BbSs - brown curly

or BbSS - brown straight

Scenario 2 Parent 2 is BbSS

Similar punnett square to above except that 50% of offspring will inherit bb, not Bb.

∴ 50% should be white. As all offspring are brown ~~this~~ is it is less likely Parent 2 is BbSs, however offspring will have same genotypes as in Scenario 1

* Assumption made white is recessive, brown is dominant.

If white was ~~co~~dominant, the genotypes of the parents would be.

parent 1 WwSS

parent 2 wwSS

Do punnet square - 50% of offspring should be white. No offspring are white, this is a $\frac{1}{2^{11}} = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$ probability

$= \frac{1}{2,048}$ } v. unlikely parents have these genotypes

NOTE: This probability also applies to scenario 2.