

①

black: B
chestnut: b

trotting: T
pacing: +

P gen: BBTT x bbTT

a) F₁ gen

BbTt
black trotting

	Bt
bT	BbTt

b) F₂ gen

BbTt x BbTt

	BT	bT	Bt	bt
BT	BBTT black trot	BbTT black trot	BBTt black trot	BbTt black trot
bT	BbTT black trot	bbTT chest trot	BbTt black trot	bbTt chest trot
Bt	BBTt black trot	BbTt black trot	BBtt black pace	Bbtt black pace
bt	BbTt black trot	bbTt chest trot	Bbtt black pace	bbtt chest pace

9 : **3** : **3** : **1**

②

black: B

white: b

short: H

long: h

* avoid Ss
as they are
easy to confuse
with 5 (five)

a) BBHh × bbhh

	BH	Bh
bh	BbHh black short	Bbhh black long

b) BbHh × bbhh

	BH	Bh	bH	bh
bh	BbHh black short	Bbhh black long	bbHh white short	bbhh white long

③ aniridia : A
normal : a

migraine : M
no migraine : m

Parent gen : Aamm × aaMm
 or
 AAmm or
 aaMM
 ♂ ♀

Determining which genotype:

∴ ♂'s mother not blind, her genotype was aa

∴ ♂'s genes must contain at least one a

∴ ♀'s father no migraine, his genotype was mm

♀'s genes must contain at least one m

F ₁ gen	Am	am
aM	<u>AaMm</u> blind migr.	aaMm no blind, migr.
am	Aamm blind no head.	aamm no blind, no mig.

25% will have both aniridia and migraines

④ deafness : $ddEE$ or $DDee$ or $ddee$

normal : D & E are necessary together.

$\therefore DDEE$ or $DdEe$

P gen deaf ♂ × deaf ♀

F₁ gen all $DDEE$ or $DdEe$

↓
impossible given both parents were deaf

\therefore F₁ gen $\Rightarrow DdEe$

trials

$ddee \times ddee$

↓

IMPOSSIBLE.
children would
all be $ddee$
and deaf.

	de
de	ddee

$ddEE \times ddEE$

↓

IMPOSSIBLE.
children would
all be $ddEE$
and deaf

	dE
dE	ddEE

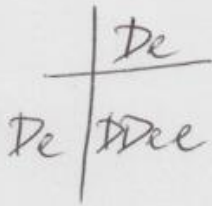
Question 4 cont'd

trials

$DDee \times DDee$



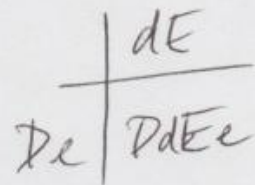
IMPOSSIBLE
children would
all be $DDee$
and deaf.



$ddEE \times DDee$



POSSIBLE
children would
all be $DdEe$



∴ Parents are $ddEE$ and $DDee$
children are all $DdEe$

⑤

black: B

solid: H

white: b

spotted: h

male ♂ BBHH or BbHH or BBHh or BbHh
black solid (four possibilities)

with ♀ A bbHh or bbHH

F1 2 black solid
B?H?

2 white solid
~~bb??~~
bbH?

with ♀ B bbHh or bbHH

F1 1 white spotted
bbhh

* the ?
denotes uncertainty
as to homozygous
or heterozygous.

with ♀ C bbhh

F1 1 white solid
bbH?

1 white spotted
bbhh

1 black spotted
B?hh

1 black solid
B?H?

Question 5 continued

start with test cross : ♀ c bbhh

since mating with ♀ c yields 4 phenotypes,
 ♂'s genotype must have greatest genetic variability.

Using ♂ BbHh as a starting point,

	BH	Bh	bH	bh
bh	BbHh black solid	Bbhh black spot	bbHh white solid	bbhh white spot

4 phenotypes

so far so good.

test with ♀ A : 2 phenotypes

assume
 ♀ A
 bbHH
 (see ♀ B
 test for
 bbHh)

	BH	Bh	bH	bh
bH	BbHH black solid	BbHh black solid	bbHH white solid	bbHh white solid

2 phenotypes

so far so good.

finally,

test with ♀B : 2 phenotypes

if you assumed ♀B to be bbHH, you'd end up with the Punnett from the previous page.

	BH	Bh	bH	bh
bH	BbHH black solid	BbHh black solid	bbHH white solid	bbHh white solid
bh	BbHh black solid	Bbhh black spotted	bbHh white solid	bbhh white spotted

specific phenotype found.

In conclusion,

male : BbHh

female A : bbHH

female B : bbHh

female C : bbhh

⑥ Factors affecting phenotype :

- environment: amt. of sun
 amt. of water } for plant
 nutrients in soil }
- competing organism / parasites
- genetic errors / mutations

Probability calculations examine theoretical outcomes. Observations provide empirical results .