

H. Biology Problem Set #1

SOLUTIONS (45pts)

(1)

$I^A - \text{Type A}$
$I^B - \text{Type B}$
$i - \text{Type O}$
$I^A I^B - \text{Type AB}$

Mary - $i i$
 Joe - $I^A I^B$

If they had 8 children, I would expect 4 to be Type A

i	$I^A i$	$I^B i$
I^A	$I^A I^A$	$I^A I^B$
I^B	$I^A I^B$	$I^B I^B$

$i i \times I^A I^B$

I^A
 I^B

Geno

$I^A i - 50\%$
$I^B i - 50\%$

Pheno

Type A - 50%
Type B - 50%

(2)

$I^A - \text{Type A}$
$I^B - \text{Type B}$
$i - \text{Type O}$
$I^A I^B - \text{Type AB}$

Sue - $i i$
 Mike - either $I^A I^A$ or $I^A i$
 Bob, Jane - $i i$

$I^A I^A \times i i$

I^A
 i

$I^A i \times i i$

I^A
 i

i	$I^A i$
I^A	$I^A I^A$
i	$i i$

i	$I^A i$	$i i$
i	$i i$	$i i$

If Mike is heterozygous $I^A i$, then there is 25% chance he is the father
 If Mike is heterozygous Type A, there is a 50% chance he could be the father.
 I would not take the case

- (3) I_A - Type A
 I_B - Type B
 i - Type O
 $I_A I_B$ - Type AB

Mr. Smith - $I_A I_A$ or $I_A i$

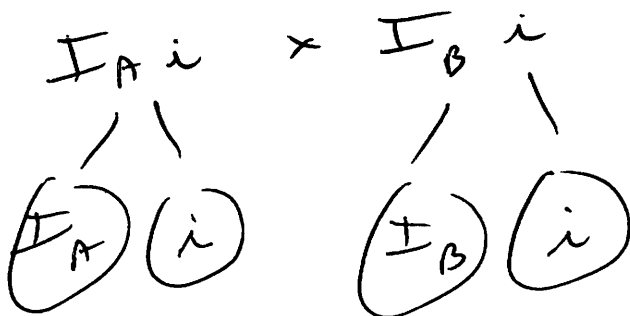
Mrs. Smith - $I_B I_B$ or $I_B i$

Michael (ii) could be biological if both heterozygous.

Isabel ($I_A I_B$ or $I_B i$) could be biological if Mrs. Smith heterozygous or homozygous and Mr. heterozygous.

Becca and Paris could be biological if both parents are homo or hetero.

Melvin and Donovan could be biological if Mrs. is heterozygous.



	I_A	i
I_B	$I_A I_B$	$I_B i$
i	$I_A i$	ii

No evidence proves any children were adopted

Geno

$I_A I_B$	-	1/4
$I_A i$	-	1/4
$I_B i$	-	1/4
ii	-	1/4

Pheno

Type AB	-	1/4
Type A	-	1/4
Type B	-	1/4
Type O	-	1/4

(4)

I_A - Type A
 I_B - Type B
 i - Type O
 $I_A I_B$ - Type AB

Bob, J - $I_A I_B$

mom - $I_A I_B$

Don - $i i$

$I_A I_B \times i i$



	I_A	I_B
i	$I_A i$	$I_B i$

Geno

$I_A i$ - $1/2$

$I_B i$ - $1/2$

Pheno

Type A - 50%

Type B - 50%

There is a 100% chance that Bob, Jamal was adopted. If that is in fact the father.

(5)

I_A - Type A
 I_B - Type B
 i - Type O
 $I_A I_B$ - Type AB

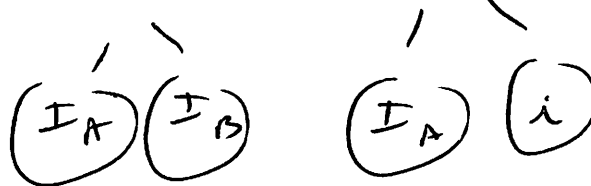
child - $i i$

mother - $I_A I_A$ or $I_A i$

Suspect #1 - $I_B I_B$ or $I_B i$

Suspect #2 - $I_A I_B$

$I_A I_B \times I_A i$



	I_A	i
I_A	$I_A I_A$	$I_A i$
I_B	$I_A I_B$	$I_B i$

Regardless of mom's genotype, suspect #2 cannot be father.
 Suspect #1 could be if heterozygous.

Incomplete Dominance Problems

a) Pink $\times$ red

R - red
r - white
Rr - pink

Rr $\times$ RR
/ /
(R) (r) (R)

	R	r
R	RR	Rr

F₁ will be expected to be
half red and half pink

Geno
RR - 1/2
Rr - 1/2
Pheno
Red - 50%
Pink - 50%

b) Red $\times$ white

RR $\times$ rr

(R) (r)

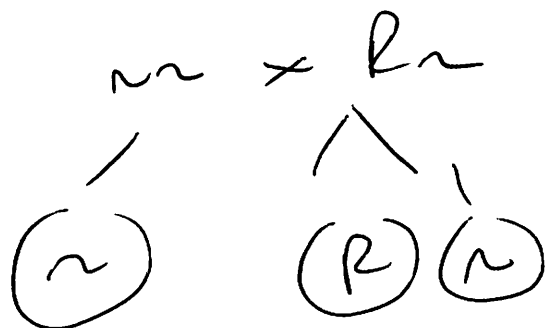
	R
r	Rr

Geno
Rr - 1/1

Phenotype
Pink 100%

100% of the
offspring will be
pink

d) White $\times$ pink

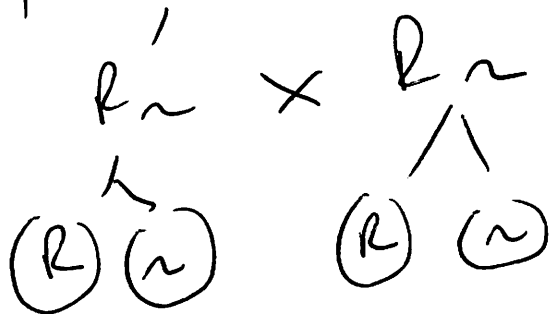


	R	r
r	Rr	rr

Pheno	
Rr	$\frac{1}{2}$
rr	$\frac{1}{2}$
Geno	
Pink	50%
White	50%

Half of F_1 will be Pink and half white

d) Pink $\times$ Pink



	R	r
R	RR	Rr
r	Rr	rr

Pheno	
$\frac{1}{4}$ RR	
$\frac{2}{4}$ Rr	
$\frac{1}{4}$ rr	
Geno	
$\frac{1}{4}$	red
$\frac{2}{4}$	pink
$\frac{1}{4}$	white.

Half pink, one quarter red and one quarter white expected.