

Genetics Final Quiz: Part A

This packet includes a "NewWorm" Quiz.

DIRECTIONS

- 1. Write your name on EVERY page.**
- 2. Use a pen. To change an answer, cross it out.**
- 3. Use empty spaces on the test for any scratch work. DO NOT use scratch paper or the backs of pages.**
- 4. If you are worried about time, skip the parts where you are asked to explain your answers, and do them last.**
- 5. Do your best.**

The NewWorm©

Original image copyright 1997, William Wadsworth.
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The left box shows what we know about NewWorms' genes. The right box shows the genetic makeup of two NewWorms. Use this information to solve the problems below.

NewWorm Genetics	Two NewWorm Genotypes	
Body: Flat: BB or Bb Round: bb	NewWorm1	NewWorm2
Mouth: Oval: ?? Slit: ??		
Head: Broad: ?? Medium: ?? Narrow: ??		
Rings: No Rings: RR or Rr Rings: rr		
Color: Green: CC Brown: Cc Black: cc		
Tail (Male): Pointed: TT or Tt Blunt: tt		
Tail (Female): Pointed: T- Blunt: t- (The Tail gene is on the X chromosome.) (The - [dash] stands for the Y chromosome.)		
Sex: Males: XX Females: XY		

GENOTYPE-PHENOTYPE MAPPING

Determine phenotypes (traits) from NewWorm1 and NewWorm2's genotypes:

	NewWorm1	NewWorm2
What body shape? <small>(cause to effect; autosomal simple dominance)</small>	1a. <u>round</u>	1b. <u>flat</u>
Does it have rings? <small>(cause to effect; autosomal simple dominance)</small>	2a. <u>yes</u>	2b. <u>no</u>
What color? <small>(cause to effect; autosomal incomplete dominance)</small>	3a. <u>black</u>	3b. <u>brown</u>
What kind of tail? <small>(cause to effect; X-linked simple dominance)</small>	4a. <u>pointed</u>	4b. <u>pointed</u>
Male or female? <small>(cause to effect; sex determination)</small>	5a. <u>male</u>	5b. <u>female</u>

If the allele for **oval mouth (M)** is dominant to the allele for **slit mouth (m)**:

What kind of mouth? <small>(cause to effect; autosomal simple dominance)</small>	6a. <u>oval</u>	6b. <u>slit</u>
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If the allele for **broad head (H)** is incompletely dominant to the allele for **narrow head (h)** and **medium head** is in between broad and narrow:

What kind of head? <small>(cause to effect; autosomal incomplete dominance)</small>	7a. <u>broad</u>	7b. <u>medium</u>
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NewWorm Genetics	Two NewWorm Phenotypes	
	NewWorm3	NewWorm4
Body: Flat: BB or Bb Round: bb	flat body	round body
Mouth: Oval: ?? Slit: ??	slit mouth	oval mouth
Head: Broad: ?? Medium: ?? Narrow: ??	narrow head	medium head
Rings: No Rings: RR or Rr Rings: rr	rings	no rings
Color: Green: CC Brown: Cc Black: cc	brown	green
Tail (Male): Pointed: TT or Tt Blunt: tt	blunt	pointed
Tail (Female): Pointed: T- Blunt: t- (The Tail gene is on the X chromosome.) (The - [dash] stands for the Y chromosome.)	male	female
Sex: Males: XX Females: XY		

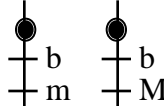
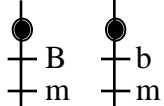
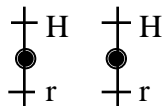
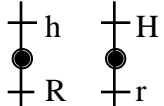
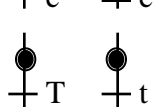
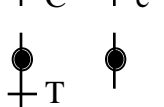

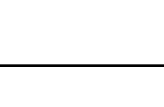
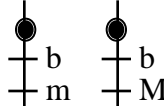
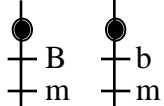
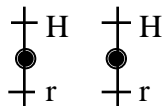
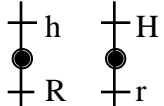
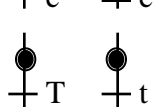
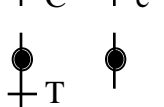

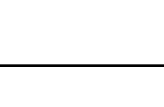
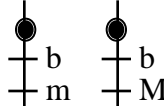
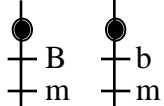
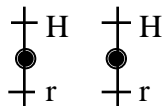
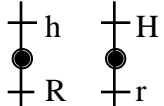
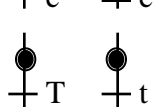
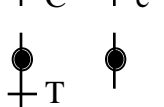

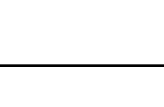
PHENOTYPE-GENOTYPE MAPPING

For each characteristic, circle ALL of NewWorm3's and NewWorm4's possible genotypes.

Characteristic	NewWorm3					Characteristic	NewWorm4				
1. Body (e to c; auto, simple)	BB	Bb	bb	B-	b-	7. Body	BB	Bb	bb	B-	b-
2. Mouth (e to c; auto, simple)	MM	Mm	mm	M-	m-	8. Mouth	MM	Mm	mm	M-	m-
3. Head (e to c; auto, incom.)	HH	Hh	hh	H-	h-	9. Head	HH	Hh	hh	H-	h-
4. Rings (e to c; auto, simple)	RR	Rr	rr	R-	r-	10. Rings	RR	Rr	rr	R-	r-
5. Color (e to c; auto, incom.)	CC	Cc	cc	C-	c-	11. Color	CC	Cc	cc	C-	c-
6. Tail (e to c; X-linked, simple)	TT	Tt	tt	T-	t-	12. Tail	TT	Tt	tt	T-	t-

Remember:

- the allele for oval mouth (**M**) is dominant to the allele for slit mouth (**m**) and
- the allele for broad head (**H**) is incompletely dominant to the allele for narrow head (**h**) and medium head is in between broad and narrow.

NewWorm Genetics	Two NewWorm Genotypes										
Body: Flat: BB or Bb Round: bb	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; padding: 5px;">NewWorm1</td> <td style="text-align: center; padding: 5px;">NewWorm2</td> </tr> <tr> <td style="text-align: center; padding: 5px;">  </td> <td style="text-align: center; padding: 5px;">  </td> </tr> <tr> <td style="text-align: center; padding: 5px;">  </td> <td style="text-align: center; padding: 5px;">  </td> </tr> <tr> <td style="text-align: center; padding: 5px;">  </td> <td style="text-align: center; padding: 5px;">  </td> </tr> <tr> <td style="text-align: center; padding: 5px;">  </td> <td style="text-align: center; padding: 5px;">  </td> </tr> </table>	NewWorm1	NewWorm2								
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Tail (Male): Pointed: TT or Tt Blunt: tt											
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Sex: Males: XX Females: XY											

MONOHYBRID INHERITANCE I

Figure out whether a baby produced by NewWorm1 and NewWorm2 will have a round body:

1a. Fill in the chart (Punnett square) to figure out possible genotypes (**BB**, **Bb**, **bb**) for a baby's body: (cause to effect; autosomal simple dominance)

	b	b
B	Bb	Bb
b	bb	bb

1b. (cause to effect; autosomal simple dominance)

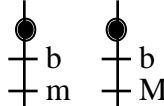
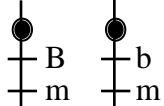
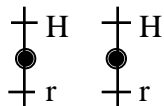
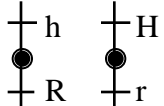
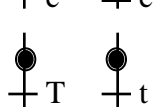
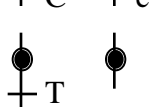

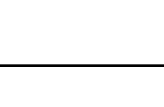
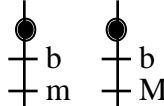
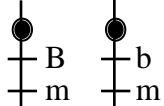
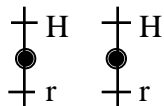
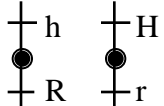
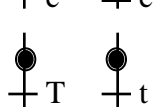
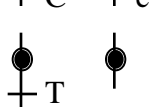

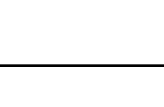
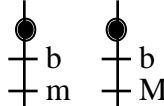
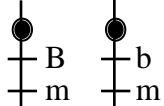
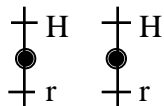
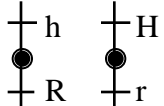
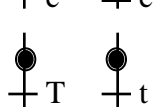
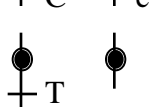

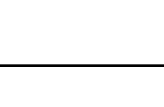
Will a baby have a **round body**?

Definitely yes _____ Maybe _____ Definitely no _____

1c. will have a **round body**?
(cause to effect, probabilistic; autosomal simple dominance)

What are the chances that a baby

0 _____ 1/4 _____ 1/2 _____ 3/4 _____ 1/1 _____

NewWorm Genetics	Two NewWorm Genotypes										
Body: Flat: BB or Bb Round: bb Mouth: Oval: ?? Slit: ?? Head: Broad: ?? Medium: ?? Narrow: ?? Rings: No Rings: RR or Rr Rings: rr Color: Green: CC Brown: Cc Black: cc Tail (Male): Pointed: TT or Tt Blunt: tt Tail (Female): Pointed: T- Blunt: t- (The Tail gene is on the X chromosome.) (The - [dash] stands for the Y chromosome.) Sex: Males: XX Females: XY	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="padding: 5px;">NewWorm1</th> <th style="padding: 5px;">NewWorm2</th> </tr> <tr> <td style="padding: 5px; text-align: center;">  </td> <td style="padding: 5px; text-align: center;">  </td> </tr> <tr> <td style="padding: 5px; text-align: center;">  </td> <td style="padding: 5px; text-align: center;">  </td> </tr> <tr> <td style="padding: 5px; text-align: center;">  </td> <td style="padding: 5px; text-align: center;">  </td> </tr> <tr> <td style="padding: 5px; text-align: center;">  </td> <td style="padding: 5px; text-align: center;">  </td> </tr> </table>	NewWorm1	NewWorm2								
NewWorm1	NewWorm2										
											
											
											
											

MONOHYBRID INHERITANCE I (cont.)

Use the NewWorm1 and NewWorm2 genotypes to answer these questions about their babies.

Color

2a. Will a baby be **brown**?
(cause to effect; autosomal incomplete dominance)

Definitely yes _____ Maybe _____ Definitely no _____

2b. What are the chances that a baby will be **green**?
(cause to effect, probabilistic; autosomal incomplete dominance)

0 _____ 1/4 _____ 1/2 _____ 3/4 _____ 1/1 _____

	c	c
C	Cc	Cc
c	cc	cc

Tail

3a. Will a baby have a **pointed tail**?
(cause to effect; X-linked simple dominance)

Definitely yes _____ Maybe _____ Definitely no _____

3b. What are the chances that a baby will be **female** AND have a **pointed tail**?
(cause to effect, probabilistic; X-linked simple dominance)

0 _____ 1/4 _____ 1/2 _____ 3/4 _____ 1/1 _____

3c. If a baby is **female**, what are the chances that it will have a **blunt tail**?
(cause to effect, probabilistic; X-linked simple dominance)

0 _____ 1/4 _____ 1/2 _____ 3/4 _____ 1/1 _____

	T	t
T	TT	Tt
-	T-	t-

NewWorm Genetics	Two NewWorm Genotypes												
Body: Flat: BB or Bb Round: bb Mouth: Oval: ?? Slit: ?? Head: Broad: ?? Medium: ?? Narrow: ?? Rings: No Rings: RR or Rr Rings: rr Color: Green: CC Brown: Cc Black: cc Tail (Male): Pointed: TT or Tt Blunt: tt Tail (Female): Pointed: T- Blunt: t- (The Tail gene is on the X chromosome.) (The - [dash] stands for the Y chromosome.) Sex: Males: XX Females: XY	<table border="0"> <tr> <td colspan="2" style="text-align: center;">NewWorm1</td> <td colspan="2" style="text-align: center;">NewWorm2</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>	NewWorm1		NewWorm2									
NewWorm1		NewWorm2											

DIHYBRID INHERITANCE

Use the NewWorm1 and NewWorm2 genotypes to answer these questions about their babies.

Body and Rings

- 1a. Will a baby have a **flat body AND no rings**?
 (cause to effect; dihybrid: both autosomal simple dominance)
 Definitely yes _____ Maybe _____ Definitely no _____
- 1b. What are the chances that a baby will have a **flat body AND rings**?
 (cause to effect; dihybrid: both autosomal simple dominance; unlinked genes)
 0 ___ 1/8 ___ 1/4 ___ 3/8 ___ 1/2 ___ 3/4 ___ 1/1 ___
 OR impossible to tell from what's given ___

Color and Rings

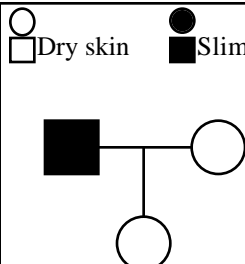
- 2a. Will a baby have a **brown body AND rings**?
 (cause to effect; dihybrid: autosomal incomplete dominance and autosomal simple dominance)
 Definitely yes _____ Maybe _____ Definitely no _____
- 2b. What are the chances that a baby will have a **black body AND rings**?
 (cause to effect; dihybrid: autosomal incomplete dominance and autosomal simple dominance; possibly linked genes)
 0 ___ 1/8 ___ 1/4 ___ 3/8 ___ 1/2 ___ 3/4 ___ 1/1 ___
 OR impossible to tell from what's given _ _

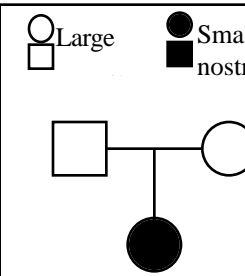
PEDIGREE I: DOMINANCE RELATIONSHIPS

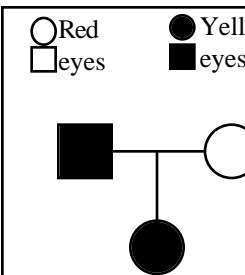
(effect to cause; simple dominance—focus on dominance relationships)

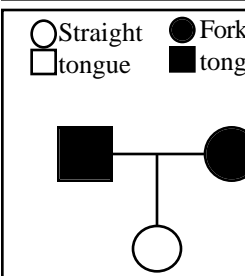
Consider four other NewWorm characteristics—Skin, Nostrils, Eyes, and Tongue.

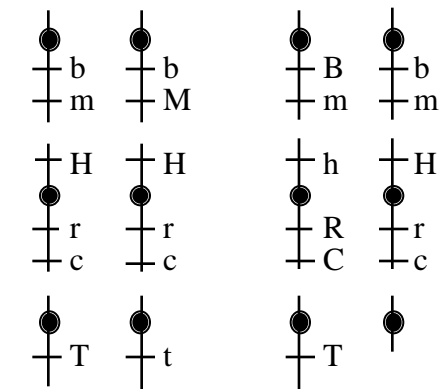
- Each characteristic has two phenotypes as shown with the pedigree.
- Females are represented by circles and males are represented by squares.
- Decide what each pedigree says about the dominance relationship between each pair of phenotypes.

	<p>1. Having slimy skin is:</p> <p><input type="checkbox"/> definitely dominant</p> <p><input type="checkbox"/> definitely recessive</p> <p><input type="checkbox"/> impossible to tell from what's given</p>
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	<p>2. Having small nostrils is:</p> <p><input type="checkbox"/> definitely dominant</p> <p><input type="checkbox"/> definitely recessive</p> <p><input type="checkbox"/> impossible to tell from what's given</p>
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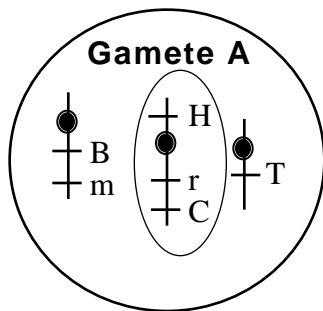
	<p>3. Having yellow eyes is:</p> <p><input type="checkbox"/> definitely dominant</p> <p><input type="checkbox"/> definitely recessive</p> <p><input type="checkbox"/> impossible to tell from what's given</p>
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	<p>4. Having a forked tongue is:</p> <p><input type="checkbox"/> definitely dominant</p> <p><input type="checkbox"/> definitely recessive</p> <p><input type="checkbox"/> impossible to tell from what's given</p>
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NewWorm Genetics	Two NewWorm Genotypes
<p>Body: Flat: BB or Bb Round: bb</p> <p>Mouth: Oval: ?? Slit: ??</p> <p>Head: Broad: ?? Medium: ?? Narrow: ??</p> <p>Rings: No Rings: RR or Rr Rings: rr</p> <p>Color: Green: CC Brown: Cc Black: cc</p> <p>Tail (Male): Pointed: TT or Tt Blunt: tt</p> <p>Tail (Female): Pointed: T- Blunt: t- (The Tail gene is on the X chromosome.) (The - [dash] stands for the Y chromosome.)</p> <p>Sex: Males: XX Females: XY</p>	<p>NewWorm1 NewWorm2</p> 

(process reasoning)

MEIOSIS: GAMETE A



1. Was crossing over necessary for NewWorm2 to produce Gamete A?

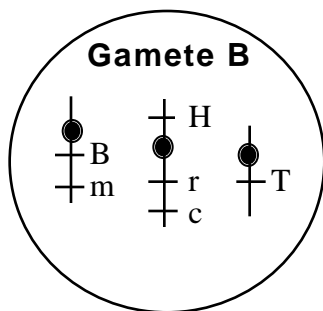
Answer yes

1a. If you answered **yes**, circle the chromosome(s) in Gamete A that resulted from crossing over.

If you answered **no**, check here ____.

If you did not answer, do nothing.

MEIOSIS: GAMETE B



1. Was crossing over necessary for NewWorm2 to produce Gamete B?

Answer no

1a. If you answered **yes**, circle the chromosome(s) in Gamete B that resulted from crossing over.

If you answered **no**, check here ____.

If you did not answer, do nothing.

PUNNETT SQUARES
(process reasoning sort of)

Label each Punnett square.

1. Write **G** in the spaces that represent gametes.

Write **O** in the spaces that represent offspring.

	G	G
G	O	O
G	O	O

2. Write **M** in the spaces that represent the possible outcomes of meiosis.

Write **F** in the spaces that represent the possible outcomes of fertilization.

	M	M
M	F	F
M	F	F

3. Write **H** in the spaces that represent haploid genotypes.

Write **D** in the spaces that represent diploid genotypes.

	H	H
H	D	D
H	D	D