

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 | <p>(The Tail gene is on the X chromosome.) (The – [dash] stands for the Y chromosome.)</p> | |
| Tail (Female): Pointed: T- Blunt: t- | | |
| Sex: Males: XX Females: XY | | |

GENOTYPE-PHENOTYPE MAPPING

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

| | NewWorm1 | NewWorm2 |
|---------------------|-----------|-----------|
| What body shape? | 1a. _____ | 1b. _____ |
| Does it have rings? | 2a. _____ | 2b. _____ |
| What color? | 3a. _____ | 3b. _____ |
| What kind of tail? | 4a. _____ | 4b. _____ |
| Male or female? | 5a. _____ | 5b. _____ |

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

| | | |
|---------------------|-----------|-----------|
| What kind of mouth? | 6a. _____ | 6b. _____ |
|---------------------|-----------|-----------|

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? | 7a. _____ | 7b. _____ |
|--------------------|-----------|-----------|

| 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 | | |

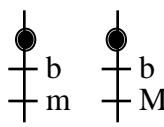
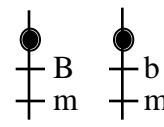
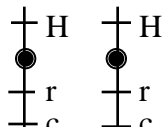
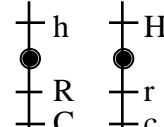
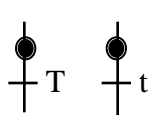
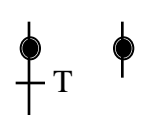

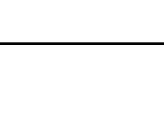
PHENOTYPE-GENOTYPE MAPPING

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

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

Remember:

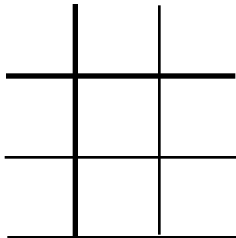
- the allele for oval mouth (**M**) is dominant to the allele for slit mouth (**m**) and
- the allele for broad head (**H**) is incompletely dominant to the allele for narrow head (**h**) and medium head is in between broad and narrow.

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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:



1b. Will a baby have a **round body**?

Definitely yes _____ Maybe _____ Definitely no _____

1c. What are the chances that a baby will have a **round body**?

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

| NewWorm Genetics | Two NewWorm Genotypes | | | | | | | | |
|--|---|----------|----------|--|--|--|--|--|--|
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| NewWorm1 | NewWorm2 | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

MONOHYBRID INHERITANCE I (cont.)

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

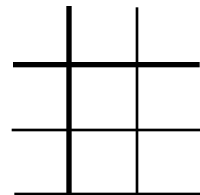
Color

2a. Will a baby be **brown**?

Definitely yes _____ Maybe _____ Definitely no _____

2b. What are the chances that a baby will be **green**?

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



Tail

3a. Will a baby have a **pointed tail**?

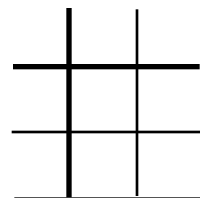
Definitely yes _____ Maybe _____ Definitely no _____

3b. What are the chances that a baby will be **female** AND have a **pointed tail**?

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**?

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



| NewWorm Genetics | Two NewWorm Genotypes | | | | | | | | |
|--|---|----------|----------|------|------|----------|----------|--|--|
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| 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**?

Definitely yes _____ Maybe _____ Definitely no _____

1b. What are the chances that a baby will have a **flat body** AND **rings**?

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**?

Definitely yes _____ Maybe _____ Definitely no _____

2b. What are the chances that a baby will have a **black body** AND **rings**?

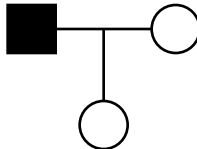
0 ___ 1/8 ___ 1/4 ___ 3/8 ___ 1/2 ___ 3/4 ___ 1/1 ___

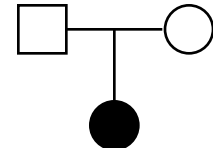
OR impossible to tell from what's given ___

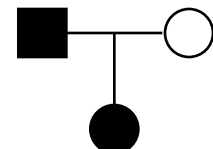
PEDIGREE I: DOMINANCE RELATIONSHIPS

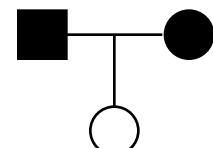
Consider four other NewWorm characteristics—Skin, Nostrils, Eyes, and Tongue.

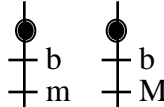
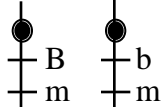
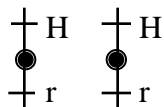
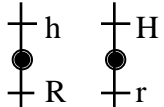
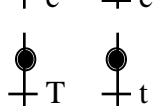
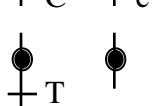
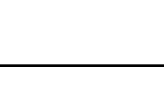
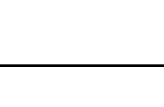
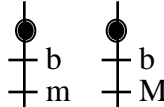
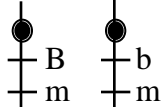
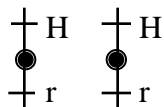
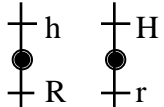
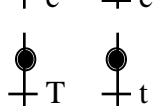
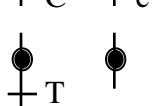
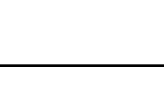
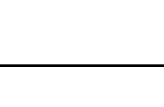
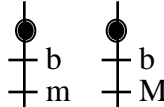
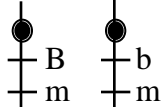
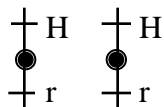
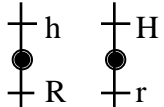
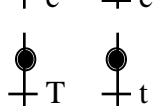
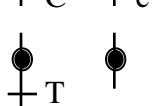
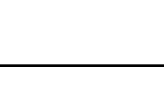
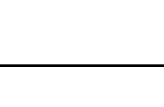
- Each characteristic has two phenotypes as shown with the pedigree.
- Females are represented by circles and males are represented by squares.
- Decide what each pedigree says about the dominance relationship between each pair of phenotypes.

| | |
|---|--|
| <p>○ Dry skin ● Slimy skin □ ■</p>  | <p>1. Having slimy skin is:</p> <p>_____ definitely dominant</p> <p>_____ definitely recessive</p> <p>_____ impossible to tell from what's given</p> |
|---|--|

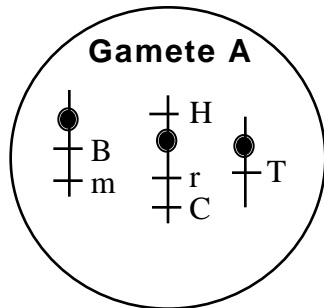
| | |
|--|--|
| <p>○ Large ● Small □ nostrils ■ nostrils</p>  | <p>2. Having small nostrils is:</p> <p>_____ definitely dominant</p> <p>_____ definitely recessive</p> <p>_____ impossible to tell from what's given</p> |
|--|--|

| | |
|---|---|
| <p>○ Red ● Yellow □ eyes ■ eyes</p>  | <p>3. Having yellow eyes is:</p> <p>_____ definitely dominant</p> <p>_____ definitely recessive</p> <p>_____ impossible to tell from what's given</p> |
|---|---|

| | |
|---|---|
| <p>○ Straight ● Forked □ tongue ■ tongue</p>  | <p>4. Having a forked tongue is:</p> <p>_____ definitely dominant</p> <p>_____ definitely recessive</p> <p>_____ impossible to tell from what's given</p> |
|---|---|

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| NewWorm1 | NewWorm2 | | | | | | | | | | |
|  |  | | | | | | | | | | |
|  |  | | | | | | | | | | |
|  |  | | | | | | | | | | |
|  |  | | | | | | | | | | |

MEIOSIS: GAMETE A



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

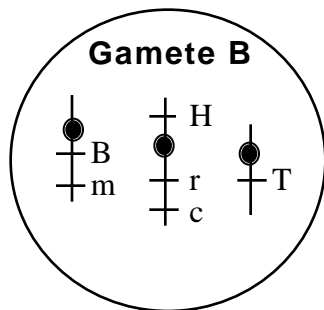
Answer _____

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 _____

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

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

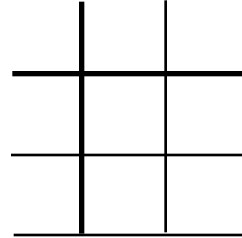
If you did not answer, do nothing.

PUNNETT SQUARES

Label each Punnett square.

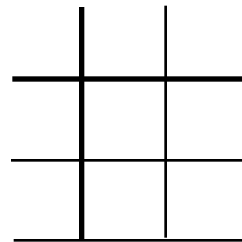
1. Write **G** in the spaces that represent gametes.

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



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.



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

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

