Monster Mash

Part 1: Multigenerational Observations—Shnorfs

1. What is a trait? ________________________________________________________________
   ________________________________________________________________

2. Where do we get our traits from? ______________________________________________
   ________________________________________________________________

3. List three traits that you have: ________________________________________________
   ________________________________________________________________
   ________________________________________________________________

   Shnorfs

4. List traits that can vary between shnorfs:
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

5. Circle the traits in question 4 that are the same in the siblings (generation 2).

6. What patterns can you identify in this set of offspring (generation 2)?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
7. A model is your understanding of how traits are inherited. What key points need to be included in a model of heredity?

- There are ___________________________ in a population of one species.

- **Siblings** have traits that are ___________________________ but they have more traits ___________________________ with each other than with the general population.

- In general, family members are not ___________________________ to each other.

8. As a class we chose to look at the: Parent Offspring

9. What patterns do you notice about generation ______ of shnorfs compared to generation 2?

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

10. What additional key points need to be included in a model of heredity?

- **Parents** have traits that are ___________________________ from their offspring, but they have more traits ___________________________ with each other than with the general population.

11. Use the information from questions 7 and 10 to create your initial model of heredity (a poster which explains how traits are inherited).

12. Based on your model, describe what you think another species of sibling monsters would look like.__________________________________________________________

_____________________________________________________________________________
Part 2: Multigenerational Observations—Dromos

Dromos

13. List traits that can vary between dromos:

_________________________   _________________________   _________________________
_________________________   _________________________   _________________________

14. Does your prediction match with the dromo siblings?  Yes  No

15. What patterns can you identify about the offspring (generation 2) in family 1?

_______________________________________________________________________________

16. What patterns can you identify about the offspring (generation 2) in family 2?

_______________________________________________________________________________

17. What patterns can you identify between family 1 and family 2?

_______________________________________________________________________________

_______________________________________________________________________________

18. What do you think caused the families to look the way they do?

_______________________________________________________________________________

_______________________________________________________________________________

19. What additional key points need to be included in a model of heredity?

- Some species produce offspring siblings that are

20. As a class we chose to look at the:  Parent  Offspring

21. What patterns do you notice about generation ______ of dromos compared to generation 2?

_______________________________________________________________________________

_______________________________________________________________________________
22. What was different about shnorfs and dromos? __________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

23. What additional key points need to be included in a model of heredity?

- Some species have parents that are ________________________________________________.
- Traits can be inherited in ________________________________________________________.

24. Use the information from questions 19 and 23 to revise your model of heredity. On your model make sure to include what you predict a sibling of each the following shnorf would look like.

Part 3: Shnorf Genetics (the study of how traits are passed down)

25. Below are pictures of two shnorf siblings. Draw what you think their parents look like.

Sibling 1:                                                                                     Sibling 2:

Parent 1:                                                                                     Parent 2:
26. Were your predictions correct? Yes No

27. Where did sibling 1’s nose color come from? ________________________________

28. What does this mean about the parents’ genes (genetic makeup)? ________________________________

29. If nose color were determined by **one piece** of genetic information, would it be possible for two green-nosed parents to have a blue-nosed offspring? Yes No

30. Justify your answer to number 29. ________________________________

31. Could nose color be determined by **two pieces** of genetic information? Why or why not?

______________________________

______________________________

______________________________

______________________________

32. We are exploring the trait of ______________________________. The genetic information for traits are stored in ______________________________. Within a ______________________________, there are ______________________________ pieces of information; these are called ______________________________. ______________________________ code for the different versions of a trait; for example, ______________________________ and ______________________________. Even though the ______________________________ could be different in a ______________________________, only one will be seen.
33. What does this mean about how genetic information is passed down?

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

34. What additional key points need to be included in a model of heredity?

- Genetic information is stored in ______________________ which contain _______ and determines _________________________________.

- Not all alleles that are carried _________________________________.

- Parents ________________________________ to their offspring.

35. Use the information from question 34 to revise your model of heredity. In addition, make sure to include the following about the shnorf family consisting of two green-nosed parents, with blue-nosed AND green-nosed offspring:

- The alleles which are contained in each family member’s genes. We will use _____ to represent the blue nose allele and _____ to represent the green nose allele.

- The possible allele combinations that the parents could pass down to their offspring.

- The fraction of offspring that are expected to show green noses, and the fraction of offspring that are expected to show blue noses.
Part 4: Predicting the Frequency of Traits - Shnorfs

36. Geneticists use __________________________ to calculate the fraction of siblings that will inherit a certain trait from their parents. Confirm that your model matches the fractions from this method.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

37. The following are eight siblings which are offspring from the parents we have been studying. Do these offspring match our predictions from question 35 and why?

<table>
<thead>
<tr>
<th></th>
<th>Green Nose</th>
<th>Blue Nose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Fraction (out of 8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual Fraction (out of 8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

38. When is our model the most accurate? ______________________________________________
______________________________________________________________________________
39. The terms **dominant** and **recessive** are often used in discussing the inheritance of traits. What do you think these terms mean?

_______________________________________________________________________________

_______________________________________________________________________________

_______________________________________________________________________________

40. What additional key points need to be included in a model of heredity?

- If the allele is dominant, ______________________________________________________

___________________________________________________________________________

- If the allele is recessive, _____________________________________________________

___________________________________________________________________________

- Punnett squares give ________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

41. Use the information from question 40 to revise your model of heredity. On your model, include a Punnett square to show the probability that two shnorf parents, one with tusks (allele “T”) and one with no tusks (allele “N”), would have offspring with tusks. Having tusks is known to be a recessive trait.
Part 5: Predicting the Frequency of Traits — Dromos

42. Are all dromos identical?  Yes  No

43. What patterns did you notice about the dromo parent and their offspring that you saw?

_______________________________________________________________________________
_______________________________________________________________________________

44. What does this mean about dromo parents? _______________________________________
_______________________________________________________________________________
_______________________________________________________________________________

45. How likely is this to happen?_____________________________________________________

46. If you have identical parents, does this mean you will have identical offspring?  Yes  No

47. Give an example to support your answer to question 46.

<table>
<thead>
<tr>
<th>Gene</th>
<th>Expressed Trait</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent 1</td>
<td></td>
</tr>
<tr>
<td>Parent 2</td>
<td></td>
</tr>
<tr>
<td>Offspring</td>
<td></td>
</tr>
</tbody>
</table>

48. How could a parent produce offspring that are identical to them? __________________________
_______________________________________________________________________________
_______________________________________________________________________________

49. What does this mean about dromos? _________________________________________________
_______________________________________________________________________________
To reproduce, shnorfs undergo **sexual reproduction**.

50. How many parents are needed for sexual reproduction? ____________________________________________

51. When an offspring is produced though sexual reproduction, what does this mean about where the offspring’s genetic makeup comes from? ____________________________________________

52. What do you think asexual reproduction is, and how many parents are needed? ______________________

53. What additional key points need to be included in a model of heredity?
   - Some species produce offspring through ________________________________,
   - others produce offspring through ________________________________.

54. Use the information from question 53 to revise your model of heredity. On your model, make sure to include a definition of sexual and asexual reproduction.
Part 6: Applying the Model

55. What patterns have you noticed in sets of human siblings?
______________________________________________________________________________
______________________________________________________________________________

56. What patterns have you noticed between parents and their children?
______________________________________________________________________________
______________________________________________________________________________

57. Use your model to make a claim about which type of reproduction humans undergo.

Humans undergo sexual reproduction asexual reproduction
because ________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

58. According to your model, what does this mean about a human child’s genes?
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

59. In humans, the allele for freckles is known to be dominant. Use your model to calculate the probability that two parents without freckles will have a child with freckles.

<table>
<thead>
<tr>
<th>Gene</th>
<th>Expressed Trait</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent 1</td>
<td></td>
</tr>
<tr>
<td>Parent 2</td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td></td>
</tr>
</tbody>
</table>
Ploobs

60. What patterns did you notice in the ploob offspring born in December of 2013? ________________
_______________________________________________________________________________
_______________________________________________________________________________

61. Use your model to make a claim about which type of reproduction ploobs undergo.

Ploobs undergo sexual reproduction asexual reproduction
because ________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

62. What patterns did you notice in the ploob offspring born in June of 2021? ________________
_______________________________________________________________________________
_______________________________________________________________________________

63. Was your prediction in question 61 correct? Yes No

64. What evidence supports this? ______________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
65. How do you think ploobs reproduce? ____________________________

______________________________________________________________

______________________________________________________________

66. What additional key points need to be included in a model of heredity?

- Some species ________________________________

67. What do you think an advantage of sexual reproduction is? ________________________________

______________________________________________________________

68. What do you think an advantage of asexual reproduction is? ________________________________

______________________________________________________________

**Part 7: Verifying the Model**

69. Is your model of heredity consistent with scientific findings? Yes No

and is your model complete? Yes No

70. What are three interesting things that you learned from the article?

1. ________________________________________________________________

______________________________________________________________

2. ________________________________________________________________

______________________________________________________________

3. ________________________________________________________________

______________________________________________________________
71. How is there diversity within populations that reproduce asexually?

_______________________________________________________________________________
_______________________________________________________________________________

72. What additional key points need to be included in a model of heredity?

- Asexual reproduction is common in ____________________________________________.
- Sexual reproduction is common in ____________________________________________.
- Plants often reproduce______________________________________________________.
- A benefit of sexual reproduction is ____________________________________________
  ___________________________________________________________________________
- A benefit of asexual reproduction is_____________________________________________
  ___________________________________________________________________________

73. Use the information from question 66 and 72 to revise your model of heredity. Make sure that each group member describes a different type of asexual reproduction on a sticky note and places it on your model.