Name: Period: Date:

**Genetic crosses- identifying modes of inheritance**

1. Pigeons may exhibit a checkered or plain pattern. In a series of controlled matings, the following data were obtained:

|  |  |  |
| --- | --- | --- |
| P generation | F1 generation | |
|  | Checkered | plain |
| Checkered x checkered | 36 | 0 |
| Checkered x plain | 38 | 0 |
| Plain x plain | 0 | 35 |

How is this gene (these genes) inherited? Explain.

1. Pear cactus plants include thick stem (T) and thin stem (t) alleles. They also vary in their oxalic acid level, which is a chemical that prevents herbivores from eating the stem: they can have high oxalic acid (A) or low (a). Cross TTAA x ttaa. All F1 offspring were TtAa. Cross one of the F1 offspring with ttaa. Results are:

|  |  |
| --- | --- |
| Thick stem, high oxalic acid | 318 offspring |
| Thin stem, low oxalic acid | 298 offspring |
| Thick stem, low oxalic acid | 59 offspring |
| Thin stem, high oxalic acid | 67 offspring |

How is this gene (these genes) inherited? Explain.

1. Mrs. Grayson was well-loved in her community, despite suffering from a disease called MELAS, which gives headaches, visual and hearing loss, exercise intolerance and elevated lactic acid in the blood.  Given her delicate state of health, her husband largely raised their five children, 3 boys and 2 girls.  It saddened them that all five children also showed signs of MELAS, but to varying degrees.  Among the boys, John was always feeling sick, Caleb was usually fine unless he exercised, and Jeffery was somewhere in between.  The two girls were different also, with Mary strongly affected and Susan less affected.  All five children married and had numerous children of their own.  Some grandchildren were affected, but only Mary's 4 kids and Susan's 2 kids.  The children of John, Caleb and Jeffery (a total of 8 grandchildren) had no symptoms of MELAS.  How is this gene (these genes) inherited? Explain.
2. Two healthy normal adults had a baby boy. They noticed that he had very thin hair. His skin was very pale. He had difficulty digesting his food, and as he grew, it became obvious that he was mentally retarded. The doctor diagnosed the problem as a disease called PKU (phenylketonurnia), where a mutation in the gene for an enzyme called phenylalanine hydroxylase causes these symptoms. How is this gene (these genes) inherited? Explain.
3. Erma and Harvey were a compatible barnyard pair, but a curious sight. Harvey’s tail was only 6 cm (the smallest the farmer ever saw) while Erma’s was 30 cm (the longest tail possible). Their F1 piglet offspring all grew tails of 18 cm. The farmer inbred the F1 piglets and got F2 offspring that ranged in tail length from 6 to 30 cm, although the largest number were around 18 cm). How is this gene (these genes) inherited? Explain.
4. One true-breeding line of frogs croaks rib-it and has long toes. Another true-breeding line croaks knee-deep and has short toes. Crossing these two frogs results in frogs that all croak knee-deep and have long toes. Next, these hybrids were crossed with a homozygous rib-it and short toes. The results were:

|  |  |
| --- | --- |
| Knee-deep, short toes | 42 males, 38 females |
| Knee-deep, long toes | 45 males, 41 females |
| Rib-it, short toes | 43 males, 44 females |
| Rib-it, long toes | 39 males, 46 females |

How is this gene (these genes) inherited? Explain.

1. Sheila had very high blood pressure (systolic pressure of 160) and her husband Kevin had low systolic pressure (105). Their two daughters had blood pressures of 157 and 121. Their two boys had blood pressures of 109 and 143. How is this gene (these genes) inherited? Explain.
2. A fruit fly can sometimes have a scalloped edge to their wings rather than the typical round edge. A male scalloped edge is bred to a female round edged. The offspring were all round edged. The F2 results were ½ female round, ¼ male round, and ¼ male scalloped. How is this gene (these genes) inherited? Explain.