

## Feline colour genetics course – Module 1 exercises

Here are the exercises for you to complete in module one: Basic genetics, Solid colour cats and the dilute gene. Please feel free to print it off to make it easier to complete the questions.

Write down your answers and any notes you wish to make as you work through the module and then when you have completed all of the questions you can check the answers using the answers sheet a link for which can be found at the bottom of module one.

Good luck!

### Exercise 1

**M1.E1:** Below are 4 cats each with their genotype written beside them. Based on what you have learned so far and from the details given in the genotype for each cat, see if you can work out what phenotype each would be and which colour (if any) each one carries...

Cat a) ooBB appears: \_\_\_\_\_ & carries: \_\_\_\_\_

Cat b) oobb1 appears: \_\_\_\_\_ & carries: \_\_\_\_\_

Cat c) oobb appears: \_\_\_\_\_ & carries: \_\_\_\_\_

Cat d) OObb appears: \_\_\_\_\_ & carries \_\_\_\_\_

### Exercise 2

**M1.E2:** Below are two punnet squares which have had the parents alleles already filled in for you. See if you can fill in the results of the next two punnet squares for yourself and from your results determine the answers to some simple questions about the kittens.

You can either scribble a copy of the punnet square down onto some scrap paper to do this exercise or alternatively you can print off our free blank punnet square by clicking [here](#) and then fill in the information you need.

Punnet square a)

|   |   |   |
|---|---|---|
|   | B | b |
| B |   |   |
| B |   |   |

- 1) Write down the different genotype/s that appeared in this litter? \_\_\_\_\_

- 2) What phenotype were the kittens? \_\_\_\_\_
- 3) What percentage of kittens were homozygous chocolate? \_\_\_\_\_
- 4) What percentage of kittens were homozygous Black? \_\_\_\_\_

Punnet square b)

|   |   |   |
|---|---|---|
|   | b | b |
| b |   |   |
| b |   |   |

- 1) What genotype would the kittens be? (this time include percentage such as 50% bb and 50% BB as applicable to this punnet square) \_\_\_\_\_
- 2) What phenotype would the kittens be? \_\_\_\_\_
- 3) What percentage of kittens would be heterozygous for chocolate? \_\_\_\_\_
- 4) What percentage of kittens carried black in their genotype? \_\_\_\_\_

Well done on completing and reading your first punnet squares! Did you spot the trick question!!! ;-)

In the above exercise we only covered black and chocolate to keep things easy. Now lets' have a go at looking at adding the cinnamon mutation into the mix. We know cinnamon is recessive to chocolate and a cinnamon cat is written as 'b1 b1'. Since cinnamon is recessive to both black and chocolate a cinnamon cat can never carry either black or chocolate.

### Exercise 3

**M1.E3:** Just like in exercise 2, see if you can fill in the punnet squares below and answer two simple questions about each one.

Punnet square a)

|   |    |    |
|---|----|----|
|   | b1 | b1 |
| b |    |    |
| b |    |    |

- 1) What phenotype would the resulting kittens be? \_\_\_\_\_
- 2) How many kittens would be black? \_\_\_\_\_

Punnet square b)

|   |    |    |
|---|----|----|
|   | b1 | b1 |
| B |    |    |
| b |    |    |

- 1) What percentage of kittens would be cinnamon? \_\_\_\_\_
- 2) What percentage of kittens would carry cinnamon? \_\_\_\_\_

Punnet square c)

|    |   |    |
|----|---|----|
|    | b | b1 |
| B  |   |    |
| b1 |   |    |

- 1) What percentage of kittens would be heterozygous for chocolate? \_\_\_\_\_
- 2) How many different phenotypes would we see in this litter of kittens? \_\_\_\_\_

#### Exercise 4

Now onto some punnet squares which include the red gene...

**M1.E4a:** The punnet square below is already filled out for you in entirety. Both X and Y chromosomes have been included alongside the colour alleles so that you can clearly see how the colour of red correlates to the X chromosome. Using the completed punnet square, try to answer the two questions below.

|    |      |      |
|----|------|------|
|    | OX   | oY   |
| BX | OBXX | oBXY |
| BX | OBXX | oBXY |

- 1) The punnet square tells us that we have a red male mated to a homozygous black female. What percentage of the kittens in the litter would be tortoiseshell? \_\_\_\_\_.
- 2) What colour would the female kittens be? \_\_\_\_\_.

**M1.E4b:** Below is another punnet square with the genotypes of the parents already filled in for you. Fill in the remainder of the punnet square and see if you can answer the questions that follow.

|   |    |    |
|---|----|----|
|   | O  | o  |
| O | OO | Oo |
| B | OB | oB |

- 1) What is the phenotype of the mother and father used in this punnet square?  
Mother: \_\_\_\_\_ Father: \_\_\_\_\_
- 2) What percentage of kittens would be red? \_\_\_\_\_
- 3) Some of the male kittens resulting from this mating would be red and some would be black. True or false? \_\_\_\_\_
- 4) From this mating, what percentage chance would a kitten have of being a red female? \_\_\_\_\_

### Exercise 5

**M1.E5:** Below are three questions for you to answer. Based on your knowledge of the dilute gene try to answer them correctly...

- 1) If a blue cat is mated to a black cat that does not carry any other colours and does not carry dilute what will the genotype of the kittens be? If you wish to draw out a punnet square to help you with this you can \_\_\_\_\_
- 2) A Cream male and a chocolate female are mated together. What colour will the female kittens be? \_\_\_\_\_
- 3) A Blue cat is a dilute version of which colour? \_\_\_\_\_

**NB.** When working out dilute colours on punnet squares...If you prefer to work over two separate punnet squares for ease of reading when adding in the dilute gene you may certainly do that. You will still get the same results. You would simply fill out the colour in one punnet square and work out your results to determine what colour your kittens would be. You would then fill out a separate punnet square for the dilute alleles to determine what percentage of the kittens would be homozygous dilute and know that this dilute could apply to any of your kittens. If you know that black becomes blue, chocolate becomes lilac and cinnamon becomes fawn you will always be able to work out what colours you might end up with in any given litter.