***Drosophila* questions** – Read the Catalyst article on *Drosophila melanogaster* by Nigel Collins (November 2006) and the handout on *drosophila* handling and sexing.

The catalyst article can be accessed at <https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/8649-catalyst_17_2_382.pdf>

Answer the following questions from the readings.

1. In hot weather, the *Drosophila* life cycle may take \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ days.
2. Adults may live \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ days and may lay \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ eggs in their lifetime.
3. Larvae live in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or food source, burrowing and feeding.
4. The forked tube at one end of the pupa is used for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. Research began on *Drosophila* about \_\_\_\_\_\_\_\_\_\_\_\_ years ago, when biologist Thomas ­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ discovered a white-\_\_\_\_\_\_\_\_\_ mutant.
6. Morgan won the Nobel Prize in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. *Drosophila* has been one of the most important organisms used in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ research, including in terms of patterns of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, as well as on understanding \_\_\_\_\_\_\_\_\_\_\_\_\_ and protein \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, as well as understanding how \_\_\_\_\_\_\_\_\_\_\_ organisms can develop from simple fertilised eggs.
8. The *Drosophila* genome was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in 2000, meaning that the exact order of DNA \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was determined.
9. 50% of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ acid sequences in fruit flies have matching sequences in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
10. \_\_\_\_\_\_\_\_\_\_\_\_ % of known human diseases have matches in the fruit fly genome.
11. *Drosophila*  has been very useful in studying human diseases caused by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genes, including \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, Huntington’s, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, diabetes and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
12. *Drosophila* can be easily kept in small \_\_\_\_\_\_\_\_\_\_\_\_, with a food source and a foam \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that prevents them from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ while allowing for air to move in and out of the bottle.
13. *Drosophila* will develop from \_\_\_\_\_\_\_\_\_\_\_\_\_ to adult in about \_\_\_\_\_\_\_\_\_ days at 25oC, and the life cycle can be completed within \_\_\_\_\_\_\_\_\_\_ weeks.
14. Large\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of *Drosophila*  can be easily and inexpensively cultured in the lab.
15. Many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ strains of *Drosophila* have been found and are used in genetic experiments.
16. *Drosophila*  has also been useful in learning about how \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is inherited, the system for which is shared by humans and fruit flies.
17. Genes that are considered sex-linked occur on the \_\_\_\_\_ and \_\_\_\_\_ chromosomes, responsible for gender.
18. Females have two X chromosomes (XX) while males have one X and one Y ( \_\_\_ ).
19. If a gene is located on the X chromosome, it may have no matching gene on the \_\_\_ chromosome.
20. See the image below of the X and Y chromosomes in humans (<http://ib.bioninja.com.au/standard-level/topic-3-genetics/34-inheritance/sex-linked-genes.html>). Notice that the Y chromosome is much \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the X chromosome.



1. The diagram below explains how sex-linked disorders occur (http://slideplayer.com/slide/8515983/):



1. In *Drosophila*, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ - eyed fly showed sex-linked \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This is because the eye colour gene in *Drosophila* Is located on the X chromosome, with no \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ position on the Y chromosome. This means that if the recessive allele for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ eyes occurs on the X chromosome, the male will have no second \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and therefore will have white eyes. The same is true for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sex-linked diseases shown above.
2. In sex-linked genes, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ may carry a recessive allele but still be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, whereas this is not true for the males, hence the higher incidence of sex-linked conditions in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Distinguishing male from female *Drosophila*:
	1. Males have \_\_\_\_\_\_\_\_ abdominal segments, while females have \_\_\_\_\_.
	2. Males have a dark-coloured sex \_\_\_\_\_\_\_\_\_\_ on the foreleg (front leg), which is a small \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of about 10 black \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .
	3. Males have darkened posterior \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the abdomen.
	4. Females have a more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ abdomen than males.
	5. Females have several dark stripes on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ , while males have \_\_\_\_\_\_\_.
	6. Males have dark \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ while female genitalia is more pale in colour, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Wild type (normal or typical) *Drosophila* are denotes with the “\_\_\_” symbol, while mutations are given letter symbols.
5. The symbol for the mutant *ebony* is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. The symbol for the mutant *garnet* is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.