Biology [33 marks]

Read the following passage:

Sharpening the Tooth

Amongst the carnivores there is one family, and only one, whose members are all specialised killers: the cats. For them **omnivory** is not an option. From the largest, 360 kg male Siberian Tiger to the smallest 1 kg Black-footed Cat, they have traded the long faces of their **ancestors** for high domed skulls and short snouts which provide anchorage for muscles that power a lethal bite. The scissor-like **carnassial** tooth has played a crucial part in the **evolution** of all carnivores, but it is the cats that have sharpened it to the finest blade.

The cats' trade relies on stealth and **ambush**. Its first known practitioners evolved in forests from ancestors that were probably much like modern genets. These hunters of the canopy are not true cats but members of another cat-branch family, the viverrids. As the omnivorous ancestors of cats descended to the ground, some took to lying in wait for prey in forest glades. Doubtless, like another modern viverrid, the Fossa, these early cats were at home in the branches and on the ground.

For ambush and stalking, cats need to be **camouflaged** to the black-and-white vision of their prey. Lives depend on detecting striped Tigers in tall grass, the indistinct rings of Snow Leopards against rock-strewn cliffs, Ocelots in dappled forest shade, dark Jaguarundis in dank undergrowth, and Lions stalking in dry savanna. In some cats, different colour forms have developed to suit different habitats. While the proverbial Leopard cannot change its spots, real Leopards can obscure them: the Black Panther, originally thought to be a distinct species, is in fact a black-coated Leopard. In certain lights, the spots shimmer through its black fur. This **melanism**, caused by a recessive **gene**, is said to be most common in Leopard populations in forests, in mountains and in Asia. In the Malay peninsula where Leopards live in dense forest, as many as 50% are black.

The faster the prey is disabled, the less likely the attacker is to sustain a crippling injury. The canines of cats are exactly the right width to wedge in the gaps between the **vertebrae** of prey, prising apart to the bones to sever the spinal-cord. Indeed canine teeth fit cats to prey as hand to glove; and this may help to minimise **competition** between species and between

the sexes of one species. In Israel, Caracal, Jungle Cat and Wildcat all occur together and in each species males are bigger than females. The diameters of the upper canines differ in a clear-cut sequence, allowing them to be ordered in neat, equal-sized steps from the smallest, female Wildcat, so the largest, male Caracal.

Adapted from "The Velvet Claw" by David Macdonald.

Using the information in the passage and your own knowledge, answer these questions:

1. What is meant in the passage by the words indicated in bold as follows:

i.	Omnivory	vi.	Camouflaged
ii.	Ancestors	vii.	Melanism
iii.	Carnassial	viii.	Gene
iv.	Evolution	ix.	Vertebrae
v.	Ambush	x.	Competition [10]

2. The scientific name of the Lion is *Panthera leo* and the scientific name of the Tiger is *Panthera tigris*. Explain:

- Why there is a similarity in the names?
- What does the difference in the names signify? [2]

3. Describe and explain (i) an advantage and (ii) a disadvantage of using scientific names. [2]

4. The cats are a type of Vertebrate called a Mammal. Name the four other classes of vertebrate. [4]

5. Explain the difference between the terms predator and prey, giving an example of each from British gardens. [2]

6. Name all the species of cat mentioned in the passage. [1]

7. Using these species [fox, grass, thrush, slug, rabbit, sparrowhawk] make:

- A food chain with three species.
- A food web with all the species. [3]

8. Fur colour is an example of a characteristic that is passed on from one generation to the next. Explain what is meant by the word inheritance and how it works. [4]

9. Cats have to exercise a lot when they are chasing their prey. Discuss some of the changes that might happen in their bodies when they are doing this (hint: most of the same things happen in humans also, so think about what happens to you when you are running a race). [5]