

Station A: Dog 1 - Identification of teeth and occlusal surfaces.

You are presented with the body of an adult greyhound. On the following page is a dog dental chart.

Examine the dog's mouth:

Identify the following teeth: incisors, canines, molars, premolars.

Q. What is the dental formula of the adult dog?

$$\begin{array}{l} \text{Upper dentition (one side): } \left(\begin{array}{cccc} \text{I} & \text{C} & \text{P} & \text{M} \end{array} \right) \times 2 \\ \text{Lower dentition (one side): } \left(\begin{array}{cccc} \text{I} & \text{C} & \text{P} & \text{M} \end{array} \right) \end{array} \quad \longrightarrow \quad \left(\begin{array}{cccc} 3 & 1 & 4 & 2 \\ 3 & 1 & 4 & 3 \end{array} \right) \times 2 = 42$$

Identify the features on the surface of the teeth (refer to lecture notes).

Q. How does the shape and distribution of the dog's teeth relate to its diet and function?

The carnivore dentition is adapted to rapid prehension and limited mastication of the flesh and bones of prey prior to deglutition (swallowing), as well as using their teeth as weapons for defence/attack.

Incisors: Sharp for holding, tearing, nibbling. Tricuspid shape (loss of definition with age).

Canines: Long for holding prey; weapons for attack/defence.

Premolars and molars: Cutting food, crushing bones. Only occlude caudally → cannot grind.

Carnassial teeth: Term to describe upper PM4 and lower M1. Large teeth adapted to shearing meat/flesh and crushing bones. Sharp rostrally and flat caudally.

Now complete a dental chart for this dog (over page).

Mark any missing teeth with a cross, and indicate any damaged or diseased teeth.

Study the pictures of juvenile dogs teeth, and examine the tables provided [Picture unavailable](#).

Q. What is the dental formula for the temporary dentition of a dog?

$$\left(\begin{array}{cccc} 3 & 1 & 3 & 0 \\ 3 & 1 & 3 & 0 \end{array} \right) \times 2 = 28$$

Q. Using the tables provided (showing when the temporary and permanent teeth erupt), estimate the age of the puppy.

See table provided in lecture notes. (Memorisation of table non-examinable, for information only.)

Supplementary questions to consider:

Q. How does the dental formula of a cat differ from that of a dog?

$$\left(\begin{array}{cccc} 3 & 1 & 3 & 1 \\ 3 & 1 & 2 & 1 \end{array} \right) \times 2 = 30$$

Structure and function of teeth similar to dog, except no blunt/crushing surfaces. Only three upper premolars (PM2-PM4) and two lower premolars (PM3-PM4); only one upper molar and lower molar.



Australian Veterinary Dental Society

Canine Dental Record

Patient: _____ Owner: _____

Breed: _____ Age / Sex: _____ Phone No.: _____ Date: _____

Chief Complaint: _____

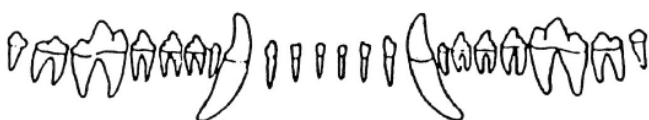
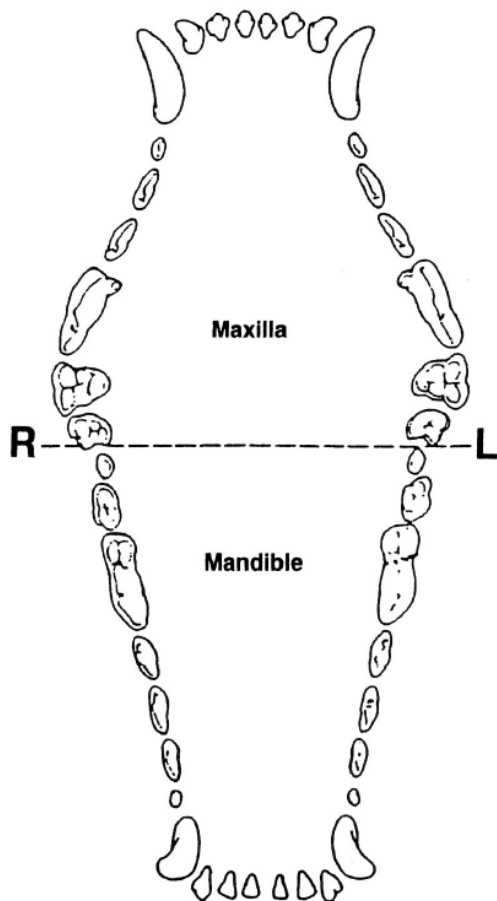
Past Dental History: _____

Existing home dental care: Brushing Oral Rinse Medication None

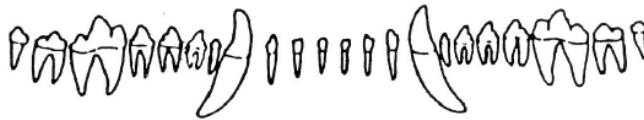
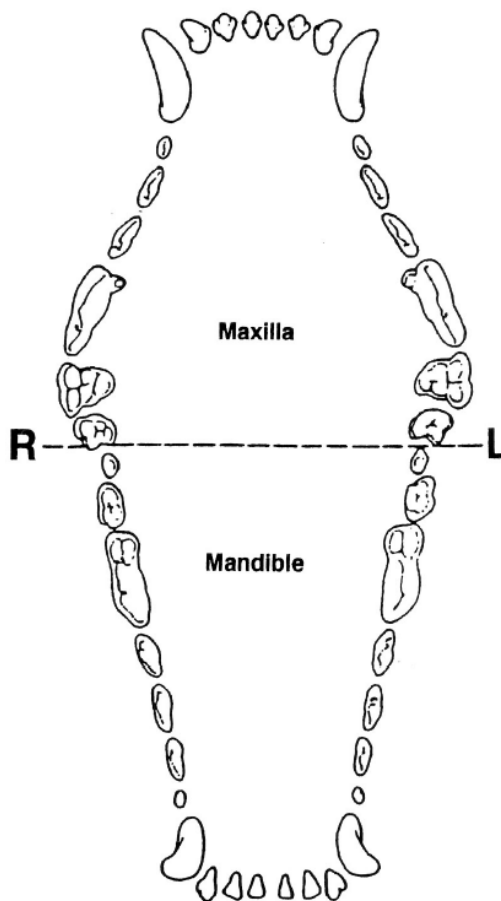
Diet / Oral Habits: _____

Occlusion: _____ Anaesthesia: _____ Temperament: _____

PRE-TREATMENT



POST-TREATMENT

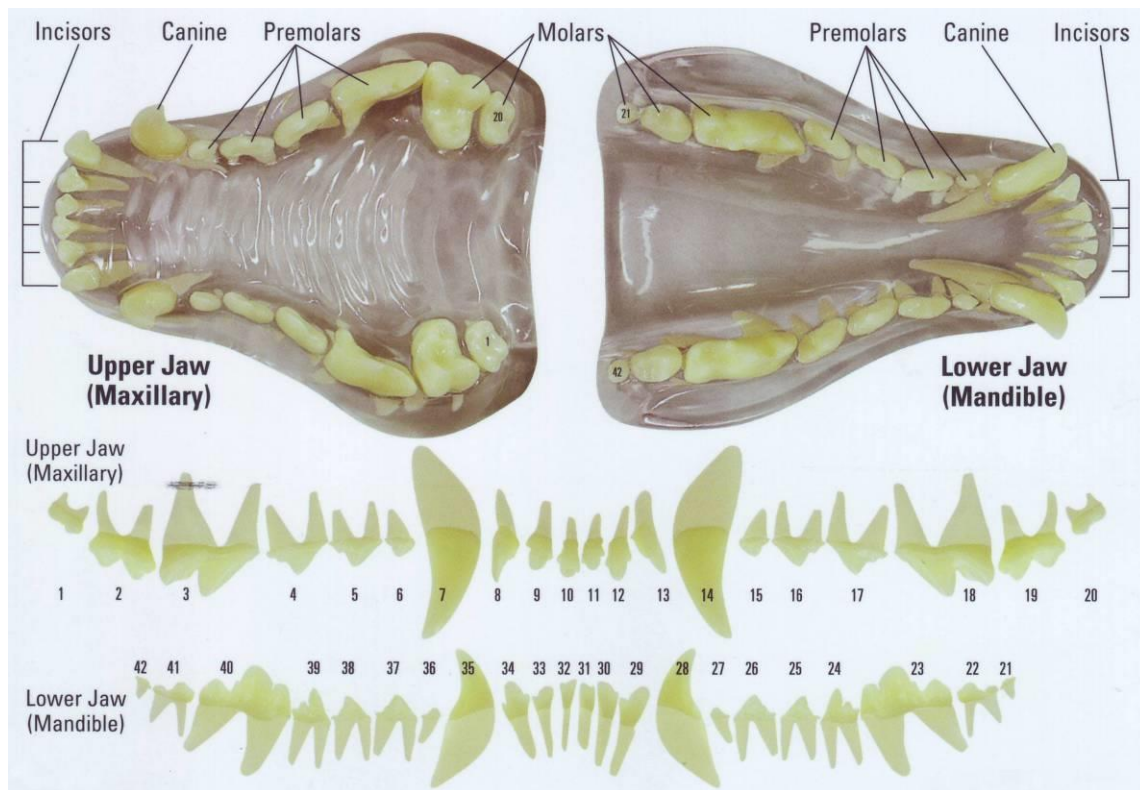


REMARKS

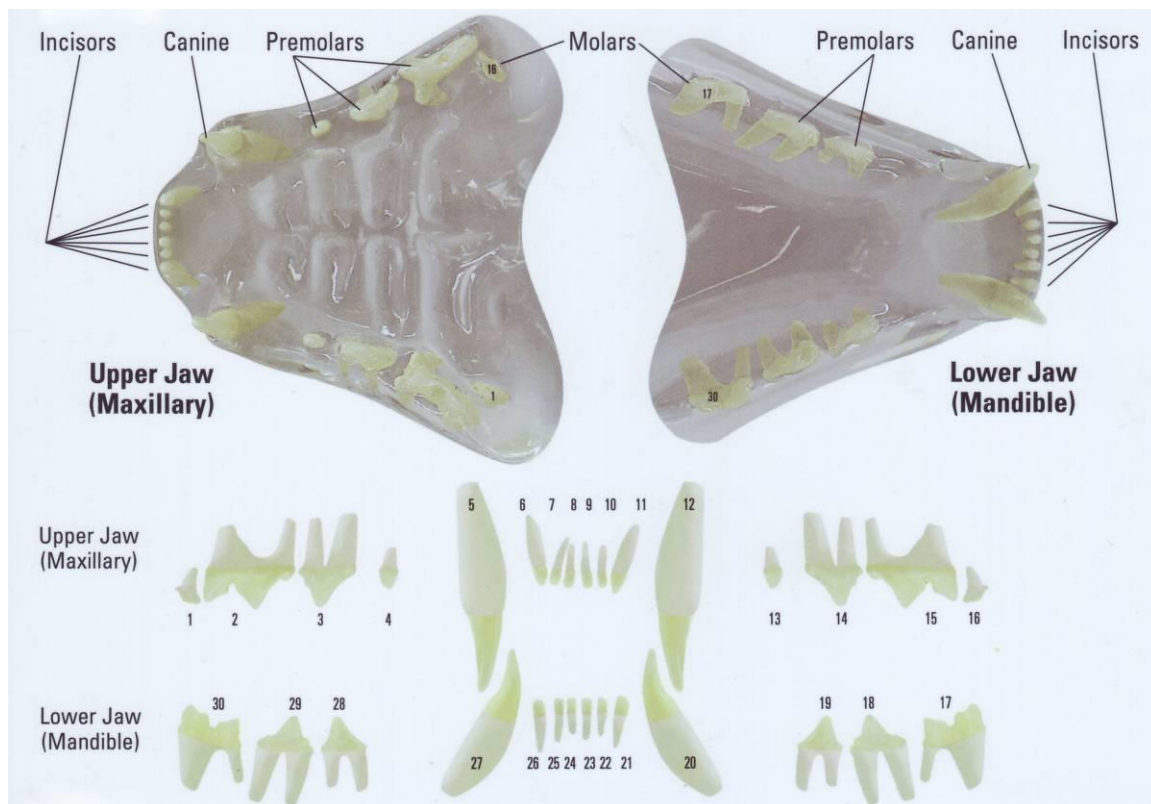
1. _____

2. _____

Dog.



Cat.



Station B: Dog 2 - relationship of teeth to underlying structures

You are presented with the body of a greyhound dog, and a clear perspex model of a dog and cat head, as well as radiographic images of dog jaws.

Examine the radiographs and head models:

Note the depth of the tooth roots into the underlying bone.

Q. How many roots does each tooth have?

Roots are in most cases much longer than the crown, to provide a deep anchor for teeth that are subjected to significant shear forces when grasping, tearing and crushing prey/food.

Incisors: 1 root

Canines: 1 root

Upper and lower PM1: 1 root

Upper PM2, PM3: 2 roots

Upper PM4, M1, M2: 3 roots

Lower PM2, PM3, PM4, M1, M2: 2 roots

Lower M3: 1 root

Now examine the dog cadaver:

Examine the gums (gingiva). Place a probe into the gingival sulcus of one of the canine teeth.

Q. How deep is this sulcus?

Normal for a dog 1-2 mm (>3 consistent with periodontal disease).

Normal for a cat <1 mm.

Some dental instruments are provided. After a demonstration of their use by the demonstrator, two or three members of the group may gently remove one of the incisor teeth, or the first premolar.

Q. What structures have to be broken down in order to release the tooth from its attachments to the alveolar bone?

Periodontal ligament.

Do not attempt to remove the canines or molars.

Q. What difficulties do you envisage in trying to remove a normal healthy molar or premolar?

Healthy premolars/molars have multiple roots and extensive periodontal ligament attachments. Damage to the roots during attempted extraction, particularly caused by excessive rotational force, can fracture the roots and result in pieces being left behind, which can become a nidus for infection. In order to overcome this, the tooth should be sectioned (using a dental drill/burr) into pieces that contain only one root each. Rotational force can then be applied around the axis of the root to loosen the section of tooth, once the periodontal ligament has been disrupted sufficiently using the dental elevator.

Station C: Horse

You are presented with a horse skull with teeth in situ, and also lateral radiographs of horses' jaws and some sectioned teeth.

Examine the horse skull:

- Identify the following teeth: incisors, molars, premolars
- Identify the diastema.
- Where might you expect to find canine teeth and wolf teeth? Can you find an example of these?

Canine teeth are located in the diastema (space between incisors and premolars).

Wolf teeth are not present in all horses; they occur more frequently in the upper than the lower dental arcade, and may not be present on both sides. They are the first premolar tooth, and there are no deciduous wolf teeth.

Q. What is the dental formula for an adult horse?

$$\frac{3 \ 1(0) \ 3(4) \ 3}{3 \ 1(0) \ 3(4) \ 3}$$

Look at the occlusal surfaces of the incisor teeth:

Q. What are the structures visible on their surface, and what causes these features to appear?

A newly erupted incisor tooth is covered in enamel and has a deep indentation (the infundibulum). As the tooth is worn down, dentine becomes visible between the enamel around the outside of the tooth and the enamel surrounding the infundibulum (now known as the cup). Once the tooth has worn down almost to the bottom of the infundibulum, the dental star (secondary dentine) becomes visible as a brownish region of dentine, which is otherwise cream in colour.

Q. What features of the teeth can be useful in aging horses?

The structures mentioned above assist in estimating age. Another feature to note is that the shape of the occlusal surface changes from oval (elongated mesio-distally) to trapezoid to triangular to oval (elongated in a labio-lingual direction) as the tooth is worn down. Other features include the curvature of the lower dental arch (becomes straighter with age) and the caudal angle between the upper and lower incisors (decreases with age). None of the features is absolutely reliable in determining age.

Note the occlusal surfaces of the premolar and molar teeth:

Q. How are these teeth adapted to their function?

The cheek teeth (upper and lower) form continuous, relatively flat grinding surfaces for breaking up vegetable matter. They have convoluted enamel ridges to assist with this process.

Q. On which sides of the teeth (buccal or lingual) may sharp edges develop?

Sharp edges can develop on the buccal side of the upper cheek teeth and the lingual side of the lower cheek teeth because the upper dental arcade is wider than the lower arcade.

Examine the radiographs. Note the extent of the tooth roots:

Q. Why are these roots so extensive, and how does this help the function of these teeth?

The roots are extremely long to allow for an extensive reserve crown to erupt and replace the crown as it is worn down. The depth of the roots also helps to ensure that the teeth are firmly held in place during mastication under the high mechanical loads exerted by the muscles of mastication.

Supplementary questions to consider or discuss:

(some additional material is provided on the LMS).

- How do diet, pasture management and stabling impact dental wear?

When horses are eating pasture containing tough plants they spend more time masticating, their teeth are worn down more quickly and the edges tend to become smoother. If they are fed high energy grains, they spend less time masticating, the teeth are worn down more slowly, and because there is less horizontal and rotational movement, sharp edges are more likely to develop. Horses kept in stables may show stereotypical behaviour (crib-biting), which may cause increased and irregular wear of the incisors.

- Why is it important for a horse to have regular dental examinations?

There are many types of dental pathology that can occur in horses, any of which may cause a reluctance to eat. The main anatomical problems are the sharp edges mentioned above, which can lead to injury of the soft tissues of the oral cavity, and excessive wear in old horses which may prevent them from obtaining sufficient nutrients from food that requires substantial mastication.

- How would you remove a molar tooth in a horse?

In old horses with teeth affected by periodontal disease, extraction through the oral cavity may be possible. Otherwise, for an upper tooth, it may be necessary to cut a hole in the maxilla (into the space around the root called the maxillary sinus) and then push it out into the oral cavity. For a lower cheek tooth, a piece of alveolar bone lateral to the tooth can be removed, so that the tooth can be lifted out.

Station D: Sheep

You are presented with a sheep head

Examine the sheep head:

Q. Identify the following teeth: incisors, molars, premolars

Incisors are brachydont, cheek teeth are hypsodont

No upper incisors or canines - replaced by hard fibrous dental pad

3 lower incisors on each side. Lower canines are incisor in form so dental formula may classify as incisor - from medial to lateral: I1: 'central', I2: 'middle' I3: 'lateral' and C: 'corner' incisors

3 upper and lower premolars and 3 upper and lower molars on each side

Q. What structure is present in the upper jaw, which replaces the upper incisors of other species?

The dental pad

Q. How does this dental arrangement relate to the diet of this animal and the process of mastication?

The sheep is a herbivore. It prehends vegetation material such as grass by the cutting action of the lower incisors against the dental pad. The dental pad has a keratinised mucosal epithelium with a thick layer of underlying connective tissue to withstand the forces exerted by the lower incisors. The cheek teeth comprise the premolars and molars that together form a grinding table to break down the particles of food during chewing after initial prehension and again during rumination. The cheek teeth are hypsodont as an adaptation to the fibrous and abrasive diet. The prolonged growth and eruption of the cheek teeth is to compensate for the attrition (wear) of these teeth resulting from abrasive feed coupled with long periods of mastication (grinding).

Q. What is the dental formula for an adult sheep?

$$\left(\begin{array}{cccc} 0 & 0 & 3 & 3 \\ \hline 3 & 1 & 3 & 3 \end{array} \right) \times 2 = 32$$

NB may also see dental formula with 4 0 3 3 for mandibular dentition: i.e. the canine is incisor in form so may be considered functionally as an incisor

Examine the photographs of juvenile, adult and old sheep.

Q. What is the basis for ageing sheep by their dentition?

Eruption times of permanent incisors:

Eruption times:

	Deciduous	Permanent
Incisor 1	0-1 wk	1 -1.5 yr (two tooth)
Incisor 2	1-2 wk	1.5-2 yr (four tooth)
Incisor 3	2-3 wk	2-3 yr (six tooth)
Canine/Incisor 4	3-4 wk	2.5-4yr (full mouth)
Premolar 1		
Premolar 2	0-4 wk	1.5-2 yr
Premolar 3	0-4 wk	1.5-2 yr
Premolar 4	0-4 wk	1.5-2 yr
Molar 1		3-6 mo
Molar 2		9-12 mo
Molar 3		1.5-2 yr

Prior to eruption of central incisors is referred to as a 'milk tooth'. In Australia for marketing purposes a lamb was previously defined as an animal in which no permanent incisors had erupted. This definition was changed in 2019 to allow farmers more time to get their animals to market in the more valuable 'lamb' category. Lamb now defined in Australia as including the stage where the central incisors have erupted but are not yet in wear. It takes approximately 1 month from eruption of the central incisors to them being in wear.

Ageing is difficult after reaches full mouth stage – deterioration depends on dietary and environmental factors. Assess for incisor wear that leads to 'broken mouth' and ultimately to 'gummy mouth', as animal ages to ensure animal is still able to prehend food.

Q. Estimate the age of the mystery sheep - see answer over the page



Supplementary questions to consider:

1. What is the implication of loss of incisor teeth in an older adult ewe?

Consider the diet the ewe is being fed – is she required to graze? (would be typical in Australia) and how short and tough is the vegetation? i.e. how easily could she prehend the food? A ewe is typically required to carry a pregnancy and then lactate to feed her offspring – both processes, especially the latter, require her to have a significantly increased energy intake on top of her requirements for maintenance and wool growth.

Mystery sheep has 2 central incisors in wear and middle incisors recently erupted and not yet in wear so estimate age at between 18 and 24 months of age.

Station E: Rabbits and rodents

You are presented with rabbit and rodent skulls and rabbit dental models. Depending on availability there will be rabbit and various rodent specimens also provided.

Examine the rabbit head.

Q. Identify the following teeth: incisors, molars, premolars

Rabbit dental formula:
$$\left(\begin{array}{cccc} 2 & 0 & 3 & 3 \\ 1 & 0 & 2 & 3 \end{array} \right) \times 2 = 28$$

Rabbits have a total of 4 upper incisors (two large rostral incisors and two smaller caudal incisors (called 'peg teeth') and two lower incisors.

Q. How does this dental arrangement relate to the diet of this animal and the process of mastication?

All teeth are hypselodont. The incisors are adapted for rapid wear (attrition). The rabbit diet is based primarily on grasses that are highly abrasive, they also eat leafy vegetation and gnaw and prehend material such as roots, bark and fibrous vegetables. The enamel on the labial surface of the incisors wears more slowly than the dentine on the lingual surface – resulting in a chisel shaped and therefore very sharp occlusal surface of the 4 rostral incisors that aids with cutting and gnawing. The cheek teeth are adapted for grinding abrasive material.

Q. What are the potential problems that may occur if the upper and lower incisors are not aligned to meet each other? How might this be managed?

Misalignment = 'malocclusion'. Can result from inappropriate diet (not abrasive enough), trauma (e.g. broken tooth) or congenital abnormalities (e.g. unequal jaw lengths). Due to the rapid growth rate and continuous growth of these hypselodont teeth, if there is malocclusion then the teeth aren't able to wear normally against each other and so they become overgrown or develop sharp points - and may also alter their curvature. Results include lacerations of soft tissues in the mouth, food impaction and periodontal abscesses, and elongation of reserve crowns that can impact on other structures such as the tear ducts or eyes (may also result in a lumpy mandible). Malocclusion and overgrowth can affect the ability of the animal to prehend food and to grind it. Overgrown teeth may need to be trimmed or removed. Removal can be problematic as the opposing teeth will no longer have that tooth surface to grind against – and because the upper and lower cheek teeth don't align exactly with each other, this problem can't be resolved by removing an opposing tooth. Removal must also be complete or the tooth will grow back. Even if it looks as though it is just the incisors that are overgrown, it is important to check all the teeth in the mouth as the underlying cause of the overgrown incisors could be due to a problem such as malocclusion further caudally in the oral cavity. In order to see all teeth in the oral cavity in a rabbit (or rodent – eg guinea pig) sedation or general anaesthetic is needed. This is because the gape (opening of the mouth) is small and there are also lip folds that project into the diastema between the incisors and the premolars that obscure the view. Use of nail clippers or bone cutters to trim teeth is contraindicated as this is likely to split the tooth – creating a tract for infection to travel down to the apex of the tooth. Appropriate dental cutting tools such as a dental bur should be used. Repeated trimming is likely to be required unless the underlying cause has been a lack of a suitably abrasive diet and the curvature of the teeth has not yet become abnormal – in these animals change to an appropriate diet (if the rabbit will accept it) may be all that is required for ongoing management following trimming.

Now examine the rodent specimens

Q.

How does rodent dentition differ from lagomorph dentition? (lagomorphs = rabbits, hares and pikas)
While rabbits have a total of four upper incisors, rodents have only two upper incisors – these are also hypselodont. In most rodents the enamel on the labial surface of the incisors is yellow due to an iron-based pigment in the enamel i.e. the yellow colour is normal (one exception=guinea pigs – their incisor enamel is unpigmented)

Q.

How does rodent dentition differ between species depending on the diet?

Rodents have 1 upper and 1 lower incisor on each side and these are hypselodont in all species.

Omnivorous rodents (e.g. rat, mouse, hamster, gerbil):

Less abrasive diet including seeds, grains and tubers

Cheek teeth are brachydont (3 upper and 3 lower molars on each side)

Herbivorous rodents (e.g. guinea pig, chinchilla, degu):

Similar diet to rabbits

Cheek teeth are hypselodont. (1 premolar and three molars in both upper and lower arcade on each side)