The trigeminal nerve
The nerve of the 1st pharyngeal arch – it has sensory and voluntary motor components

The sensory fibres of the trigeminal nerve have a ganglion in the middle cranial fossa and the three divisions radiate out from there
Sensory divisions to the 3 regions of the face as discussed in the development lecture

1. Ophthalmic – to the frontonasal process
2. Maxillary - to the maxillary process of the 1st arch
3. Mandibular - to the mandibular process of the 1st arch

a. The mandibular division also carries motor nerves to the muscles of mastication (1st arch)
The trigeminal nerve not only supplies the skin of the face – it also supplies deeper structures in the same regions:
1. Meninges – of the anterior and middle cranial fossae - supplied by a recurrent branch from each division.
2. Cornea of eye
3. Nasal cavity and paranasal sinuses
4. Oral cavity and teeth

The trigeminal nerve has a tendency to pick up hitchhikers. This is because it goes to all regions of the face (hitchhikers are shown in italics in the following)

Ophthalmic division
Exits the cranial cavity through the superior orbital fissure. The recurrent branch supplies the anterior cranial fossa and the tentorium cerebelli (meningeal fold above the posterior cranial fossa) It divides into the following branches
1. Frontal nerve – goes through the top of the orbit and divides into the supra orbital and supra trochlear nerves. Both supply the skin of the forehead and the frontal sinus.
2. Lachrymal nerve – passes further laterally through the orbit – it supplies the skin over the lateral part of the upper eyelid
   a. It also receives a parasympathetic branch from the facial nerve that hitchhikes to it with the lachrymal gland
3. Nasociliary nerve – goes more medially through the orbit and has a number of branches.
   a. Posterior ethmoid nerve – supplies the linings of the ethmoid and sphenoid sinuses.
   b. Anterior ethmoid nerve – supplies the upper part of the nasal cavity and a skin over the cartilaginous part of the nose (=Philtrum) - (external nasal branch)
   c. Nasociliary nerve – is the most important because it supplies the cornea of the eye. This branch also carries the parasympathetic hitchhikers from the oculomotor nerve that supply the ciliary muscle and the pupillary muscles
      i. Branch to the ciliary ganglion (preganglionic parasympathetic) – from there short ciliary nerves go to the eyeball
      ii. Long ciliary nerves – are sensory nerves to the front of the eye including the cornea.
      iii. Infratrochlea nerve – emerges onto the face near the medial corner of the eye and supplies some skin in that region

Mandibular division
Exits the cranial cavity through the foramen ovale. A recurrent meningeal branch goes back into the cranial cavity to supply the middle cranial fossa and inside the temporal region.

Motor branches
In the infratemporal region the mandibular nerves has branches to all the muscles of mastication (temporalis, masseter, medial pterygoid, lateral pterygoid) plus also the anterior belly of digastric, tensor palati and tensor tympani (in the middle ear).

The sensory branches include:
1. Auriculotemporal – passes through the parotid gland and supplies the anterior part of the external ear and the skin of the temporal region. It receives a hitchhiker from the glossopharyngeal nerve (otic ganglion) which it carries to the parotid gland
2. Buccal – supplies the inner and outer surfaces of the cheek
3. Lingual – Goes to the tongue and is its main sensory supply. The lingual nerve is joined by the chorda tympani which hitchhikes to the submandibular ganglion. The chorda tympani carries taste fibres from the tongue and parasympathetic fibres to submandibular and sublingual glands.
4. Inferior alveolar nerve – runs into the mandibular canal and supplies all the lower teeth. Its ends on the chin as the mental nerve

Maxillary division
Exits the cranial cavity through the foramen rotundum. The recurrent branch supplies the anterior part of the middle cranial fossa. The maxillary nerve goes to the nasal region (pterygopalatine fossa) branch supplies the anterior part of the middle cranial fossa. The sensory fibres of the maxillary nerve go to all regions of the face

Sensory fibres to the 3 regions of the face as discussed in the development lecture

1. Ophthalmic – to the frontonasal process
2. Maxillary - to the maxillary process of the 1st arch
3. Mandibular - to the mandibular process of the 1st arch

a. The maxillary division also carries motor nerves to the muscles of mastication (1st arch)
The maxillary nerve not only supplies the skin of the face – it also supplies deeper structures in the same regions:
1. Meninges – of the anterior and middle cranial fossae - supplied by a recurrent branch from each division.
2. Cornea of eye
3. Nasal cavity and paranasal sinuses
4. Oral cavity and teeth

The sensory branches include:
1. Zygomatic nerve – goes through the inferior orbital fissure into the orbit it divides into zygomaticofacial and zygomaticotemporal nerves and also passes its hitchhiker to the lachrymal branch of the ophthalmic nerve
2. Posterior superior alveolar nerves – stream over the front of the maxilla to the molar teeth
3. Anterior superior alveolar nerves – run through the orbit with the infraorbital nerve and then stream over the front of the maxilla to the anterior teeth
4. Infraorbital nerve – runs through the orbit and sinks into the orbital floor before emerging onto the face at the infraorbital foramen. It supplies the upper lip, cheek, adjacent lining of the mouth, and the lower eyelid
5. Palatine nerves (greater and lesser) go down through the palatine foraminae to the posterior part of the palate. They supply the posterior part of the palate and gums.
6. Nasopalatine nerve – enters the nasal cavity and runs down the septum towards the incisor teeth to the incisive foramen. It supplies the nasal septum and the ends in the anterior part of the palate.
7. Posterolateral nasal nerves – Supply the posterior parts of the nasal cavity both the septum and the lateral walls.

The palate, Nasopalatine and Nasal nerves carry hitchhikers that stimulate secretion from the nasal and palate glands, and taste fibres to the palate
Facial Nerve

The nerve of the 2nd pharyngeal arch.

Components include

1. Motor to muscles of facial expression – SVE 2nd arch
2. Parasympathetic to glands - GVE
   a. above the mouth (palatine, nasal, lachrymal)
   b. below the mouth (submandibular, sublingual)
3. Taste – SVA.
   a. Palatine taste buds above the mouth
   b. Anterior 2/3 of the tongue (below the mouth)
4. It also has some small sensory fibres to the external ear.

Exits the cranial cavity through the internal acoustic meatus – leading into the petrous temporal bone.

Branches in the temporal bone:

1. Greater petrosal nerve – emerges from the temporal bone in the middle cranial fossa and goes through the foramen lacerum on its way to the pterygopalatine fossa. – (above the mouth)
   a. Parasympathetic fibres synapse in the ganglion; taste fibres go through non-stop – branches are distributed with branches of the maxillary division of the trigeminal
2. Chorda tympani – emerges from the temporal bone through petrotympanic fissure (near the TMJ).  It joins the lingual branch of the mandibular nerve. (below the mouth)
   a. Parasympathetic fibres synapse in the submandibular ganglion before rejoining the lingual nerve to be carried to sublingual and submandibular glands.
3. The main motor part of the facial nerve supplies muscles of facial expression. It emerges through the stylomastoid foramen.
   It swings forwards and branches as it passes through the parotid gland.
   a. Temporal
   b. Zygomatic
   c. Buccal
   d. Mandibular
   e. Cervical

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* Also GSA - muscle sensory