

The University of Western Australia

SURNAME: _____

STUDENT NO: _____

GIVEN NAMES: _____

FACULTY: _____

2nd SEMESTER EXAMINATIONS November 2004

School of Anatomy and Human Biology Human Functional Anatomy 213 (910.213)

This paper contains:
21 pages (including this page)
Two Sections :
Section A : 40 Multiple Choice Questions
Section B : 12 Short-answer Questions
See instructions at the beginning of each section.

Time Allowed : 3 hours
Reading time : 10 minutes

PLEASE NOTE

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Examiners' use only

Section A. (20% of the TOTAL unit mark)

Section B. Short answer section Total marks 197 – 30% of the TOTAL unit mark.

Q	1	2	3	4	5	6	7	8	9	10	11	12	total
Mark													
Out of	22	22	22	18	17	17	11	16	17	13	9	18	197

Section A : Multiple choice questions.

In each question, select ONE best alternative from A, B, C, D and E.

Indicate your answer by completely blackening in pencil the appropriate circle for that question in the MCQ answer sheet.

If you wish to change your answer, make sure your first answer is completely erased. MCQs are marked by a computer which rejects double answers and any irrelevant markings on the answer sheet.

Do NOT mark the MCQ sheet beyond Q 40.

1. The deltoid muscle is
 - A. an elevator of the scapula.
 - B. a developmentally dorsal muscle.
 - C. the prime mover for flexion of the glenohumeral joint.
 - D. the main adductor of the shoulder joint.
 - E. one of the rotator cuff muscles.

2. The muscles of the rotator cuff of the shoulder joint :
 - A. are all lateral rotators.
 - B. are supplied by the lateral cord of the brachial plexus.
 - C. include the supraspinatus.
 - D. include the pectoralis major.
 - E. are attached to the surgical neck of the humerus.

3. The lateral cord of the brachial plexus
 - A. gives rise to the ulnar nerve.
 - B. is formed by the ventral division of the lower trunk.
 - C. supplies the lateral rotators of the humerus.
 - D. gives rise to the musculocutaneous nerve.
 - E. supplies the triceps brachii muscle.

4. Regarding the biceps brachii muscle :
 - A. It acts on both shoulder and elbow joints.
 - B. Its long head passes through the shoulder joint.
 - C. It receives nerve supply from the musculocutaneous nerve.
 - D. A and C are correct.
 - E. A, B and C are correct.

5. The radial nerve
 - A. is a branch of the posterior cord of the brachial plexus.
 - B. supplies the dorsal interosseous muscles of the hand.
 - C. supplies the flexor carpi radialis muscle.
 - D. winds around the surgical neck of the humerus.
 - E. A, B and C are correct.

6. Regarding extension of the elbow joint, all of the following are true EXCEPT :
- A. The movement is limited by the olecranon process fitting into the olecranon fossa.
 - B. The superior radio-ulnar joint participates in the movement.
 - C. When aided by gravity, it is controlled by the biceps brachii.
 - D. The prime mover for the movement is attached to the ulna.
 - E. The tendon of the brachialis is a limiting factor.
7. The median nerve :
- A. arises from both medial and lateral cords of the brachial plexus.
 - B. gives branches to the brachialis muscle.
 - C. is easily damaged by a fracture of the medial epicondyle of the humerus.
 - D. supplies all the muscles of the anterior compartment of the forearm.
 - E. supplies the palmar interosseous muscles in the hand.
8. The ulnar nerve :
- A. gives branches to the flexor compartment muscles in the arm.
 - B. runs in the spiral groove of the humerus.
 - C. supplies the extensor carpi ulnaris muscle.
 - D. passes through the carpal tunnel.
 - E. supplies all the interosseous muscles of the hand.
9. With reference to supination of the forearm :
- A. The supinator muscle is a developmentally dorsal muscle.
 - B. The biceps can supinate only when the elbow is semiflexed.
 - C. The supinator can act even if the elbow is extended.
 - D. When both muscles act, the biceps is more powerful than the supinator.
 - E. All of the above.
10. The brachioradialis muscle :
- A. is a flexor of the elbow joint.
 - B. develops as a dorsal muscle.
 - C. is supplied by the radial nerve.
 - D. B and C are correct.
 - E. A, B and C are correct.

11. The musculocutaneous nerve
- A. is developmentally comparable to the femoral nerve in the lower limb.
 - B. arises from the lateral cord of the brachial plexus.
 - C. winds around the surgical neck of the humerus.
 - D. supplies the triceps brachii muscle.
 - E. is the only nerve in the limbs to supply both muscles and skin.
12. The flexor digitorum profundus muscle can flex the
- A. wrist joint
 - B. metacarpophalangeal joints of the fingers
 - C. distal interphalangeal joints
 - D. joints of the thumb
 - E : A, B and C are correct
13. Regarding the movements of the wrist joint :
- A. It can be flexed by the brachioradialis muscle.
 - B. The range of adduction is greater than abduction.
 - C. All its movements occur only at the radiocarpal joint.
 - D. The movement of pronation takes place at this joint.
 - E. Its flexion is essential in forming a tight grip by the hand.
14. If the radial nerve is damaged by a fracture in the spiral groove :
- A. There is total loss of supination.
 - B. The deltoid muscle is paralysed.
 - C. Extensors of the wrist are paralysed.
 - D. Abduction of the thumb is impossible.
 - E. B and C are correct.
15. Regarding dorsal interosseous muscles of the hand :
- A. They are adductors of the fingers.
 - B. They are smaller than the lumbrical muscles.
 - C. They are developmentally dorsal muscles.
 - D. The middle finger has two dorsal interossei.
 - E. None of the above is correct.

16. The quadriceps femoris muscle
- A. acts on the knee joint only.
 - B. has a double nerve supply.
 - C. is developmentally a dorsal muscle.
 - D. has a hiatus for the passage of the femoral artery.
 - E. is attached to the fibula.
17. The hamstring group of muscles includes :
- A. semimembranosus
 - B. short head of the biceps femoris
 - C. semitendinosus
 - D. A and C are correct
 - E. A, B and C are correct.
18. Regarding the nerves of the foot :
- A. The lateral plantar nerve enters the foot from the lateral side.
 - B. The medial plantar nerve is comparable to the ulnar nerve in the hand.
 - C. Both lateral and medial plantar nerves are branches of the tibial nerve.
 - D. The lateral plantar nerve supplies the peroneal muscles.
 - E. Both lateral and medial plantar nerves are purely cutaneous nerves.
19. The psoas major muscle
- A. is a lateral rotator of the femur IF the femoral neck is fractured.
 - B. is attached to the greater trochanter.
 - C. is an extensor of the vertebral column.
 - D. receives nerve supply from the obturator nerve.
 - E. None of the above is true.
20. The ankle joint
- A. is formed by the tibia, fibula and the talus.
 - B. has the deltoid ligament on the lateral side.
 - C. is the joint for the movements of inversion and eversion.
 - D. is a saddle type of joint.
 - E. All of the above are true.

21. Preaxial structures in the limbs include :
- A. The fibula in the lower limb
 - B. The radius in the upper limb
 - C. The basilic vein in the upper limb.
 - D. The short saphenous vein in the lower limb.
 - E. All of the above are true.
22. The posterior cruciate ligament of the knee joint
- A. prevents the femur from slipping forwards on the tibia.
 - B. divides the knee joint into two completely separate compartments.
 - C. is attached to the femur on the posterior side.
 - D. is a part of the popliteus tendon.
 - E. is also known as the meniscomfemoral ligament.
23. The gluteus maximus muscle
- A. has a large part attached to the iliotibial tract.
 - B. takes origin from the ischial tuberosity.
 - C. is a medial rotator of the hip joint.
 - D. is supplied by the femoral nerve.
 - E. prevents tilting of the pelvis to the opposite side during walking.
24. Muscles of the posterior compartment (calf) of the leg
- A. are developmentally dorsal muscles.
 - B. are supplied by the tibial nerve.
 - C. dorsiflex the ankle joint.
 - D. help in clearing the toes from the ground during walking.
 - E. include the peroneus (fibularis) longus.
25. The cervical plexus of nerves supplies the
- A. skin of the face.
 - B. strap muscles of the neck.
 - C. muscles of mastication.
 - D. skin of the back of the neck.
 - E. muscles of the tongue.

26. The ophthalmic division of the trigeminal nerve
- A. passes through the optic canal.
 - B. supplies sensory fibres to the eyeball.
 - C. gives parasympathetic fibres to the lacrimal gland.
 - D. carries sensory fibres for smell.
 - E. supplies the orbicularis oculi muscle.
27. Regarding muscles of facial expression, all of the following are true EXCEPT :
- A. They develop from the second branchial arch.
 - B. They are supplied by the 7th cranial nerve.
 - C. They include the elevator of the upper eyelid (levator palpebrae superioris).
 - D. They all have at least one end attached to the skin.
 - E. They are under voluntary control.
28. All of the following are dural venous sinuses EXCEPT :
- A. Sigmoid sinus
 - B. Frontal sinus
 - C. Transverse sinus
 - D. Straight sinus
 - E. Cavernous sinus
29. The maxillary division of the trigeminal nerve supplies
- A. a large part of the nasal cavity
 - B. lower teeth
 - C. the posterior one third of the tongue
 - D. muscles of the soft palate
 - E. none of the above.
30. Regarding structures which develop from branchial arches, which of the following pairs is correctly matched?
- A. Muscles of the tongue : first arch
 - B. Constrictors of the pharynx : third arch
 - C. Styloid process : second arch
 - D. Muscles of the larynx : third arch
 - E. Temporalis muscle : second arch

31. Regarding the facial nerve
- A. It is the nerve of the second branchial arch.
 - B. It carries fibres for the sensation of taste.
 - C. It emerges from the stylomastoid foramen.
 - D. A and B are true.
 - E. A, B and C are true.
32. The vagus nerve
- A. supplies the anterior two thirds of the tongue.
 - B. carries parasympathetic fibres.
 - C. controls the secretion of the parotid salivary gland.
 - D. has a spinal root.
 - E. None of the above.
33. Regarding the dural venous sinuses, which of the following pairs is matched INCORRECTLY?
- A. Superior sagittal sinus : arachnoid granulations.
 - B. Transverse sinus : sphenoid bone.
 - C. Inferior sagittal sinus : free margin of the falx cerebri.
 - D. Sigmoid sinus : jugular foramen.
 - E. Cavernous sinus : middle cranial fossa.
34. Regarding parasympathetic nerve supply to the structures in the head and neck :
- A. Parasympathetic fibres in the oculomotor nerve (III) control the lacrimal gland.
 - B. Parasympathetic fibres in the facial nerve end in the otic ganglion.
 - C. The pterygopalatine ganglion sends fibres to the parotid gland.
 - D. The submandibular ganglion receives fibres from the glossopharyngeal nerve.
 - E. The ciliary ganglion sends fibres to the constrictor pupillae muscle.
35. With reference to the muscles of the eyeball :
- A. The superior rectus is an elevator and abductor.
 - B. The inferior oblique is an elevator and adductor.
 - C. The lateral rectus is supplied by the abducens nerve.
 - D. Orbicularis oculi is the circular muscle of the iris.
 - E. When both eyes are turned to the right, both lateral rectus muscles contract.

36. In normal speech, all of the following affect the sound produced by the larynx, EXCEPT :
- A. Length of the air column above the larynx.
 - B. Opening of the Eustachian (pharyngotympanic) tube.
 - C. Position of the tongue.
 - D. Position of the lips.
 - E. Position of the soft palate.
37. Regarding the functional anatomy of the larynx :
- A. The larynx is elevated during swallowing.
 - B. Vocal cords control airflow through the larynx.
 - C. During speech the vocal cords are close to each other.
 - D. A and C are correct.
 - E. A, B and C are correct.
38. Regarding the process of swallowing :
- A. The soft palate closes the passage between the nasopharynx and oropharynx.
 - B. Respiratory movements stop during swallowing.
 - C. Cricopharyngeus relaxes at the end of the pharyngeal phase.
 - D. The entire sequence of events is under voluntary control.
 - E. A, B and C are true.
39. With reference to the foramina in the skull and structures passing through them, which of the following pairs is **correctly** matched?
- A. Superior orbital fissure : Maxillary nerve
 - B. Foramen ovale : Mandibular nerve
 - C. Optic canal : Oculomotor nerve
 - D. Jugular foramen : Hypoglossal nerve
 - E. Foramen magnum : Internal carotid artery
40. The glossopharyngeal nerve (IX)
- A. carries taste fibres from the posterior one-third of the tongue.
 - B. supplies the constrictors of the pharynx.
 - C. is developmentally the nerve of the second branchial arch.
 - D. carries parasympathetic fibres for the sublingual gland.
 - E. supplies the muscles of the tongue.

Section 2 : Q 1 to 12 : Short-answers : Answer only in the space provided.

Question 1. Dorsal and ventral nerves of upper and lower limbs

Limbs develop with dorsal and ventral aspects and dorsal and ventral nerves that supply dorsal and ventral muscles that attach to dorsal and ventral bony elements of the limb girdles.

On the dorsal side of limbs the skin is _____ and _____.

The flexor muscles are usually found on the _____ (dorsal or ventral) side of limbs. The exception to this is for the muscles that cross the _____ joint.

Ventral bony elements of the pelvic girdle include the _____ and _____, and for the pectoral girdle ventral muscles attach to the _____, _____ and _____.

Complete the table below

Nerve	Muscle group or compartment	Dorsal or ventral
Obturator nerve	Adductors / medial thigh	Ventral
Femoral nerve		
	Hamstrings / posterior thigh	
	Calf muscles / posterior leg	
	Peroneal muscles	
	Anterior leg	
	Triceps / posterior arm	
Musculocutaneous		
Median		
Ulnar		

22 marks

Question 2. The Brachial plexus

Roots

The brachial plexus is formed from the _____ rami of the _____, _____, _____, _____ and _____ spinal nerves.

Trunks

The roots unite to form 3 trunks: the upper trunk forms from _____, the middle trunk forms from _____, and the lower trunk forms from _____ roots.

Divisions

Each trunk divides into _____ and _____ divisions.

Cords and nerves

The **posterior cord** of the brachial plexus is derived from _____
_____. Posterior cord ends by dividing into the _____
and _____ nerves, and it also gives branches that supply the _____
_____ and _____ muscles.

The **lateral cord** is derived from _____.

The lateral cord ends by dividing into the _____ nerve and _____, and it gives off a branch that supplies _____.

The **medial cord** is derived from _____.

The medial cord ends by dividing into the _____ nerve and _____, and it gives off branches that supply _____ and _____.

22 marks

Question 3. Scapular Movements and Muscles

Complete the following table to show the actions of the scapular muscles – For each movement, indicate the main prime movers with two ticks and those muscles that may assist with a single tick. Up to 3 marks will be given for each column.

	Elevate	Depress	Protract	Retract	Upward rotate	Down rotate
Levator scapulae						
Serratus anterior						
Rhomboids						
Pectoralis minor						
Trapezius Upper						
Trapezius Middle						
Trapezius Lower						
Pectoralis major						
Latissimus dorsi						

What else could be considered as a prime mover for scapular depression and downward rotation?

Name the two muscles (above) that also act on the glenohumeral joint :

_____ and _____

22 marks

Question 4. Hip movements and muscles

Complete the following table to show the actions of muscles crossing the hip joint – For each movement, indicate the main prime movers with two ticks and those muscles that may assist with a single tick. Up to 3 marks will be given for each column.

	Flexion	Extension	Adduction	Abduction	Medial rotation	Lateral rotation
Sartorius						
Rectus femoris						
Iliopsoas						
Pectineus						
Adductor longus						
Adductor Brevis						
Adductor Magnus						
Gracilis						
Semi-tendinosus						
Semi-membranosus						
Biceps (long)						
Gluteus maximus						
Gluteus medius						
Gluteus Minimus						
Tensor fascia lata						

18 marks

Question 5. Ligaments of the knee

The knee is a joint that relies heavily on its ligaments because the bony surfaces are _____ and the muscles cannot hold the bones in place because _____.

Collateral ligaments

The collateral ligaments lie at the sides of the knee joint. Superiorly they attach to the medial and lateral _____ of the femur. Inferiorly the medial collateral ligament attaches to the _____ and the lateral one attaches to the _____. The medial collateral ligament prevents _____ and the lateral one prevents _____. The test for collateral ligament damage involves _____.

Cruciate ligaments lie between the medial and lateral condyles of the knee. They are concerned with _____ stability of the knee. The anterior cruciate ligament prevents _____ movement of the tibia, and the posterior one prevents _____ movement of the tibia.

Which ligaments of the knee are concerned with preventing hyperextension?

The menisci are not strictly ligaments of the knee but play an important role in controlling _____ movements of the knee.

17 marks

Question 6. Ulnar nerve – course, distribution and lesions

Injuries

The ulnar nerve is most commonly damaged where it passes behind the _____
_____ of the humerus. It is also vulnerable where it crosses the
_____ superficially.

Root values

The ulnar nerve is derived from the _____ spinal nerves.

Distribution

The ulnar nerve supplies most of the small muscles in the _____ and these are
the basis of any deficiency. These small muscles include:

1. _____
2. _____
3. _____

Deficit

The ulnar nerve lesion results in a condition called _____ hand, where the
metacarpal joints are held in _____ and the interphalangeal joints are
held in _____

This is a very debilitating injury because _____

In addition there will be loss of function in the _____ finger, weakness in _____
_____ of the thumb, and if the lesion is at the elbow, there will also be a
weakness in _____ and _____ of the wrist.

17 marks

Question 7. Regions of the neck

The neck can be divided into triangles.

What is the name of the region indicated “A” in the diagram? _____

Name the structures that form the boundaries of that triangular region :

- 1. _____
- 2. _____
- 3. _____

What is the name of the region indicated “B” in the diagram? _____

Name the structures that form the boundaries of that triangular region

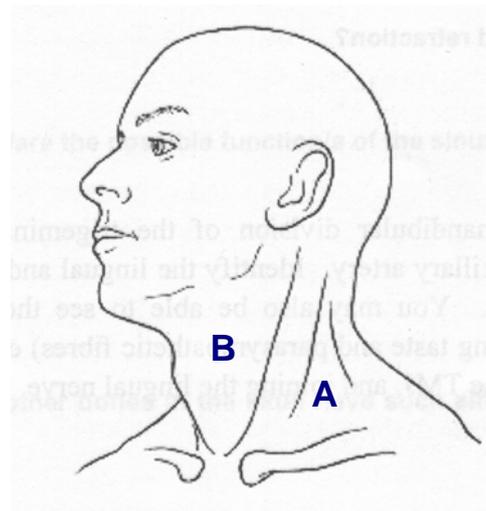
- 1. _____
- 2. _____
- 3. _____

Region “B” is further subdivided into 3 regions by 3 muscles. For each pair of regions below, state the muscle separating them

Submandibular and carotid regions are separated by

Carotid and muscular regions are separated by

Muscular and submandibular regions are separated by _____



11 marks

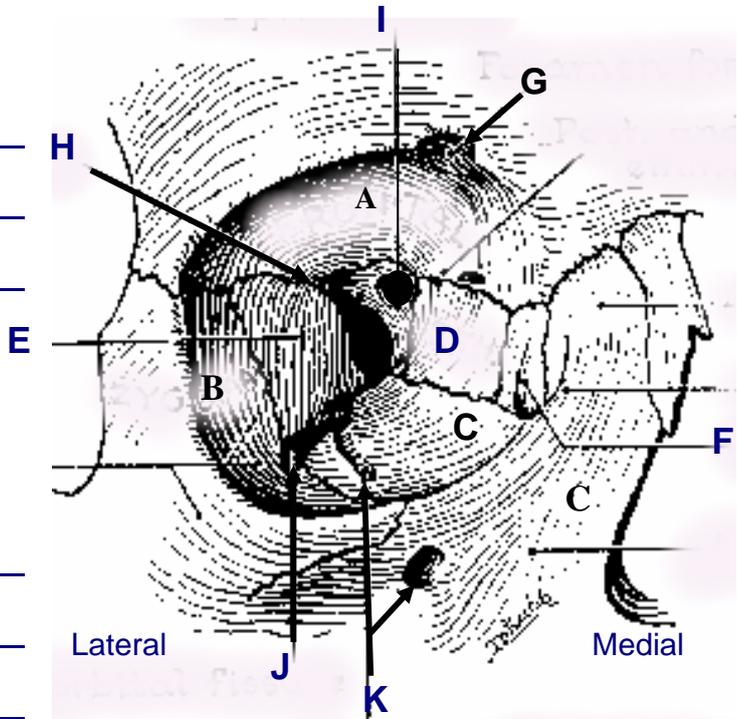
Question 8. Bones of the orbits

Name the bones indicated that contribute to the margin of the orbit.

- A. _____
- B. _____
- C. _____

Name the bones indicated that contribute to the walls of the orbit

- D. _____
- E. _____
- F. _____



Name the openings in the orbit

- G. _____
- H. _____
- I. _____
- J. _____
- K. _____

Name One structure that passes through "I" _____

Name One structure that passes through "K" _____

Name Three structures that pass through "H" _____

16 marks

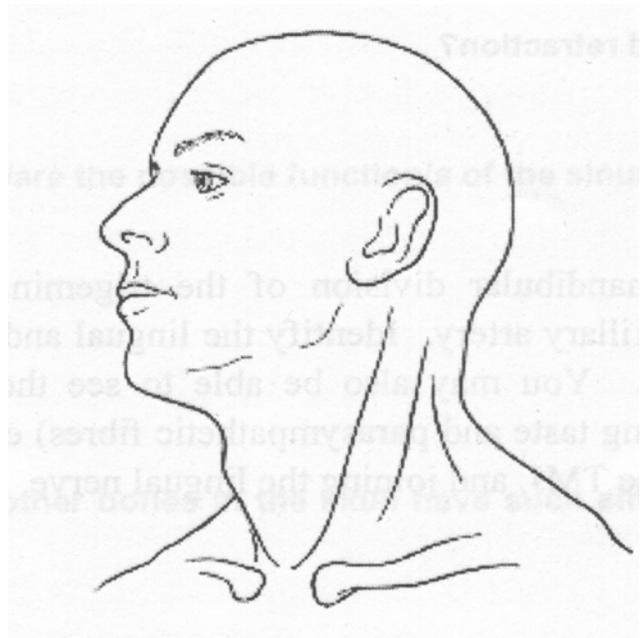
Question 9. The trigeminal nerve

The trigeminal nerve has three divisions that are sensory to, and develop with, elements of the developing face. The mandibular division also carries motor fibres to the muscles of the _____ pharyngeal arch...

List 4 muscles supplied by the Trigeminal nerve (there are actually 8)

Use the diagram provided to draw the areas of skin supplied by each division of the trigeminal nerve. KEY:

- Ophthalmic
- Maxillary
- Mandibular



Name three tissues other than the skin that receive sensory innervation from the trigeminal nerve.

For each division of the trigeminal nerve name two branches:

Ophthalmic : _____

Maxillary : _____

Mandibular : _____

17 marks

Question 10. Temporomandibular joint

The temporomandibular joint has an intraarticular disc that partitions the joint into an upper part and a lower part

The upper part is between the intra-articular disc and the _____ bone.

The movements that take place here are _____ and _____

The lower part of the joint is between the articular disc and the condyle of the _____

The movements that occur here are _____ and _____.

Complete the following Table to indicate the actions of masticatory muscles

Muscle	Elevation	Depression	Protraction	Retraction
Temporalis				
Masseter				
Medial pterygoid				
Lateral pterygoid				

Opening the mouth involves depression of the mandible and what other movement?

What movements of the temporomandibular joint are involved in chewing movements where the chin moves from side to side? _____

13 marks

Question 11. Motor nerves of the mouth, pharynx and larynx

For each nerve listed below, state how it contributes to the motor innervation of the mouth, pharynx and larynx.

Trigeminal nerve

Facial nerve

Hypoglossal nerve

Vagus nerve (includes cranial accessory nerve)

Glossopharyngeal nerve

Make sure you have considered all the muscles and structures listed below

Cheeks, Palate, Tongue intrinsic, Tongue extrinsic, Muscles of mastication, Lips, Other muscles associated with the tongue (like digastric, geniohyoid, stylohyoid), Other muscles in the floor of the mouth (mylohyoid, anterior belly of digastric), Pharyngeal muscles, stylopharyngeus, laryngeal muscles

9 marks

Question 12. Supply and drainage of tears

Tears are produced in the _____ gland, which is situated _____.

The nerve that controls the secretion of tears is _____ nerve (cranial nerve number _____). The secretomotor fibres synapse in the _____ ganglion, and then hitchhike with branches of the _____ nerve (cranial nerve number _____) to reach the gland.

The stimulation for the secretion of tears is quite complex. Irritation (pain, dryness) of the cornea or conjunctiva is detected by the _____ branch of the _____ nerve, will stimulate secretion of tears. However emotional triggers will also cause excessive tear secretion.

Tears flow across the surface of the eyeball from _____ (side) to _____ (side), and this movement is assisted by the movements of the _____.

Tears drain from the _____ corner of the eye through tiny ducts called _____. They are collected in the _____ sac, and from there they drain to the _____ cavity via the _____ duct.

18 marks

END OF PAPER